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Suicide probability in university students

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ABSTRACT

Purpose: This study was conducted to determine the probability of suicide in university students and the related factors.

Materials and methods: The sample group consisted of 1015 university students who received formal education in the faculties and high schools. The participants were administered a Personal Information Questionnaire and the Suicide Probability Scale (SPS).

Results: 24.2% of the students were normal with respect to suicide probability, 66.2% were at slight risk, 9.1% at moderate risk and 0.5% at high risk. The mean score of the SPS was 32.50±12.31. A statistically significant difference was found in the mean SPS scores of the students in relation to the variables of age, gender, department, willingness to study in that department, family type, income status, accommodation and physical self-harm. The suicide probability levels also showed a significant difference with respect to the variables of department, willingness to study in that department, family type, income status, accommodation and physical self-harm.

Conclusions: We recommend that it should be the first priority of the student advisors and Psychological Counseling and Guidance units to support the students who are at risk in terms of suicide probability.

Key words: Young, suicide probability, university, student, risk factors

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INTRODUCTION

Suicide, which has become an important public health issue in human life, has significant effects not only on the individual but also on their associates and the community in which they live [1]. For this reason, it should be evaluated multi-dimensionally and dealt with meticulously.

It is stated in the list named "Five Problems in Preventing Suicides" that was prepared by the World Health Organization (WHO) that suicide was one of the top three causes of death among people aged between 15 and 34 years and the second leading cause of death among people aged between 10 and 24 years. As per the data in the list, the rate of suicide worldwide is 16 in one hundred thousand on the average [2]. The highest rate of suicide in the world is seen in Lithuania with 95.3 in a hundred thousand, followed by Russia with 87.4. In America, 30.000 people lose their lives every year due to suicide. The rate of suicide was found to be 10.7 in a hundred thousand in America as per 2001 data and this was reported to be the eleventh cause of death [3-5].

According to the data of the State Statistics Institute, the incidences of suicide differ from region to region in Turkey, increasing when going from east to west with higher rates in larger cities. Looking at the age groups of those who lost their lives due to suicide, we see that the highest figures belong to the young population in Turkey as is the case worldwide. According to the data of the Turkish Statistics Agency, suicides in our country are concentrated in the 15-24 and 25-34 age intervals [6].

Considering the problems experienced by the youth studying at universities, it is important to identify the probability of suicide to structure protective and preventive mental health services to be planned for students [1,7,8]. Garlow et al. [9] reported in their study that suicide probability was 11.1% in university students. Mackenzie et al. [10] identified suicide ideation in 10% of female and 13% of male university students. In Turkey, Gürkan and Dirik [11] found in their study with university students that 10.91% of the students had suicide ideation. Therefore, there is a lot to do for the agencies and institutions serving in the field of healthcare. As important members of healthcare teams, nurses should very well assess the groups at risk in the community and play an effective role in the prevention, early diagnosis and treatment of suicidal behavior [12]. While the risk factors will be reduced when nurses assume an effective role in preventive works, it will also be possible to encourage young people in taking heed of healthy behaviors when the protective factors are fortified.

Studies in the literature have reported that suicide ideation is associated with depression and hopelessness [9,13].

Much work is currently underway to elucidate the relationships between adverse life events, psychopathology, substance use, bullying, internet use, and youth suicidal behavior. Recent evidence also suggests sex-specific and moderating roles of gender in influencing risk for suicide [14-16]. It has been concluded that deficient problem-solving skills, impulsiveness, anger, weak family relations, loneliness, hopelessness, and lack of joy in life are the factors that increase suicide probability [17-21]. Skills in coping with stress, using social support as a way of coping, having the habit of healthy living, and physical activities and sports have been found to reduce suicide probability [11,22-24]. Ceyhun and Ceyhun [25] have also investigated in their study suicide probability in high school and university students. The results obtained in the study may provide important information at an institutional level on suicide probability of the youth and the related factors. It will also provide important contributions to nurses in identification of suicide risk in young individuals for early intervention. For this reason, the study was carried out to determine suicide probability in university students and the related factors.

The research questions were:

1. How is the suicide probability of university students?
2. What are the factors influencing the suicide probability in university students?

MATERIALS AND METHODS

Design and participants

The population of the study consisted of 11.499 university students who studied at the faculties and high schools of Mersin University between February and March 2011, a period including the spring semester of the 2010-2011 academic year.

The study sample comprised 1015 university students who studied at these schools, who had not been diagnosed with a mental illness previously, who did not have any chronic disease, whose general health conditions allowed the completion of the questionnaires to be used for collecting the study data and who agreed to take part in the study. Permission could not be obtained for the study from Tarsus Technical Education Faculty and Foreign Languages High School; therefore, students studying in these school could not be included in the sample. The sample group was established using the stratified random sampling method and the sample size was determined with the help of the Med-Calc 11.2.1 package program.

Data collection

The study data were collected using a 29-item "Personal Information Questionnaire" for the descriptive information of students and the "Suicide Probability Scale" for measuring their suicide probability levels.

The Personal Information Questionnaire was developed by the investigator after a search through the literature and it included questions on the socio-demographic, academic, family, social and personal characteristics of adolescents.

The "Suicide Probability Scale", which was developed by Cull and Gill (1990) to measure suicide probability in adolescents and adults who have risk of suicide attempt, is a 4-point Likert-type scale consisting of 36 items, each of which are scored from 1 to 4. The scale was tested for reliability and validity by Tuğcu in 1996 and by Atlı, Eskin and Dereboy in 2009. It comprises 4 subscales; hopelessness with 12 items, suicide ideation with 8 items, hostility with 7 items and negative self-evaluation with 9 items. The scoring involves giving weights from 0 to 5 to each choice of an item. The highest score obtainable from the scale is 144 and the lowest is 36. A high score obtained from the scale is directly proportional to suicide probability, showing that suicide risk is also high. The alpha coefficient is 0.85 for the scale and between 0.74 and 0.79 for the subscales. Its test-retest reliability is 0.98 [26]. In this study the alpha value of the scale is 0.84.

Within the knowledge of the institution managers, the data collection instruments were administered after holding a meeting with the students in the sample group to explain the purpose and method of the study as well as the questionnaire and scale to be used in the study. The data were collected by six people, an investigator and five surveyors. The surveyors were 3rd grade students of the Health High School. Prior to the collection of data, the investigator gave a 3-hour training to the surveyors about the study objective, characteristics of the sample group, inclusion criteria, data collecting instruments and duration of the procedure. The training involved explanations and question-answer technique. The investigator supervised the surveyors throughout the data collecting process.

Data analysis

Normality controls of continuous measurements tested with Shapiro-Wilk test and it has been found to show a normal distribution. The Pearson Chi-Square test was used in comparing the qualitative data. Statistical methods (frequency, percentage, mean and standard deviation) were used to evaluate the study data, the independent samples *t*-test was used for comparing quantitative data, the One Way Anova test for intergroup comparisons when more than two groups were involved and the Bonferroni and LSD tests for identifying the group that caused the difference. The results were assessed with a 95% two-sided confidence interval and at $p<0.05$ significance level.

Ethical considerations

An ethics committee (Mersin University Clinical Studies Ethics Committee) approval and the necessary institutional permissions have been obtained. Participation was voluntary and no identifying information has been used.

Limitations

This research utilized a cross-sectional design. Thus, causality cannot be interpreted from these results. Second, all data were collected based on self-report measures. Thus, the data may be influenced by individuals' subjective responses. Additionally the university students in this study are not the representative the whole of Turkish university students.

RESULTS

It was found that 68.8% of the students were in the 21-25 age group, 51% of them were male, 88.1% were single, 11.9% were economically independent of their families and 65.6% had a moderate level of income (Table 1).

Table 1. Socio-demographic characteristics of students

Characteristics	n	%
Age		
17-20	275	27.1
21-25	698	68.8
26-30	42	4.1
Gender		
Female	497	49
Male	518	51
Marital status		
Married	121	11.9
Single	894	88.1
Economically independent of the family		
Yes	121	11.9
No	894	88.1
Income status		
Good	251	24.7
Moderate	666	65.6
Poor	98	9.7

According to the Suicide Probability Scale (SPS), 24.2% of the students were normal with respect to suicide probability, 66.2% were at slight risk, 9.1% at moderate risk and 0.5% at high risk

(Table 2). The mean score of the Suicide Probability Scale was calculated as 32.50±12.31.

Table 2. Students' suicide probability levels

Suicide Probability Levels	**n**	**%**
Normal	246	24.2
Slight risk	672	66.2
Moderate risk	92	9.1
High risk	5	0.5
Total	1015	100

A significant difference was found in the SPS scores with respect to the variable age (p=0.048). The mean suicide probability scores were highest in the 26-30 age group (35.7±13.2) and this was followed by the students in the 17-20 age group (33.4±11.8). As a result complementary LSD post-hoc analysis conducted to determine the sources of differences; SPS scores of students in the 21-25 age group were lower than those of students in the 26-30 age group (p=0.04).

However, no significant difference was seen in the variable age in terms of suicide probability levels (p=0.056) (Table 3).

Table 3. Suicide probability scores of students with respect to their socio-demographic and educational characteristics

Characteristics	**SPS**	**Normal**		**Slight risk**		**Moderate or high risk**		*p*
		n	**%*****	**n**	**%*****	**n**	**%*****	
Age								
17-20	33.4±11.8	54	19.6	194	70.5	27	9.8	0.056
21-25	31.9±12.3	183	26.2	453	64.9	62	8.9	
26-30	35.7±13.2	9	21.4	25	59.5	8	19.5	
p	0.048*							
Gender								
Female	33.4±11.9	110	21.1	332	66.8	55	11.1	0.125
Male	31.5±12.4	136	26.3	340	65.6	42	8.1	
p	0.011*							
Department								
Health Sciences	30.2±9.7	40	27.0	104	70.3	4	2.7	0.002**
Arts	34.5±11.9	17	17.5	67	69.1	13	13.4	
Technical Sciences	33.9±13.6	52	19.8	179	68.1	32	12.2	
Educational Sciences	30.2±11.6	52	34.9	85	57.0	12	8.1	
Social Sciences	32.7±12.1	85	23.7	237	66.2	36	10.1	
p	0.002**							
Studying in the department willingly								
Yes	31.2±11.3	190	26.1	486	66.7	53	7.3	0.001*
No	35.6±13.7	56	19.6	186	65.0	44	15.4	
p	0.001*							

*p<0.05, **p<0.01, ***Line percentages were obtained from totals for each category

There was a significant difference in the mean SPS scores when they were evaluated with respect to the variable gender (p=0.011). The mean SPS scores of female students (33.4±11.9) were higher than the mean scores of male students (31.5±12.4). However, no significant difference was found with respect to suicide probability levels (p=0.125) (Table 3).

A statistically significant difference was found in the mean SPS scores with respect to the variable department (p=0.002). When the results were evaluated, the mean SPS scores of the students studying in the Arts Department (faculty of communication, state conservatory, high school for jewelry designing, faculty of architecture and faculty of fine arts) were found the highest (34.5±11.9), which was followed by the students studying in the

Technical Sciences Department (engineering, water products, Erdemli technical school, Silifke technical school and, tourism and hotel management high school) (33.9±13.6) and those in the Social Sciences Department (collage of science and literature, faculty of economics) (32.7±12.1). As a result complementary post-hoc Bonferroni analysis conducted to determine the sources of differences; SPS scores of students studying in technical sciences department were higher than those of students studying in educational and health sciences department (p=0.03). The suicide probability levels showed a significant difference with respect to the department in which the students were studying (p=0.002). It was found that 13.4% of the students studying in the Arts Department, 12.2% of those studying in the Technical Sciences and 10.1% of those studying in the Social Sciences had moderate to high suicide risk (Table 3).

There was a statistically significant difference in the mean SPS scores with respect to the variable willingness to study in that department (p=0.001). The mean suicide probability scores of the students who stated that they did not study in their department willingly were the highest (35.6±13.7) (Table 3). Similarly, their suicide probability levels also showed a significant difference (p=0.001). 15.4% of the students who stated that they did not study in their department willingly were found to be at moderate to high suicide risk (Table 3).

A statistically significant difference was found in the mean SPS scores of the students and their suicide probability levels with respect to the variable family type (p=0.001). The mean SPS scores of the students classified as other (those who had no parents and stayed with their relatives or in a social service institution) were the highest (40.7±17.2) and this was followed by the students who had broad-type families (35.0±12.8).

As a result complementary post-hoc Bonferroni analysis conducted to determine the sources of differences; SPS scores of students family types are “other” were higher than those of students with nuclear and single parent family type (p=0.003). 26.1% of the students classified as other (those who had no parents and stayed with their relatives or in a social service institution) and 15.7% of the students who lived with broad families were at moderate to high risk of suicide (Table 4).

Table 4. Suicide probability scale scores of students with respect to their family types and income statuses

Characteristics	**SPS**	**Normal**		**Slight Risk**		**Moderate or high risk**		***P***
		n	**%*****	**n**	**%*****	**n**	**%*****	
Family Type								
Nuclear	32.0±11.6	185	24.0	526	68.1	61	7.9	0.001**
Broad	35.0±12.8	15	16.9	60	67.4	14	15.7	
Single Parent	31.9±13.4	42	32.1	73	55.7	16	12.2	
Other	40.7±17.2	4	17.4	13	56.5	6	26.1	
p	0.001**							
Income Status								
Good	30.7±11.7	74	29.5	156	62.2	21	8.4	0.033*
Moderate	32.7±12.3	159	23.9	441	66.2	66	9.9	
Poor	35.2±12.1	13	13.3	75	76.5	10	10.2	
p	0.007**							

*p<0.05, **p<0.01, ***Line percentages were obtained from totals for each category

There was a statistically significant difference in the mean SPS scores of the students and their suicide probability levels with respect to the variable income status (p=0.007, p=0.033). The students who stated their income status as “poor” had the highest mean SPS score (35.2±12.1). As a result complementary post-hoc Bonferroni analysis conducted to determine the sources of differences; SPS scores of students who have a good level of income were lower than those of students with poor income (p=0.007). 76.5% of the students who stated their income status as “poor” were at a slight risk of suicide and 10.2% of them at moderate to high risk of suicide (Table 4).

Table 5. Suicide Probability Scale Scores of Students with respect to their Social and Personal Characteristics

Characteristics	**SPS**	**Normal**		**Slight Risk**		**Moderate or high risk**		***p***
		n	**%*****	**n**	**%*****	**n**	**%*****	
Accommodation								
Home	32.4±11.9	126	24.5	344	66.8	45	8.7	0.002**
State dormitory	34.6±11.7	23	13.5	130	76.5	17	10.0	
Private dormitory	32.3±12.5	43	25.6	109	64.9	16	9.5	
Family	29.7±13.2	49	36.3	71	52.6	15	11.1	
Other	34.2±10.8	5	18.5	18	66.7	4	14.8	
p	0.013*							
Engagement in any social activity								
Yes	32.4±11.7	88	21.9	280	69.8	33	8.2	0.137
No	32.5±12.5	158	25.7	392	63.8	64	10.4	
p	0.885							
Physical self-harm								
Yes	37.7±14.4	33	16.1	132	64.4	40	19.5	0.001**
No	31.1±11.2	213	26.3	540	66.7	57	7.0	
p	0.001**							

*p<0.05, **p<0.01, ***Line percentages were obtained from totals for each category

There was a statistically significant difference in the mean SPS scores of the students with respect to their accommodation (p=0.013). Those who stayed in state dormitories had the highest mean SPS scores (34.6±11.7).

As a result complementary post-hoc Bonferroni analysis conducted to determine the sources of differences; students staying with family were lower than those of students staying in the private dormitory (p=0.01).

The suicide probability levels also showed a significant difference with respect to the accommodations of the students (p=0.002). 14.8% of the students who stayed in other places (youth hostels, with relatives, social service facilities, etc.) were at moderate to high risk of suicide (Table 5).

No statistically significant difference was found in the mean SPS scores of the students and their suicide probability levels with respect to engagement in a social activity (p=0.885, p=0.137).

A statistically significant difference was found in the mean SPS scores with respect to physical self-harm (nail-biting, hair pulling, etc.) (p=0.001).

The students who stated that they harmed themselves physically had the highest mean suicide probability scores (37.7±14.4).

Similarly, the suicide probability levels showed a significant difference (p=0.001). 19.5% of the students who stated that they harmed themselves physically were at moderate to high risk of suicide (Table 5).

DISCUSSION

The mean SPS score was calculated as 32.50±12.31 in this study. In the studies where suicide probability in university students was assessed using a similar measurement instrument, the mean SPS score was 65.43±12.03 [16], 67.29±11.51 [21] 70.54±9.6 [23] and 59.51 [25]. In the study carried out by Uğurlu and Ona [22] with the students of Health High School, the mean SPS score was found to be 68.78±20.48. In the study of Tuğcu [27] the mean SPS score was found to be 70.67 in healthy adults. In the study made by Hisli Şahin et al. [18] with public employees, the mean SPS score was found to be 77.88±12.88. In the study of Atlı et al. [26] the mean SPS score was found to be 60.86±11.13 in healthy individuals. The suicide probability in students was found quite lower in the present study than in the other studies. We think this difference in the results originated from age groups, education levels and regional differences.

A significant difference was found in the mean SPS scores with respect to age groups. The 26-30 age group was found to have the highest mean SPS scores and this was followed by the students in the 17-20 age group. There are also studies that are similar to the present study reporting that there is a relationship between age and suicide probability [19,23]. We think that the students in the 26-30 age group try to struggle with negative factors such as decreased financial support from their families, expectations of their families, increased

responsibilities (i.e. marriage and having children), economic needs, worries about finding a job and tiredness and exhaustion caused by a prolonged education process. We also think that the students in the 17-20 age group try to overcome a number of problems such as being a university student, having an occupation and having ideals to plan for their future and their efforts to adapt to a new school, a new city and a foreign environment. All these problems may lead to emergence of various problems including interpersonal conflicts in many young people in the first or last year of their university life, many neurotic tendencies, risky health behaviors and suicide probability.

There was a statistically significant difference in the present study in the mean SPS scores of the students with respect to their gender. The mean SPS scores of female students were higher than those of male students. Similar studies report that suicide ideation or probability do not show a difference with respect to gender [11,21]. Contrary to the present study, some other studies have found that suicide probability is higher in males than females [19,22,25]. This difference in the results may be because students coming from regions with different cultural values formed the sample group. Higher suicide probability in female students may suggest that female students have more sources of stress. The roles and responsibilities assumed by women in the society in Turkey and the expectations of their families and community can lead to an emotional load in female students [28].

A statistically significant difference was also found in the mean SPS scores and suicide probability levels with respect to the variable department. The highest suicide probability was in the students studying in the Arts Department and this was followed by the students studying in the Technical Sciences and Social Sciences departments. The students studying in Health Sciences and Education Sciences had the lowest suicide probability. Studying at a university is expected to have, for a young individual, meanings such as critical thinking, analytical reasoning, problem solving, and access to universal information, gaining vision, learning how information is built and developing the culture. The reasons for the students in Turkey to receive university education include having an occupation and a job, gaining economic-social freedom and having a diploma [29]. Gizir [30] investigated in their study the breakdown of occupation-related worries of students by their faculties. According to this, the students of the Faculty of Sciences and Literature experienced anxiety with respect to "failing to find a job", the students of the Faculty of Architecture with respect to "failing to find an appropriate job in financial terms" and the students of the Faculty of Economics and Administrative Sciences with respect to "failing to find a job in their profession" (38.5%) and with respect to "not knowing what to do after graduation" (7.5%). We think that those students who have anxiety about their profession may experience hopelessness and depression, and this can increase their tendency to commit suicide.

We found in the present study that the students who did not study in their departments willingly had a higher suicide probability. When a student is pleased with the department where he/she studies, this may be helpful for the student in having positive views about his/herself and his/her future and protecting his/her psychological health. However, family demands and surrounding factors rather than the individual's talents have become the determinant factor in occupational guidance in our country [31] In the study of Uğurlu and Ona [22], the students who said that "they would leave the department if they had the choice" had the highest level of suicide probability. This is similar to the results we obtained in our study.

We found that the suicide probability of the students who did not have parents was significantly high. In order for students to have basic confidence and a healthy personality, they need unconditional love. Being deprived of parents who would give such love and support may increase the suicide probability of the young individual. Uğurlu and Ona [22] reported in their study that whether or not the mother was alive made a significant difference in the student's mean SPS scores. This supports the results of the present study.

The students who stayed in a state dormitory, hostel, relative house or social services facility and who stated that their income status was "poor" had significantly higher suicide probability. Students have some needs such as adequate sleep, rest, studying, establishing communication, security, hygiene and personal care. A student should have the appropriate conditions to meet these needs in the place he/she stays. Family support and financial income are important for a student to have a healthy shelter. Şahin et al. [8] found in their study that the major problem of university students was economic problems and being unable to meet their basic needs.

No statistically significant difference was found in the mean SPS scores of the students and their suicide probability levels with respect to engagement in a social activity. Taliaferro et al. [24] found in their study that physical activity and sporting reduced the suicide risk in the youth. The difference in the results may have originated from individual and cultural differences and study populations. We think that the contribution of an activity to a student's mental and physical health is as important as the event itself as named by the student as a social activity.

The students who stated that they had previously given physical harm to themselves had higher risk of suicide probability. When a university

student gives physical self-harm, this may be a sign of the anxiety, hopelessness, tension, frustration and even despair experienced by him/her. All these emotions can lead to suicide ideation in the young individual.

Similar to our results, it is reported in the literature that those who have the behavior of physical self-harm are more prone to suicide [32,33].

CONCLUSIONS

We found in this study that more than a half of the students were in the slight-risk group with respect to suicide probability. The 26-30 age group, females, those studying in Arts department, those who stated that they studied in their department unwillingly, those who had no parents, those who stayed with their relatives or in state dormitories and social service facilities, those with poor income status and those who reported physical self-harm had the highest mean suicide probability scores. Those studying in Arts department, those who stated that they studied in their department unwillingly, those who had no parents, those who stayed with their relatives or in hostels and social service facilities and those who reported physical self-harm were found to be at moderate to high suicide risk.

In view of these results;

- Since the students who studied in their department unwillingly in the first and last years of their university life, those who had no parents, those who stayed with their relatives or in state dormitories or social service facilities, those who reported physical self-harm, those who have low family income and especially female students have a high level of suicide probability, the students who carry these risks should be supported as a priority group by their advisors and the Psychological Counseling and Guidance units.
- Periodical screenings should be carried out to closely monitor the health conditions of university students.
- Students with low income should be informed about scholarship, loan and part-time job opportunities.
- Secure, clean and economical dormitory environments where students can shelter should be increased.
- Training or elective courses should be provided to students about crisis and fighting with a crisis, depression and methods to cope with it, developing problem-solving skills, self-knowledge and communication, and related subjects and the outcomes of these should be evaluated.
- Studies involving large sample groups should be carried out in universities to explore psychosocial aspects of students.

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Aligning executive incentives with global public health goals

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ABSTRACT

Introduction: The World Health Organization (WHO) estimates that together tobacco and alcohol kill about 9 million people annually despite aggressive and widespread public health controls. These legal industries persist because of the demand for their products and their substantial economic influence, which is magnified by the concentration of wealth in the executives of leading corporations that profit from increased legal drug sales.
Materials and methods: This preliminary study quantifies the link between global premature deaths from these legal addictive drugs as a function of executive compensation in order to provide the necessary data to make more effective policy recommendations for preventing legal drug-related deaths.
Results: The results indicate a need to incentivize chief executive officers (CEOs), such that they have a constant marginal utility per life saved.
Conclusions: An executive compensation incentive that moves to eliminate tobacco use is achieved by a pay structure that increases exponentially with the number of lives saved.
Key words: tobacco control; alcohol control; global public health; executive compensation

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INTRODUCTION

Multi-criteria decision analysis has repeatedly found that the legal drugs of tobacco and alcohol cause significant harm to both individuals and society [1,2]. In particular, the health-related dangers for tobacco [3-8] and alcohol [6,9-14] are well known to the medical community and the World Health Organization (WHO) estimates that together these two drugs kill about 9 million people annually. These deaths are premature deaths, which occur before a person would otherwise be expected to die of age and are thus considered preventable. Despite substantial effort by public health officials to institute control policies [15-19] such as the WHO's Global Treaty on Tobacco Control, which places broad restrictions on the sale, advertising, sponsorship, promotion, shipment, and taxation of tobacco products [20], the number of smokers has increased steadily worldwide and is now nearly a billion users [21]. Similarly, despite 61.7% of the global population (>15 years) avoiding alcohol consumption, there is a worldwide increase in recorded alcohol per capita [22].

These legal industries persist because of the demand for their products and their substantial economic influence: tobacco generated US$722 billion in 2013 and alcohol over US$1.4 trillion in revenue [23]. This economic influence is magnified by the concentration of wealth in the executives of these leading corporations that profit from increased drug sales. The evidence that the wealthy and thus politically powerful have frequently worked together to create or perpetuate privilege, often at the expense of the national interest (e.g. in this case public health) and usually at the expense of the middle and lower classes is well established [24].

The aim of this preliminary study is to quantify the link between global premature deaths from two legal addictive drugs as a function of executive compensation in order to provide the necessary data to make more effective policy recommendations for preventing legal drug-related deaths. The results are analyzed and policy recommendations are made to decouple this link for the benefit of the public health goals of increased quality of life and longevity globally.

MATERIALS AND METHODS

The global earnings per death or death ratio, $r_{g(i)}$, is the annual chief executive officer (CEO) compensation for company *i* per avoidable death in year *(t)* given by:

$$r_{g(i)}(t) = \frac{c_i(t)}{d_i(t)} \quad \text{[US\$/avoidable death/year]} \quad (1)$$

where d_i is the global total deaths caused by the company *i* per year and c_i is the summation of annual CEO compensation for company *i* consisting of base salary, bonuses and stock options, benefits and other forms of remuneration. The total deaths for a given year statistically attributed to any specific company can be approximated by:

$$d_i(t) = D(t)\, m_i(t) \quad \text{[avoidable deaths/year]} \quad (2)$$

where *D* is the total deaths attributed to a specific industry in year *t* and $m_i(t)$ is the market share (as percent of revenue) of a specific company in the industry. Similar calculations for the death ratio for a specific country and innocents (e.g. second hand smokers or drunk driver victims) can be calculated substituting D_{inn} for *D*, and using the appropriate *m*.

The market share, *m*, in 2013 for the top eight companies in tobacco and top ten in alcohol was determined from Euromonitor International's gateway Passport (www.portal.euromonitor.com). Inputs for *c* were determined for each individual CEO from Bloomberg Businessweek (http://www.bloomberg.com/). All monetary units were converted to US$ using Dec. 31, 2014 exchange rates published on xe.com. *D* was determined from the WHO, which reports that the tobacco industry is annually responsible for more than five million direct-deaths from tobacco and an additional 600,000 are the result of non-smokers being exposed to second-hand smoke [4]. Similarly, WHO estimates about 3.3 million deaths due to alcohol consumption [12]. For the purposes of a first order approximation the errors associated with all of the inputs are acceptable.

RESULTS

The inputs are summarized in Tables 1 and 2 for the tobacco and alcohol industries, respectively. The tables show the company, market share (m) of the company, CEO of the company and the annual compensation (c) for that CEO.

It is clear from Table 1 and 2 that both industries are largely controlled by only a few companies. The tobacco industry is particularly concentrated with only eight companies making up >88% of sales. The largest is China National Tobacco Corporation (CNTC), which is a special case as it is a Chinese state-owned manufacturer with nearly a complete monopoly of the Chinese cigarette market.

Table 1. The tobacco industry market share for the top eight companies, CEO and CEO compensation for 2013

Company	**m [%]**	**CEO**	**c [US$]**
China National Tobacco Corp (CNTC)	43.2%	Jiang Chengkang	N/A
Philip Morris International Inc	14.3%	André Calantzopoulos	$10 906 612
British American Tobacco Plc	11.6%	Nicandro Durante	$10 108 434
Japan Tobacco Inc	9.4%	Mitsuomi Koizumi	$1 102 570
Imperial Tobacco Group Plc	4.9%	Alison Cooper	$4 112 217
Altria Group Inc	2.3%	Martin J. Barrington	$20 139 967
ITC Ltd	1.4%	Yogesh Chander Deveshwar	$112 849 000
Reynolds American Inc	1.3%	Daniel M. Delen	$10 452 206

Table 2. The alcohol industry market share for the top ten companies, CEO and CEO compensation for 2013

Company	**m[%]**	**CEO**	**c [US$]**
Anheuser-Busch InBev NV	15.5%	Carlos Brito	$7 411 606
SABMiller Plc	7.6%	Alan Clark	$10 063 279
Heineken NV	7.4%	Jean-François van Boxmeer	$8 258 114
Carlsberg A/S	4.9%	Jørgen Buhl Rasmussen	$3 158 148
China Resources Enterprise Ltd	4.8%	Jie Hong	$3 260 000
Tsingtao Brewery Co Ltd	3.4%	Ke Xing Huang	$250 497
Molson Coors Brewing Co	2.5%	Peter S Swinburn	$8 406 628
Beijing Yanjing Brewery Co Ltd	2.2%	Fucheng Li	N/A
Kirin Holdings Co Ltd	2.0%	Senji Miyake	$1 100 880
Diageo Plc	1.4%	Ivan Menezes	$12 095 242

As the CNTC is under the jurisdiction of China's State Tobacco Monopoly Administration it does not function under the rules of the market that other companies must follow, nor is CEO compensation made public so it will be excluded from further analysis here.

The remaining seven tobacco companies make up 45% of the global market. Likewise the top ten alcohol companies make up 51.7% of their market. The results of substituting the solutions of equ. 2 into equ. 1 are shown in Figures 1 and 2 for the tobacco and alcohol industries, respectively.

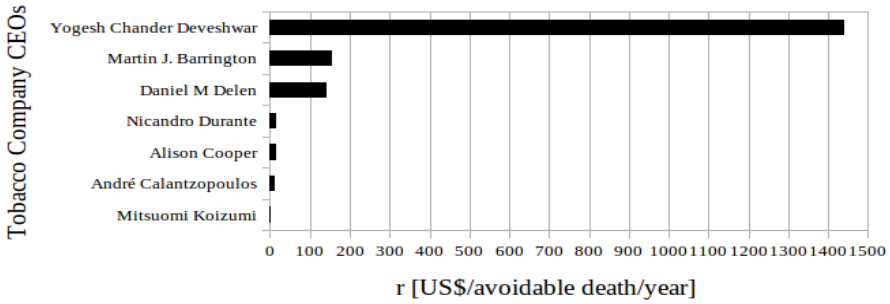

Figure 1. The tobacco executive compensation per avoidable death for 2013

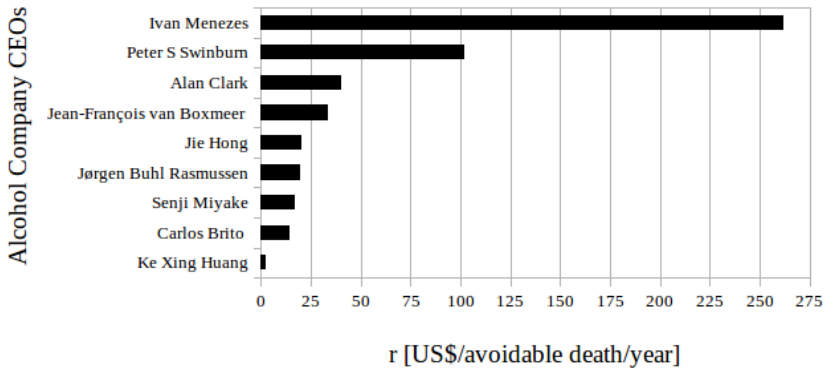

Figure 2. The alcohol executive compensation per avoidable death for 2013

DISCUSSION

In the tobacco industry the most striking result is how little some of top executives are compensated per avoidable death, when it is well known that approximately 50% of their customers die as a direct result of using their product [12]. Overall, as can be seen in Figure 1, the death rates in the tobacco industry range from a little over $2 of CEO compensation per attributable death for Mr. Koizumi of Japan Tobacco to over $1,400 per death for Mr. Deveshwar of ITC. Likewise, as can be seen in Figure 2, in the alcohol industry the death rate ranges from $2.23 for Mr. Huang of Tsingtao Brewery up to $261.80 for Mr. Menezes of Diageo. If it is assumed that all of the CEOs analyzed are attempting to maximize their income in order to give to charities to save lives [25], these low *r* values become even clearer. Give Well, an organization devoted to calculating the effectiveness of charities, found that one of the most effective charities is the Against Malaria Foundation, where it costs approximately $3,400 to save a human life [26]. What this means practically is that even if their entire compensation was directed at saving lives, the CEOs do not earn enough money to make up for the lives lost from selling their companies' products. To make this possible, *r* must be increased, which by following the equations can be done by: 1) increasing executive compensation or 2) decreasing the mortality rates of the products sold by their companies.

Thus, restructuring the incentive for CEOs could provide a solution to a large public health sector paradox: how is it that both alcohol and tobacco consumption are increasing globally – becoming what some are calling a “crisis” or “epidemic” [3,4,15,19]– while there have been enormous efforts to develop and implement control policies worldwide?

Calculating the executive compensation per avoidable death from legal drugs provides some clarity on this paradox. The answer is all of the control policies tried previously, from labeling laws to public use bans to taxes, would all act to decrease the revenue of the company, the value *r* and in turn decrease CEO compensation, *c*. So even the most ethical CEO living a deprived personal life from nearly 100% charitable donation would be a net destroyer of human life. In a free market economy all actors are expected to want to increase and even maximize the compensation for their work and would be expected to fight bitterly if it is threatened or reduced. In this way, all of the previous control policies have acted against the best long-term economic interests of the CEOs of legal drug companies, with unfortunate results for global health. These CEOs have considerable problem solving ability both because of the enormous scale of the multi-billion dollar companies they lead, but also from their own extremely valuable business acumen. For example, consider that Mr. Calantzopoulos is compensated over US$10 million for his work, indicating that the board of Philip Morris International consider his yearly effort more valuable to the company than over 150 highly-trained and experienced chemical engineers. Thus, it is clear for a more effective public health outcome, it would be best if the interests of these elite business people are aligned with health goals of lower mortality and morbidity. To reach this goal it is necessary to attempt to increase r and thus *c* if deaths are reduced. To do that, the rules of executive compensation need to be altered.

Currently, executive compensation limits are avoided under the assumption that competition for higher compensation will lead to more optimal outcomes for the economy and thus the overall society. As the simple analysis presented here shows, some products (e.g. tobacco and alcohol) have such large negative effects on the global scale, they warrant a re-evaluation of this assumption. The trans-industry damage for tobacco and alcohol are so great (for example in the U.S. tobacco causes 443,000 deaths annually [27] and alcohol causes ~88,000 deaths annually [28,29] both of which are orders of magnitude above threats such as terrorism for which substantial

resources are mobilized to combat) that a small intervention may be justified on ethical grounds. In particular the upper limit on compensation of executives (c_l) of companies whose products result in substantial death from the use of their products can be governed by a formula like:

$$c_l(t) = S_1(t)\exp\left[\frac{d_0 - d(t)}{S_2(t)}\right] \text{ [US\$]} \quad (3)$$

where S_1 is the base salary (including all forms of compensation), d_0 is the initial number of deaths per year, S_2 scales the saved lives, and $d(t)$ is defined above. S_1 and S_2 can be altered to account for inflation and other factors and could be set by legislatures in each area. S_1 should be enough that the executive can live normally, but modestly. The utility from the salary roughly goes with the logarithm of the salary. Therefore, equ. 1 has the salary increasing exponentially with the number of lives saved. This means that the CEO has a constant utility incentive per life saved. Thus the executive compensation would be incentivized for more ethical practices. One complication is that the sales of drugs often cause death much later, so in order to provide immediate feedback to the CEO, it may be necessary to predict the eventual number of deaths based on sales of different products. Within this compensation limit, the boards can vary the salaries based on performance or other company objectives.

The effects of such a policy change, which would only affect the work compensation for a very small number of individuals would be expected to create rapid change. CEOs would immediately have the choice between staying at their existing companies for a much lower compensation that they are earning now in the short term or moving elsewhere in the economy. Two outcomes are possible, both of which will result in improvements in global public health. First, it can be assumed that the CEOs currently running the top companies in the tobacco and alcohol industries are the most qualified and best at their jobs. If some or all choose to leave, their less-qualified replacements would be bound by the same rules and have the same incentives to reduce $d(t)$ (and in aggregate $D(t)$). All of the CEOs analyzed (and their likely replacements) have already have amassed great wealth and could be expected to be able to tolerate even very low S_1 values in the short term. For these CEOs unafraid of a challenge to fundamentally change their companies, they would be expected to use their considerable resources and business skills to aggressively reduce $d(t)$ in order to raise their compensation limits. They can do this by various means such as technically reducing the mortality of their products (e.g. shifting to electronic cigarettes), changing advertising practices to reduce the number of problem drug users, etc. Some interventions could work even if only some companies are regulated, such as those headquartered in the regulating country. For instance, these companies could lobby for laws to ban smoking in public spaces like restaurants, which would affect all companies selling the product in that country. However, shifting to electronic cigarettes by domestic companies could be met with foreign companies ramping up sales of conventional cigarettes and would need to be enforced with trade deals/sanctions/import tariffs as is common in ensuring appropriate corporate behaviour in other industries. Most likely, however, the CEOs would try to diversify their businesses following the example of ITC's CEO, who had the largest r in this study by a wide margin (Figure 1). ITC is an Indian conglomerate and includes diversified businesses in consumer goods, agri-business, hotels, paperboards and packaging, and information technology. Mr. Deveshwar's full compensation ranges between more than five times to orders of magnitude higher than his competitors in the tobacco industry. This demonstrates that diversification in the long-term can be both profitable for existing legal drug companies, but also financially lucrative for CEOs following this model (Table 1). Speculation on how the CEOs would reduce d in order to raise r and c_l is unnecessary as their methods are immaterial to the resultant improved global public health outcomes. As the companies take on new markets they will invest less in the legal drug portion of the business and reduce sales in that area. What is important is that by making minor rule changes similar to equ. 3 for executive compensation for a small group of companies, CEO motivation will be aligned directly with optimal public health outcomes. This is in contrast to past interventional policies, such as bans on tobacco advertising, promotion and sponsorship, which reduced drug use in one region/country, but tended to shift it into other markets with poorer, less educated and more vulnerable citizens. The expected superior results of incentivizing CEOs to reduce deaths would come at negligible cost to the tax payers of nations, avoid having to outlaw these drugs and the concomitant problems associated with enforcement [30], and still enable choice for the consumers to use these legal drugs. It would be expected that fewer consumers would choose addictive and dangerous drugs if these industries simply reduced their efforts to sell them, which would be a result of a properly incentivized CEO shifting resources during diversification. For example, in the U.S. in 2011 the tobacco industry spent $8.4 billion on cigarette advertising and promotional expenses with about $7.0 billion of this expenditure on

price discounts to encourage addiction to their products [31]. As the health effects of tobacco use is well known, the ethics of this practice are at best questionable. With CEOs being unwilling to invest resources in such efforts that would reduce their income, no laws managing advertising, sponsorship or promotion would be necessary.

There is a history of intervening in CEO compensation. For example, a U.S. court ruling in 1930 found that a tobacco CEO bonus was wasteful [32]. In 1993, the U.S. eliminated tax-deductibility to the company of CEO pay over $1 million [33]. Also, regulated companies like electric utilities have lower CEO pay, and this correlates with lower CEO educational attainment [34]. Restricting CEO pay for economic reasons can have unintended consequences.

There are several risks with this approach. First, as the large legal drug companies began to diversify away from drugs, there is a risk that smaller companies could come in to fill the demand. If the CEO payment limitation were constant across all companies, smaller companies would be less affected because their CEOs make less to start with (however, the equation could be adjusted based on company size). There is likely a reason that the market is so concentrated in large companies, so smaller companies would likely be less effective. At the same time, the smaller companies would not have the resources (e.g. billions for ads) necessary to continue to expand the market, so the effect would at best only be to slow the contraction of the legal drug market. This, however, is necessary as shown by many studies covering tobacco and alcohol control and extrapolating globally from those done on a country with, for example, a smoke free goal [35-37]. There is also a risk that legal drug companies would dispense with the CEO and lead with the VPs. To counteract this, all executives of the companies responsible for significant negative health impacts would need to be held to a system of remuneration similar to equ. 3, but perhaps with different S factors. There is also the risk that employees or shareholders could try to compensate the CEO for profit-maximizing deadly behavior, so there would need to be a rigorous enforcement mechanism. Finally, it should be noted that because of the revenue of the legal drug industry, there is significant influence on the states' budgets, as its contribution to the overall tax system is considerable and cannot be neglected. In the same vein, the legal drug industry also causes secondary economic activity – e.g. increased revenue in the medical industry to care for dying addicts. Future work is needed to quantify this effect and compare this cost to the benefits of improved longevity, health and productivity of the workforce. In addition, a comparison should be made for the direct government costs of this approach (with low direct costs) to more traditional health promotion programs [e.g. 8]. Finally, it should be pointed out that although improving the rules for executive compensation in legal drug companies would be expected to improve public health, a holistic public health program is still necessary.

CONCLUSIONS

The results of calculating CEO compensation per avoidable death indicated a need to target CEO pay regulation to potentially save millions of lives. The solution proposed here is to incentivize legal drug company CEOs, such that they have a constant marginal utility per life saved, which is achieved by a pay structure that increases exponentially with lives saved. Gaming of the system can be minimized by global action in order to realize the enormous public health benefits of minimizing tobacco and alcohol use.

CONFLICTS OF INTEREST

None.

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The clinical importance of *Helicobacter pylori* antigens detected in the dental plaque and feces

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ABSTRACT

Purpose: It is expected that *H. pylori* residing outside the stomach influences the results of the stool test. The aim of the study was to investigate the occurrence of *H. pylori* antigens in dental plaque and feces of the patients with *H. pylori* infected and non-infected stomachs.

Materials and methods: The study was conducted in 188 dentate patients, 107 with *H. pylori* infected and 81 non-infected stomachs. Stomach infection with *H. pylori* was evaluated with CLO test, histology and culture. The stomach was classified as infected if at least two of three tests (CLO test, culture, histology) were positive and as non-infected if all three tests were negative. Dental plaque was taken only from the natural teeth. On the day of the gastroscopic examination or on the next two days a stool sample was collected for *H. pylori* antigens testing. *H. pylori* antigens in dental plaque and feces were determined by immunological method.

Results: In 60.8% of subjects with an infected stomach, *H. pylori* antigens were present both in the dental plaque and feces, in 37.4% in feces only, in 0.9% only in the dental plaque, and in 0.9% neither in the dental plaque nor feces. In 46.9% of subjects with a non-infected stomach, *H. pylori* antigens were found neither in the dental plaque nor feces, in 24.7% both in the dental plaque and feces, in 23.5% only in the dental plaque, and in 4,9% only in feces.

Conclusions: There is a weak association between the occurrence of *H. pylori* antigens in feces and the dental plaque, and also between the occurrence of the antigens in the dental plaque and stomach infection.

Key words: *Helicobacter pylori* antigens, immunoassay, dental plaque, feces

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INTRODUCTION

In the last decade, a test assessing the occurrence of *Helicobacter* (*H.) pylori* antigens in feces has been applied and popularized [1,2].

At present, it is used in the evaluation of stomach infection before and after eradication therapy both in adults and children [2,3].

Unfortunately, some number of positive test results (approximately 10%) in subjects with a non-infected stomach imply that extragastric bacteria influence the test result [4-6].

By using the *H. pylori* antigen test it was shown that *H. pylori* occurs not only in feces but also in dental plaque and saliva [7-10].

Therefore, it cannot be excluded that detection of *H. pylori* antigens in feces is a consequence of the presence of *H. pylori* bacteria only in some extragastric locations, e.g. in the oral cavity. This is theoretically possible as *H. pylori* may pass through the stomach without causing an infection [11].

The aim of this study was to test the hypothesis that there is association in the occurrence of *H. pylori* antigens in feces and dental plaque in subjects both with infected and non-infected stomachs.

MATERIALS AND METHODS

Study subjects

One hundred and eighty eight patients between the ages of 19-77 years were enrolled in the study; 107 with *H. pylori* infected and 81 non-infected stomachs (Table 1).

Table 1. Patients' characteristics

Age (years; median, range)	54.0 (19-77)
Gender (M/F)	73/115
Smokers (%)	40 (21.3)
Alcohol usage (%)	41 (21.8)
Diagnosis	
Gastritis (%)	166 (88.3)
Peptic ulcer disease (%)	22 (11.7)

They had natural or a combination of natural and artificial teeth.

The inclusion criteria were as follows: good general condition (an inter-view and medical examination), no chronic or devastating diseases, no antibiotics taken within the last month, and no *H. pylori* eradication treatment in the past.

Samples collection and processing

Each patient had a gastroscopic examination with biopsies of gastric mucosa taken from the prepyloric and the gastric body areas, one for a urease test, one for culture, and two for histological examination. The *H. pylori* infection in the stomach was determined by an urease test (Campylobacter-Like Organism - CLO test), pre-pared in the Physiology Department of the Medical University in Białystok, using methods described by Marshall et al. [12].

The results of test were considered to be positive if a color change from orange to pink was observed within 24 hours. The sensitivity and specificity of CLO test in relation to the histological examination, culture, and stool test were 84.3% and 88.4%, 87.5% and 83.5%, and 75.4% and 87.5 %, respectively [13].

Specimens for culture were collected into transport medium (Por-tagerm-pylori, bioMerieux, France) and following homogenization were inoculated on selective Pylori-Agar (bioMerieux, France) and nonselective Columbia agar enriched with 5% sheep blood (Oxoid, UK). The culture was conducted under microaerophilic conditions for 7 days at 37^{o}C. Specimens for histological examination were placed in buffered formalin and then processed and stained with hematoxylin-eosin and Giemsa. The microscopic assessment of the preparations was performed by two experienced histopathologists who did not know the results of the other tests. Gastritis was assessed on a 4-step scale (0-3) including neutrophil (activity) and mononuclear cell infiltration (inflammation) and *H. pylori* density [14].

The stomach was classified as infected if at least two of three tests (CLO test, culture, histology) were positive and as non-infected if all three tests were negative (Table 2).

Table 2. Qualification of stomach infection with *H. pylori* on a base of three tests

CLO test	**histology**	**culture**	**n(%)**
+	+	+	90(84.1)
+	-	+	5(4.7)
-	+	+	4(3.7)
+	+	-	8(7.5)

Dental plaque was collected only from the natural teeth, at least 2 mg from each subject, always in the morning before breakfast, oral hygienic practices, and gastroscopic examination. The plaque examination was started soon after collection. On the day of the gastroscopic examination or on the next two days after it a stool sample was collected for *H. pylori* antigens testing.

Helicobacter pylori antigen test

The determination of *H. pylori* antigens in dental plaque and feces was conducted in accordance with the manufacturer's instruction (Amplified IDEIA™, Hp StAR ™, Oxoid, UK).

In brief, the sample and horseradish peroxidase labeled monoclonal antibodies were added in one step to the monoclonal antibody- coated microwells of the microtitration plate, using a sandwich technique.

After incubation, the microwells were washed with phosphate buffer to remove the unbound antibody conjugates and tetramethyl-benzidine was added.

Bound horseradish peroxidase oxidized tetramethylbenzidine to a blue colored product.

The reaction was stopped with sulphuric acid which changed the color from blue to yellow.

The intensity of the color was measured spectrophotometrically.

Modification of the method used for determination of *H. pylori* antigens in dental plaque relied on preliminary incubation of the plaque for 72 hours in microaerophilic conditions [7].

Statistical Analysis

The results were analyzed using Mann-Whitney U test (Statistica 8.0). The differences were considered to be statistically significant at $p<0.05$. The sensitivity and specificity of *H. pylori* antigen stool test in relation to the occurrence of stomach infection were calculated according to standard methods.

RESULTS

In 60.8% of subjects with an infected stomach (positive results in at least two of three gastric tests), *H. pylori* antigens occurred both in the dental plaque and feces, in 37.4% only in feces, in 0.9% only in the dental plaque, and in 0.9% the antigens of *H. pylori* were present in neither the dental plaque nor feces (Table 3).

In 46.9% of subjects with a non-infected stomach no presence of *H. pylori* antigens was found in either the dental plaque or feces, in 24.7% antigens occurred in both the dental plaque and feces, in 23.5% only in the dental plaque, and in 4.9% only in feces (Table 3).

In 10.6% of all subjects, *H. pylori* antigens were found in the dental plaque and feces but no stomach infection was found (Table 4).

In these two groups, the histology of gastric mucosa characteristic for *H. pylori* infection did not occur (Table 5).

The sensitivity and specificity of the test for the presence of *H. pylori* antigens in feces in relation to the occurrence of stomach infection for the entire population studied amounted to 98.5% and 71.1%, respectively.

If excluding those for whom positive results of the stool test were not associated with stomach infection but were associated with the presence of *H. pylori* antigens in the oral cavity, the specificity of the stool test increases to 93.5%.

Table 3. The distribution of *H. pylori* antigens in the dental plaque and feces of subjects with infected and non-infected stomachs

	***H. pylori* antigens**		
	plaque	**stool**	**n(%)**
Infected stomach (n=107)	+	+	65(60.8)
	+	-	1(0.9)
	-	+	40(37.4)
	-	-	1(0.9)
Non- infected stomach (n=81)	+	+	20(24.7)
	+	-	19(23.5)
	-	+	4(4.9)
	-	-	38(46.9)

In 10.2% of all subjects, the presence of *H. pylori* antigens was documented in the plaque but no stomach infection and *H. pylori* antigens in feces were found.

Table 4. *H. pylori* status of gastric mucosa in relation to *H. pylori* antigens in the dental plaque and feces

plaque *H. pylori* antigens	**stomach *H. pylori* infection**	**stool *H. pylori* antigens**	**n(%)**
+	+	+	65(34.6)
+	-	+	20(10.6)
+	+	-	1(0.5)
+	-	-	19(10.2)
-	+	+	40(21.3)
-	-	+	4(2.1)
-	-	-	38(20.2)
-	+	-	1(0.5)

Table 5. Histological characteristics of the gastric mucosa in relation to the presence of *H. pylori* antigens in the dental plaque and feces (median, range)

	antrum		**corpus**	
***H. pylori* antigens**	**Inflammation**	**activity**	**Inflammation**	**activity**
infected stomach (total)	3(1-3)	2(0-3)	1(0-3)	2(0-3)
plaque (+) stool (+)	3(1-3)	2(0-3)	1.5(0-3)	2(0-3)
plaque (+) stool (-)	3	3	1	2
plaque (-) stool (+)	3(1-3)	3(1-3)	2(0-3)	2(0-3)
plaque (-) stool (-)	3	2	1	2
non-infected stomach (total)	1(0-3)*	0(0-2)*	0(0-3)*	0(0-2)*
plaque (+) stool (+)	1(0-3)*	0(0-2)*	0(0-2)*	0(0-2)*
plaque (+) stool (-)	0(0-2)	0(0-2)	0(0-2)	0(0-2)
plaque (-) stool (+)	1(0-1)*	1(0-1)*	0(0)*	0(0)*
plaque (-) stool (-)	1(0-2)	1(0-2)	0(0-3)	0(0-2)

$p < 0.001$ vs infected stomach

DISCUSSION

The results of this study have shown that there is a weak association between the occurrence of *H. pylori* antigens in feces and the dental plaque, and also between the occurrence of antigens in the dental plaque and stomach infection. Full correspondence of results determining *H. pylori* antigens in dental plaque and feces with stomach infection was found only in 54.8% of subjects. Assuming that dental plaque is a basic location of *H. pylori* in the oral cavity [15,16], infection of the stomach with this bacterium (positive results in at least two of three gastric tests) combined with the simultaneous presence of their antigens in feces and absence in dental plaque implies that in a number of subjects with infected stomachs the oral cavity remains uninfected. It constitutes indirect evidence that stomach infection may occur without a corresponding infection of the oral cavity. In 0.9% of subjects, the stomach is infected even with the absence of *H. pylori* antigens in the oral cavity and feces. In 0.9% of subjects, the stomach is infected and *H. pylori* antigens are present in the oral cavity but not in feces. In both cases, an error in the assessment of *H. pylori* infection in the dental plaque, stomach or feces is likely. However, it should be noticed that the percentage of clearly erroneous results is small.

An interesting issue in subjects with a non-infected stomach is the occurrence of *H. pylori* antigens in dental plaque and their absence in feces or the presence of *H. pylori* antigens both in feces and in dental plaque. Since only a sufficiently large number of bacteria reaching the stomach, under favorable conditions, can cause its infection [11], it may be supposed that either the population of *H. pylori* in the oral cavity in these subjects was too small [17] or the bacteria were in a viable but non-culturable form [18,19].

In 24.7% of subjects with non-infected stomachs, the concomitant presence of *H. pylori* antigens in the dental plaque and feces was found. Apart from negative results of the three tests assessing the presence of bacteria in endoscopic specimens, also the inflammatory response of the gastric mucosa typical for *H. pylori* infection was not observed. Only advanced gastritis with no infection of *H. pylori* would allow us to suspect that an error in the microscopic examination of gastric mucosal specimens took place [20,21]. The simultaneous presence of *H. pylori* antigens in the dental plaque and feces without a stomach infection (10.6% of all subjects studied) might indicate that a positive stool test is related, in a number of cases, to the presence of *H. pylori* only in the oral cavity. In subjects with positive stool test but with a non-infected stomach and negative for plaque antigens, the extra-stomach population of *H. pylori*, e.g., oral bacteria from other locations than dental plaque, might be a source of *H. pylori* antigens in feces [9,10,19]. One may think therefore that proper oral hygiene might, in some extent, protect against *H. pylori* presence in the oral cavity, but no evidence for this was found in earlier studies [8,16,22].

The current results have shown that in subjects with positive stool test the stomach is infected only in 81.4%. On the other hand, 23.5% of subjects who have *H. pylori* antigens both in feces and in the dental plaque have a non-infected stomach. Based on positive results in two tests for the presence of *H. pylori* antigens (feces, dental plaque) it is not possible to confirm a stomach infection in an accurate manner, unless additional tests documenting a direct stomach infection are performed. Negative results of the tests documenting *H. pylori* infection in gastric mucosal specimens would indicate an extragastric source of *H. pylori* antigens in feces. Thus, the assessment of the presence of stomach infection exclusively on the basis of tests illustrating the presence of *H. pylori* antigens in feces or in dental plaque and feces possess a high risk of error, at least in a population with a high index of *H. pylori* infection [23,24].

CONCLUSIONS

Tests assessing the presence of *H. pylori* antigens in feces and dental plaque are helpful in diagnosing stomach infection, however, if relying on only these tests, a number of patients will require additional complementary tests due to the high percentage of false positive results.

Conflicts of interest

None declared.

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Variety of food intake measured with Food Intake Variety Questionnaire (FIVeQ) and nutritional status of Polish adolescents aged 13-15 years

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ABSTRACT

Purpose*:* To demonstrate the relationship between variety of food intake described with Food Intake Variety Index and nutritional status of Polish adolescents aged 13-15 years.

Materials and methods*:* Pattern of food consumption for 131 adolescents (52% boys, 48% girls, mean age 14.4 ± 0.9) was evaluated by using FIVeQ (Food Intake Variety Questionnaire), whose interpretation allowed to determine FIVeI (Food Intake Variety Index). According to FIVeI four levels of variety of food consumption were defined: inadequate, sufficient, good and very good. Nutritional status was examined with selected anthropometric parameters, i.e.: weight, height, thickness of the skinfolds, body circuits, BMI (Body Mass Index), AMC (Arm Muscle Circumference), WHtR (Waist-to-Height Ratio), WHR (Waist-Hip Ratio) indexes and FM (Fat Mass), %FM (Fat Mass Percentage), FFM (Fat-free Mass), taken with the FUTREX device. In addition, measurements of BP (Blood pressure) were used for assessing nutritional status.

Results: Variety of food intake for majority of examined adolescents was defined as sufficient (FIVeI = 28.4 products/week). The average BMI value for both sexes was 20.4 kg/m^2, and fat mass percentage was 22.4%. Analysis of percentile ranges of given anthropometric parameters and BP according to gender and level of FIVeI showed that generally their values were within the normal range (10-90 percentile), although overweight and obesity was found in 11% of the adolescents. 38% of the examined group had values of blood pressure indicating prehypertension.

Conclusions: Overall nutritional status was defined as good, however variety of food consumption was inadequate and needs improvement. Alarming blood pressure values require further investigation.

Key words: Adolescents, diet quality, questionnaires, nutrition assessment, anthropometry

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INTRODUCTION

Assessment of the way of eating implies taking into account customary food consumption and contained therein nutrients. In nutritional epidemiology, traditional methods of examining the occurrence of disease relate to one or several nutrients or foods. Such approach does not fully reflect the complex relationship between nutrients and the diversity of nutrient intake and combining foods [1,2]. A comprehensive approach to food consumption can be achieved by using food intake questionnaires, for example Food Intake Variety Questionnaire (FIVeQ). Questionnaires contain a list of foods for which frequency of consumption is determined. They have a high level of reliability and repeatability, are practical, easy to use and inexpensive. Facilitate data analysis, because does not affect the usual food intake and minimize individual variation [3]. Qualitative assessment of food intake using a questionnaire may be less accurate compared to the 24-hour food intake interview, but it allows assessing dietary habits of the population, even from a single study [4]. Studied by FIVeQ eating habits affects the long-term health effects, allowing to define the relationship between nutrition and diet-related disease morbidity [3]. In order make questionnaire suitable for epidemiological studies, it should include a complete list of products that are consumed by the study population, thus taking into account different ethnic and age [5,6]. Based on the FIVeQ questionnaire used in this study Food Intake Variety Index (FIVeI) was developed.

To achieve proper nutritional status and complete coverage of macro- and micronutrient needs eating a variety of foods is essential. Preference for varied flavors should ultimately increase the range of food products and nutrients consumed as well as the likelihood that a well-balanced diet is achieved. Food variety also contributes to the psychological dimension of eating, since variety, both within and between meals, contributes to the pleasure of eating. Flavor differences between foods within the same food group might contribute to the overall variety within a meal [7,8]. Age 13-15 years is a period of high demand for nutrients; especially complete protein, calcium and iron, which should be provided with a variety of food groups. Increased consumption of milk and dairy products, a wide range of different vegetables, poultry, fish, legumes and cereal products, especially whole grain provide coverage of needs for nutrients and stable growth [9]. Monotonous food intake, especially high in processed products, enriched with sugar and hydrogenated fatty acids, contributes to strengthening of irregular eating habits and in the future could affect the occurrence of obesity, hypertension and atherosclerosis [10]. Another aspect is neophobia- aversion and uncertainty of trying and eating new foods, which can be observed during the third year of life. Habits of eating a variety of foods acquired before the neophobic phase track further on into childhood, adolescence and early adulthood [8]. Moreover, between the ages 11-17 occurs a decrease in neophobia. Due to these factors, adolescence is a period likely to induce changes in food behavior if the proper variety of food intake has been implemented since the early childhood [11].

It is estimated that hypertension affects about 3-3.5% of the total population of children and adolescents. However, the prevalence of hypertension increases with age and after puberty reaches up to 10% [12]. Occurring in childhood and during adolescence elevated BP (Blood pressure) track into adulthood causing adult hypertension [13,14]. In 2009, the European Society of Hypertension declared HT in children a major and growing health problem requiring organized strategies to address it [14].

The main objective of this study was to demonstrate the relationship between variety of food intake described with Food Intake Variety Index and nutritional status of Polish adolescents aged 13-15 years old. Additionally, blood pressure was measured and its values were also compared with FIVeI.

MATERIALS AND METHODS

The study was conducted from October to December 2012 in Bydgoszcz, Poland, with the approval of the Bioethics Committee at the Ludwik Rydygier Collegium Medicum in Bydgoszcz (decision No. 102/2008). Participants of the study were adolescents aged 13-15 years from five lower secondary schools. Recruitment was performed on the basis of random selection of the individual, ensuring that all students had equal probability to participate in the study. However, the condition for participation in the study was to present a member of the research team written permission from a parent. Anthropometric measurements were performed in a classroom allocated by the director of the institution or the school nurse's office. The final number of subjects included in the study was 131 adolescents (52% boys, 48% girls, mean age 14.4±0.9). Each study participant filled Food Intake Variety Questionnaire, with a help of a member of the research team if necessary.

Anthropometric Measurements

All anthropometric measurements were performed in accordance with the guidelines of the WHO (Geneva 1995) [15]. Subjects were measured and weighted in light outerwear. Normal value was considered as the average of two measurements. Body height was measured in standing position using the Martin anthropometer. The accuracy of

measurement was 1 mm, the result was given in centimeters. Using an electronic scale, weight measurement was performed (accuracy 100g, result in kg). After obtaining values for height and weight the Body Mass Index was calculated according to the formula given by the World Health Organization. Using caliper, thickness of four skinfolds was measured: fold over the triceps, over the biceps, the lower angle of the scapula (subscapular skinfold) and above the iliac crest. Measurements were performed on the non-dominant side of the body (accuracy 0.1 mm, result in mm). Also, on the non-dominant side of the body, using tape, arm circumference (AC) was measured (accuracy 0.1 cm, result in cm). After obtaining the values of AC and triceps skinfold, Arm Muscle Circumference (AMC) was calculated (cm). Next two measurements concerned waist and hip circumferences (accuracy 0.1 cm, result in cm). Measurements were taken using tape again, remembering to avoid too strong pressure on soft tissues. Determined girths allowed estimating Waist-Hip Ratio (WHR) and Waist-to-Height Ratio (WHtR). Using near-infrared technology Free Fat Mass (FFM, kg), Fat Mass (FM, kg) and Fat Mass Percentage (%FM) were assessed with body content analyzer FUTREX 6100 A/ZL. FUTREX is a portable equipment, which during measurement sends a safe, Near-Infrared Light beam into the biceps of the dominant arm. Body fat will absorb this light and lean mass will reflect the light. The light absorption is measured by the FUTREX to determine body composition [16]. FUTREX is a validated equipment with repeatability of measurement 0.3% [17,18]. The only known possible restriction on NIR is to avoid measurements on an extremely black tattooed location due to possible light absorption. NIR does not have any of the other restrictions that BIA instruments have (e.g.: time of food, alcohol consumption, use of hand cream, menstrual cycle, pacemakers, internal heart defibrillators) [19].

To indicate correct and incorrect results during evaluation of body weight and body composition, standards of growth for children and youth developed by Palczewska and Niedźwiecka [20] were used. The percentages of young people with low (<10th percentile), or high (>90th percentile) values of examined somatic parameters were assigned.

Measurement of BP (systolic and diastolic) was made with electronic sphygmo-manometer. Participant sat calmly for 3 minutes before the measurement. Cuff of the sphygmo-manometer was put on a bare arm about 2-3 centimeters above the elbow, keeping in mind that arm of the study participant should be on the level of the heart [21]. Measurements were repeated twice and average value of these measurements was assumed as BP. By finding individual respondent's position on growth chart correctness of BP value was assessed (correct values between 10^{th}-90^{th} percentile) [22].

Food Intake Variety Questionnaire

Assessment of the way of eating was made using FIVeQ questionnaire developed by Ph.D. E. Niedźwiecka and Prof. L. Wądołowska from the Department of Human Nutrition, University of Warmia and Mazury in Olsztyn, Poland. FIVeQ questionnaire allows specifying the frequency of food consumption. Questionnaire is a validated and accurate tool to assess food variety [23,24] In this study, adolescents supplied information about the consumption of sixty-three food group products, which were divided into main food groups. Respondents answered yes/no questions, whether in the past seven days (last week) they ate more than proposed amounts of listed heat-treated food products (the amount "eaten from plate"). Quantities were defined as: "seven slices" for cereal products, "seven cups" for dairy and beverages, with the exception of wine (amount defined as 1 glass of wine- 100 ml) and spirits (one shot of liquor- 50 ml), for cold cuts and sausages “amount sufficient for one slice of bread well covered" (about 20 grams), "10 cubes" for chocolate, and for the rest of the food products " two tablespoons” e.g. groats, nuts, fish, and butter. When a person did not know a food product or did not remember whether ate it or not, the assumed answer was "no." FIVeQ provides information whether during the previous week food product was consumed in amounts greater than a very small quantity.

Food Intake Variety Index allows expressing variety of food consumption. It is calculated as the sum of food products consumed during the week, with the exception of alcohol (beer, wine and other spirits). Maximum index value is 60 products/week. Based on the obtained points it was possible to identify study participants with four FIVeI levels: inadequate (V1; <20 products/week), sufficient (V2; 20-29), good (V3; 30-39) and very good (V4; ≥40).

Statistical analysis

Statistical analysis was performed using STATISTICA StatSoft 10.0 PL. For the analysis, a non-parametric tests were used. Their choice was conditioned by failing to meet the basic assumptions of parametric tests, i.e. the compatibility of distributions of measured variables with normal distribution and homogeneity of variance. The compliance of distributions with normal distribution was verified with Shapiro-Wilk test while the equality of variances with Levene's test. To evaluate the differences in the average level of numerical characteristics of the two populations Mann–Whitney U test was used. This test can be calculated as the so-called exact test, which allows a fair comparison of data even from very small groups.

Differences in the average values of analyzed variables were determined by Kruskal-Wallis test. Sex and variety of food consumption were assumed as independent variables. Classified features were analyzed using the Pearson chi^2 test.

The level of statistical significance was set at p <0.05 (acceptable error of 5%); p <0.01 (acceptable error of 1%); p <0.001 (acceptable error of 0.1%).

RESULTS

Assessment of nutritional status

The assessment was made based on the results of selected anthropometric parameters (table 1). The level of significance at p <0.001 was found for thickness of skinfolds above the triceps, above the biceps, above the iliac crest, WHR, AMC, FFM, FM and %FM. Girls had higher values of the listed skinfolds, as well as for the subscapular skinfold (p <0.05). In addition, they had higher values of FM and %FM. Boys had higher values of body height, body weight and selected indexes- WHR, AMC and FFM. The level of significance at p <0.05 was also observed for waist circumference, which value was higher for boys. For other evaluated anthropometric parameters, no statistically significant difference was shown.

Table 1. Results of selected anthropometric parameters

Parameters	All groups N=131	Sex		p
		Boys N=68	Girls N=63	
	Mdn; Min-Max			
Body height [cm]	167.1; 143.0-188.6	170.1; 143.0-188.6	164.4; 147.9-181.2	<0.01
Body weight [kg]	55.6; 34.1-94.5	57.0; 37.7-94.5	53.3; 34.1-82.5	ns
Thickness of skinfolds [mm]:				
• above the triceps	11.6; 4.4-26.0	9.4; 4.4-24.3	13.1; 4.8-26.0	<0.001
• above the biceps	5.5; 2.0-20.7	4.6; 2.0-16.8	7.0; 3.0-20.7	<0.001
• subscapular	9.5; 4.9-35.2	8.1; 4.9-35.2	11.2; 5.2-33.8	<0.01
• above the iliac crest	10.0; 4.4-32.8	8.1; 4.4-31.7	12.0; 4.6-32.8	<0.001
Circuits [cm]:				
• arm	24.2; 18.5-33.4	24.8; 19.5-32.4	24.0; 18.5-33.4	ns
• waist	66.8; 55.1-96.1	68.4; 56.0-96.1	65.5; 55.1-83.1	<0.01
• hips	90.2; 68.5-112.0	87.8; 76.8-106.5	91.6; 68.5-112.0	<0.05
BMI [kg/m^2]	19.8; 15.2-30.5	20.0; 15.2-30.5	19.7; 15.3-30.0	ns
WHR	0.75; 0.64-0.92	0.78; 0.72-0.92	0.72; 0.64-0.91	<0.001
WHtR	0.40; 0.34-0.54	0.41; 0.34-0.54	0.40; 0.34-0.50	ns
AMC [cm]	20.4; 15.7-27.6	21.6; 16.8-27.6	19.8; 15.7-26.1	<0.001
Body composition made with FUTREX:				
• FFM [kg]	43.7; 29.1-70.5	48.9; 32.4-70.5	40.2; 29.1-53.1	<0.001
• FM [kg]	10.7; 3.1-29.8	7.2; 3.1-26.0	12.7; 5.0-29.8	<0.001
• %FM [%]	20.0; 5.9-36.7	13.4; 5.9-27.8	24.3; 14.6-36.7	<0.001

N – number, p- level of significance (p <0.05, p<0.01, p<0.001), Mdn- Median, Min-Max- Range minimum to maximum values, ns – differences not significant, BMI- Body Mass Index, WHR- Waist-Hip Ratio, WHtR- Waist-to-Height Ratio, AMC- Arm Muscle Circumference, FFM- Fat-free Mass, FM- Fat Mass, %FM- Fat Mass Percentage

Blood pressure

Systolic and diastolic BP was analyzed while interpreting results for health status. Their median values and compliance with standards were evaluated. Statistically, significant differences were indicated between the results of systolic BP and gender (table 2). The median value for boys was 128.0 mmHg, for girls 121.0 mmHg. Values of diastolic BP were similar for both sexes (74.0; 58.0-153.0 mmHg).

Table 2. Values of blood pressure

Parameters	All groups N=131	Sex		p
		Boys N=68	Girls N= 63	
Systolic blood pressure [mmHg], Mdn; Min-Max	125.0; 95.0-175.0	128.0; 99.0-175.0	121.0; 95.0-159.0	<0.01
Diastolic blood pressure [mmHg], Mdn; Min-Max	74.0; 58.0-153.0	74.0; 58.0-153.0	74.0; 58.0-123.0	ns

N – number, p- level of significance (p<0.01), ns - differences not significant Mdn- Median, Min-Max- Range minimum to maximum values Connection between BP and percentile ranges was also assessed (table 3). 60% of respondents had values of systolic BP within the normal range (10-90 percentile). 72% of respondents had correct values of systolic BP. Elevated systolic BP (above 90 percentile) was found in 38% of boys and girls, and diastolic in 24% of boys and 27% girls.

Table 3. Distribution of values of blood pressure according to percentile ranges of the examined adolescents

Parameters/ scopes	All groups N=131	Sex		p
		Boys N=68	Girls N= 63	
Systolic blood pressure				ns
< 10 percentile	2 (2)	2 (1)	2 (1)	
10-90 percentile	60 (79)	60 (41)	60 (38)	
> 90 percentile	38 (50)	38 (26)	38 (24)	
Diastolic blood pressure				ns
< 10 percentile	3 (4)	4 (3)	2 (1)	
10-90 percentile	72 (94)	72 (49)	71 (45)	
> 90 percentile	25 (33)	24 (16)	27 (17)	

N – number, p- level of significance (p <0.05), ns - differences not significant, x- average value, SD- standard deviation

Food Intake Variety Index

The median FIVeI was 29.0 (min-max 13.0-56.0) products per week with a maximum of 60 (table 4). Differences in FIVeI levels according to gender were statistically significant (p <0.05). Diet of 50% boys and 27% girls was defined as good. Nearly 11% of the respondents consumed monotonous diet, with a FIVeI level inadequate (V1) and only 6% had a very good diet (V4).

Table 4. Variety of food consumption

Parameters	All groups N=131	Sex		p
		Boys N=68	Girls N=63	
FIVeI (max 60 products/week), Mdn; Min-Max	29.0; 13.0-56.0	33.0; 14.0-48.0	27.0; 13.0-56.0	<0.05
Variety of food intake, % of population				ns
V1	11 (15)	9 (6)	14 (9)	
V2	44 (57)	35 (24)	53 (33)	
V3	39 (51)	50 (34)	27 (17)	
V4	6 (8)	6 (4)	6 (4)	

N – number, p- level of significance (p <0.05), ns - differences not significant, FIVeI- Food Intake Variety Index Mdn- Median, Min-Max- Range minimum to maximum values, V1- variety of food consumption - inadequate, V2- variety sufficient, V3- variety good, V4- variety very good, () - number in brackets

Levels of FIVeI and nutritional status

Values of FIVeI showed that 57 adolescents had the variety of food consumption defined as sufficient, 51 as good, 15 as inadequate and 8 as very good (table 5). The highest body height achieved adolescents with level V4 (very good) and highest body weight with level V4 and V2 (very good and sufficient). Along with the increasing level of FIVeI decreased values of AMC and thickness of skinfold above the biceps, waist circumference, diastolic and systolic blood pressure (with the exception of level V4).

Values of the studied anthropometric parameters were within the normal range, referred to

10-90 percentile range (table 6). Increased body height (>90 percentile) had 7% of the examined adolescents from group V1, 23% from group V2, 14% from group V3 and 37% from group V4. Along with the increasing FIVeI level, decreased the number of underweight (<10 percentile) and overweight (>90 percentile) participants. Adolescents with FIVeI level V1 had the highest values of triceps and subscapular skinfolds. With the increase of FIVeI decreased the number of adolescents with BMI value above 90 percentile, which is used as a criterion for obesity. In the same manner decreased rates of WHR and AMC.

63% of adolescents had elevated systolic BP. 47% of participants assigned to group V1 had systolic BP within the normal range. Accurate blood pressure was observed in 60% of participants assigned to group V3 and V2. Most of the examined adolescents (67-80%) from groups V1-V4 had diastolic BP within the normal range. Elevated diastolic BP was least likely to be observed in adolescents with inadequate food variety intake.

Table 5. Values of somatic parameters and blood pressure of examined adolescents, depending on the variety of food consumption

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Parameters	All groups N=131	Variety of food consumption				p
		V1 N= 15	V2 N= 57	V3 N= 51	V4 N= 8	
	Mdn; Min-Max					
Body height [cm]	167.1; 143.0-188.6	165.1; 151.6-173.4	167.7; 147.9-188.6	164.6; 143.0-183.0	168.6; 153.3-182.8	ns
Body weight [kg]	55.6; 34.1-94.5	53.3; 36.4-81.1	56.2; 34.1-92.2	53.0; 40.3-94.5	57.0; 44.0-63.8	ns
Thickness of skinfolds [mm]:						
above the triceps	11.6; 4.4-26.0	10.0; 5.0-23.3	12.9; 5.2-26.0	10.7; 5.4-23.5	10.8; 4.4-24.3	ns
above the biceps	5.5; 2.0-20.7	5.8; 2.8-18.3	5.6; 2.8-20.7	5.0; 2.4-16.8	7.0; 2.0-11.2	ns
subscapular	9.5; 4.9-35.2	9.1; 5.6-33.8	10.2; 5.2-31.7	8.8; 4.9-35.2	8.1; 5.2-15.0	ns
above the iliac crest	10.0; 4.4-32.8	9.1; 4.9-32.8	10.7; 4.6-30.0	9.6; 4.4-31.7	9.5; 4.6-19.8	ns
Circuits [cm]:						
arm	24.2; 18.5-33.4	24.7; 18.6-33.4	24.8; 18.5-31.8	24.0; 19.1-32.	24.1; 21.3-26.3	ns
waist	66.8; 55.1-96.1	67.3; 55.1-82.9	66.9; 55.4-92.8	65.0; 57.4-96.1	67.2; 56.2-73.6	
hips	90.2; 68.5-112.0	89.2; 77.3-109.0	93.0; 75.6-112.0	89.5; 77.5-106.5	89.3; 68.5-98.9	ns
BMI [kg/m^2]	19.8; 15.2-30.5	19.3; 15.7-30.0	20.0; 15.2-30.5	19.7; 15.3-28.8	19.4; 16.6-21.6	ns
WHR	0.75; 0.64-0.92	0.76; 0.65-0.84	0.74; 0.66-0.88	0.75; 0.65-0.92	0.75; 0.64-0.91	ns
WHtR	0.40; 0.34-0.54	0.40; 0.34-0.50	0.41; 0.35-0.53	0.40; 0.34-0.54	0.39; 0.34-0.46	ns
AMC [cm]	20.4; 15.7-27.6	21.5; 15.7-26.1	20.4; 16.2-26.3	20.2; 16.3-27.6	20.0; 17.3-23.0	ns
Body composition made with FUTREX: • FFM [kg] • FM [kg] • %FM [%]	43.7; 29.1-70.5 10.7; 3.1-29.8 20.0; 5.9-36.7	44.4; 29.5-51.3 10.6; 3.9-29.8 20.7; 7.7-36.7	44.9; 29.1-70.5 11.8; 3.7-29.4 22.2; 8.5-35.7	43.3; 33.2-68.5 9.5; 3.1-26.0 18.5; 6.5-31.6	47.0; 31.9-55.7 10.7; 3.4-14.3 18.5; 5.9-29.2	ns ns ns
Systolic blood pressure [mmHg]	125.0; 95.0-175.0	125.5; 95.0-144.0	125.0; 100.0-154.0	123.0; 99.0-159.0	128.0; 104.0-175.0	ns
Diastolic blood pressure [mmHg]	74.0; 58.0-153.0	74.0; 65.0-84.0	74.0; 58.0-116.0	73.0; 58.0-123.0	77.0; 65.0-153.0	ns

Table 6. Distribution of values of anthropometric parameters and blood pressure according to percentile ranges and Food Intake Variety Index of the examined adolescents

Parameters/ scopes	All group N=131	Food Intake Variety Index				p
		V1 N= 15	V2 N= 57	V3 N= 51	V4 N= 8	
Body height						ns
< 10 percentile	12 (15)	7 (1)	10 (6)	16 (8)	0 (0)	
10-90 percentile	70 (92)	86 (13)	67 (38)	70 (36)	63 (5)	
> 90 percentile	18 (24)	7 (1)	23 (13)	14 (7)	37 (3)	
Body weight						ns
< 10 percentile	8 (10)	13 (2)	7 (4)	8 (4)	0 (0)	
10-90 percentile	80 (105)	67 (10)	75 (43)	86 (44)	100 (8)	
> 90 percentile	12 (16)	20 (3)	18 (10)	6 (3)	0 (0)	
Above the triceps skinfold thickness						ns
< 10 percentile	6 (8)	13 (2)	7 (4)	2 (1)	13 (1)	
10-90 percentile	76 (100)	67 (10)	74 (42)	82 (42)	74 (6)	
> 90 percentile	18 (23)	20 (3)	19 (11)	16 (8)	13 (1)	
Subscapular skinfold thickness						ns
< 10 percentile	3 (4)	0 (0)	3 (2)	4 (2)	0 (0)	
10-90 percentile	74 (97)	73 (11)	72 (41)	74 (38)	88 (7)	
> 90 percentile	23 (30)	27 (4)	25 (14)	22 (11)	12 (1)	
Arm circumference						ns
< 10 percentile	8 (10)	13 (2)	7 (4)	8 (4)	0 (0)	
10-90 percentile	80 (105)	67 (10)	75 (43)	86 (44)	100 (8)	
> 90 percentile	12 (16)	20 (3)	18 (10)	6 (3)	0 (0)	
BMI						ns
< 10 percentile	11 (15)	7 (1)	14 (8)	8 (4)	25 (2)	
10-90 percentile	78 (102)	80 (12)	72 (41)	84 (43)	75 (6)	
> 90 percentile	11 (14)	13 (2)	14 (8)	8 (4)	0 (0)	
WHtR						ns
< 10 percentile	17 (22)	13 (2)	18 (10)	14 (7)	37 (3)	
10-90 percentile	78 (102)	74 (11)	77 (44)	82 (42)	63 (5)	
> 90 percentile	5 (7)	13 (2)	5 (3)	4 (2)	0 (0)	
AMC						ns
< 10 percentile	13 (17)	6 (1)	16 (9)	14 (7)	0 (0)	
10-90 percentile	75 (98)	67 (10)	70 (40)	78 (40)	100 (8)	
> 90 percentile	12 (16)	27 (4)	14 (8)	8 (4)	0 (0)	
Systolic blood pressure						ns
< 10 percentile	2 (2)	6 (1)	2 (1)	0 (0)	0 (0)	
10-90 percentile	60 (79)	47 (7)	67 (38)	61 (31)	37 (3)	
> 90 percentile	38 (50)	47 (7)	31 (18)	39 (20)	63 (5)	
Diastolic blood pressure						ns
< 10 percentile	3 (4)	7 (1)	5 (3)	0 (0)	0 (0)	
10-90 percentile	72 (94)	80 (12)	67 (38)	75 (38)	75 (6)	
> 90 percentile	25 (33)	13 (2)	28 (16)	25 (13)	25 (2)	

N – number, V1- variety of food consumption - inadequate, V2- variety sufficient, V3- variety good, V4- variety very good, p- level of significance ($p < 0.05$), ns - differences not significant, BMI- Body Mass Index, WHR- Waist-Hip Ratio, WHtR- Waist-to-Height Ratio, AMC- Arm Muscle Circumference

DISCUSSION

Anthropometric measurements were used to assess the nutritional status of the study participants. Results of weight and body height obtained from this study were higher than those acquired by other researchers, although BMI index was similar to the results of other studies from Poland (Mdn=19.8 kg/m^2) [25,26]. Noticeable were larger values of the studied parameters in boys compared to girls, with the exception of hip circumference and thickness of skinfolds. These disparities can be explained by puberty and fat accumulation in girls' bodies as a result of a development of secondary sexual characteristics. Measurements taken with FUTREX were used to assess body fat mass (FM), percentage of body fat mass (% FM) and free fat mass (FFM).

Values of FM and % FM for the entire study group were similar to the results of other researchers (respectively 10.7 kg and 20.0%) and were higher for girls than boys [25,27]. Excessive body weight was indicated in 12% of examined adolescents. This is consistent with results of other Polish researchers [28]. According to BMI index 11% of respondents obtained values defining body weight deficiency (<10 percentile), and another 11% values defining overweight and obesity (>90 percentile). Results of the measurements vary depending on the region and differences become even stronger when comparing different countries. The tendency to be overweight among children and adolescents in Brazil is 18%, United Kingdom 18.4%, Portugal 18%, Italy 17.4%, USA 30% [29].

Obesity is a key determinant of elevated BP in children and adolescents. Along with the growing epidemic of obesity in the pediatric population their BP increases. In Poland, the percentage of children and adolescents with diagnosed hypertension is 5-15% [30]. To evaluate BP of adolescents, it is necessary to use growth charts and also take into account age, gender and body height. Correct values of BP on growth charts cover range lower than 90 percentile, 90-95 percentile signifies prehypertension and values above 95 percentile hypertension [31].

In adolescents, prehypertension can be diagnosed not only on the basis of mentioned before percentile ranges but also with its values (≥120/80 mmHg) [32]. In this study, values of systolic BP differed according to gender ($p<0.05$). Comparing these values with growth charts, 60% of study participants had normal systolic BP, but as much as 38% (both boys and girls) had prehypertension (> 90 percentile). Incorrect values (> 90 percentile) of diastolic BP had 25% of the respondents and its median value for both sexes was 74.0 mm Hg. Common to many studies is the fact that boys have higher BP values than girls [33]. Comparing measurements of blood pressure in adolescents is difficult, due to the considerable regional diversity of its occurrence [30,34]. Always, also in this study, a possible measuring mistake should be taken into account. There are many measurement methods and recommended guidelines are constantly being improved [35]. Commonly studied is a predisposition to abdominal obesity measured with WHtR ≥0.5 Chinese researchers found that among 38,810 students mean values for systolic and diastolic BP were significantly higher in those with WHtR ratio ≥0.5. The study confirmed that WHtR ratio is positively correlated with BP in both children and adolescents [36]. In present study highest percentage of people (47%) with abnormal systolic BP (> 90 percentile) had FIVeQ level V1. The same level of variety was observed in 13% of adolescents with high WHtR values (>90 percentile). This may indicate a relationship between WHtR and BP. Elevated values of BP in childhood tend to remain on the same growth curve over time [13]. It becomes an essential approach to controlling BP from an early age. Elevated BP during childhood is an important contributor to increased cardiovascular risk in later life, such as atherosclerosis [37]. New guidelines emphasize the necessity for BP screening among children and adolescents aged 3-17 years during their annual preventive care visits. The main cause of this action is to reduce the prevalence of hypertension among children and adolescents by 10% [38].

The median value of FIVeI was 29.0 products/week and the variety of food intake was higher for boys than for girls (33.0 and 27.0 products/week respectively). Interpretation of the index for the entire study group indicates a sufficient variety of food intake (44%), with 50% of boys diversity defined as good, and 53% of girls as sufficient. The results are unsatisfactory and indicate irregularities in the diet of the young people. Varied daily diet in adolescents contributes to an adequate nutritional intake, is associated with lower risk of youth and adult obesity and is strongly related to the physical and cognitive development. Adolescence is a critical period in which poor dietary practices may contribute to an increased risk of chronic diseases in adulthood [39,40].

Moreover, increased consumption of junk food and snacks contribute to the development of obesity and hypertension among children [41].

On the basis of a simple analysis of the FIVeQ questionnaires, we found that youth with inadequate FIVeI level consumed less nuts, seeds and fish. Consumption of dairy products, refined and whole meal cereal products and water was strongly diversified. Regardless of the level of FIVeI all youth had low consumption of vegetable juices and legumes, and high consumption of products with high energy density: chocolate, salty snacks and fruit juices. Compared with other countries, a diet of French adolescents had high values of fat, saturated fatty acids and very high values of cholesterol. Using data obtained from the FFQ questionnaire researchers demonstrated a high intake of meat, cooked foods, yogurt, milk, bread, pasta, rice, cereals, potatoes, fruit, vegetables, sweet sodas, water, and low consumption of legumes, legumes, foods with reduced fat, oil, eggs, fish and cheese [4]. Analysis of FFQ filled by Belgian youth showed an increased intake of bread, vegetables, potatoes, fruit, soft drinks and alcoholic beverages, water, milk and dairy products, and reduced cereal, snacks, cheese, yellow and chocolate [42].

Results of anthropometric and blood pressure measurements were compared with four levels of FIVeI. Youth with highest body height was characterized with a very good variety of food intake; they also demonstrated the highest value of systolic BP. The lowest systolic BP had the shortest

adolescents, with good food variety intake. It is well known that blood pressure is closely associated with body size (weight, height or body mass index) [43]. According to German Health Interview and Examination Survey on Children and Adolescents (KiGGS), it also increases with age [44].

Some studies indicated that weight and BMI index more closely correlates with BP levels than height [32,37,45]. A study from Mozambique, in which took part 2316 students (aged 6-18) showed that systolic and diastolic BP were significantly higher in subjects who were overweight. On the contrary, malnourished subjects had significantly lower systolic and diastolic BP compared to those with normal nutritional status [46].

In the present study, the direct relationship between body weight and BP was not tested. However, according to percentile ranges, the highest percentage of overweight and obese youth (20%) had an inadequate variety of food consumption, and this level of FIVeI (V1) obtained 47% adolescents with abnormal systolic BP. In case of underweight (<10 percentile), the highest percentage of youth (13%) also had inadequate FIVeI (V1) and at the same level of variety were 6% of people with reduced systolic BP, and 7% with lower diastolic BP.

For body height, weight, above triceps and subscapular skinfolds, arm circumference, BMI, WHR, AMC, systolic and diastolic blood pressure were defined percentile ranges according to gender and level of variety of food consumption. Overall, all parameters had the correct values within 10-90 percentile. With the increasing level of the variety of food consumption increased the percentage of youth with proper body weight and decreased under- and overweight. This dependence can be explained by previously mentioned preferred choice of food products (more fish and nuts in the diet) in V4 group, despite similar amounts of sweets and salty snacks. On the other hand, at level V1 percentage of people with shortage values of these parameters (<10 percentile) increased. This can be explained by incorrect dieting, which may include unhealthy eating practices such as an extreme restriction of overall caloric intake and/or eating only certain types of food contributing to monotonous diet [47].

Additionally dieting during adolescence is associated with unhealthy weight control behaviors, risky or healthful dieting behaviors (as fasting and excessive exercising, use of diet pills, vomiting) [48]. Weight control behaviors can progress into young adulthood and predict a higher BMI later in life [49]. The variety of food intake had no effect on BMI percentile ranges because of the lack of connection with body height.

As study limitations, we can denote a small study group, possible inaccuracy of blood pressure measurement due to using electronic sphygmomanometer and a possibility of obtaining some incorrect answers from variety of food intake questionnaire filled by study respondents, resulting from not remembering eating behaviors from previous week. The strengths of this study include using various and accurate anthropometric measurements, presence of a member of the research team at every stage of filling the Food Intake Variety Questionnaire and using standardized questionnaires.

CONCLUSIONS

Nutritional status of examined adolescents can be defined as good. Values of BMI, FM and %FM were similar to those obtained by other researchers. Overweight and obesity were observed in 11% of study participants as well as underweight. Determined using FIVeQ variety of food consumption was insufficient and needs improvement. However, there may be a positive influence of the variety of food consumption on body weight. BP was connected with high levels of FIVeI and body height. Alarming is that incorrect values of systolic BP (> 90 percentile) had 38% study participants and diastolic 25%. Further studies concerning blood pressure and a variety of food consumption are essential.

Conflicts of interest

The authors declare no conflicts of interest.

Financial disclosure

The authors declare no financial disclosure.

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Role of quality in healthcare service provision process

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ABSTRACT

Introduction: The role of quality in achieving, improving, maintaining repeatable processes, service level guarantee patient satisfaction, determinants of hospitals.
Objective: Identification of the mechanisms consistent quality in the provision of services in the public hospitals.
Materials and methods: The study was conducted on a random sample of 104 public hospitals in the provinces of A, B, C. Author's questionnaire was distributed among 8975 participants of the medical staff. An analysis of the operating environment and documents, query literature. Was conducted individual in-depth interview with 540 medical experts from January 2007 to December 2011.
Results: Diagnosed public hospitals network problems in the implementation phase of quality management system for medical services: interpretation of the requirements of the standards, development of implementation documentation, knowledge of procedures, standards. The work confirmed the theory that managers/Medical is responsible for the good/bad its functioning.
Conclusions: Building on the paradigms of science organization and management expanded the scope of the study on the analysis of the factors determining the quality management of medical services based on a family of ISO standards. Factors focused on human capital and structural describing the quality of intellectual capital, supplemented by a layer of organizational and functional entities. This made it possible to get an answer in terms of phenomena, which in the area of quality in the network of public hospitals can be observed. And suggests practical solutions. Indicated tools and capabilities to implement the principles of quality in shaping the satisfaction of stakeholders.
Key words: quality management system, patient, hospital staff, health care

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INTRODUCTION

Quality management systems in compliance with the ISO 9000 requirements of standards are currently the most widespread management systems [1] in health care. Since 1993, these systems gradually entered into all spheres of life. Public hospitals as entities of social trust, where the quality of service provision processes has both educational and integrating role in terms of health behaviours [2,3].

From this perspective, we can talk about special meaning of a complex quality of work in medical environment. It allows the realization of scenarios for providing hospital services focusing on the increase of health values of stakeholders. Quality of service provision processes and investment in the development of medical environment's competences is a determinant of entities' successes within the framework of public hospitals; depending on utility components – user components, standards, procedures, guidelines, quality of hospital equipment and medication.

According to Krukowska-Miler [4], the quality of healthcare services is dependent on the realization of expectations in areas of accessibility and proportionality in relation to the pro-health needs of the prosumer, social acceptance and the economization of the health service. In contrast, the common denominator of the definition of quality and marketing strategy is to determine the ability to satisfy health-related expectations [5].

Furthermore, a determinant of complex quality and timeliness of service provision process is the possession of adequate resources. Implementation of a quality management system compliant with ISO 9001:2008 leads to the development of an intelligent organization. In accordance with the aim of the study, an important issue is to identify determinant for the quality of healthcare services.

For this purpose, the proposed approach aims at the analysis and evaluation of the intellectual capital's quality in public hospitals. The adopted concept is similar to the CAF method (*The Common Assessment Framework*) and management principles resulting from the standard requirements of ISO 9001:2008.

In accordance to the information listed above, the quality of management of provided services in public hospitals depends on mutual relations, engagement of the management staff, awareness and competence of the medical environment. For the purpose of discussion, it was assumed that individual human capital is understood as specific features of a doctor – interdisciplinary team members with a certain value expressed by knowledge, skills and abilities. The study included 8975 participants of 104 public hospitals functioning in the Warmia and Mazury, Pomeranian and Greater Poland Voivodeships during the period from January 2007 to December 2011. Qualitative data was obtained by in-depth interviews with employees of these hospitals.

Concern for health - the management of public hospitals and study conducted within the framework, represent contribution to the discipline of management science. They are also the subject of further analysis and continuation of the study, due to the increasing importance of quality management in the provision of hospital services, dynamic development, a growing number of threats, cause significant changes in the functioning formulas of entities in the network organization. Used research tools contribute to the efficient diagnosis of the undertaken subject matter of the quality process in public hospitals.

Quality management in public hospitals – health care

Defining the term "*quality in public hospitals*" is a very difficult task because of its many aspects. The main bodies in the process of complex quality management in public entities are: managerial and medical staff, National Health Fund (NFZ), competition and State (Ministry of Health).

Implementation of the requirements for ISO 9000 standards, TQM principles and flexibility of managerial and medical staff enables the effective use of existing public hospitals' potential. Furthermore, on the basis of the process approach and the idea of continuous improvement, these standards determine the systematic growth in the quality of diagnostic and therapeutic processes. Pro-quality and complex offer of hospital services is perceived and understood as a "*Pure action, a behaviour aimed at helping the patient or providing him or her with advice, but the characteristic feature of this service is its intangibility, inseparability, impermanence and diversity*" [6].

Raising the qualifications of the medical environment, enrichment of the work processes' content and participatory management determine the pro-quality management of the service provisioning process in public hospitals.

In accordance with Donabedian [7] paradigm, the quality of service provision process management is based, among others, on the structure – resources, processes and results – effects, but none of these elements (separately realized) do not guarantee the repeatable quality of provided hospital services.

Krot [8] describes the quality in a dynamic manner (process of provision of health services in a repeatable quality) determined by exogenous terms (possessed technology, human resources). On the other hand, perceived quality of health services (where the patient obtains the product not as such, but as a solution to a health problem) is the result of his subjective evaluation and feelings.

However, whether the offered services are considered to be good in terms of quality, depends primarily on the way in which the technical quality will be given (functional) (Tab. 1).

Table 1. Factors of the repeatable quality of services in the public hospitals' network

No.	Dimensions of the quality	Features of the potential (expected quality)	Features of the process (experienced quality)	Features of the result (obtained quality)
1.	Technical dimension of the quality – **what can we offer to the prosumer**?	Buildings and interior Technical and hotelier equipment Location of public hospital Professional qualifications of the medical environment Number, type and placement of personnel Quality certificates Prices of hospital services	Complexity of patient's medical documentation Course of service provisioning processes Understandability and accessibility of received information Additional services (e.g. Hotel, catering, etc.) Necessary length of hospital stay	Health status of the patient – post-hospital care processes Procedure in case of complaints and reasonable claims
2.	Functional dimension of the quality – **how does the prosumer perceive us (criteria)**?	Image of the public entity References Awards	Relations between participants of interdisciplinary teams Behaviours of the medical community towards patients culture of the service Service efficiency Atmosphere in the public hospital	Well-being and patient satisfaction Understanding of actions during the provision of hospital services Recovery time

Source: Table was created on the basis of: Schuhen A, *Marketing in der stationären Altenhilfe. Ein kundenorientiertes Freiburger Konzept*, Nomos Verlagsgesellschaft, Baden-Baden 1997, 64.

Health services are characterized by immateriality and the patient's presence during their provision. On the other hand, this causes specific consequences in the process of quality formation, representing a sequence of actions – a chain for the creation of healthy values. It was stated [9] that the added value does not result from the offer, but from experience and co-creation, which is realized by the patient at a specific time and place, in the context of a specific (health) event. The internalisation of the patient knowledge and participation in the creation of pro-quality scenarios of hospital services creates an added value. Introducing to the network organization specific conditions allows, among other things, construction of knowledge environment and transparency. In order to implement the principles of TQM and quality management system requirements of the services provided in public hospitals, it becomes important to identify sources and determine the effects, which are reflected in the current economic situation of the entities.

One of important obstacles, which are present among public hospitals implementing the TQM philosophy and requirements of ISO 9000 standards, is not taking under account the fact that each individual entity and its environment are different from each other [10].

In these considerations it is also assumed that the organization of the network of public hospitals can reduce this important determinant. Furthermore, network structures are based not only on the quality management system, but also on other solutions similar to the family of ISO standards, which contributes to ensuring a repeatable, satisfactory level of the quality for stakeholders; including:

- ISO 22870:2007 – the research system concerning the patient care, which determines requirements for the quality and competence,
- ISO 13485:2003 – quality management system for medical products determining quality management systems, which can be used in design and development works of scenarios for provided services and service of medical products,
- ISO 14971:2012 - system for medical products – the use of risk management for medical products determining among others: methods for the identification of risks concerning the use of medical appliances in diagnostic and therapeutic processes.

In Polish hospitals, the most commonly used certificated quality management systems from ISO series are: quality management (ISO 9001),

environmental management (ISO 14001), management of occupational health and safety (ISO 18001), management of food safety (ISO 22000), management of information security (ISO 27001), medical laboratories (ISO 15189).

For the purpose of this work, it was assumed that measures of evaluating the effectiveness of the implementation of a complex quality management system in public hospitals are:

- Number of admitted patients,
- Time of admission,
- Provision of diagnostic sub-processes,
- Number of reported complaints,
- Timeliness,
- Continuity – complexity of processes concerning provided services.

Furthermore, qualitative factors of the intellectual capital determining adopted measures include, inter alia: knowledge, qualifications, personal culture, engagement and motivation of the medical environment in diagnostic and therapeutic processes. Determining control points and systematization of quality's evaluation criteria lead to the increase of stakeholders' [11] satisfaction in managing the process of service provision in public hospitals. Guidelines for the operation of network organization in addition to the ISO series 9001: 2008 also include the ISO 10015 standard and the ISO 10018 series, covering the commitment and competence of the whole staff in the process of quality management. The effectiveness of quality management systems largely depends on external consultants, so it is necessary to use ISO 10019 standards in the implementation process, because they have guidelines concerning selection principles and the information about methods of their use [12].

Quality has become synonymous of the twenty-first century, and organizational structure - functional public entities are concentrated on processes ensuring consistent repeatable quality, the determinant is:

- Family of ISO standards constitutes of, inter alia: quality management standard (ISO 9001:2008) – integrated management system platform. An important aspect is also the certification by independent entities, which are supervised by accreditation bodies. Management standards are revised with the dissemination of process approach and striving for the continuous improvement of management [13].
- CAF - Common Assessment Framework is a holistic approach in the self-assessment process, in which all problems included in the criteria, are linked together. On the other hand, cyclical nature of self-assessment leads to a conscious determination of areas, in which activities brought desired results and in which the efficiency was too small in relation to expectations, allowing the identification of reasons,
- IiP – *Investors in People (*this program was developed in the 90s by the National Training Task Force. National Training System in cooperation with the CBI - Confederation of British Industry, the TUC - Trade Union Congress and the Institute of Personnel and Development - the Chartered Institute for Personnel and Development) is a program aimed at the establishment of a standard for the human resource management associated with the development of an organization by the process of investing in personnel. An important premise of this standard is a process concerning the identification of possessed potential and developing the skills of conscious development of medical environment's intellectual capital.

Additionally, a determinant of quality management process in the network of public hospitals is the intellectual capital, in which IiP principles play an important role in the complex improvement of the provided hospital service quality. In contrast, investment in medical environment determines the process of achieving strategic goals by:

- Improvement of the quality in working environment and patient service,
- Reduction of costs and efficient management of possessed resources of entities from the network organization,
- Increase in qualifications, competence and commitment of personnel from particular entities in the network organization,
- Reduction of information asymmetry,
- Growing importance of motivation processes among participants of interdisciplinary teams,

Knowledge management processes in the network of public hospitals as a fundamental resource management, constitute the essence of effective management of quality services. In contrast, information technology - Decision Support Systems - SWD [14] promote virtualization processes, improve the quality and reliability of the data obtained, for example, in the community interview.

They are also a source of knowledge, reducing effort and cost [15] of diagnostic and therapeutic sub processes and at the same time reducing the decision-making risk. The consequence of these processes is an intelligent organization, which is a higher stage of the improvement process (public hospitals), which not only benefit from their resources of knowledge, but they also renew and update [16] it.

Therefore, for the purposes of the study it was assumed that the diagnosis policy management quality by evaluation of the quality of the intellectual capital as the factor determining the process of provision of hospital services, is about the complexity approach to the problem of quality. Rules of conduct are defined by law (operating

procedures), and by standards, instructions and guidelines for the medical staff behaviour. On the other hand, the lack of awareness of existing procedures, commitment, and relatively low focus on the quality of diagnostic and therapeutic sub processes can be derived from the quality of the possessed intellectual capital (Tab. 2) by a network organization and structural capital (Tab. 3).

Table 2. Arrangement of medical personnel in the analysed voivodeships

No.	Voivodeship	Doctors			Dentists		Pharmacists	
		Number	Dr/10 thousand people	Double practice	Number	Dr/10 thousand people	Number	Number
1.	Pomeranian	7544	34.5	8	2174	9.9	1848	8.4
2.	Warmia and Mazury	3333	23.3	2	857	6.0	484	3.4
3.	Greater Poland	9475	28.2	52	2677	8.0	1893	5.6

Source: The above table was prepared on the basis of data from CSO and the Ministry of Health.

Table 3. Selected elements of the structural capital in the analysed voivodeships (indicator – 100 thousand people)

No.	Voivodeship		Population	Number of patients	Gamma camera	Linear accelerator	X ray with video channel	Computer tomography	MRI
1.	Warmia and Mazury	2007	1426883	265059	2 /0.1	0/0.0	35/2.5	4/0.3	0/0.0
		2008	1426155	263607	1/0.1	0/0.0	38/2.7	4/0.3	0/0.0
		2009	1427073	285201	2/0.1	0/0.0	33/2.3	4/0.3	0/0.0
		2010	1427118	270100	2/0.1	0/0.0	30/2.1	6/0.4	0/0.0
		2011	1427241	265 975	3/0.2	0/0.0	33/2.3	6/0.4	0/0.0
2.	Pomeranian	2007	2203595	359646	5/02	7/0.3	53/2.4	18/0.8	3/0.1
		2008	2210920	340109	5/0.2	7/0.3	51/2.3	19/0.9	3/0.1
		2009	2219512	399360	5/0.2	7/0.3	56/2.5	17/0.8	4/0.2
		2010	2230099	416795	4/0.2	7/0.3	60/2.7	19/0.9	6/0.3
		2011	2240319	406 568	7/0.3	8/0.4	46/2.1	19/0.9	6/0.3
3.	Greater Poland	2007	3378502	691356	6/0.2	5/0.1	84/2.5	20/0.6	3/0.1
		2008	3386882	705756	6/0.2	5/0.1	82/2.4	23/0.7	2/0.1
		2009	3397617	765273	5/0.1	7/0.2	82/2.4	27/0.8	2/0.1
		2010	3408281	781568	5/0.1	7/0.2	73/2.1	31/0.9	3/0.1
		2011	3419426	786 807	5/0.1	7/0.2	81/2.4	34/0.1	6/0.2

Source: Own studies in the period from January 2007 to December 2011 and data from the Ministry of Health

The development of organization network is a consequence of improving quality management systems and knowledge in accordance with the PDSA (Plan-do-study-act) cycle. The market success of the network of public hospitals determines a number of important factors such as: qualified, interdisciplinary team, access to capital, information and modern medical technologies.

Human capital cannot be separated from people [17].

However, the most important thing is the way in which staff (the medical environment) are working together with the use of these factors, with what values are they guided with and what attitudes and behaviour do they manifest (in the process of ensuring consistent quality of hospital services [18]).

These determinants significantly shape the comprehensive management of quality services in public hospitals.

MATERIALS AND METHODS

A query literature of the subject [19-22] was a model for the author's study questionnaire, covering thematic blocks of:

- comprehensive image of public hospitals,
- quality of work in the medical environment,
- complex quality management in the network of public entities.

This enabled the identification of the respondents' opinions concerning the above issues and obtaining answers to questions, for which it will be difficult or even impossible to get full knowledge on the basis of a document review or other

supplementary methods. The study analysed the working environment of the participants, including the access to tangible and intangible resources – knowledge & information. Information about the areas of the engagement of medical environment, in the process of building and improving comprehensive model of the quality management in public hospitals was also collected. Multifaceted and multidimensional nature of the compact quality management process in public hospitals is the subject of interdisciplinary studies. In accordance to the principle of triangulation adopted in research methodology, secondary data were used. The data were obtained as a result of:

- literature review – theoretical publications and works concerning the quality of health services,
- document review – analysis of relevant documents in the area of quality management of health services and legal solutions in the health care.

On the other hand, the primary data were obtained using an author's interview questionnaire with purposely selected group of respondents. Pilot research allowed a specification of questions – they have become clearer and more understandable for the respondents. The study was conducted from January 2007 to December 2011 based on methods, techniques and research tools, which were agreed upon after pilot testing from September 2006 to December 2006. It was carried out through the means of a categorized, authorial questionnaire. Furthermore, in order to widen the qualitative data, individual in-depth interviews (IDI) were carried out among representatives of medical staff, concerning the subject matter of thematic blocks included in the author's questionnaire.

Research sample was chosen in a random-layer way. Layers were public entities (small, medium and large [23]) (Table 4) as basic elements of heath care system in Poland.

Table 4. Public hospitals study based on employment

No.	**Size of a public hospital**				**Shared percentage**
1.	Small-sized hospitals (from 51 to 250 employees) in voivodeships	A	25	23,7%	64,8%
		B	23	22.2%	
		C	20	18,9%	
2.	Medium-sized hospitals (from 250 to 500 employees) in voivodehips	A	4	4,5%	26,5%
		B	19	17,9%	
		C	4	4,1%	
3.	Large-sized hospitals (over 501 employees) in voivodeships	A	1	0,79%	8,7%
		B	5	4,9%	
		C	3	3,01%	
Total			**104**	**100%**	**100%**

Source: Table prepared on the basis of author's own studies in the period from 2007 to December 2011 and CSO (Polish: GUS) data

There were 509 public hospitals registered in REGON (Code (acronym formed from the Register of the National Economy). Identification of companies operating in Poland through a number code is mandatory. The resulting information collected in the territorial scope, ownership, industry and legal forms. As of 31.12.2007) [24], raising credibility and representativeness of obtained results. Selection of public hospitals took place with the use of stratification in accordance with the following criteria of differentiation:

- regional – a division into voivodeships,
- employment structure (number), while members of the medical environment (N_1) were selected by:
- place of work – hospital wards.

Testing area included randomly selected public hospitals operating in Warmia and Mazury, Pomeriania and Greater Poland Voivodeship (18.75% of all voivodeships), determined in further considerations as A, B and C (analogously). Anonymous questionnaires were send to 104 public hospitals (20.43% of all public hospitals) in A, B and C voivodeships. The study was performed on a sample:

- N_1 - 8975 doctors representing the medical environment (7.33% of all doctors), who were selected in two stages; the 1st stage (5) of hospital wards [25,26] – internal medicine, gynaecology and obstetrics, neurology, orthopaedics and cardiology. The 2nd stage was the provision of work (in accordance with employment standards) regardless of the employment form, in favour of the analysed hospital wards. Studied population is, in accordance with the assumptions of the research procedure, similar, although small differences in public hospital were noted down as a result of changes in the health care system. Completion rate reached 81.20% (203 from 250). Representation of the medical environment taking part in the study is presented in Table 5.

Table 5. Structure of the surveyed population – medical environment

No.	Hospital wards	Seniority in hospital wards (years)					Education					Sex	
		Up to 5	>5-10	>10-15	>15-20	> 20	Without specialization	I^0	II^0	dr	Prof	W	M
1.	Internal medicine	2051	174	294	429	318	2051	397	686	657	74	2555	973
2.	Gynaecology and obstetrics	421	139	245	385	213	421	113	134	153	26	1058	331
3.	Neurology	249	198	209	184	167	249	299	354	398	56	1020	503
4.	Orthopaedics	583	193	229	294	174	583	322	374	429	31	199	767
5.	Cardiology	271	231	299	309	216	271	250	264	342	41	1076	493
Total		**3575**	**935**	**1276**	**1601**	**1588**	**3575**	**1381**	**1812**	**1979**	**228**	**5908**	**3067**

Medical Personnel: I0 - the first stage of a specific medical specialization, II0-second degree specific medical specialization, PhD - Doctor of Medicine, Professor. - Professor of medical science
Source: Own studies in the period from January 2007 to December 2011.

- N_2 - 120 participants of the pilot research from the medical environment
- *N3* - 540 participants. The report was based on an intentional sample: from (36) selected public hospitals from A, B and C voivodeships, groups of 15 people were chosen including: directors for medical affairs, voivodeship health departments, professors, heads of analysed departments and voivodeship medical consultants. Interviews were carried out using an identical set of questions (9) that were arranged in a proper order, which allowed grouping them in adopted, thematic blocks. These interviews were held in the period of time from January 2007 to December 2011.

The usefulness of adopted research methodology and the scale of benefits achieved by determining the important factors in the management process of repeatable quality for provided services in public hospitals, was achieved by a consistent and systematic repetition of researches in the adopted annual cycles. Furthermore, it allowed to formulate the research problem in the form of a questions: *What are the knowledge resources of the medical environment in terms of factors determining a repeatable level of provided services in public hospitals?*

RESULTS

In the process of the complex quality management for medical services, each participant has a particular knowledge, skills and abilities, which must be used at his/hers position - also possess "tacit knowledge". The intellectual capital is also a potential to entities, which later on translates into image and profit. However, for this to happen, there must be structural capital in public hospitals, which allows to transform knowledge into health-related benefits for the prosumer. It contains, among other things, all buildings, equipment, infrastructure and trading assets to enable the conversion of innovations emerging from the network operators to increase the quality of the patient care and satisfaction. The combination of these elements gives a full image of the intellectual potential of public hospitals (Tab. 2 and 3). The analysis of distribution of the structural capital conducted in the period from January 2007 to December 2011 of regions A, B and C, allowed to assess the extent of the problem in both the access to modern diagnostic equipment, as well as the level of quality of hospital services. In province A there is a luck of, among other things, a linear accelerator and MRI. This creates a risk for the continuity of the diagnostic process, and on the other hand increase in the cost of providing hospital services for both the entity and the patient (visits to another province, the additional fee for the use of equipment in private entities). Significant differences also exist in access to a CT scanner in A province in relation to the regions B and C.

Further research procedure was based on seeking answers from received thematic blocks in terms of knowledge of the important factors determining the quality of comprehensive medical services in the period from January 2007 to December 2011. The research problem was expressed in a form of a question: *What is the knowledge of the medical staff in public hospitals concerning the factors affecting the level of quality of medical services?* The analysis of respondent answers allowed to draw the following hypothesis: *The state of knowledge in medical environment in terms of the impact on significant factors for the repeatable level of quality in management of service provision process in public hospitals is satisfactory,*

while in managerial staff – relatively low. The boards of public bodies should draw conclusions: public hospital as a rewarding place to work is perceived negatively. Detailed information is summarized in the figures 1-2.

The effectiveness of the recruitment process is only 46% of the respondent answers. A lack of legal responsibility for the decisions was indicated by 34%. This is an important determinant, which may hinder the implementation of comprehensive quality systems in public hospitals. Availability, knowledge of procedures, standards was declared by 34%. The relatively low level - 47% of the respondents, indicated a lack of knowledge about the objectives and tasks of the entities/ hospital wards. This situation speaks for communication problems between the management of public hospitals and medical staff. Similar trends exist in adjusting the organizational and functional structure of public hospitals, for which 43% were in favour. They lack the flexibility to adapt to the standards and procedures for quality management process. Effective motivation policies has been appreciated by 52%. Positive atmosphere affects the increasing level of psychosocial competence for which 79% respondents were in favour of. This is an important factor in the process of sharing knowledge in the comprehensive quality of medical services. By the analysis of the "human factor" in public hospitals, including, among other things, a remuneration policy which is poorly assessed by 48% of the respondents: satisfaction with the workplace declared 59% of the respondents, the possibility of self-realization 43%, whereas the possibility for a promotion -50%. Positively about competition, as a growth factor of the quality level, was chosen by 36%.

Negatively assessed was the level of expenditure on human capital development (improving expertise, e.g. the amount of residencies: 2011. 369 FTEs in 2012, a slight increase in 444), for which 54% members of the medical staff were in favour of. For a quantitative and qualitative deficiency of the constituent components of hospital services 56% of the participants of medical staff were in favour of. In times of the public finance crisis, management effectiveness of the process affects the situation of public hospitals in a rather significant way, financial management - an important element of the policy for which 64% of the respondents were in favour of. Another microeconomic determinant is the quality of provided hospital services and their timeliness, chosen by 68%. Important factors of a comprehensively managed process of provision of hospital services should include the experience of medical staff, for which 81% of the respondents were in favour of. Based on the analysis of statements of medical experts (IDI participants) additional information was obtained concerning the classification of important risk factors occurring in the process of comprehensive quality management. According to the responders the risk of major importance for the quality management process is pro-health policies 19.80% (local authorities - 3.98%, Ministry of Health - 6.67%, and the National Health Fund - 9.15%).

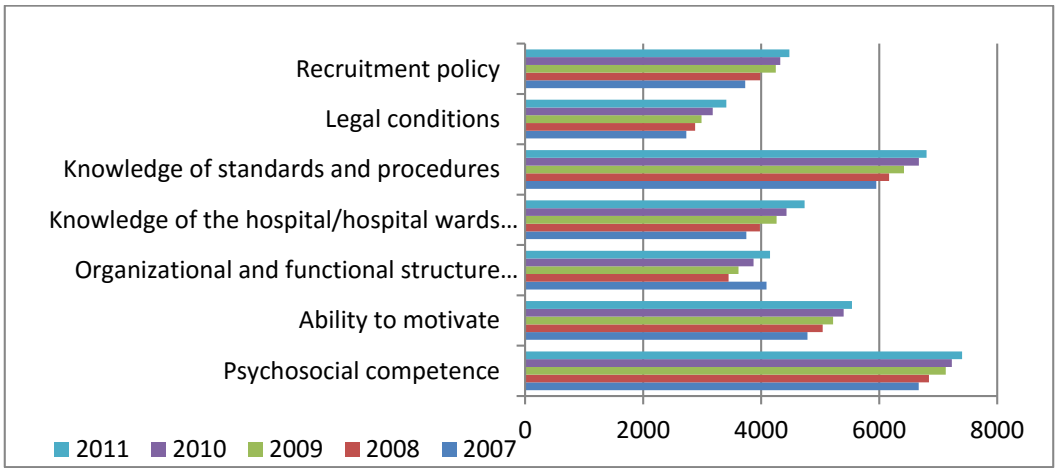

Figure 1. Criteria for assessing the quality level of the medical staff in analysed public hospitals Source: Own studies in the period from January 2007 to December 2011

On the next place is formalism and indecision in the decision making process 16.90% and ineffective coordination of sub processes 14.40%. For technical risks 11.56% were in favour of. For the lack of implementation timetable 9.36%. Obstruction in communication channels 7.29%, the risk of infrastructure 6.87%, for the lack of experience of the medical staff 5.01%, for the legal risk 4.65%, financial risks 3.16% and for the lack of adequate precision in the patient's medical records 2.89%.

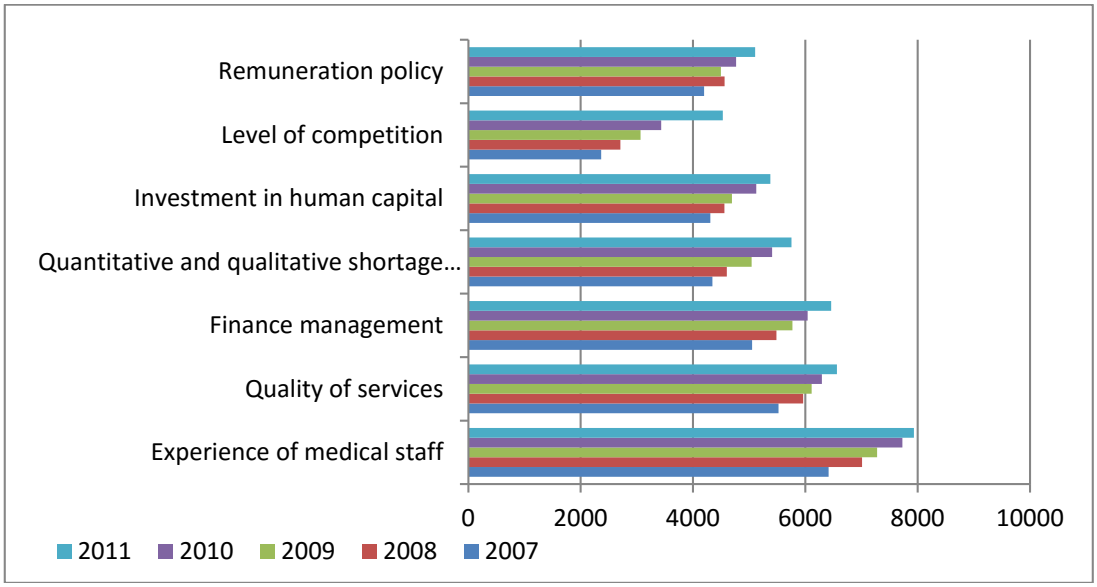

Figure 2. Quality determinants according to the medical staff of analysed public hospitals
Source: Own studies in the period from January 2007 to December 2011

Difficulties in obtaining qualified medical staff 2.36%, but the risk of environmental protection only 1.11%. The least are higher powers with 0.83%. The results are presented in Table 6 (where 1 means the risk of the highest importance in the process of the comprehensive quality management).

Table 6. Ranking of risk factors in the process of quality management according to the IDI participants

No	Types of risk	Place	% of answers
1.	Political risks, e.g. Health policy of local authorities, Ministry of Health, the National Health Fund	1.	19.80
2.	Formalism and indecision in the decision making process	2.	16.90
3.	Ineffective coordination of sub processes	3.	14.40
4.	Technical risk	4.	11.56
5.	No timetable for the implementation of the quality management system	5.	9.39
6.	Demotivational remuneration system	6.	8.53
7.	Obstruction in communication channels	7.	7.29
8.	Infrastructure risk	8.	6.87
9.	Lack of experience of medical staff	9.	5.01
10.	Legal risk	10.	4.65
11.	Financial risk	11.	3.16
12.	Lack of proper precision in the documentation	12.	2.89
13.	Difficulties in obtaining qualified medical	13.	2.36
14.	Environmental protection	14.	1.11
15.	Higher power	15.	0.83

Source: Own studies in the period from January 2007 to December 2011

Respondents could choose more than one answer, so the numbers do not add up to 100% Data analysis (Figure 3) shows that 85% believe that the use of appropriate procedures and standards are the key quality factors, while 76% of respondents believe that it is the modern hospital equipment. 79% of the IDI participants preferred innovative drug therapies as determinants of the increase in the process quality provision of hospital services. A disturbing phenomenon is the lack of opinion declared by 6.54% of the surveyed medical experts.

According to the authors, these results reflect the situation in public hospitals.

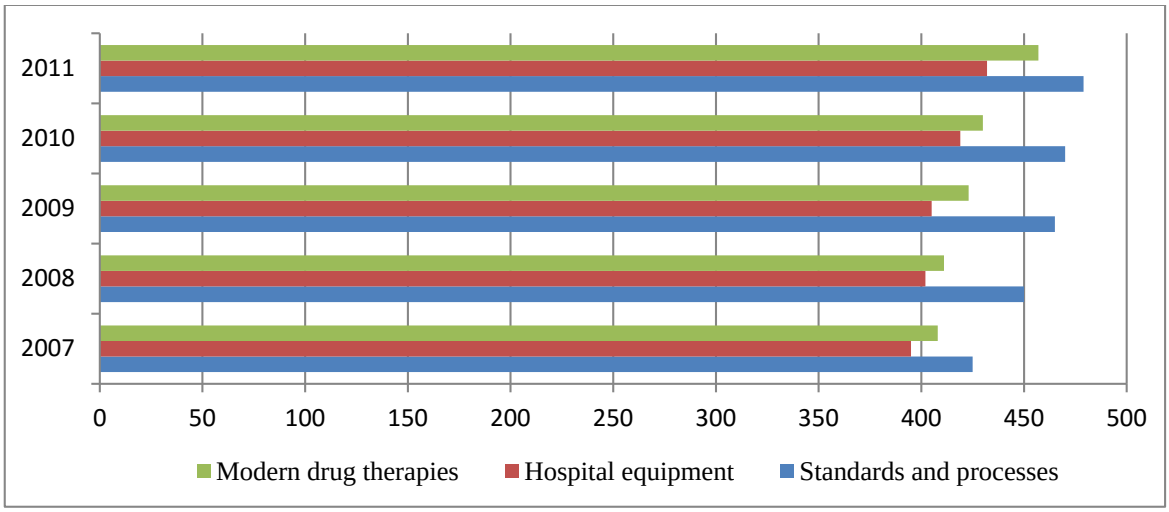

Figure 3. Quality determinants according to medical experts
Source: Own studies in the period from January 2007 to December 2011

Reconsideration of the presented results leads to the conclusion that the synthetic approach can be summarized as follows:

- quality converted into value for both the public hospitals and a patient is the basis for the creation and development of the intellectual capital of medical staff,
- intellectual capital is formed on the basis of management of its resources, which may be the source and material of values of modern public hospitals and comprehensive quality management systems,
- therefore, only those assets, which are relevant to the strategic objectives of public entities and can be effectively used in the process of providing quality hospital services, are important.

Accession to the European Union – The EU has created not only the need of implementation but also to respect the EU standards. Adaptation of the network of public hospitals (medical environment) is a multistage and long-term process connected with the need to overcome a number of barriers occurring both in entities and their surroundings.

DISCUSSION

Public hospitals are the basis for the functioning of health care in Poland. The study, which was partially presented in this paper, including the results of previously conducted studies (An original research project: Socio-economic determinants of process management services in public hospitals. The study was conducted from January 2007 to December 2011 in three provinces in 104 public hospitals. The study involved: N1 - 8975 in the medical and N2 - 120 participants in the pilot group, N3 - 540 participants in individual interviews and N4 - 93 600 inpatients and N5 - 1000 participants of the pilot group) of authorial research, provided evidence to support the hypothesis. This standpoint is consistent with pro-quality benefits, which are also presented in the works of K. Opole, M. and M. Możdżonek Dykowska [27]. In addition, it also provides evidence that the CAF system can have a significant impact on the level of quality in the Polish health care. In Finland, for example, the implementation of CAF rules in health care is supported through training, introduction of electronic tools the publication of information materials and creation of databases [28]. In Poland, the evaluation criteria includes personnel qualification, skills and experience, provided equipment and medical equipment, external evaluation confirmed with a certificate (Tables 2, 3).

It is difficult to determine the “right” level of quality for patients and the network of public hospitals. In the case of hospital services, entities compete with each other by providing services of varying quality and price, and patients express their preferences in the selection process. The quality of hospital services depends on the investments in the infrastructure (Table 3) of a network organization, and as a reflective relation – the level of required investments is a function of the service’s level. The sense of purpose, implementation of the public hospital network, the patient expectations and factors determining pro-quality requirements determine the complexity of the quality management process. Health satisfaction of a patient is a determinant of health care [29].

In the medical environment, there is a growing interest concerning the achievement of repeatable quality of provided hospital services. This is reflected in the growing importance of the determinants presented in the quality management for medical services in the conducted study from January 2007 till December 2011 in 104 public entities in three provinces. This reflects the relatively high awareness of the issue of quality management in public hospitals. Comprehensive quality

management system, based on ISO standards, is a complex and multi-faceted tool that requires adequate knowledge, preparation and commitment of personnel from public hospitals by:

- Implementation of procedures and standards in order to enable the improvement of the quality,
- Conscious realization of pro-quality policy in terms of trainings,
- Motivational tools, employee evaluation system and patient service standards.

Referring to the views of J. Solano [30], regardless of what the actual preferences of patients and physicians about the situation are, that which is to be considered normal is the one where preferences related to the time and method of provision of hospital services are converging. An important aim of the staff (managing public hospitals) should be to strive to build an organizational and functional culture of pro-effective, targeted value and organizational learning system. The results of the study, supplemented by qualitative data also confirmed the significance of the training processes and information activities to promote knowledge and shaping mutual understanding. In Poland there should be an organization based on the Canadian Health Services Research Foundation - CHSFR which aims to: *Encourage decision-making process based on scientific evidence [...], management and provision of health services through funding research, creating opportunities and transfer of knowledge with the intention to implement it, creating and fostering relationships between decision-makers [managers and politicians] and researchers* [31].

The analysis of respondent answers, supplemented by the data from IDI, allowed to draw a following hypothesis: *The state of knowledge in medical environment in terms of the impact on significant factors for the repeatable level of quality in management of service provision process in public hospitals is satisfactory, while in managerial staff – relatively low*. In addition, according to the results of K. Rogoziński work, the core of continuous quality in the public hospitals network is: *"A masterful control […] and appropriate moral attitude, which conditions the achievement of the success* [32]*"* in the pro-quality processes of provided services and the increase of stakeholders' satisfaction.

CONCLUSIONS

Paradigms of organization and management sciences allowed expanding the scope of study on the analysis of determinants for the complex quality management for public hospitals based on the family of ISO standards. Factors focused on human and structural capital describing the quality of intellectual capital, supplemented by an organizational and functional layer, allowed to obtain answers in the range of phenomena that can be observed in the quality management of public hospitals' network. All evidences and conducted observations allowed the, inter alia:

- Identification of needs for the network structure in the range of quality management and phenomena, which have positive/negative influence on the complexity of management process,
- Diagnosis of the status and condition of quality management in the network of public hospitals,
- Medical environment in diagnostic and therapeutic processes has certain obligations,
- Procedures, standards and recommendations applicable in public hospital are appropriate. However, there is a lack of personal responsibility among the medical environment's and lack of updating processes of mutual communication with the environment where
- The public opinion about the functioning of public entities has been improving. On the other hand, the medical environment strongly emphasizes on
- The quality of diagnostic and therapeutic sub-processes in the process of building a positive image and the growth of public trust.

In accordance with these objectives, results can serve as an inspiration for stakeholders in the implementation of repair and preventive actions in a process of complex quality management of provided services and be an important source of information for managerial staff – shaping quality management policies within the framework of public hospitals' network. Adopted concept of researches allows the identification of relation in the range of quality policies' realization and the use of specific models (tools, principles) for the complex quality management with an intellectual capital of the medical environment.

Moreover, these conclusions provided information that an important factor in the process of the organization network comprehensive quality management, which determines the quality perceived from the perspective of patients, are (inter alia) awareness, attitude and value of the medical environment. In the context of this effect, it is possible to put forward a hypothesis that the public hospital complex quality management should be based on the family of ISO standards, CAF method, IiP – Investors in People, supported by Information and Communication Technologies – ITC. In this perspective, they become important tools in support of desirable directions of development the quality of provided services by the network of public hospitals. Furthermore, they emphasize the need to measure achievements of the network organization and shaping processes of acquiring and managing information. Additionally, they are significant tools in the process of planned changes in the turbulent environment of individual entities.

- Study conclusions and the review of essential requirements for a quality management system in the provision of medical services can be summarized as follows:
- The implementation of the next formalized risk management decision-making system in public hospitals should be approached with special attention focusing on adaptation or including pre-existing solutions to new system requirements.
- In the case of systems based on the analysis, the focus should be on setting up rules and procedures on realistic and substantial threats to the quality process otherwise new solutions may not meet with the understanding and acceptance of the medical staff,
- Rational formulation of the objectives of public entities is an expression of adapting to the turbulent environment of quality management for medical services,
- Implementation of IT solutions increase the effectiveness of “the quality policy",
- Internationalization of specialized centres (e.g. oncological, neurological or treatment of burns) is an effective means of increasing the quality of services and use of economies of scale.

The diagnosis of the process management quality of services provided in public hospitals was also made based on the analysis of the human capital, resulting from the involvement of medical personnel and the quality of the work environment. The approach of TQM philosophy facilitates the implementation of pro-quality requirements that determine the effective management of areas in the provision of medical services.

In addition, respondents are pointing out the necessity of putting specific requirements before the quality management system, confirm the validity of the claim that it is a tool, and the ability to support it depends on what benefit a specified public hospital. Furthermore, respondents emphasize the lack of system’s perception as a set of interrelated and interacting elements – a natural tool for the management of network organization and its development on the basis of PDSA cycle.

In conclusion, the aim of this work was to identify determinants of quality in the provision of medical services. According to the authors, this objective has been achieved through a study of knowledge concerning the quality present in process management services in public hospitals, as entities operating in market conditions. It presents the current status of public entities and proposes practical solutions, indicating the tools and capabilities to implement the principles of quality in the process of the stakeholder’s satisfaction. It is also an important contribution to the deepening of knowledge about the shaping of the quality management of services in public hospitals. Its theoretical layer is based on a query literature and empirical verification of the important factors of quality systems in the provision of medical services, extending the knowledge of this segment of contemporary economics of public hospitals.

Conflicts of interest

The authors declare that there are no conflicts of interest of this paper.

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Lipid peroxidation and antioxidant protection in patients with papulo-pustular rosacea

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ABSTRACT

Purpose: To examine lipid peroxidation, antioxidant protection and L-arginine-NO – system in patients with papulo-pustular rosacea.

Materials and methods: The study included 128 women with papulo-pustular rosacea aged 40.1±0.99 years (range: 18-68 years). The patients were divided into three groups based on the severity of the symptoms: group I –patients with mild rosacea (n=42), group II – patients with moderate rosacea (n=49), group III – patients with severe rosacea (n=37). Indicators of lipid peroxidation and antioxidant protection were defined in all patients by a spectrophotometric method.

Results: The first group of patients showed a significant decrease in superoxide dismutase (SOD) and ceruloplasmin when compared to the control group. A significant increase in diene conjugates (DC), malondialdehyde (MDA), liposoluble antioxidants (retinol, α-tocopherol) and decrease in SOD, catalase and ceruloplasmin were observed in the second group. Patients in the third group had similar dynamics with a worsening of lipid peroxidation.

Conclusions: The changes in some parameters of lipid peroxidation and antioxidant protection were revealed in patients with papulo-pustular rosacea. The nature of these changes depends on the severity of the disease. Evaluation of the antioxidant imbalance may be informative to determine the understanding of the genesis of dermatosis and to study therapeutic strategy aimed at reducing the generation of reactive oxygen species (ROS), leading to a decrease in the capacity of the antioxidant defense.

Key words: rosacea, papulo-pustular subtype, etiopathogenesis, lipid peroxidation, antioxidant protection.

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INTRODUCTION

Today rosacea is a common disease. According to different authors, frequency of dermatosis varies from 5 to 10%, and women suffer from this disease three times more often than men [1,2]. The high prevalence of the disease, the implementation of multifactorial and genetically determined mechanism of chronic, often relapsing course, as well as resistance to conventional therapies allows rosacea to refer to the most vital diseases in modern dermatology and cosmetology [3-5].

Despite the increased interest in recent research to this dermatosis, etiopathogenetic aspects of rosacea are not fully understood and are often contradictory. Several authors assign an important role in the development of rosacea to the disturbance of prooxidant-antioxidant balance, to the factors that stimulate angiogenesis and vasodilation, as well as nitric oxide which is constantly produced in the endothelium from L-arginine with the participation of NO-synthase [6-9].

Skin is the largest organ in organism, which prevents it from different environmental pollutants or toxicants. Most of them are oxidants. These substances directly or indirectly lead to production of reactive oxygen species (ROS). ROS are short-lived entities that are continuously generated at low levels during the course of normal aerobic metabolism. ROS include singlet oxygen (O_2), superoxide anion (O_2^-) H_2O_2, the hydroxyl radical (OH^-), etc. [10]. Increased production of ROS is involved in the pathogenesis of a number of skin disorders including vitiligo, lupus erythematosus, psoriasis, acne vulgaris, rosacea, different allergic reactions in the skin, etc. [11-14].

There is compelling evidence that oxidative stress drives the production of oxidation products, which can denature proteins, alter apoptosis, and influence the release of proinflammatory mediators, such as cytokines, which may be critical for the induction of some inflammatory skin diseases. This is also based on the recognition that ROS can act as second messengers in the induction of several biological responses, such as the activation of TNF, the generation of cytokines, the modulation of signaling pathways [10]. However there is own complex antioxidant system (AOS) in human organism for prevention of lipid peroxidation. These AOS includes ceruloplasmin, retinol, α-tocopherol, reduced glutathione, superoxide dismutase (SOD), catalase, etc. Antioxidants interact with ROS or their by-products to either eliminate them or to minimize their deleterious effects.

In this context, it is important to study the state of free-radical processes and antioxidant L-arginine-NO-system in patients with papulo-pustular rosacea, which will enhance the understanding of dermatosis mechanism and improve the treatment.

The aim of our investigation was to study of lipid peroxidation, antioxidant protection and L-arginine-NO – system in patients with papulo-pustular rosacea.

MATERIALS AND METHODS

The study involved 128 women with papulo-pustular rosacea, seeking medical care in out-patient and in-patient department of Grodno Regional Dispensary of Skin and Venereal Diseases and at the department of Dermatovenereology of Grodno State Medical University. The control group consisted of almost 41 healthy women.

Study inclusion criteria: papulo-pustular rosacea (L71); progressive stage of the disease; female; age over 18 years; informed consent to medical intervention and compliance with doctor's instructions regarding the prescribed therapy; the absence of concomitant diseases in the acute phase, requiring constant medical treatment; negative pregnancy test.

In order to determine the clinical form of the disease, we referred to the international classification which was developed by the National Rosacea Society Expert Committee on the Classification and Staging of Rosacea [15]. This classification includes erythemato-telangiectatic rosacea, papulo-pustular rosacea, phymatous rosacea (hypertrophic) and ocular rosacea.

According to the scale of the diagnostic evaluation of rosacea, which included a qualitative assessment of the severity of the main symptoms of the disease, all the subjects were divided into three groups based on the severity: group I – patients with mild rosacea (n=42), group II – patients with moderate rosacea (n=49), group III – patients with severe rosacea (n=37).

The activity of the various stages of free radical processes was evaluated on the content of the primary (diene conjugates (DC)) and secondary (malondialdehyde (MDA)) lipid peroxidation products in the red blood cells and blood plasma using spectrophotometric method. The state of non-enzymatic and enzymatic components of AOS was studied on the content of ceruloplasmin, retinol, α-tocopherol in the blood plasma, as well as reduced glutathione, SOD and catalase activity in erythrocytes with use of spectrophotometric method [16].

Nitric oxide production was determined by the total content of nitrate/nitrite (NO^{3-}/NO^2) in the blood plasma. In order to estimate the total nitrite NaOH, blood plasma was deproteinized with zinc sulfate, followed by reduction of nitrate to nitrite by means of granules of cadmium. Measuring the level of NO^{3-}/NO^2 in blood plasma was carried out by

spectrophotometric method at 540 nm with Griess reagent [17,18].

Statistical analysis of digital data was performed using the application package Microsoft Excel and Statistica 6.0. In order to describe the results obtained, we calculated the frequency of the studied phenomena (p) with the arithmetic mean (M) and the standard error of mean (m). The figures and the text data are expressed as M±m. As the group variances were not homogeneous, analysis was performed by nonparametric Mann-Whitney U test. If the group variances were homogeneous, independent-samples t-test was used for comparing two groups. $P < 0.05$ between the two groups was accepted as significant.

RESULTS

The study involved 128 women with papulo-pustular rosacea. The average age of patients was 40.1±0.99 years (range: 18-68 years). The dominant age group was aged 31-40 years and consisted of 49 participants (38.3%). Moderate rosacea existed in all age ranges. However, age group from 31 to 40 years showed the majority of patients, suffered from severe rosacea.

The disease duration ranged from 1 month to 10 years with an average of 44.5±2.5 months. The proportion of patients with disease duration of up to one year was 14.1%, from 1 year to 5 years – 60.2%, from 5 to 10 years – 25.8%. Within these groups, results showed the largest number of patients suffered between 1-5 years. Additionally, the results also showed that the majority of patients who suffered either from 1-5 years or 5-10 years were affected with moderate rosacea (21.9% and 12.5%, respectively). In patients with disease duration up to a year, the majority of patients suffered from mild rosacea (8.6%). The maximum duration of dermatosis was in the 51-60 year-old age bracket. For patients under the age of 60, the following pattern was defined: the older the patient is, the longer the continuation of dermatosis lasts.

When assessing subjective sensations, patients with papulo-pustular rosacea reported that they suffered from: itch of the skin (61.0% of cases), a burning sensation in the area of lesions (45.3%), hot flushes (33.6%), tightening of the skin (28.9%), pain in the rash (21.1%). Only 10.9% of patients reported that there were no subjective sensations.

In all patients, the clinical picture was characterized by the presence of papules and pustules against a background of persistent erythema and telangiectasia. The incidence of erythema differed among patients. It was observed that in 123 (96.1%) patients it affected the cheeks, in 115 (89.8%) – the chin, in 99 (77.3%) – the forehead, in 37 (28.9%) – the nose, in 16 (12.5%) – perioral region, in 3 (2.3%) – eyelids, in 1 (0.8%) – neck. Against erythema background both visual and dermatoscopic treelike branching network of blood vessels were verified. Multiple papular and pustular elements were placed on the skin of the cheeks for 83 (64.8%) patients, on the skin of the chin for 39 (30.5%), on the forehead for 24 (18.8%), on the nose for 23 (18.0%), in the perioral area for 3 (2.3%). The size of the papules and pustules ranged from 1 to 4 mm in diameter.

From the 128 patients in this study, 94 (73.4%) patients used systemic medications such us antibiotics, antihistamines and desensitizing agents, metronidazole and vitamins. Such drugs as metronidazole, azelainic acid, antibiotics, agitated slurry containing alcohol, acaricidal and / or antibacterial component were topically prescribed. Additionally, 23 (18.0%) patients independently and 46 (35.9%) patients on prescription used outside agents containing steroids. The therapy gave moderate inconstant effect. These patients had repeatedly received out-patient treatment from dermatologists and cosmetologists near their places of residence or in-patient treatment from the department of Grodno Regional Dispensary of Skin and Venereal Diseases.

The next stage of this research was to study the lipid peroxidation in patients with papulo-pustular rosacea. For this purpose, an evaluation of primary (DC) and secondary (MDA) lipid peroxidation products in the erythrocytes and blood plasma were carried out (Tab. 1).

As seen in Table 1, when evaluating the primary (DC) and secondary (MDA) lipid peroxidation products in the erythrocytes and blood plasma of patients with mild papulo-pustular rosacea, significant differences from those of the control group were not found ($p>0.05$).

In erythrocytes of the patients with the moderate rosacea compared to the control group it was found a reliable growth of indicators of both primary (DC) (11.6±0.33 U/ml and 10.3±0.35 U/ml respectively, $p<0.01$) and secondary (MDA) (10.5±0.28 mmol/L and 9.6±0.25 mmol/L respectively, $p<0.05$) lipid peroxidation products. In regard to plasma, no significant differences in the content of DC and MDA were detected ($p>0.05$).

When investigating the similar indicators of the patients with severe rosacea, it was observed that the concentration of DC and MDA in erythrocytes was 1.2 times higher than that in the control group. The concentration of DC in erythrocytes was noted at 12.8±0.53 U/ml and 10.3±0.35 U/ml respectively, $p<0.001$. For MDA, the concentration was 11.5±0.41 mmol/L and 9.6±0.25 mmol/L respectively, $p<0.001$.

These results are possible due to the accumulation and subsequent activation of free radicals (Tab. 1). The blood plasma of the patients in this group showed a significant increase of MDA

concentration (1.9±0.14 mmol/L and 1.5±0.08 mmol/L respectively, p<0.05) compared to the control group.

Table 1. Indicators of the lipid peroxidation in women with papulo-pustular rosacea

The test indicator		Control group (n=41)	Group I (n=42)	Group II (n=49)	Group III (n=37)
Erythrocytes	DC (U/ml)	10.3±0.35	9.8±0.46	11.6±0.33*#	12.8±0.53*#†
	MDA (mmol/L)	9.6±0.25	9.5±0.25	10.5±0.28*#	11.5±0.41*†
Plasma	DC (U/ml)	1.2±0.12	1.3±0.15	1.3±0.14	1.5±0.18#
	MDA (mmol/L)	1.5±0.08	1.6±0.07	1.7±0.05	1.9±0.14*

* – significant differences between the control and the first group, between the control and the second group, between the control and the third group; # – significant differences between the first and second group, between the first and the third group; † – significant differences between the second and third group.

Increased activation of accumulation of free radicals in patients resulted in a significant increase in lipid peroxidation for all three groups. Furthermore, the more severe the symptoms, the more dramatic the results become. By studying the results in patients of the second and first groups, it was found that the concentrations of DC (11.6±0.33 U/ml and 9.8±0.46 U/ml respectively, p<0.01) and MDA (10.5±0.28 mmol/L and 9.5±0.25 mmol/L respectively, p<0.05) in erythrocytes of the patients in the second group were significantly higher than that of in the first group. When comparing the data obtained in patients from the second and the third group data showed a significant increase in concentration of both DC (p<0.05), and MDA (p<0.05) in the red cell mass of the patients of the third group compared with the patients of the second group. Concentrations of DC in blood plasma (p<0.001) and erythrocytes (p<0.001) were significantly higher in patients from the third group in relation to those in the first group.

When evaluating the content of nitric oxide (Fig. 1) was found an increase in patients with different severity of papulo-pustular rosacea. Thus, the first group showed (11.3±0.6 mkmol/L), the second group showed (13.0±0.6 mkmol/L) and the third group showed (14.9±0.71 mkmol/L) a significant increase of nitric oxide compared to the control group which only showed (9.4±0.39 mkmol/L) (Fig. 1). Evaluation of the content of the nitric oxide found in patients showed that as the severity of the disease increased, so did the concentration of nitric oxide.

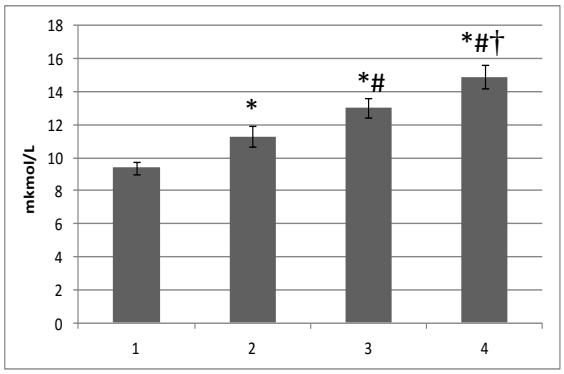

Figure 1. Level of nitric oxide (mkmol/L) in patients with papulo-pustular rosacea in the control group – 1, in the first group – 2, in the second group – 3, in the third group – 4; * – significant differences between the control and the first group, between the control and the second group, between the control and the third group; # – significant differences between the first and second group, between the first and the third group; † – significant differences between the second and third group.

To evaluate indicators of AOS condition, ceruloplasmin, retinol, α-tocopherol in the blood plasma, as well as reduced glutathione, catalase and SOD in red blood cell mass were tested (Tab. 2).

Performance analysis of the enzymatic chain of AOS showed a significant decrease in the activity of the main intracellular antioxidant – SOD in erythrocytes of patients of the first (43.5±2.01%, p<0.01), of the second (40.7±1.94%, p<0.001) and of the third (36.71±2.05%, p<0.001) groups compared with the control group (50.3±1.38%). In addition, there was a significant decrease in the activity of the enzyme studied in patients with mild papulo-pustular rosacea compared with severe (p<0.05) (Tab. 2).

The activity of catalase in red blood cells of the first group of patients showed a tendency of its reduction (29.9±0.42 mmol H_2O_2/min/g Hb and 30.5±0.53 mmol H_2O_2/min/g Hb respectively, p>0.05) compared with the control group. The activity of this enzymatic antioxidant was significantly lower in patients with moderate rosacea (28.6±0.43 mmol H_2O_2/min/g Hb, p<0.01), than in the control group. The most pronounced changes verified in erythrocytes of patients with severe rosacea (27.5±0.54 mmol H_2O_2/min/g Hb, p<0.001) compared with the control group. This data clearly showed a significant decline of catalase in the second and third groups compared to the first group (Tab. 2).

No significant differences in the concentration of reduced glutathione in patients with different forms of papulo-pustular rosacea were not found (Tab. 2).

An analysis of the functioning of non-enzymatic components of AOS showed a significant decrease in the level of ceruloplasmin in the blood plasma of patients of the first (109.3±5.59 mg/L, $p<0.05$), of the second (92.3±5.71 mg/L, $p<0.001$) and of the third (75.9±5.44 mg/L, $p<0.001$) groups compared with the control (124.1±4.81 mg/L). In addition, there was a significant decrease in the concentration of the studied antioxidant with an increase of the severity of rosacea (Tab. 2).

Table 2 Indicators of antioxidant system in patients with papulo-pustular rosacea

The test indicator		Control group (n=41)	Group I (n=42)	Group II (n=49)	Group III (n=37)
Erythrocytes	SOD (%)	50.3±1.38	43.5±2.01*	40.7±1.94*	36.7±2.05*#
	Catalase (mmol H_2O_2/min/g Hb)	30.5±0.53	29.9±0.42	28.6±0.43*#	27.5±0.54*#
	Reduced glutathione (mkmol/g Hb)	24.7±1.05	24.6±1.26	25.7±1.31	28.6±1.72
Plasma	Ceruloplasmin (mg/L)	124.1±4.81	109.3±5.59*	92.3±5.71*#	75.9±5.44*#†
	Retinol (mkmol /L)	1.03±0.05	1.09±0.05	1.3±0.07*#	1.1±0.07
	α-tocopherol (mkmol /L)	15.6±0.71	17.6±0.83	19.7±1.10*	17.0±1.71

* – significant differences between the control and the first group, between the control and the second group, between the control and the third group; # – significant differences between the first and second group, between the first and the third group; † – significant differences between the second and third group.

In assessing the content of liposoluble antioxidants, we found a significant increase in the level of retinol in the blood plasma of patients with moderate rosacea (1.3±0.07 mkmol/L and 1.03±0.05 mkmol/L respectively, $p<0.01$) compared with the control group. Indicators of vitamin A in patients of the first and third groups were not significantly different from the control group, but tended to increase ($p>0.05$).

Furthermore, when comparing the value of this indicator between the groups of examined patients it showed a significant increase in the second (1.3±0.07 mkmol/L and 1.1±0.07 mkmol/L respectively, $p<0.05$) compared to the third group was found (Tab. 2).

The concentration of α-tocopherol in the blood plasma of patients of the second group was significantly higher (19.7±1.10 mkmol/L and 15.6±0.71 mkmol/L respectively, $p<0.01$) compared to the control group. In patients of the first (17.6±0.83 mkmol/L and 15.6±0.71 mkmol/L respectively, $p>0.05$) and the third (17.0±1.71 mkmol/L and 15.6±0.71 mkmol/L respectively, $p>0.05$) groups the above mentioned figure tended to increase, but did not differ significantly from that of the control group.

Comparison of α-tocopherol between groups revealed no significant difference (Tab. 2).

DISCUSSION

Low concentrations of free radicals and lipid peroxidation products of different stages are produced as a result of normal oxidative metabolism occurring in physiological conditions at a very low level [19].

Disorders of the antioxidant-prooxidant balance are caused by excessive activation of lipid peroxidation. When the antioxidant-prooxidant balance is disrupted, free radicals and toxic products of reactions of lipid peroxidation alter the original structure and the normal functional activity of cellular and subcellular membranes [20,21]. This further promotes the release of proteolytic enzymes in the cell cytoplasm and then into the bloodstream and alter metabolism of cellular systems.

Furthermore, it stimulates the formation of inflammatory mediators – prostaglandins, leuko-trienes, lymphokines [22].

The result of this process is a development of inflammatory changes in the affected skin, which clinically manifest as the main signs of dermatosis – erythema, telangiectasia, papules, pustules, edema and infiltration. In addition, disturbance of lipid peroxidation activity promotes changes of proliferative activity of lymphoid cells and (starting)

immunopathological mechanisms of inflammatory reactions [22].

Lipid peroxidation and oxidative stress have an important role in many inflammatory skin diseases. Rosacea is a disorder of unknown pathophysiology. Multiple aetiological factors have been proposed. Sunlight and heat are important factors in the pathogenesis of disease [23]. Recent studies have shown the role of oxidative stress and antioxidative system disorders in rosacea: exposure to UV light resulted in a significant increase in antioxidant enzyme activities in skin [24-26].

In our study an increase in the content of nitric oxide was revealed. The maximum increase of them being observed in cases of severe pathology. It is known that nitric oxide molecule acts as an effector, which determines the amount of blood flow in the microcirculation [19]. At the same time, this molecule when combined with superoxide anion forms peroxynitrite, which has a marked cytotoxic effect and is capable of oxidizing lipids and proteins of cell membranes. This results in damaging effects of the membranes [9].

The concentration of nitrogen monoxide in the systemic circulation may reflect not only the level of activity of L-arginine-NO-system, but the tension of other mechanisms. These are encountered when there is excess of nitric oxide, particularly an increase in lipid peroxidation and decrease in antioxidant defense. Nitric oxide can be characterized as one of the mediators of inflammation in rosacea [27].

The body has its own antioxidant system that eliminates an excess of reactive radicals, but in many pathological conditions, it is inconsistent, which results in damage to the cell membranes. This damage causes dysfunction of cells and tissues, which entails the development of oxidative stress. In patients with this disorder, the development of oxidative stress takes place, which is implemented through the NO-dependent mechanisms. The action of nitric oxide is spread through its reactive forms and is carried out with the participation of over-expression of inducible form of NO-synthase, through which a large amount of NO is produced. Thus, not only oxidation, but also nitrosative stress caused by excessive formation of NO in these regions of the body are being developed [28]. Undoubtedly, the increased activity of free radical oxidation of lipids is an important factor in the development of pathogenesis that must be considered in the therapy of this pathology.

The activation of free radical processes that causes the depletion of antioxidant defense mechanisms is an important pathogenic factor in this disease. Obviously, carrying out the treatment of patients with rosacea should include a means that strengthen the antioxidant resource and decrease the manifestations of oxidative stress. Evaluation of the mechanisms of free radical pathology will allow for justification of the therapeutic strategy aimed at reducing the generation of active oxygen forms.

CONCLUSIONS

Thus, according to the results of a comparative analysis of clinical and laboratory data of patients with papulo-pustular rosacea we can deduct the following conclusions:

1. In patients with papulo-pustular rosacea prooxidant-antioxidant disbalance was found. It was manifested in the activation of lipid peroxidation and in the change of some parameters of antioxidant protection, the nature of which depends on the severity of the disease.
2. Patients with different severity of papulo-pustular rosacea showed increase in primary and secondary lipid peroxidation products (DC and MDA). The concentration level of main components of antioxidant system was decreased. Concentration of reduced glutathione showed no change.
3. The revealed disorders of prooxidant-antioxidant balance are accompanied by an increasing concentration of nitric oxide. This reflects that L-arginine-NO system involved in the observed changes. Obviously, the NO-dependent nature of the oxidative stress is an important part of the pathogenesis of papulo-pustular rosacea for these patients.
4. Considering that the level of liposoluble antioxidants (retinol and α-tocopherol) in the blood plasma for the patients with papulo-pustular rosacea is higher than that for those patients in the control group, we raised the question whether it is compulsory to include these antioxidants in the therapy of this disease.

Conflicts of interest

The authors declare no conflicts of interest.

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The quality of life of women suffering from polycystic ovary syndrome

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ABSTRACT

Purpose: To assess how certain clinical symptoms of polycystic ovary syndrome (PCOS) affect the quality of life of women, their activity, and their sexual lives.

Materials and methods: The World Health Organization quality of life questionnaire (WHOQOL-Bref) was used to assess the quality of life and health of 78 women diagnosed with PCOS, and the female sexual function questionnaire -28 (FSQ-28) was used to assess their sexual activity and associated disorders.

Results: Among three groups of women with varying body mass indexes and aged 26.93 years on average, significant differences ($p<0.05$) were found in quality of life. In individual domains of the WHOQOL-Bref, the median score of women with obesity was lower than that of women with normal body weight or with overweight. Women with symptoms of hirsutism showed lower quality of life than women without these symptoms, while women who had undergone treatment for 4–6 years experienced significantly worse quality of life than those who had undergone therapy for less than 3 or more than 6 years. In the various domains of sexual response, regression analysis showed a positive correlation ($p <0 .05$) between better quality of life and women's sexual activity.

Conclusions: Clinical symptoms of PCOS such as obesity and hirsutism affect women's quality of life, as does the length of infertility treatment, whereas general quality of life affects the occurrence of disorders in women at particular stages of sexual response.

Key words: polycystic ovary syndrome, women, quality of life

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INTRODUCTION

Polycystic ovary syndrome (PCOS) is classified amongst the endocrine disorders occurring in women in the reproductive period. The frequency of its occurrence in this group of women varies between 6 to 10% [1,2]. Its pathogenesis has not yet been conclusively explored. It is believed to result from complex interactions between genetic, behavioral, and environmental factors [1,3,4].

Mutations of several genes are important pathogenic factors; they are involved in the synthesis of steroid hormones as well as regulation of gonadotropin, insulin signal, and body weight. The environmental factors contributing to PCOS in women with genetically determined insulin resistance are mainly weight gain and obesity [1,4].

Women suffering from PCOS exemplify a variety of clinical symptoms such as: menstrual disorders (53-66%), problems conceiving (42-73%), hirsutism (65%), obesity (35-38%); whereas about 20% of women do not experience any characteristic symptoms [1,2,5].

The clinical symptom of PCOS has a huge negative impact on the individual's psychological and interpersonal functioning [1,6]. Also, infertility, which often accompanies PCOS, is a source of anxiety, sleep disorders, feelings of helplessness, guilt, hurt, and difficulty maintaining interpersonal relationships. Moreover, the treatment process is associated with many invasive procedures, as well as a kind of objectification of the sexual act, which can lead to communication and sexual problems between partners [5,6].

Few studies have undertaken the issue of the functioning of women with PCOS. However, there is empirical evidence that the accompanying changes in the body's appearance and reproductive organ dysfunctions can affect women's sense of self and lead to frustration, depression, and problems with self-acceptance [1,5,6].

The aim of this research was to assess the influence of selected clinical symptoms of PCOS on the quality of life of women, their activity, and sexual life.

MATERIALS AND METHODS

The project obtained approval from the Ethics Committee of the Medical University of Lublin.

249 patients of the Infertility Treatment Clinic in Lublin participated in this study in the period between January 2014 and December 2014. From within this group, 78 women diagnosed with PCOS were chosen, and the resulting research material is presented in this paper. A three-part questionnaire constituted the research method. The first part pertained to personal information, menarche, reproductive history (number of pregnancies, labors, miscarriages), menstrual disorders, the time of PCOS diagnosis and the occurrence of excessive hair growth on the chin and abdomen starting from the symphysis pubis to the navel and/or from the navel to the thoracic cage. Depending on the presence as well as the character of excessive hair growth in the aforementioned regions, the participants of the study received, in accordance with the Ferriman-Gallwey score, between 1 to 4 points, for one in every three of the examined regions. The sum of points, according to this scale, higher or equal to 3 indicates the occurrence of hirsutism, whereas 0-2 – its lack. This part of the questionnaire involved questions about the weight and height [7].

The second part consisted of the WHOQOL-Bref questionnaire, which is used in the assessment of quality of life of both healthy individuals as well as sick patients in clinical practice. The first question evaluated the individual overall perception of one's quality of life, the second the individual satisfaction perception of one's health, while the rest concerned the following domains of quality of life, and its functioning:

- physical; assessed: activities of daily living, dependence on pharmaceuticals and medical help, energy and tiredness, mobility, pain and discomfort, sleep and rest, efficiency at work;
- psychological; assessed: appearance, negative emotions, positive emotions, self-assessment, spirituality, religion, individuality, faith, thinking, studying, memory, concentration;
- social relationships; assessed: personal relations, social support, and sexual activity;
- environment; assessed: financial situation, freedom, safety and physical protection, health and social care – availability and quality, the surroundings of the house, the availability of gaining new information and abilities, participation in activities and the availability of recreation/recreational activities, physical environment (pollution /movement/climate), transport.

The answers are evaluated on a 5-point scale (points ranging between 1-5). One can receive a maximum of 20 points within each of the domains. The results of the particular spheres have a positive direction – the greater the number of points, the greater the quality of life.

The third part consisted of a questionnaire of sexual activity and sex life (FSQ-28). It is aimed at women at different stages in their lives with varying states of health. The questions regarding sexual activity (amounting to 26) refer to the preceding four weeks only. Whereas, the others refer to the physical and emotional relationship with one's partner. The FSQ-28 questionnaire allows for the diagnosis of sexual disorders within the particular stages of a woman's sexual reaction (desire, sensation of arousal, lubrication, emotional arousal,

orgasm) and the dysfunctions associated with pain, foreplay (enjoyment), and relations with one's partner.

In the evaluation of the parameters of the FSQ-28 scale, there are particular stages of the sexual reaction, which suggest their normal functions or the occurrence of sexual disorders. The results of the particular domains have a positive direction – the greater the amount of points, the better the quality of sexual life – the absence of sexual dysfunctions.

The body mass assessment was carried out on the basis of height and the body weight, by calculating BMI (*Body Mass Index*), which is the ratio of the body weight in kg to the height in m^2. The criterion of obesity was defined at BMI 30 and more, overweight between 25.1-29.9, and normal body mass 19-25.

The participants were informed of the study's aim, the criteria of being included, and its course beforehand.

Patients gave their consent to participate in the study. After the formal agreement, the patients were asked to fill in the questionnaire. Any ambiguities arising from the questions included in the questionnaire as well as the method of their interpretation were immediately explained. During the study, each patient's hair growth was assessed using the Ferriman-Gallwey score. Special care was taken to ensure an intimate and friendly atmosphere during the examination.

The study inclusion criteria were: diagnosis with PCOS in accordance with the Rotterdam criteria, infertility treatment for at least 1 year, and patient's consent to participate in the study. The Rotterdam criteria are widely used for diagnosis. These criteria require that patients have at least two of the following conditions: hyper-androgenism, ovulatory dysfunction, and polycystic ovaries.

The exclusion criteria were: diagnosed hormonal and metabolic disorders not linked to the occurrence of PCOS, such as: hyperprolactinemia, thyroid disorders, and adrenal hyperplasia.

Twenty-eight patients refused to participate in the study, approximately 30% of those who had been approached and asked to participate in the study.

Statistical analysis

Calculations were performed using Statistica 10.0 software (StatSoft, Poland). Each constant variable was assessed depending on its distribution. Variables whose distribution deviated from normal, and for which homogeneity of variance was not confirmed, were analyzed using non-parametric methods. The Mann-Whitney test was used to compare two continuous variables. For testing differences among three independent groups, the Kruskal-Wallis test was used. In addition, we used analysis of variance and Tukey's post hoc test. Correlations between different ordinal scales were analyzed using Spearman's correlation matrices. We assumed a level of $p<0.05$ as relevant.

RESULTS

The average age of the respondents was 26.93. The largest group (52; 66.67%) consisted of women between 20–30 years, one of the participants was over 40 years old, while the rest (25; 32.05%) were between 31-40 years old. The majority of women were married (54; 69.23%), the rest were single women or divorcees (24; 30.77%). Most women had a higher-level of education (56; 71.79%), and the remainder had a high school (19; 24.35) or trade school education (3; 3.86%).

The average duration of PCOS, from the moment it was diagnosed, was 5.76 ± 4.70 years. Treatment duration was: 1 to 3 years for 29 (37.2%) participants, 6 years for 27 (34.61%), and 4 to 6 years for 22 (28.19%).

Hirsutism was diagnosed in 54 (69.23%) participants according to the Ferriman-Gallwey score. Average BMI (*Body Mass Index*) in the studied groups was 24.68 ± 4.52. Over half of the examined women (46; 58.97%) had normal body weight (BMI 19-25), one in four respondents (21; 26.92%) were overweight (BMI 26-30), and one in ten (14.11%) obese (BMI >30). Age of menarche within the studied group of women was on average at 12.86 ± 1.56 years. Menstruations occurred on average every 36.40 ± 7.80 days.

The majority of the participants (52; 66.67%) had never been pregnant. The remaining 26 respondents (33.33%) had been pregnant, out of which: in 16 (61.54%) participants, the pregnancy had been successfully carried to the end; in 5 (19.23%) necrosis had occurred, in 5 (19.23%) spontaneous abortion had taken place.

The data referring to the quality of life of women, assessed with the WHOQOL-Bref test, are presented in Table 1, which shows the results of the overall assessment of quality of life, satisfaction with health, and functioning in the physical, psychological, social relationships, and environment domains.

The overall quality of life of the participants of this study (assessed on a scale from 1 to 5) was 4.00; the satisfaction with health was slightly lower (3.00). Whereas, the assessment of the particular spheres of life (on a scale from 1 to 20) has shown that physical functioning (15.43) and social relationships (14.67) were assessed the highest.

Functioning in the environment was assessed slightly lower (13.50), while psychological functioning was assessed as the lowest (12.00).

Table 2 presents the perception of quality of life in various spheres depending on the women's

body mass according to BMI (normal body weight, overweight, and obese).The median of the individual domains of the WHOQOL-Bref in women with obesity was lower than in the group with normal body weight and overweight. We observed statistically significant differences ($p < 0.05$) in quality of life among the three studied groups with varying BMI.

Differences in the assessment of quality of life between patients with symptoms of hirsutism and those not showing any such symptoms are presented in Table 3.

Table 1. The quality of life of women suffering from PCOS in particular spheres assessed using the WHOQOL-Bref test

The study of the sphere of quality of life (WHOQOL-Bref test)	Min - Max	Me
Overall quality of health rating	1.00 – 5.00	4.00
Satisfaction with health	1.00 – 5.00	3.00
Physical	5.71- 19.43	15.43
Psychological	8.00 – 19.33	12.00
Social relationships	5.33 – 20.00	14.67
Environment	9.50 – 19.00	13.50

WHOQOL-Bref: test is a shorter version of the original WHOQOL (World Health Organization Quality of Life) questionnaire; Min – Max: the values obtained from minimum to maximum; Me – median

Table 2. The study of the sphere of quality of life and the assessment of body mass

The study of the sphere of quality of life (WHOQOL-Bref test)	Body Mass Index (BMI)						Statistical analyses	
	Normal n=46; 58.97%		Overweight n=21; 26.92%		Obesity n=11; 14.11%			
	Min –Max	Me	Min –Max	Me	Min –Max	Me	H	p-value
Overall quality of health rating	1-5	4.00	1-5	3.00	1-4	3.00	13.46	0.001
Satisfaction with health	1-5	3.00	1-4	2.00	1-3	1.50	10.75	0.005
Physical	7.56 - 19.43	16.57	5.71 - 19.88	15.43	5.71 – 17.42	13.14	14.88	0.001
Psychological	8.00 – 19.33	12.67	8.00 – 19.05	12.67	8.00-15.38	10.33	8.12	0.024
Social relationships	5.36 – 20.00	16.00	5.33 – 19.24	14.67	5.33- 17.50	12.67	7.07	0.033
Environment	9.50 – 19.00	13.50	9.50 – 18.68	13.50	9.50-17.25	11.00	8.05	0.021

WHOQOL-Bref test is a shorter version of the original WHOQOL (World Health Organization Quality of Life) questionnaire; Min – Max - the values obtained from minimum to maximum; Me – median; H – Kruskal-Wallis Test

Table 3. Quality of life and the occurrence of the symptoms of hirsutism

The study of the sphere of quality of life (WHOQOL-Bref test)	Hirsutism				Statistical analyses	
	Yes n= 24; 30.76 %		No n= 54; 69.23%			
	Min –Max	Me	Min –Max	Me	Z	p-value
Overall quality of health rating	1.00 – 5.00	3.00	1.00 – 5.00	4.00	-2.70	0.010
Satisfaction with health	1.00 – 4.00	2.00	1.00 – 5.00	3.00	1.39	0.172
Physical	5.71- 19.43	14.86	7.25 - 19.43	16.00	2.50	0.013
Psychological	8.00 – 19.00	12.00	8.00 – 19.33	12.67	2.22	0.035
Social relationships	5.33 – 18.36	14.67	6.33 – 20.00	16.00	2.22	0.035
Environment	9.50 – 18.00	12.50	9.50 – 19.00	13.50	2.70	0.021

WHOQOL-Bref test is a shorter version of the original WHOQOL (World Health Organization Quality of Life) questionnaire; Min – Max - the values obtained from minimum to maximum; Me – median; Z – Mann-Whitney Test

In women with symptoms of hirsutism, we observed lower quality of life in the individual domains compared with women without symptoms of hirsutism ($p<0.05$). Respondents' satisfaction with health was not statistically dependent on symptoms of hirsutism ($p=0.172$).

Table 4 presents data on the quality of life of the studied female patients taking into consideration duration of infertility treatment as a result of PCOS.

Table 4. The quality of life of the participating women and duration of infertility treatment

The study of the sphere of quality of life (WHOQOL-Bref test)	Duration of treatment ≤ 3 years n=29; 37.20%		Duration of treatment 4 - 6 years n= 22; 28.19%		Duration of treatment ≥6 years n=27; 34.61%		Statistical analyses	
	Min- Max	Me	Min- Max	Me	Min- Max	Me	H	p-value
Overall quality of health rating	1.00 – 5.00	4.00	1.00 – 4.00	3.00	1.00 – 5.00	4.00	4.66	0.101
Satisfaction with health	1.00 – 4.00	3.0	1.00 – 3.00	2.00	1.00 – 5.00	3.00	7.91	0.023
Physical	6.00- 19.43	16.00	5.71- 18.43	13.71	6.41- 19.43	16.00	8.05	0.020
Psychological	8.40 – 19.33	12.00	8.00 – 18.66	11.33	9.00 – 19.33	12.67	9.32	0.011
Social relationships	7.26 – 19.50	16.00	5.33 – 18.33	13.33	5.33 – 19.25	14.67	7.78	0.025
Environment	9.50 – 19.00	13.50	9.50 – 18.00	12.00	9.50 – 19.00	13.50	8.57	0.018

WHOQOL-Bref test is a shorter version of the original WHOQOL (World Health Organization Quality of Life) questionnaire; Min – Max - the values obtained from minimum to maximum; Me – median;H – Kruskal-Wallis Test

Taking into consideration the duration of infertility treatment, we observed statistically significant differences in the assessment of satisfaction with health ($p=0.023$), quality of life in the physical sphere ($p=0.020$), psychological sphere ($p=0.011$), social relationships ($p=0.025$), and the environment ($p=0.018$). Whereas, we found no such differences in the assessment of overall quality of health ($p=0.101$). Women's sexual functioning at particular stages of sexual response as well as the relationship with a partner were evaluated using the FSQ-28 scale. The results of this evaluation, depending on participants' overall quality of life assessed using the WHOQOL-Bref test, are presented in Table 5.

Table 5. Researched sexual spheres and participants' general quality of life

Researched sexual spheres (FSQ-28)	Min -Max	Scores suggesting normal function	Me	General quality of life (WHOQOL-Bref test)	
				r_s	p-value
Desire	5-31	≥23	20.50	0.45	0.000
Arousal (sensation)	4-20	≥14	13.00	0.11	0.415
Lubrication	2-10	≥8	7.00	0.32	0.020
Emotional arousal	2-10	≥8	7.00	0.34	0.014
Orgasm	1-15	≥12	10.50	0.39	0.002
Pain	2-15	≥12	13.00	-0.16	0.230
Foreplay (pleasure)	6-30	≥23	22.00	0.38	0.003
Relationship with partner	2-10	≥8	7.50	-0.52	0.000

WHOQOL-Bref test is a shorter version of the original WHOQOL (World Health Organization Quality of Life) questionnaire;SFQ-28 = Female Sexual Function Questionnaire;Min – Max - the values obtained from minimum to maximum; Me – median; r_s Spearman's rank correlation coefficient

Regression analysis revealed the impact of quality of life on the occurrence of disorders at various stages of sexual response. There was a low positive correlation between better quality of life and women's sexual activity in the desire, lubrication, emotional arousal, orgasm, and foreplay domains ($p<0.05$). However, we found a negative correlation

between quality of life and the relationship with a partner (R= -0.52).

The results of the estimation (median) suggest that within this group of women disorders occurred at varying stages of the sexual response. They were the most prevalent in the case of desire, orgasm, and foreplay, where the resulting average point count within a group was smaller by over 3 points than the lowest score range limit describing normal sexual functioning. Assessment of sexual disorders associated with pain was the only one within the norm. Within the range of the other parameters of arousal (*sensation of arousal, lubrication, and emotional arousal)* as well as the relationship with one's partner, the participants of the study received on average between 1-2 points below the score range limit signifying the norm.

DISCUSSION

There exists well-documented knowledge of the negative influence of PCOS on women's quality of life in the psychological, physical, and social spheres [6,8,9,10]. In our research, we found that general quality of life of the questionnaire participants was good, while general perception of health was worse. Taking into consideration the particular domains of life, the physical domain was assessed the highest by the participants, while the social and environmental domains were assessed slightly lower, and the psychological domain was assessed least favorably.

Multifaceted research, carried out amongst women in Southern Asia by Kumarapeli et al. proved a correlation between the type of PCOS, the degree of escalation of selected clinical symptoms, and the quality of their life. Moreover, the authors observed a significant effect of this syndrome on the general perception of health and on the psychological state of the research participants [10]. Similarly, in other research carried out using the SF-28 questionnaire, a significant decrease in the functioning of women in the physical, social, and emotional domains was observed [9].

The present study shows that among women with obesity the median of individual domains of quality of life, assessed on the basis of the WHOQOL-Bref, and was lower than in the group of respondents with normal weight and overweight.

According to some authors, the negative effect of inappropriate body mass on quality of life is especially visible amongst European women [5,11-14].

Turkish women between the ages of 15-49 with BMI above 25 had significantly lower results of quality of life *(assessed with HRQOL)* in every social domain, when compared with women with normal weight, except for the social domain [11, 14]. These observations were explained by the fact that the degree of excess of body mass correlated positively with impairment of functioning in the physical and psychosocial sphere, and was associated with a greater number of subjective health ailments.

Sundararaman et al. wishing to assess the psychological state of women suffering from PCOS, carried out "*The Scaled General Health Questionnaire-28*" (GHQ28) test. On its basis, they stated that obesity and a broader waistline cause stress and deteriorate the psychological state of these women [15]. In the presented material, BMI had a greater effect on quality of life in the physical domain (p=0.001), and a smaller, but significant, effect on the psychological domain (p=0.024). It is worth highlighting that the majority of researchers from Asia did not find a significant correlation between an increased BMI in women suffering from PCOS and the perception of the quality of their lives [10].

Apart from obesity, hirsutism also has a negative impact on women's quality of life. Deeks et al. prove that women showing symptoms of hirsutism have a negative perception of their own bodies [16]. They are much more prone to developing depression and such negative emotions as frustration, fear, anger, shame, hopelessness, and loneliness [17].

Workshop Group ESHRE/ASRM concludes with the statement that there is proof confirming the more common occurrence of psychological disorders in women suffering from PCOS [1].

However, many researchers are doubtful whether psychological problems occur due to metabolic disorders or the symptoms of this syndrome (obesity, hirsutism, infertility) [1,18]. Some authors, researching the quality of life of women suffering from PCOS, present the negative effect of hirsutism on the perception of one's quality of life, especially in the psychological sphere [8,10,19,20]. Similar results have been achieved in our research.

According to Levental's Self-Regulation Model (SRM), the subjective way of perceiving one's illness exerts a strong influence on experiencing its course [21].

According to this concept, an individual creates cognitive and emotional images of the disease. The cognitive component of these schemes includes, among other things, convictions about the essence, the causes, the timing, the consequences, and the degree of possible control over the symptoms and affects the physical and psychological experience of this state. Hence, patients suffering from PCOS, treated for infertility, are under greater risk for developing psychological disorders, such as depression or anxiety, compared with healthy women [6].

In their research, Dahan et al. observed the occurrence of depression in infertile women twice as

often as in the control group as well as a much a higher level of its escalation. What is interesting, this referred to especially those women who were diagnosed with infertility 2-3 years prior, more than those under 1 year or 6 or even longer [22].

However, in our study, we found that the median for each domain of the WHOQOL-Bref in women undergoing infertility treatment from 4 to 6 years was lower than in women undergoing treatment for less than 4 years or over 6 years.

To sum up, it is important to highlight the fact that obesity, hirsutism, and infertility decrease the quality of life of women suffering from PCOS. This fact is proven not only by our research, but also that of other authors [8,19,20,23].

The sexuality of women suffering from PCOS should be considered from the perspective of somatic symptoms and the way they are subjectively perceived by the patients. These women are significantly less satisfied with their sexual lives compared with a group of healthy women. They consider themselves to be less attractive physically; this belief resulting from symptoms of hirsutism [6,8,19,23].

In the research of Mansson et al. 43% of women suffering from PCOS admitted that the disease exerts a negative influence on their sexual life. They assessed their sexual lives much lower and felt less attractive to their partners than women from the control group [24].

The present research was aimed at the evaluation of sexual disorders with the help of the FSQ-28 questionnaire. The respondents proved to have a slightly disordered sexual life with regard to desire, pleasure, arousal, and experiencing orgasm. No disorders were reported in the sphere of pain. In our study, regression analysis revealed a positive correlation between better quality of life and women's sexual activity in the desire, lubrication, emotional arousal, orgasm, and foreplay domains ($p < 0.05$).This has confirmed the claims of other authors that a better quality of life has a positive impact on limiting the occurrence of sexual disorders [19,23].

Women suffering from PCOS constitute a distinctly specific group of patients who require specialist diagnostics and treatment, as well as multifaceted psychological and social support. Hence, apart from targeting the somatic sphere, it seems that the key factor in treatment is psychological work on the acceptance of functioning of one's body, emotions and motivation as well as self-validation and belief in one's worth.

CONCLUSIONS

Clinical symptoms of PCOS such as obesity and hirsutism, affect women's quality of life. Another factor determining the quality of life of women with PCOS is the length of infertility treatment. General quality of life affects the occurrence of disorders in women at particular stages of sexual response.

Conflicts of interest

The authors have no conflicts of interest to disclose.

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Psychological, physical, and social situation of patients with Hodgkin lymphoma undergoing radical chemoradiotherapy

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ABSTRACT

Purpose: To assess the physical and psychosocial situation and needs of Polish patients with Hodgkin lymphoma (HL), who had undergone radical chemoradiotherapy.

Materials and methods: 50 Hodgkin lymphoma patients were asked to complete an institution-developed questionnaire concerning their physical, emotional and social well-being, as well as their perceptions regarding the medical care they had received.

Results: The physical and psychosocial quality of life of patients with HL was diminished by the disease and its treatment. The most frequently reported side effects of both chemo- and radiotherapy were fatigue and loss of taste. The observed symptoms were slight or moderate. Although 36% of participants reported feelings of depression and 52% - were concerned about their future functioning in society, more than half of patients reported that were happy (60%). 20% of respondents were unable to work at all, but more than half had some difficulties with their employment. 20-40% of the patients complained about having received insufficient dietary instructions and lack of information about the late adverse effects of treatment. Although the majority of respondents assessed the quality of medical care as very high emotional problems preferred to share with relatives (90%).

Conclusions: Although the physical and psychosocial situation of HL patients may be affected by the disease and its treatment, for the majority of patients, these impediments did not cause serious deterioration in functioning. Medical care was positively assessed by the HL patients, but more emotional and informative support is needed to decrease patients' anxiety regarding future functioning in society.

Key words: Hodgkin lymphoma, chemoradiotherapy, quality of life, medical care

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INTRODUCTION

Hodgkin lymphoma (HL) is a rare malignant disease which accounts for 0.5% of all new cancer cases in Poland, with more than 700 patients diagnosed annually (30 in the northeastern region) [1,2]. The majority of HL patients are diagnosed in the age group of 15-40 years – during the active period of human life. The overall 5-yr survival rate is approximately 80% (77.8% and 82.7% for men and women, respectively) and has been continuously improving, resulting in a growing population of lymphoma survivors [3, 4]. A substantial percentage of radically treated HL patients receive chemoradiotherapy. Unfortunately, both modalities are accompanied by acute and long-term adverse effects [5].

In addition, patients with Hodgkin lymphoma may present a variety of systemic or local symptoms associated with the natural course of the disease. Physical ailments and time-consuming therapy may impede patients' daily activities and limit their ability to learn, work and/or conduct their social life. Stress, irritation and feelings of insecurity during and after treatment are emotional consequences of the condition. Many studies have shown that the well-being of HL patients is significantly affected by the cancer both in the physical as well as in psychosocial area [6-8], hence Hodgkin lymphoma survivors represent a group having to manage the late and long-term effects of the disease and its treatment.

Findings indicate that lymphoma survivors may develop symptoms of posttraumatic stress disorder (PTSD), suffer from chronic fatigue and/or present worse physical and psychosocial performance in comparison to the general population [6-11].

In order to decrease the impact of the negative consequences of the "trauma" associated with cancer, the treatment process should provide not only appropriate medical care, but also emotional and social support for patients. To undertake optimal and individualized actions a more comprehensive insight into the situation of this particular subset of patients is essential.

Patients' quality of life (QoL) is currently an important consideration for Polish medical staff during the treatment process. Until recently, QoL evaluation was predominantly conducted in palliative settings [12].

Unfortunately, information concerning the impact of the cancer on Polish HL patients is limited and patients' perception of medical care is understudied.

The aim of this study was to evaluate patients' QoL in the physical and psychosocial areas shortly after treatment and their satisfaction with medical care, especially informative and emotional support.

MATERIALS AND METHODS

The current study was conducted in the Department of Clinical Oncology at the Medical University of Bialystok and in the Department of Radiotherapy of the Comprehensive Cancer Center in Bialystok, Poland. Eligible participants included 50 Hodgkin lymphoma patients (28 women, 22 men) who had undergone radical chemo-radiotherapy between June 2012 and March 2014. All participants were administered 4-6 courses of ABVD regimen (doxorubicin (adriamycin), bleomycin, vinblastine, dacarbazine) chemotherapy. The number of courses depended on the stage of the lymphoma and treatment outcome. Involved field radiotherapy at a total dose of 30-36 Gy was performed after chemotherapy.

To obtain the necessary information about the impact of Hodgkin lymphoma on the lives of patients suffering from the disease, an individualized two-part questionnaire was constructed, which patients were requested to complete at the end of the treatment or during the first follow-up visit (within two weeks from the last fraction of radiotherapy). Patients were included in the study after signing an informed consent form. They were asked to complete the questionnaire independently and were given the assurance that their anonymity would be preserved. Participation in the study was voluntary. The first part of the questionnaire contained questions about the patient's: age, gender, education, marital status, place of residence and financial situation. The second part was devoted to the psychosocial and physical problems encountered during treatment and to the patients' perceptions of the nursing care. The questionnaire contained closed questions with both binary and multiple-choice options.

Ethical approval for the study was obtained from the Human Care Committee of the Medical University in Bialystok, Poland.

RESULTS

The demographic characteristics of the study sample is presented in table 1.

All adverse effects of treatment were considered by respondents to be slight or moderate, so that fewer than half of the patients (44%) reported them to the medical staff. In addition, more than half of the respondents assessed their health status as good or very good and only 7 (14%) reported feeling unhealthy (all over the age of 50). One-third of the patients had difficulty in evaluating their physical condition – "they were not sure how they felt". Finally, as many as 66% of all the respondents denied feeling lack of energy.

Table 1. Demographic Characteristics, n = 50

Variable	Value	
Age (years, N (%))		
Mean (min-max)	38.6	(22-68)
18-30	12	(24)
31-40	25	(50)
41-50	3	(6)
51-60	8	(16)
61-70	2	(4)
Education (N (%))		
Primary	3	(6)
Vocational	8	(16)
Secondary	22	(44)
University or college	17	(34)
Place of residence (N(%))		
Town or city	33	(66)
Country	17	(34)
Financial status (N (%))		
Very good	2	(4)
Good	41	(82)
Unsatisfactory	5	(10)
Poor	2	(4)
Marital status (N (%))		
Single	8	(16)
Married	33	(66)
Divorced	5	(10)
Widow/er	4	(8)

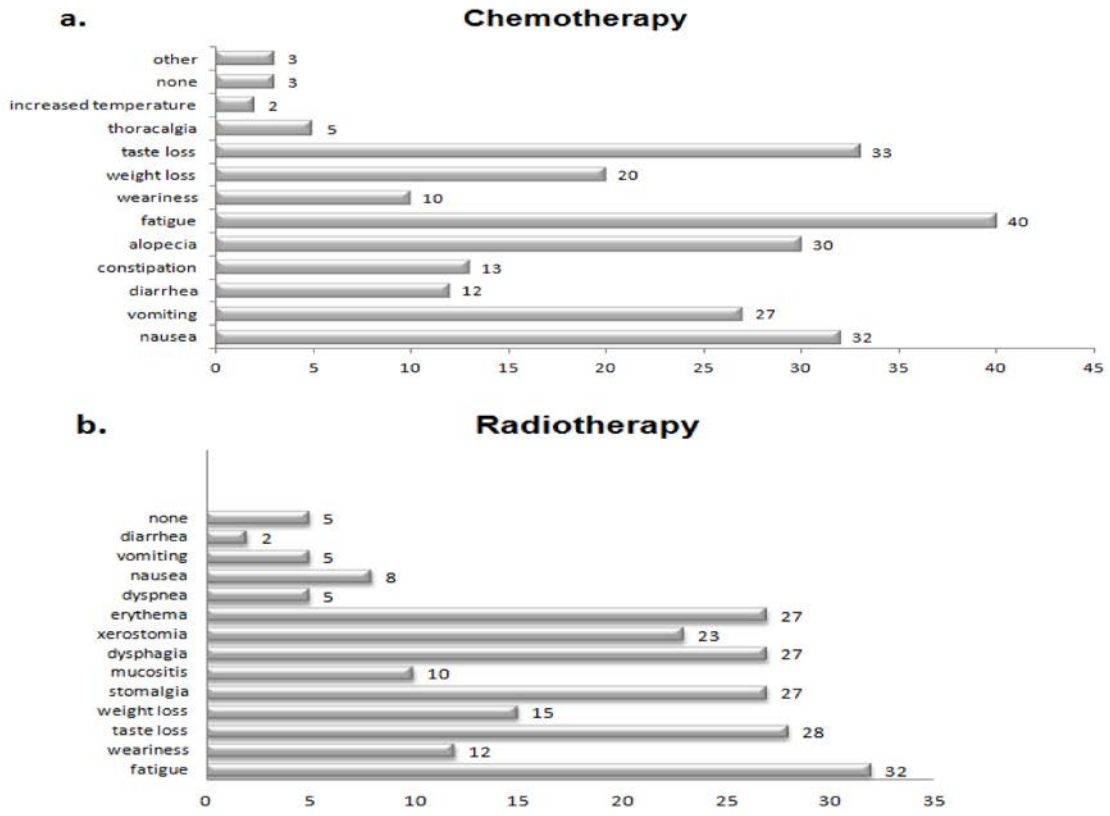

Figure 1. Adverse effects of chemotherapy (a) and radiotherapy (b) reported by Hodgkin lymphoma patients treated with radical intention. Multiple answers were possible. Other symptoms (3 patients) were headache, myalgia and neuropathy

Physical well-being

The most frequently reported adverse effects of both treatment modalities were fatigue, loss of taste and weight loss. During chemotherapy patients often also suffered from nausea, vomiting and alopecia, whilst during radiotherapy they were affected by mucositis, dysphagia and skin rash. The entire range of symptoms presented by the HL patients during oncological treatment is presented in Fig. 1.

Psychological well-being

We found that the diagnosis of Hodgkin lymphoma affected the psychological status of approximately 60% of patients. Approximately one-third of them felt depressed (36%) and/or nervous/irritated (24%). An even larger percentage of respondents described anxiety or fear during therapy. The most frequent causes of these feelings were: uncertainty regarding treatment outcome (60%) and fear of side effects (44%) (Fig. 2).

Furthermore, they were apprehensive about their future functioning in society (52%). With regard to external appearance, very few patients (n=7) perceived their appearance as unattractive.

More than half of patients felt reconciled with the disease (56%) and despite the illness, reported feeling happy overall (60%). 38/50 respondents (76%) felt they were coping with the disease and 1/3 expressed a need to talk about the illness with a healthcare professional. Of particular importance in terms of psychological and spiritual well-being was the fact that the majority of respondents (80%) regarded themselves as fully-valued individuals, able to play an active and useful role in society.

Social well-being

The family, social and professional life of Hodgkin lymphoma patients was also affected by the disease and its treatment.

More than half of the patients (38/50) admitted that they had been forced to change their previous lifestyle as a result of the disease (Fig. 3).

All of them had informed close relatives about their disease and the majority of respondents (90%) had received emotional support from their family. The majority of patients (80%) felt that the disease had not affected the quality of their relationships with family and friends negatively, and in some cases (20%) they even felt that their relationships had improved in the context of the illness. 64% of patients were satisfied with their sexual life.

The patients also complained about the negative impact of the disease on their professional activities. Every 5th patient had had to resign from work and more than half were unable to fully complete their duties.

Medical care – informative and emotional support

All patients felt they had been fully informed about their diagnosis and oncological treatment schedule. 90% considered they had been informed about medical procedures and potential (acute) side effects associated with therapy. 80% of the respondents reported that they had received advice from the medical staff about rules of hygiene and methods of dealing with adverse effects, both during and after treatment. They were familiar with preparations for the treatment of erythema and oral cavity hygiene during radiotherapy and knew the basic rules of management for nausea, vomiting, diarrhea and constipation. Of greater concern is the fact that a high percentage of patients reported that they had not been informed about diet (20%) and the late effects of chemoradiotherapy (40%), notably its influence on fertility.

Moreover, participants reported having insufficient knowledge about the effects of oncological treatment on their sex lives and had doubts about the necessity of using contraception during and after treatment (40%).

Also, as many as 40% of patients had difficulties in answering a question about whether they were “dangerous” in relation to other people during treatment and/or whether they should take special precautions in relation to contact with children, in particular.

A substantial percentage of patients were aware that, should any symptoms arise during treatment, they ought to inform their nurse or doctor. However, fewer than half of the respondents (44%) had actually done so. A common reason for this was that the patients considered that their ailments were not serious enough to inform medical staff about them and/or they did not want to “bother” them.

All patients confirmed that the nurses and doctors talked with them during medical procedures and a significant majority (96%) described the staff as “empathic” and “friendly”. None of the respondents complained about communication with the medical staff. The majority described the nurses’ and doctors’ language as simple and easy to understand.

Furthermore, the nurses and doctors were regarded by patients (80% and 72%, respectively) as the appropriate persons to ask for help in the event of medical problems arising. In contrast, for emotional support, the patients turned, in particular, to members of their family (45/50) (30% mentioned also doctors or nurses).

Finally, as many as 96% of respondents assessed the medical help they received as sufficient and satisfactory and affirmed that they felt safe in hospital.

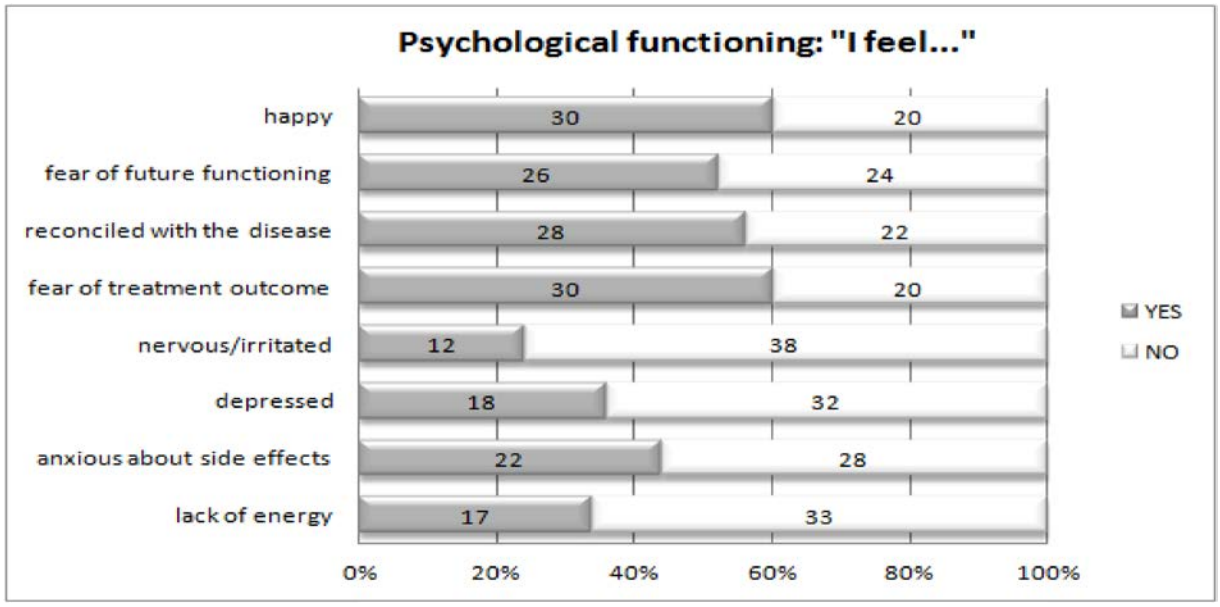

Figure 2. The psychological impact of Hodgkin lymphoma on patients' lives (n = 50)

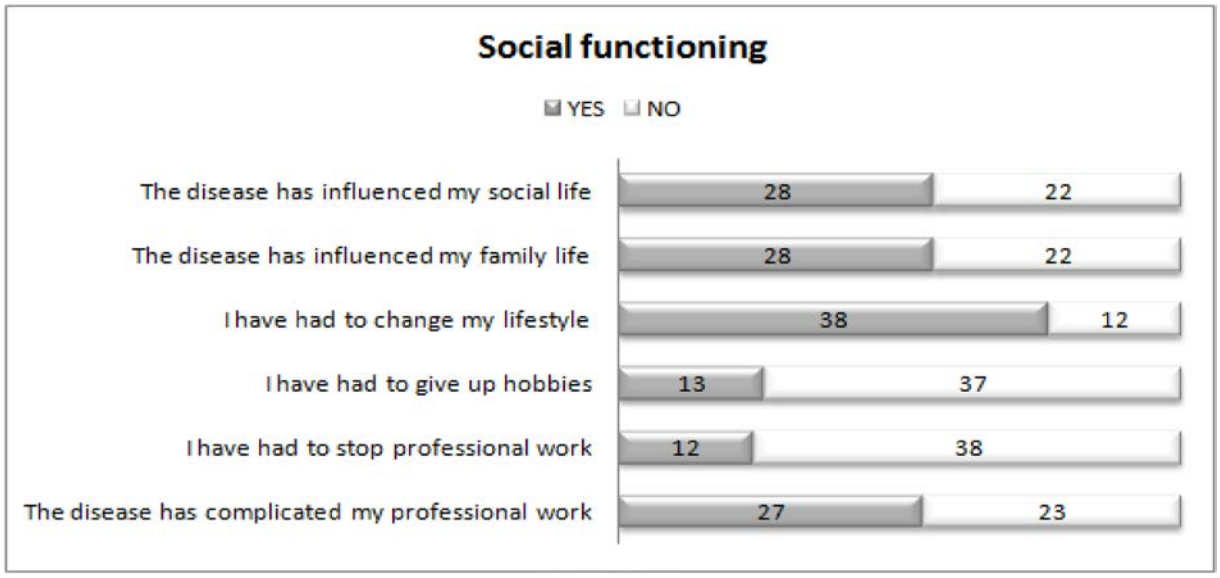

Figure 3. The social impact of Hodgkin lymphoma on patients' lives (n = 50)

DISCUSSION

Cancer diagnosis and oncological treatment can affect patients' present and future life [13-16]. Identification of the factors contributing to the well-being of individuals with HL may help to provide a more patient-directed approach. Thus, better quality of healthcare could decrease the negative impact of the cancer on HL survivors.

The most frequently reported adverse effects of both treatment modalities were fatigue, loss of taste and weight loss. The observation that fatigue is a prevalent symptom during chemo- or radiotherapy (40/50 and 32/50, respectively) is in accordance with data from the literature – as many as 96% of oncological patients may suffer from it [6,8,15,17,18].

Furthermore, fatigue at the end of treatment is a predictive variable for persistent fatigue among HL survivors, and this, in turn, may be a serious cause of maladaptive responses [6,8,10,11,19-22].

Miltényi et al. [7] have revealed that fatigue is significantly higher in patients who had been treated more than 20 years before than in those who were undergoing treatment suggesting that the intensity of this ailment may be enhancing in the course of time.

Importantly as regards patients' physical status, all side effects of treatment (including

fatigue) were assessed by respondents as being only slight or moderate. This was reflected in the frequency that patients reported these symptoms to the medical staff (only 44%) and by the fact that none of the patients required hospitalization during the course of treatment. These findings show that HL patients did not experience a significant decline in physical well-being. Additional support for this conclusion comes from the fact that as many as 66% of all respondents denied experiencing "lack of energy" and more than half assessed their health status as good or very good. Unfortunately the situation may change in the course of time – findings noted that HL survivors treated with chemo- or radiotherapy presented a lack of energy many years after treatment [8].

Furthermore, 64% of patients were satisfied with their sexual life, which also confirms good functional well-being shortly after treatment [16].

Data from literature indicate that contrary to fatigue the sexual functioning improves during follow-up, except for patients ≥50 years [23].

It may be the case that the functional status of the individuals with HL is associated with the young age of the patients. The majority of respondents were less than 50 years old. This age group is typical for Hodgkin Lymphoma [3]. In the present study, those patients who made a negative assessment of their health were more than 50 years old. Many studies have shown an association between the age of the patient and physical quality of life [6,13,14,24]. As regards side effects, younger patients generally report weaker symptoms and faster recovery [6,8].

The psychological functioning of HL patients appeared to be affected more significantly than their physical performance, though still not as seriously as expected. More than half of respondents managed to cope with the disease (38/50) and to feel happy in spite of it (30/50). More importantly, in terms of human spiritual well-being, as many as 80% of respondents felt that they were fully valued as people, able to play a useful role in society. They were hopeful and interested in life. Possibly, the younger age of the HL individuals and the generally good prognosis for the disease contributed to the more positive emotional attitude of the patients, without detriment to their self-evaluation.

On the other hand, 36% of patients reported feelings of depression and 60% described their emotional status as fearful. This finding cannot be ignored by medical staff. In the light of findings suggesting that 8% of lymphoma survivors may suffer from PTSD (prevalence in general population – 2.4%) and heightened physiological and psychological stress [11,25], the emotional support during treatment is of paramount importance. In the present study, 56% of patients felt they had reconciled themselves with the disease but only 1/3 wanted to talk about it. It may be the case that young adults, burdened with domestic and professional duties, do not have the time or the inclination to analyze the disease and discuss personal matters. On the other hand, their unwillingness to discuss the illness may reflect ways of coping based on avoidance and denial, related, for example, to a fear of hearing bad news (60% of patients expressed fear of lymphoma recurrence). They may also have felt that the appropriate conditions did not exist to discuss their concerns with the medical staff.

Our findings showed that HL influenced social functioning in more than half of the patients. Interestingly, the observed impact was both positive and negative. All patients had informed close relatives about the disease and the majority of them (90%) felt they had received emotional support from their family (66% of respondents were married). The quality of interpersonal relationships did not change for the majority of patients (80%) and in some cases (20%) it had even improved. These results are in line with the literature, which suggests that lymphoma patients experience a great deal of support from different sources [26,27].

A serious life event, which beyond all doubt is that of malignant disease, in the majority of cases positively verifies the quality of relationships [26]. In contrast, the disease had a deleterious effect on the professional sphere of the patients' lives. In the present study, every 5th patient had to resign from work and more than half were unable to fully complete their duties.

Many studies have shown that up to 40-60% of cancer patients have difficulties at work [8,27]. These problems may lead to financial difficulties and evoke feelings of instability [8,27]. Fortunately, in the present study, 84% of respondents assessed their financial situation as good. One paper [8] showed that Hodgkin's lymphoma survivors mentioned the topics of finance less frequently than controls. However, there is evidence that the financial situation of HL patients has a tendency to worsen and impede re-integration even years after a return to full health [4,10,25,28].

The data derived from the EORTC-GELA H8 trial [5] revealed that impairment in patients' QoL early after treatment occurs mainly in the social and psychological domain and to a lesser extent in physical status. There is evidence that quality of medical care (e.g. meeting the needs of cancer patients, time devoted to patients) can influence patients' emotional well-being [12,29].

Our findings have shown that the discussion which precedes treatment is of the essence in shaping HL patients' feelings of security. Insufficient information concerning aspects of patients' sexual lives, contraception and fertility

(vital issues for young adults) was the source of patients' apprehension associated with future functioning in their family and in society. Another important consideration is that only 30% of respondents expected emotional support from the medical staff. This perception may be caused by a shortage of patient-allotted time and inappropriate working conditions hampering building of close relationships between nurses and patients [30].

Another explanation might be inadequate psychological skills among the medical staff. Therefore, more effort should be made to train nurses and doctors in the psychological skills required to communicate with patients.

The present study has numerous limitations. The relatively small number of patients available due to the low prevalence of the disease made the statistical evaluation impossible. To investigate more thoroughly patients' opinion about some aspects of treatment as well as quality of medical care an institution-developed no validated questionnaire was used.

Moreover the single-institution study provides only a regional picture. There is need to carry out such an analysis across the country to yield more reliable and accurate data that may then be incorporated into a greater whole. Despite its shortcomings and relatively small scale, this study is of great importance because brings about additional improvements in the local healthcare system of HL patients and provides basis to multi-institution investigation.

CONCLUSIONS

The physical and psychosocial functioning of HL patients may be deteriorated by the disease and its treatment. It would seem that simple measures like extended discussions and detailed advice about disease-associated issues could decrease HL patients' distress and feelings of insecurity and improve their general well-being. Ultimately, a multidisciplinary team would be required to meet the needs of patients with HL undergoing radiochemotherapy.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Predictive roles of coping and resilience for the perceived stress in nurses

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ABSTRACT

Introduction: Nursing profession is physically and emotionally demanding
Purpose: To determine the relationship between coping strategies and resilience, as well as perceived stress among nurses.
Materials and methods: The study included 173 nurses from Świętokrzyskie province. Examination material was collected using the following tools: the Perceived Stress Questionnaire (KPS), The Resiliency Assessment Scale (SPP - 25), the Brief COPE
Results: Among nurses emotion-focused strategies, such as: denial, self-blame and seeking emotions, positively correlated with the perceived stress. Resilience, and particularly personal skills to cope with and tolerate negative emotions, negatively correlated with the perceived stress.
Conclusions: Resilience, to a lesser extent than coping strategies contributed to determination of the level of perceived stress.
Key words: resilience, coping with, perceived stress, nurses

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INTRODUCTION

The paper attempts to determine predictive role of resilience and coping strategies for the levels of perceived stress in nurses. Nursing profession is physically and emotionally demanding [1]. According to Bennett et al. [2], the group of environmental stressors in the nursing profession includes: unpredictable staffing and scheduling, lack of role clarity, low involvement in decision-making, poor status, and poor support. In addition, the scope of competence and autonomy of nurses has extended [3], which is likely to increase the level of stress and lead to job burnout. Emotional burden also involves contacts with suffering patients due to responsibility held for their lives and health [4]. Previous studies indicate that a higher perception of stress among nurses is associated with worse well-being, intensification of depression and anxiety symptoms [5]. However, not only environmental/objective stressors but also skills and abilities that favor effective coping strategies are responsible for the perception of stress. It is important to determine which personal resources are conducive to the perceived stress [6,7], and which may be used in developing support and preventive programmes at various levels of the nursing training and in combating job burnout.

One of the most popular models presenting how environmental stressors translate into the experience of stress has been developed by Lazarus and Folkman [8]. In that model stress is defined as a relationship with the environment that exceeds an individual's ability to cope. Assessment of a situation as a stressful one results in a coping process. Coping is defined "as efforts to prevent or diminish threat, harm, and loss or to reduce associated distress" [9]. Coping may be problem-focused or emotion-focused. Problem-focused coping includes action-oriented strategies, such as e.g. planning or performing specific activities. Emotion-focused strategies, on the other hand, include seeking social support, denial, drug use. These two coping styles complement each other rather than constitute independent categories [9].

Carver and Connor-Smith [9] have made a distinction between engagement coping and disengagement coping. Engagement coping includes problem-focused and some forms of emotion-focused coping: support seeking, positive reframing, and acceptance. On the other hand, disengagement coping includes strategies such as denial, avoidance, wishful thinking. Disengagement coping is generally ineffective in reducing distress over the long term [9]. Ineffective coping may increase the level of perceived stress. Studies among nurses indicate a relationship between selected coping strategies and health [10,11], substance use [12].

Stress assessment and initiation of a coping process depends, among others, on personality predispositions of an individual, such as e.g. self-efficacy [13], optimism [13], and resilience [14]. In this paper, particular attention was paid to resilience as a significant personality factor involved in the process of coping. Ogińska-Bulik and Juczyński [15] define resilience as a mental characteristic conducive to endurance, flexible adjustment and mobilization to act in problematic situations. Also, resilience helps tolerate negative emotions and experienced failures. In addition, Ogińska-Bulik and Juczyński [15] point out that resilience is a self-regulatory mechanism. This mechanism includes emotional, cognitive and behavioral components. Emotional components are related to the positive affect and emotional stability, whereas cognitive components are related to beliefs, expectations as well as an individual's competencies and approaching various tasks as challenges. Behavioural components of the resilience mechanism are manifested by an individual looking for new experiences and trying to apply various, effective methods of coping with difficult situations. Individuals with a high level of resilience have a positive approach to life, they are emotionally stable, feel the control over decisions they make, and they treat obstacles as a challenge and a chance for development.

Resilience as a personal resource is used in job-related situations [6,16]. Taking into consideration stressful nature of the nursing profession, resilience may be an important resource protecting nurses against negative effects of occupational stress. So far there have been studies on resilience, inter alia, among: nurses on managerial posts [14], pediatric oncology nurses [17], nurses involved in palliative care [18] and operating room nurses [19]. Resilience among nurses supports more efficient coping with occupational burden and protects them against PTSD [20-22]. It also enables to maintain work-life balance among managerial nurses [14]. What is more, a high level of resilience prevents job burnout, which has been confirmed, e.g. by studies among female social workers [12] and nursing students [13]. Nevertheless, there are no studies that would refer to the significance of resilience among the general group of nurses.

Moreover, resilience impacts individually perceived stress and taking stress-combating actions; and this also refers to the job requirements and stress experienced in job-related situations [23]. Psychological capital (PsyCap) construct describes the role of resilience in job-related situations. The Psychological capital is construed as a set of positive psychological resources significant for

effective human functioning at work. This model, apart from resilience, also accounts for efficacy, optimism and hope [13].

The aim of the study was to determine the predictive role of coping strategies and resilience for the perceived stress among actively employed nurses. Resilience and engagement coping were expected to be conducive to a lower level of perceived stress, and disengagement coping to a higher level of perceived stress.

Research hypotheses

As concerns the presented considerations, the following research hypotheses have been put forward:

- Hypothesis 1: Engagement coping shows a negative correlation with the perceived stress.
- Hypothesis 2: Disengagement coping shows a positive correlation with the perceived stress.
- Hypothesis 3: Resilience shows a negative correlation with the perceived stress (emotional tension, intrapsychic stress, and external stress).

MATERIALS AND METHODS

The sample consisted of 200 nurses from Świętokrzyskie province. In the final analyses, results of 173 completed surveys were included. The respondents were employed by various institutions: hospitals, outpatient clinics, welfare houses across Świętokrzyskie province. The mean age of the respondents was 43.5, whereas their average work experience was 20.7 years. The nurses were participants of a training course. Their participation was voluntary and anonymous.

The following instruments were used:

Perceived stress. The general level of perceived stress was measured using the Perceived Stress Questionnaire (KPS) developed by Plopa and Makarowski [24]. The questionnaire is composed of 27 items divided into 3 diagnostic subscales (Emotional Tension, Intrapsychic Stress and External Stress). Respondents relate to individual items using a five-point scale. Overall score ranges from 21 to 105. Each diagnostic subscale features 7 items, the score ranges from 7 to 35. Cronbach's alpha ranges from 0.69 to 0.81. The higher the score, the higher the level of stress displayed by a respondent.

Resilience. The resilience level was assessed by the use of The Resiliency Assessment Scale (SPP - 25) developed by Ogińska–Bulik and Juczyński [15]. The SPP-25 is composed of subscales determining 5 factors and the overall score. Factor 1 - Persistence and determination in action; Factor 2 - Openness to experience and sense of humor; Factor 3 – Individual's ability to cope and tolerance of negative emotions; Factor 4 - Tolerance of failure and viewing life as a challenge; Factor 5 - An optimistic approach to life and the ability to mobilize oneself in difficult situations. Participants respond to individual items using a five-point scale. Cronbach's alpha measuring reliability is 0.89. Test retest reliability (r=0.85) is also satisfactory.

Coping. Coping strategies were measured using the Brief COPE [25,26]. The Brief COPE is a short version of COPE - The Coping Orientations to Problems Experienced [27]. The scale is composed of 28 items determining 14 coping strategies: Active Coping, Planning, Positive Reframing, Acceptance, Humor, Religion, Emotional Support Seeking, Instrumental Support Seeking, Self-Distraction, Denial, Behavioral Disengagement, Venting, Drug Use, Self–Blame. Respondents reply to each statement using a four-point scale, where 0 – "I hardly ever do it" and 3 – "I do it almost always". The higher the score, the more often a respondent uses a given strategy. The instrument shows satisfactory psychometric parameters. Cronbach's alpha is between 0.50 – 0.90.

A statistical analysis was conducted by means of the STATISTICA software by StatSoft. The Pearson test for correlations was used between resilience, coping strategies vs. the perceived stress. The stepwise regression model was created in order to estimate determinants of the perceived stress. The value of $p \leq 0.05$ was established as statistically significant.

RESULTS

Correlation coefficients between the analyzed variables are presented in Table 1. The obtained results revealed a relationship between some strategies vs. resilience and the perceived stress.

Emotional tension showed a negative correlation with positive reframing, and a positive correlation with strategies such as religion, denial, behavioral disengagement and self–blame. The level of intrapsychic stress, external stress and the general stress showed a negative correlation with such adaptive strategies as: active coping, planning and using emotional support, and a positive correlation with maladaptive strategies such as: denial, venting, substances use, behavioral disengagement and self-blame.

Negative correlations were recorded for the perceived stress and all resilience factors.

In order to identify contribution of the considered strategies and resilience in determining variability of the perceived stress in the responding nurses, a stepwise regression analysis was used (Table 2).

Table 1. Coping and resiliency vs. perceived stress in subjects – Pearson's r correlation coefficients

		Emotional tension	Intrapsychic stress	External stress	Perceived stress
Strategies of Coping	Active Coping	-0.12	-0.21*	-0.26*	-0.22*
	Planning	-0.13	-0.18*	-0.18*	-0.19*
	Positive Reframing	-0.15*	-0.08	-0.12	-0.13
	Acceptance	-0.04	0.01	-0.12	-0.06
	Humour	-0.08	-0.03	0.00	-0.04
	Religion	0.18*	0.06	0.14	0.14
	Using Emotional Support	-0.09	-0.15*	-0.22*	-0.18*
	Using Instrumental Support	0.04	0.02	-0.04	0.01
	Self-Distarction	0.06	0.04	0.05	0.06
	Denial	0.25*	0.28*	0.33*	0.33*
	Venting	0.15	0.19*	0.22*	0.21*
	Substances Use	0.08	0.24*	0.17*	0.18*
	Behavioural disengagement	0.33*	0.28*	0.36*	0.37*
	Self - Blame	0.35*	0.36*	0.31*	0.39*
Resiliecny	Persistence and determination in action	-0.37*	-0.32*	-0.37*	-0.41*
	Openness towards new experiences and a sense of humour	-0.37*	-0.31*	-0.38*	-0.40*
	Personal skills to cope and tolerance to negative emotions	-0.44*	-0.34*	-0.47*	-0.48*
	Tolerance to failure and view life as a challenge	-0.39*	-0.36*	-0.46*	-0.46*
	An optimistic attitude towards life and the ability to self-mobilization in difficult situations	-0.42*	-0.32*	-0.42*	-0.44*
	SPP – Resiliency	-0.45*	-0.37*	-0.48*	-0,50*

*p<0.05

The obtained results indicate that a combination of coping strategies and resilience factor accounts for 45% of the variance of the generally perceived stress. Higher frequency of using the escape and avoidance coping strategies (denial, self-blame) and a less frequent use of active strategies (using emotional support) with a simultaneous low level of personal coping competencies and tolerance of negative emotions, are conducive to a higher level of perceived stress. Predictors of specific aspects of the perceived stress identified in the study point to a higher contribution of coping strategies than resilience factors to determination of their variability.

Table 2. Coping strategies and resiliency vs. perceived stress – results of a stepwise regression analysis

Coping strategies and resiliency	**Perceived stress**		
	β	**t**	**P value**
	Emotional Tension R=0.60 R^2=0.40 F(8,164)=11.44 p<0.001		
Personal skills to cope and tolerance to negative emotions	-0.52	0.12	<0.001
Self – Blame	2.46	0.59	<0.001
Denial	1.52	0.58	0.009
Positive Reframing	-1.78	0.71	0.013
	Intrapsychic stress R=0.60 R^2=0.36 F(11,161)=8.25 p<0.001		
Self - Blame	2.25	4.17	<0.001
Denial	1.81	3.52	0.001
Using Emotional Support	-1.52	-2.13	0.035
Humour	-1.29	-2.34	0.021
Acceptance	1.86	2.86	0.005
	External stress R= 0.64 R^2= 0.41 F(9,163)=12.51 p<0.001		
Personal skills to cope and tolerance to negative emotions	-0,61	-4,04	<0.001
Self- Blame	1,95	3,59	<0.001
Denial	1,73	3,18	0.002
Using Emotional Support	-1,78	-3,06	0.003
	Perceived stress R= 0.67 R^2= 0.45 F(10,162)=13,22 p<0.001		
Personal skills to cope and tolerance to negative emotions	-1.30	-4.46	<0.001
Self-Blame	6.62	4.75	<0.001
Denial	5.09	3.64	<0.001
Using Emotional Support	-3.37	-2.24	0.027

Coping strategies and resilience factor account for 40% of the variance of emotional tension. The use of self-blame, denial and, less frequently, positive reframing is conducive to emotional tension. In addition, the variance of emotional tension is determined by a low level of an individual's ability to cope and tolerate negative emotions.

Distribution of coping strategies and resilience factors determined for intrapsychic stress, allows prediction of 36% of its variance. A higher level of intrapsychic stress involves a more frequent use of such strategies as: self-blame, denial, acceptance and a less frequent use of emotional support, humor. The intrapsychic stress level among the nurses participating in the study may also be predicted in the case of low tolerance of failure and viewing life as a challenge and an individual's ability to cope and tolerate negative emotions.

In the case of external stress, the established set of strategies and resilience factors accounts for 41% of the variance. A high level of external stress may, to some extent, be predicted based on a frequent use of escape and avoidance coping strategies (self-blame, denial), and simultaneously a non-frequent use of emotional support seeking. In addition, the level of external stress may be accounted for through poor individual's ability to cope and tolerate negative emotions.

DISCUSSION

The aim of the study was to determine the correlation between resilience, coping strategies and perceived stress among the participating nurses. In addition, the predictive role of coping strategies and resilience vs. the perceived stress was indicated.

Hypotheses 1 and 2 which predicted that disengagement coping would be positively associated with the perceived stress, and that engagement coping would be negatively correlated with the perceived stress were partly supported. It turned out that a higher level of the perceived stress in nurses was associated with intensification of such strategies as denial and self–blame, as well as venting, substances use, behavioral disengagement. Weaker intensification of engagement coping strategies, such as: active coping, planning, using emotional support and humor, positive reframing was conducive to an intensified perception of stress in this occupational group. Our results are in agreement with the so far obtained results both among nurses in Poland [28] as well as in other countries [10-12].

The results revealed a significant role of maladaptive coping strategies, such as denial and self-blame, in the respondents' stress experience. While experiencing a high level of stress, nurses deny the existence of difficult situations and additionally blame themselves for their emergence. There are numerous difficult situations in the nursing profession such as, e.g.: deterioration of a patient's health, wrong diagnosis, death of a patient. Both strategies, i.e. denial and self-blame, are categorized as escape and avoidance coping strategies, and in the study by Carver [9], they are included in one and the same factor, therefore, these two strategies may be expected to support each other. Denial is a unique strategy used at the beginning of a stressful transaction and it may prove beneficial due to temporary distance to the situation. Nevertheless, it disturbs and prevents effective coping. Self-blame, on the other hand, is a strategy manifesting helplessness, and it is defined as criticizing oneself for stressful circumstances. The study findings are confirmed by numerous studies showing that using self-blame [29,30] and denial [31] as a coping strategy is not conducive to adjustment to a difficult situation. Mark and Smith [10] indicate that strategies, such as: self-blame and avoidance are conducive to anxiety and depression among nurses. Similar results have been presented by Shreuder et al. [11] confirming that using passive coping by nurses is associated with poor general and poor mental health.

The presented results show that seeking emotional support is conducive to a lower level of stress. However, mere looking for support does not necessarily mean it will be received. Emotional support seeking is categorized as emotion-focused and engagement coping. Failure to seek such support makes it resemble disengagement coping [9]. In addition, Carver, Scheier and Weintraub [27] pay attention to the fact that this strategy is a double-edged sword. On the one hand, looking for consolation, understanding, sympathy may in some ways be helpful in gaining strength and getting back to action, but, on the other hand, it may bring about excessive focus on emotions and lead to abandonment of the activity. In the study by Łuczak [32], emotional support seeking has displayed a positive correlation with job-related stressors, such as organizational uncertainty, stressful interpersonal relations or lack of support, and a negative correlation only with adverse working conditions.

All the strategies which in the study proved the most significant for the perceived stress could be categorized as emotion-focused [8,27]. Emotion-focused strategies are less beneficial than problem-focused strategies. The relationship between emotion-focused coping strategies and the perceived stress may result from the fact that the sample was composed only of women. A higher tendency among females of different populations to use maladaptive or emotion-focused stress-coping

strategies and to experience more stress have been previously reported.

The study results also confirmed that the hypothesis (3) about a negative correlation between the perceived stress and resilience was right. The results indicated that a low level of the perceived stress is related to a high level of resilience. This shows that the ability to adapt to and solve problems in a flexible manner is conducive to perceiving various problems as stressful. The presented in the paper results have been confirmed by other research. Kim and Windsor [14] have proven that resilience interpreted as positive thinking, flexibility, assuming responsibility, and separating work and life is conducive to the ability to maintain the work-life balance among nurses on managerial posts. Resilience also protects nurses against development of the symptoms of PTSD [20], and the level of perceived stress and job burnout [7]. The obtained results are consistent with empirical findings of other research, where a high level of resilience was conducive to a lower level of stress in other groups [24-26].

The obtained results allowed verification of research hypotheses and drawing the following conclusions. The level of perceived stress in nurses significantly correlated with coping strategies they use and resilience. However, it was found that the level of perceived stress may be primarily predicted based on denial, self-blame, failure in seeking closeness and consolation in others, with a simultaneous low level of individual's ability to cope and tolerate negative emotions. What is more, based on the conducted research, it may be observed that disengagement coping, especially escape and avoidance coping strategies, such as: denial and self-blame play a more significant role for the perceived stress than engagement coping and problem-focused strategies, although the latter are also important for the perceived stress but to a smaller extent.

Limitations

One limitation of the presented research is lack of diversification among the studied nurses due to the place of work, age and length of working experience. The available research indicates legitimacy of such divisions [10,11,12]. Therefore, the obtained results should be treated as an introductory stage for further research, in which attention could be paid to the characteristics of the workplace and in which not only general, but also occupational stress could be included. Another limitation is certainly homogeneity of the group in terms of gender. The available results indicate differences between men and women in terms of the used stress coping strategies [36], and that is why it would be interesting to include also men working as nurses in the study.

CONCLUSIONS

1. The level of perceived stress in nurses may be accounted for by using disengagement, emotion-focused coping strategies as well as a poor level of personal competencies and low tolerance of negative emotions.
2. Coping strategies used, such as self-blame, denial and absence of emotional support seeking are the most significant for the perceived stress. However, for particular types of the perceived stress (emotional tension, external and intrapsychic stress), the range is additionally extended by other strategies.
3. The obtained results may be used and included in psychoeducational programmes for nurses focused on building resilience and raising awareness of the negative effects of the use of maladaptive coping strategies.

Conflicts of interest

The author have declared no conflicts of interest.

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Evaluation of occlusion and orthodontic needs of thirteen-year-old children from Podlaskie voivodeship

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ABSTRACT

Purpose: One of the main research aims of epidemiological studies is to prove the prevalence of diseases and physiological conditions among people. The results of these studies enable to implement efficient prophylaxis and to plan proper health care management. Information about the prevalence of malocclusions in children and adolescents is a very important aspect of the planning of preventive care in health policy. In addition, evaluation of malocclusion allows for determining current treatment effectiveness and orthodontic treatment need after the completion of free orthodontic treatment under the Polish National Health Fund, which the legislator provided for children up to 13 years of age.

Materials and methods: The study included 500 children, aged 13 years (249 girls, 251 boys) from the Podlaskie voivodeship. The study was conducted in nine junior high schools, in a school nursing surgery using basic diagnostic tools (periodontal probe, dental mirror, laryngological spatula). The rules of Polish orthodontic diagnosis by Orlik-Grzybowska were applied in diagnosis of malocclusion. Dental abnormalities were also determined.

Results: Malocclusions were found in 57.8% of patients. 34% of children had distal occlusion belonged to the most frequent irregularities, while lingual occlusions (1.6%) was observed the most rarely. Dental abnormalities, including teeth rotations (81.8%) as most frequent were reported in 82.8% of the respondents.

Conclusions: The prevalence of malocclusion in 13 - year old school children from the Podlaskie voivodeship is high and indicates the inadequacy of orthodontic health care program. Distal occlusion is the most common malocclusion No significant differences were found between the prevalence of malocclusion and the place of residence.

Key words: malocclusion, epidemiological study, children

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INTRODUCTION

Health, including the status of the masticatory system, is the result of many factors. According to the generally accepted Dahlgren and Whitehead's model, biological factors (age, sex, genetic factors), life style, social support networks and socio-economic, cultural and environmental factors belong to these factors [1]. The guidelines of the World Health Organization (World Health Organization – WHO,) regarding oral health for 2020, relate mainly to the prevention, early detection and treatment of occlusal disorders [2]. In Poland, the main objective of the National Health Programme (NHP) for 2007-2015 is to improve the health and related quality of life of the population. One of the strategies is to intensify the prevention of tooth decay in children and adolescents. The specific objectives of oral health do not take into consideration the prevalence of malocclusion [3,4]. One of the strategic objectives of the National Programme for the Protection of the Masticatory System in 1997-2001, developed by Ministry of Health and Social Welfare, in February 1996, was to reduce the prevalence of malocclusion. It was assumed to reduce by 15% the percentage of children and adolescents compared to 1995, when the need for orthodontic treatment was observed in 60% of patients [5].

Epidemiological studies allow for evaluating the distribution and severity of morbid conditions that occur in a population. They can also check the influence of the etiological factors on the prevalence of diseases, providing the data for planning preventive and therapeutic actions. Currently, malocclusions are the third in the ranking of priorities among the problems of dental public health worldwide, surpassed only by dental caries and periodontal diseases [6].

For many years, the epidemiological studies screening occlusion disorders have been carried out by numerous authors in Poland and abroad. Analysis of the Polish literature showed a difference in the prevalence of malocclusions in children and adolescents. Simultaneously, the highest incidence of malocclusion was observed in a group of distal occlusion (according to the classification by Orlik-Grzybowska) [7-11].

However, there was no current data regarding the Podlaskie voivodeship. The last screening of occlusion in Bialystok was carried out in Białystok, the 60s of the last century [10]. In 2004, school children and adolescents were studied for the presence of posterior cross bites [12].

Objectives

Occlusal conditions were assessed to help establish current treatment effectiveness and orthodontic treatment need after the completion of free orthodontic treatment under the Polish National Health Fund, which the legislator provided for children up to 13 years of age.

MATERIALS AND METHODS

The study included 500 children (249 girls and 251 boys), aged 13 years from the Podlaskie voivodeship. Children came from 3 residential environments: a big city (> 50,000 inhabitants - BC) - 276 people, a small town (5,000-50,000 inhabitants - ST) - 199 people and a village (<5,000 inhabitants - VI) - 25 people, belonging to the county: Bialystok and Sokolka. The study was conducted in nine junior high schools, in a school nursing surgery, in daylight, using basic diagnostic tools (dental mirror, laryngological spatula and periodontal probe). Occlusal conditions of the children were evaluated by a dentist. In each case, a written consent to the examination of a child was obtained from parents or guardians.

Extraoral analysis was carried out on the basis of the facial symmetry. Kolmann's rule, Rickett's profile and Korkhaus lip step were determined [13].

Intraoral conditions were evaluated on the basis of: canine classes, Angle's class and the volume of overjet and overbite.

Malocclusion was diagnosed according to the Polish orthodontic diagnosis by Orlik-Grzybowska [14]. Dental abnormalities were also determined and divided into two groups. Dentoalveolar disproportions whose symptom was teeth crowding or their spacing represented the first group, while dental abnormalities such as eruption time, morphology, number and topography of the teeth – the second group.

The results were analyzed using Pearson's chi-square test of independence (p *) and chi-square test for linear trend (p **). Results at $p < 0.05$ were considered statistically significant. Statistics were calculated using SPSS 20.0.

The study was approved by the Bioethics Committee of the Medical University of Bialystok (RI-002/14/2014).

RESULTS

In the examined group, intact facial symmetry was observed in 329 patients (65.8%). Equality of three sections of the face (Kolmann's rule) was established in 300 children (60%). Rickett's normal profile was reported most frequently - 325 people (65%), while a moderate negative Korkhaus lip step in 338 (67%). Both Rickett's normal profile and moderate negative Korkhaus lip step occurred significantly more frequently in boys. There was also a statistically significant increase in the number of children with preserved facial symmetry and Kolmann's rule with the increased number of residence (Tab. 1).

The majority of the children had correct overjet (74.8%) and overbite (72.2%). Increased overbite was recorded in 117 children (23.4%) and concerned more frequently the children from the rural areas (28%). Enlarged overjet was observed in 132 patients (23.4%), mainly among children in the rural areas (44%). Negative overbite was revealed in 11 (1.8%), while reverse overjet in 7 patients (1.4%). Both types of overjet were not encountered in children in the rural areas.

Fang Classes I were reported markedly more frequently on both the right - 350 (70%) and the left - 344 respondents (68.8%). Fang Class II (24.7%) was observed less frequently, while class III was the least likely (4.1%). In 1.8% of children, fang classes could not be determined. No child from the rural area was qualified to this group.

Similarly, Angle's class I was the most frequently reported (73.5%), Angle's class II, more rarely (16.7%), and Angle's class III, the least frequently (8.1%). In 1.7% of the children, Angle's classes were not defined. Angle's class I was observed least frequently among the children from the rural areas. In addition, in this group, the highest percentage of children with missing sixth teeth was revealed, which prevented from assessing correctly molar classes (Tab. 1). No statistically significant relationship was found between the gender and place of residence, and the intraoral conditions investigated in the study.

Table 1. Analysis of the facial features and intraoral conditions broken down by gender and place of residence

		girls	**boys**	**p***	**VI**	**ST**	**BC**	**p****
face symmetry	correct	166 (66.7%)	163 (64.9%)	0.684	9 (36.0%)	132 (66.3%)	188 (68.1%)	0.028**
Kolmann's rule	correct	154 (61.8%)	146 (58.2%)	0.401	5 (20.0%)	109 (54.8%)	186 (67.4%)	0.000**
Rickett's profile	concave	74 (29.7%)	54 (21.5%)	0.031*	7 (28.0%)	49 (24.6%)	72 (26.1%)	0.565
	normal	158 (63.5%)	167 (66.5%)		15 (60.0%)	129 (64.8%)	181 (65.6%)	
	convex	17 (6.8%)	30 (12.0%)		3 (12.0%)	21 (10.6%)	23 (8.3%)	
Korkhaus lip step	enlarge negative	39 (15.7%)	57 (22.7%)	0.001*	10 (40.0%)	42 (21.1%)	44 (15.9%)	0.346
	medium negative	164 (65.9%)	174 (69.3%)		12 (48.0%)	123 (61.8%)	203 (73.6%)	
	positive	46 (18.5%)	20 (8.0%)		3 (12.0%)	34 (17.1%)	29 (10.5%)	
overbite	increased	50 (20.1%)	67 (26.7%)	0.213	7 (28.0%)	39 (19.6%)	71 (25.7%)	0.528
	in norm	194 (77.9%)	180 (71.7%)		18 (72.0%)	157 (78.9%)	199 (72.1%)	
	negative	5 (2.0%)	4 (1.6%)		0 (0.0%)	3 (1.5%)	6 (2.2%)	
overjet	increased	69 (27.7%)	63 (25.1%)	0.762	11 (44.0%)	47 (23.6%)	74 (26.8%)	0.440
	in norm	177 (71.1%)	184 (73.3%)		14 (56.0%)	150 (75.4%)	197 (71.4%)	
	reversed	3 (1.2%)	4 (1.6%)		0 (0.0%)	2 (1.0%)	5 (1.8%)	
canine's class / right side	cannot be defined	2 (0.8%)	9 (3.6%)	0.186	0 (0.0%)	4 (2.0%)	7 (2.5%)	0.317
	I	174 (69.9%)	176 (70.1%)		15 (60.0%)	141 (70.9%)	194 (70.3%)	
	II	61 (24.5%)	55 (21.9%)		9 (36.0%)	43 (21.6%)	64 (23.2%)	
	III	12 (4.8%)	11 (4.4%)		1 (4.0%)	11 (5.5%)	11 (4.0%)	
canine's class /left side	cannot be defined	2 (0.8%)	5 (2.0%)	0.624	0 (0.0%)	3 (1.5%)	4 (1.4%)	0.720
	I	169 (67.9%)	175 (69.7%)		17 (68.0%)	140 (70.4%)	187 (67.8%)	
	II	69 (27.7%)	62 (24.7%)		8 (32.0%)	48 (24.1%)	75 (27.2%)	

	III	9 (3.6%)	9 (3.6%)		0 (0.0%)	8 (4.0%)	10 (3.6%)	
Angle's class / right side	cannot be defined	6 (2.4%)	2 (0.8%)	0.429	3 (12.0%)	1 (0.5%)	4 (1.4%)	0.210
	I	177 (71.1%)	188 (74.9%)		13 (52.0%)	156 (78.4%)	196 (71.0%)	
	II	46 (18.5%)	40 (15.9%)		7 (28.0%)	30 (15.1%)	49 (17.8%)	
	III	20 (8.0%)	21 (8.4%)		2 (8.0%)	12 (6.0%)	27 (9.8%)	
Angle's class / left side	cannot be defined	7 (2.8%)	2 (0.8%)	0.350	2 (8.0%)	3 (1.5%)	4 (1.4%)	0.063
	I	185 (74.3%)	185 (73.7%)		16 (64.0%)	157 (78.9%)	197 (71.4%)	
	II	39 (15.7%)	42 (16.7%)		7 (28.0%)	25 (12.6%)	49 (17.8%)	
	III	18 (7.2%)	22 (8.8%)		0 (0.0%)	14 (7.0%)	26 (9.4%)	

A statistically significant relationship was proved between the normal Rickett's profile, the moderate negative Korkhaus lip step and correct overbite, and the preserved Kolmann's rule (Tab. 2).

Table 2. Relationships between Kolmann's rule and Rickett's profile, Korkhaus' lip step and overbite

	Kolmann's rule		**p***
	not retained	**retained**	
Rickett's normal profile	119 (59.5%)	206 (68.7%)	p=0.002*
medium negative Korkhaus' lip step	122 (61.0%)	216 (72.0%)	p=0.001*
normal overbite	157 (78.5%)	217 (72.3%)	p=0.035*

Children with Rickett's normal profile, correct overbite and Angle's class I and cannine's class I on both sides of the arch had significantly more likely moderately negative Korkhaus lip step (Tab. 3).

Table 3. Relationships between Kolmann's rule and Rickett's profile, Korkhaus' lip step, Angle's classes and canine's classes

	Korhaus lip step			**p***
	enlarge negative	**medium negative**	**positive**	
Rickett's normal profile	43 (44.8%)	244 (72.2%)	38 (57.6%)	p=0.000*
normal overjet	61 (63.5%)	252 (74.6%)	48 (72.7%)	p=0.000*
canine's I class / right side	55 (57.3%)	250 (74.0%)	45 (68.2%)	p=0.000*
canine's I class / left side	54 (56.3%)	248 (73.4%)	42 (63.6%)	p=0.000*
Angle's I class / right side	60 (62.5%)	261 (77.2%)	44 (66.7%)	p=0.000*
Angle's I class / right side	57 (59.4%)	272 (80.5%)	41 (62.1%)	p=0.000*

In the study of 13-year-olds, occlusion disorders were found in 289 children, 57.8% of all the examined. In some children, there was more than one malocclusion, hence the total score of malocclusions amounted to 393. Distal occlusion, the most frequent in occlusion disorders, was diagnosed in 170 patients (34%). Defects in the vertical (deep bites - 22%) were the second most numerous group of malocclusions, while cross bites - 47 (9.4%) were the third in the order of malocclusion. Lingual occlusions were the least common - 8 children (1.6%).

Dental defects, concerning dentoalveolar disproportions (crowding, spacing), were observed in 414 respondents, which accounted for 82.8%. The smallest percentage of irregularities (76%) were found in the children from the rural areas. Other dental abnormalities were detected in 464

children (92.8%), of which 100% involved children from the rural areas. In both types of dental defects the highest percentage of defects was revealed in children from small towns.

Occlusal norms excluding the presence of both occlusion and dental defects were observed in 12 children (2.4%). No malocclusion and dental defects were found in children from small towns and big cities.

Distribution of individual malocclusion and dental defects according to children's gender and place of residence is shown in Table 4. There was no statistical significance between defects and the gender or place of residence.

Table 4. Prevalence of malocclusion, dental abnormalities and normal occlusion in subjects broken down by gender and place of residence

		girls	**boys**	**p***	**VI**	**ST**	**BC**	**p****
normal occlusion		6 (2.4%)	6 (2.4%)	0.989	0 (0.0%)	5 (2.5%)	7 (2.5%)	0.630
malocclusion	distal occlusion	94 (37.8%)	76 (30.3%)	0.078	10 (40.0%)	65 (32.7%)	95 (34.4%)	0.957
	mesial occlusion	21 (8.4%)	23 (9.2%)	0.773	2 (8.0%)	18 (9.0%)	24 (8.7%)	0.981
	open bite	7 (2.8%)	7 (2.8%)	0.988	0 (0.0%)	6 (3.0%)	8 (2.9%)	0.656
	deep bite	47 (18.9%)	63 (25.1%)	0.093	7 (28.0%)	38 (19.1%)	65 (23.6%)	0.612
	cross bite	21 (8.4%)	26 (10.4%)	0.461	3 (12.0%)	23 (11.6%)	21 (7.6%)	0.148
	lingual occlusion	6 (2.4%)	2 (0.8%)	0.151	0 (0.0%)	5 (2.5%)	3 (1.1%)	0.541
dental abnormality	dentoalveolar disproportions	204 (81.9%)	210 (83.7%)	0.607	19 (76.0%)	172 (86.4%)	223 (80.8%)	0.444
	others	232 (93.2%)	232 (92.4%)	0.748	25 (100.0%)	185 (93.0%)	254 (92.0%)	0.251

Of the dentoalveolar disproportions, crowding of teeth (57.5%) was reported most frequently compared to the presence of spaces between teeth (10.3%). Crowding was more common in the lower arch (64.4%) than in the upper (50.6%). In contrast, the trems were found in the similar number of children, in the upper arch (10.6%) and the lower arch (10.0%). A statistically significant correlation was revealed between the occurrence of spaces in the upper arch and the gender (Tab. 5).

Persistent deciduous teeth were observed in 45 patients (9.0%), 26 boys (10.4%) and 19 girls (7.6%).

In a one boy (0.4%), a big city dweller, two medial upper incisors with increased dimensions were reported. Fifteen microdontic teeth were observed in 8 children (3.2%). The most common irregularity concerned the upper lateral incisors - 14 teeth. In a one child, microdontic lower central incisors were found.

Hyperdontia in the form of the middle tooth (mesiodens) occurred in a one boy (0.4%) from a small town. Hyperdontia was observed in five patients (1.0%) from small towns and big cities, who had 8 permanent teeth gaps – 5 of second premolars and 3 lateral incisors.

Incompatibility of dental midline with regard to the midline of the face was observed in 41.9% of children. In the upper arch, this irregularity concerned more girls (47.4%), which was confirmed statistically. In the lower arch, this finding was revealed in a similar number of girls (44.2%) and boys (43.0%). Diastema was reported more frequently in the upper arch (12%) than in the lower arch (4%).

In a one boy (0.4%) from a small town, transposition of the canine with lateral incisor was revealed. Reinclusion of lower second primary molars was observed in two boys (0.8%) from a big city. Protrusion of 486 incisors was reported in 64 girls (25.7%) and 62 boys (24.7%), affecting more frequently the upper teeth (353 teeth). Retrusion of 353 incisors occurred in 49 girls (19.7%) and 51 boys (20.3%), more frequently in the upper arch (258 teeth). A total of 22 girls (8.8%) and 34 boys (13.5%) had 76 ectopic teeth, 53 of them located in vestibule, 18 – in palatal and 5 – in lingual positions.

Teeth rotations (81.8%) were the most common irregularities, reported in slightly more girls (84.7%). A total of 2,165 teeth were rotated, of which 1,302 belonged to the lower arch. Rotated incisors constituted the largest group - 943, then, upper incisors - 650, successively, lower canines - 279, upper canines – 193 and finally, premolars and molars - 20.

The number of children with retrusion and rotations of teeth was observed to decrease with the increasing size of residence. This relationship was confirmed statistically (Tab. 5).

Table 5. Prevalence of dental abnormalities by gender and place of residence

		girls	boys	p*	VI	ST	BC	p**
dentoalveolar disproportions	crowding in the upper arch	134 (53.8%)	119 (47.4%)	0.152	10 (40.0%)	110 (55.3%)	133 (48.2%)	0.545
	crowding in the lower arch	161 (64.7%)	161 (64.1%)	0.904	17 (68.0%)	132 (66.3%)	173 (62.7%)	0.373
	spacing in the upper arch	17 (6.8%)	36 (14.3%)	0.006*	2 (8.0%)	25 (12.6%)	26 (9.4%)	0.523
	spacing in the lower arch	19 (7.6%)	31 (12.4%)	0.079	3 (12.0%)	22 (11.1%)	25 (9.1%)	0.435
time eruption disorders	the presence of persistent deciduous teeth	19 (7.6%)	26 (10.4%)	0.287	1 (4.0%)	18 (9.0%)	26 (9.4%)	0.525
size disorders	macrodontics	0 (0.0%)	1 (0.4%)	0.319	0 (0.0%)	0 (0.0%)	1 (0.4%)	0.400
	microdontics	2 (0.8%)	6 (2.4%)	0.157	0 (0.0%)	5 (2.5%)	3 (1.1%)	0.541
number disorders	hypodontia	2 (0.8%)	3 (1.2%)	0.660	0 (0.0%)	3 (1.5%)	2 (0.7%)	0.699
topography disorders	incompatibility midline in the upper arch	118 (47.4%)	83 (33.1%)	0.001*	8 (32.0%)	86 (43.2%)	107 (38.8%)	0.770
	incompatibility midline in the lower arch	110 (44.2%)	108 (43.0%)	0.796	10 (40.0%)	79 (39.7%)	129 (46.7%)	0.145
	diastema in the upper arch	29 (11.6%)	31 (12.4%)	0.809	1 (4.0%)	21 (10.6%)	38 (13.8%)	0.110
	diastema in the lower arch	8 (3.2%)	12 (4.8%)	0.371	0 (0.0%)	10 (5.0%)	10 (3.6%)	0.988
	protrusion	64 (25.7%)	62 (24.7%)	0.796	12 (48.0%)	46 (23.1%)	68 (24.6%)	0.207
	retrusion	49 (19.7%)	51 (20.3%)	0.858	7 (28.0%)	47 (23.6%)	46 (16.7%)	0.034 **
	ectopy	22 (8.8%)	34 (13.5%)	0.095	1 (4.0%)	23 (11.6%)	32 (11.6%)	0.489
	rotation	211 (84.7%)	198 (78.9%)	0.090	22 (88.0%)	171 (85.9%)	216 (78.3%)	0.027 **

A statistically significant correlation was established between the rotation of teeth and their crowding in both dental arches (Tab. 6).

Table 6. The relationship between the occurrence of rotation and the presence of dental crowding

	Rotations		p*
	yes	no	
crowding in the upper arch	9 (9.9%)	244 (59.7%)	p=0.000*
crowding in the lower arch	9 (9.9%)	313 (76.5%)	p=0.000*

DISCUSSION

The rules of the Polish orthodontic diagnosis allow for the initial diagnosis of orthodontic condition during screening. Orthodontic extraoral and intraoral analysis and functional examination can easily be carried out in a school nursing surgery. Analysis of the definition of malocclusion in line with the findings of the International Commission for Unification of Orthodontic Systematics of the World Health Organization, stating "malocclusion is a state of the masticatory system that limits the action of chewing and breathing and/or is felt by the patient as a disfigurement", reveals the difficulty in comparing Polish and foreign studies [11]. Moreover, Polish authors, in their studies, frequently used a different classification than Orlik-Grzybowska. Angle's

classification and severity of malocclusion, divided into good and bad occlusion or the WHO classification were frequently applied in the studies [15-18].

The Polish stricter criteria for diagnosis, based on the biological norm, compared to tests carried out in centres abroad, had no influence on a significant difference in the study results, compared to the data presented by American, Brazilian or Indian authors [19-21]. Class II malocclusion, found in 170 children, representing 34%, was the most frequently observed. A similar percentage of these defects was revealed among Asian kids - about 33% [22], 27.5% [23] and European kids - 29.2% [24]. Similarly, crowding, as the most common dental defect, was diagnosed in 57.5% of children, which was confirmed in other authors' reports - 46.4% [25], 53% [22], 54% [26].

The orthodontic study included 13-year-old children, residing in the areas with different distances from dental offices. The access to specialist orthodontic consultation was limited, especially in the rural areas. The low health awareness of parents and guardians manifesting itself in lack of interest in children's state of dentition may be associated with the relatively high prevalence of occlusion-tooth defects among the study children (82.8%). A high percentage of defects may result from inadequate prevention and unsatisfactory or ineffective treatment of children covered by the survey.

The prevalence of malocclusion and dental abnormalities in the study of 13-year-old children was comparable with the values reported in national publications based on the similar evaluation criteria, from 53.3% in the Szczecin region to 93% in Bielsko-Biala [27,28]. The nationwide epidemiological study of the masticatory system in 1995 revealed occlusion-tooth defects in 63.7% of 12-year olds [17,29]. In each of these studies, there was a different number of participants in each study, from 120 [27] to 1,860 children [17]. Comparing the occlusion study in children from the area of present Podlasie region, an increase in the percentage of children with malocclusions (57.8%) was observed in comparison with the study performed in 1969 (32.9%) [10].

A similar pattern was revealed in the Dolnoslaskie voivodeship, where the percentage of occlusive disorders in 1992 accounted for 50.6% and was almost twice as high as a few years earlier. In the former voivodeship of Szczecin - after 8 years, there was an increase in the percentage of occlusal abnormalities from 33.3% to 53.3% [7].

Although the results of individual occlusion studies are impossible to compare in detail due to the different populations and age classification used, it undoubtedly contributes greatly to the overall understanding of the epidemiology of malocclusion. A large percentage of children with occlusion-tooth defects suggests the need for reflection on existing orthodontic care in Poland - the availability and effectiveness of treatment. Orthodontic prevention is also significant, combating various forms of dysfunction or parafunctions from an early age. Healthy teeth constitute the foundation of the proper condition of occlusion. Thus, a major role is attributed to the treatment of primary teeth, protecting against tooth decay and furrows in newly erupted permanent teeth, early treatment of dental caries and tooth injury prevention. In the case of premature loss of baby teeth or neglect of hygiene leading to a reduction in the number of permanent teeth in children, appropriate steps should be undertaken to correct further development of the masticatory system.

The report of the Supreme Audit Office of 2013 year states that the five-year study of children conducted in 2011 showed that only 20.1% of them were free of tooth decay. In the opinion of the Supreme Audit Office, this situation was significantly affected by insufficient health education and disease prevention. The report showed that only 2.96% of the population of children and adolescents in 2011 benefited from guaranteed preventive services financed from public funds [30].

CONCLUSIONS

1. In the region of Podlasie, the consequences of inadequate orthodontic treatment were reported. Despite existing free care under the Polish National Health Fund for children up to the age of 13, the prevalence of malocclusion and dental defects have still been high.
2. The study proved that the highest number of children had posterior occlusion, which confirms that distal occlusions are still the most common malocclusions.
3. There was no correlation between the place of residence and the prevalence of malocclusion, which may illustrate the map of orthodontic surgeries in the Podlaskie voivodeship and confirm the awareness of parents, guardians and patients themselves regarding treatment of dental irregularities.

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Conflicts of interest

The authors declare that there are no conflicts of interest of this paper.

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Perception of the elderly by junior high school students and university students in Poland

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ABSTRACT

Introduction: Statistical data from the turn of the 20th century shows a significant increase in the average human life span and, what follows, an extension of old age. The world is aging and Poland has joined the list of countries which have been classified as demographically old since the rate at which society is aging has become very fast.

Purpose: The aim of this thesis was to become familiar with the opinions submitted by respondents regarding aging and old age, health problems connected with aging and preferred health behaviors.

Materials and methods: The research was conducted between January 3rd of 2013 and February 15th of 2014 on a group of 200 junior high school students and 200 university students from the Medical University of Białystok Faculty of Health Sciences using a questionnaire created by the authors.

Results: A vast majority of the respondents of the study groups declared that they have thought about old age. Among university students this percentage reached 38.5%. Almost 50.0% of all respondents acknowledged that older people are needed by society.

Conclusions: The results show that the aging process should be contemplated considering multiple aspects of life: biological, psychological and social. Moreover, youth education programs about seniors and old age as well as about ways to counteract their stigmatization should be introduced.

Key words: aging, social health, students

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INTRODUCTION

Statistical data from the turn of the 20th century shows [1] a significant increase in the average human life span and, what follows, an extension of old age. The world is aging and Poland has joined the list of countries which have been classified as demographically old since the rate at which society is aging has become very fast.

Negative stereotypes of aging affect not only the senior citizens' experience of aging but also young people's perception of it, influencing their attitude to older people. It would seem that the negative perception of seniors is the basis of unsympathetic attitudes toward older people and discrimination against them, the so called ageism [2].

In obtaining key abilities the most important element is normal communication within a family, especially between the young generation and the elderly. Currently it is not only the old who teach the young but more and more we see the reverse when the older generation of mature people bring their problems to children [3]. Most often these are technical problems – a child teaches their grandparents how to use a computer, a cell phone or how to surf the Internet [3].

The main aim of this thesis was to become familiar with the opinions submitted by respondents regarding aging and old age, health problems connected with aging and preferred health behaviors.

MATERIALS AND METHODS

The research was conducted between January 3rd of 2013 and February 15 of 2014, after previously obtaining permission from the bioethics committee of the Medical University of Białystok (no. R-I-002/651/2012) as well as the consent of the headmaster of the Junior High School in Pozezdrze, the headmaster of the Mother of Divine Mercy Catholic Junior High School in Bialystok and the dean of the Faculty of Health Sciences of the Medical University of Bialystok on a group of 200 junior high school students and 200 university students from the Bialystok Medical University, Faculty of Health Sciences.

The study used a questionnaire created by the authors concerning ascertaining the opinions about aging and old age as well as health problems connected with old age, comprising of two parts and in total containing 54 questions. The data obtained was compiled using Microsoft Excel 2010. Statistical analysis was completed by applying the Chi-square test and the proportion test with the Bonferroni correction. Statistical hypotheses were verified at the p= 0.05 significance level. Calculations were completed using IBM® SPSS® Statistics program, version 20.0.

RESULTS

Women dominated both study groups (71.2% of the study population). The junior high school group contained 56.0% of women and the university group – 86.5%.

During the analysis of the age of the respondents it turned out that over 35.0% of the questioned high school students were 14 years old (n= 71). Only two fewer people (34.5%) were a year older. Three quarters of the study population in the group of university students consisted of people between the ages of 21-25 (75.0%).

Analysis of the education level of respondents showed that 75 junior high school students (37.5%) were in the 1st grade, 72 people (36.0%) attended the 2nd grade and 53 children (26.5%) were in the 3rd grade of their schools. In case of the university students almost half of respondents (45.0%) were studying public health, 55 people (27.5%) physiotherapy, and 31 people (15.5%) nursing. Students of speech therapy with phono-audiology constituted 11.0% (22 people) of this sub-group. This group consisted predominantly of first-year students (61.0%), 18% were second-year students and the remaining 21.0% were students attending their third year. Over 60.0% of the participants were full time day students and the remaining (37.5%) were weekend and night students.

In the junior high school group, the largest percentage constituted residents of a major city while in the group from the Faculty of Health Studies of the Medical University of Białystok the majority came from the country.

A relatively even distribution of answers in both study groups has been recorded for the question "*How does age relates to old age?"*. In the junior high school group the most common answer was "66-70 years old" (29.5%) while among the Medical University student it was "71-75 years old" (36%). The variance between the two groups was statistically significant ($p<0.001$).

A vast majority of the respondents reported that they have thought about old age. The smallest percentage (39.0%) was recorded among junior high school students with only 1.0% fewer giving the opposite opinion. In the university student group, the same answer was given by 67.0% of respondents. The differences between groups were statistically significant ($p < 0.001$) (Table 1).

Table 1. Considering old age according to respondents

			Group		Total	p
			Junior High School Students	University Students		
Do you think about old age?	yes	n	78	134	212	< 0.001
		%	39.0%	67.0%	53.0%	
	no	n	76	43	119	
		%	38.0%	21.5%	29.8%	
	it's hard to say	n	46	23	69	
		%	23.0%	11.5%	17.3%	
Total		n	200	200	400	
		%	100.0%	100.0%	100.0%	

Additionally respondents were asked whether they are afraid of old age. Almost half of the junior high school students questioned (49.5%) stated that they are not afraid of it. In the university student group this number reached 38.5%. Also, in this case the variance between the two groups was statistically significant ($p<0.001$). The proportion test showed significant variance between junior high school students and university students ($p<0.05$). A detailed distribution of answers is presented in Table 2.

Table 2. Fear of old age in the opinion of junior high school students and university students

			Group		Total	p
			Junior High School Students	University Students		
Are you afraid of old age?	**yes**	**n**	42	77	119	< 0.001
		%	21.0%	38.5%	29.8%	
	no	n	99	58	157	
		%	49.5%	29.0%	39.3%	
	it's hard to say	n	59	65	124	
		%	29.5%	32.5%	31.0%	
Total		n	200	200	400	
		%	100.0%	100.0%	100.0%	

In answer to the question "*Which opinion about the elderly is closest to your own views*?" almost 50.0% of all participants admitted that old people are needed in society. In the junior high school student group this percentage reached 45.5% while in the university student group it was 51.5%. The analyzed data has been presented in Table 3.

Table 3. Respondent opinion concerning the position of the elderly within society

			Group		Total
			Junior High School Students	University Students	
Which opinion about the elderly is closest to your own views?	the elderly rather are a burden to society	n	21	30	51
		%	10.5%	15.0%	12.8%
	the elderly are needed by society	n	91	103	194
		%	45.5%	51.5%	48.5%
	it's hard to say	n	88	67	155
		%	44.0%	33.5%	38.8%
Total		n	200	200	400
		%	100.0%	100.0%	100.0%

An even distribution of answers was recorded concerning respect shown to the elderly by members of society. Over 41.0% of all respondents were of the opinion that senior citizens are not respected by society, and a slightly lower number of participants (40.5%) had a difficult time deciding whether older people are respected in society or not. The proportion test also did not find significant variance between individual groups. More detailed data is presented in Table 4.

Table 4. Respondent opinion concerning respect shown the elderly in society

			Group		Total
			Junior High School Students	University Students	
Do you think that the elderly are respected in society?	yes	n	39	34	74
		%	19.5%	17.0%	18.5%
	no	n	78	87	165
		%	39.0%	43.5%	41.3%
	It's hard to say	n	83	79	162
		%	41.5%	39.5%	40.5%
Total		n	200	200	400
		%	100.0%	100.0%	100.0%

Most junior high-school students (48.5%) and most university students (71.0%) were of the opinion that it is easier to go through old age in the countries of Western Europe than in Poland. The answers to this question are shown in Table 5.

Table 5. Respondents' answers to the question "Do you think that it is easier to go through old age in the countries of Western Europe than in Poland?"

			Group		Total
			Junior High School Students	University Students	
Do you think that it is easier to go through old age in the countries of Western Europe than in Poland?	yes	n	97	142	239
		%	48.5%	71.0%	59.8%
	no	n	30	7	37
		%	15.0%	3.5%	9.3%
	it's difficult to say	n	73	51	124
		%	36.5%	25.5%	31.0%
Totals		n	200	200	400
		%	100.0%	100.0%	100.0%

In the junior high school group 51.0% would like to live with family as seniors while in the college student group this number is 48.0%. The differences presented between the groups were statistically significant ($p < 0.001$).

A vast majority of respondents from all study groups believed that the aging process should be contemplated considering all analyzed aspects: biological, psychological and social. During analysis of individual aspects respondents most often chose the biological aspect of life as the most significant (junior high school students – 29.5%, university students – 13.5%). The variance presented between the two groups was statistically significant ($p < 0.001$).

Nearly ¾ of the respondents from the junior high school group (74.5%) during their course of study never discussed problems the elderly faced. The same percentage (74.5%) of university students did discuss these types of problems during their course of study. The variance presented between the groups was statistically significant ($p<0.001$). The proportion test showed significant differences between the junior high school group and the university student group in respect to their "yes" and "no" answers ($p < 0.05$).

In relation to the previous question only ¼ (25.0%) of junior high school students and almost half (49.0%) of university students believed that subjects connected with the problems facing the

elderly should be a part of the school curriculum. A large percentage of "it's difficult to say" answers has been recorded in respect to the posed question (junior high school – 48.0%, college students – 45.5%). The differences presented between the groups were statistically significant ($p < 0.001$). The proportion test showed significant variances between the junior high school group and the university student group in respect to their "yes" and "no" answers ($p<0.05$).

DISCUSSION

In many countries most recent decades are characterized by various forms of ageism which is visible through the discrimination and stigmatization of the elderly [4]. Jefferys [5] states that discrimination of the elderly is a result of their problems connected with adjusting to the fast pace of technological development and civilization changes which, in turn, are the reason that in many realms of life these people are not able to use the various forms of the modern lifestyle and become dependent on the young [5].

Ageism, according to Szukalski [6], can occur as:

- disdain – belief that the opinions, ideals and needs of the elderly are less important or less valuable;
- over-protectiveness (paternalism) – the inclination to relieve senior citizens in simple everyday chores even when they are able to perform them on their own;
- condescension – the inclination to treat the elderly as people who are not capable of surviving on their own without the help of other people or institutions;
- negligence – conscious or unconscious disregard for various needs which are very significant from the perspective of the elderly;
- social isolation – isolation of the elderly from the rest of society by restricting them to a closed area;
- financial abuses – various types of fraudulent activities connected with intentional taking advantage of the lack of knowledge and helplessness of senior citizens as consumers;
- physical abuse – physical aggression toward the elderly occurring in various forms (from shoving them to assault);
- extermination – intentional activities whose purpose is to shorten the life of the elderly [6].

According to Frąckiewicz [7] social exclusion of seniors can take on the following forms:

- lack of social ties;
- exclusion connected to cultural activity;
- exclusion connected to social participation and low electoral turnout;
- exclusion connected to lack of access to basic services such as medical services;
- exclusion connected with neighbors;
- exclusion connected to economic ability;
- exclusion connected to poverty [7].

Research conducted in November of 2009 by the Center for Public Opinion Research (CBOS) titled "Current problems and events" [8] revealed the opinions of Poles about the elderly including their attitude to their own old age. In answer to the question "Which opinion about the elderly, meaning those who are over 60 or are retired, is closest to your own views?" an overwhelming 87% of respondents chose the answer "The elderly are needed in society", 9% stated that "The elderly rather are a burden on society", and only 4% of participants marked the answer "It's hard to say"[8]. In our own research distribution of answers to this question was very similar. In all study groups the answer "The elderly are needed in society" was dominant.

In the analyzed study conducted by the Center for Public Opinion Research of the group's 1022 respondents only 13% of them were certain that the elderly in Poland are respected in society and half of them had a reserved opinion on this subject (they are rather respected). Almost one third of participants (31%) did not perceive the respect given the elderly. In our study 41.3% of respondents were of the opinion that older people are not respected in society, while 40.5% chose the "It's hard to say" answer.

On the basis of the declarations of the respondents of the Center for Public Opinion Research study [8] it can be ascertained that currently 72% of them have considered their own old age and about a quarter of them (26.0%) state that for now they have not thought about old age. The youngest participants think about old age the least – nearly half of respondents between the ages of 18 to 24 have never considered this aspect of their life while almost the same amount of people over 65 do it very often [8]. In our own study 53% of participants has thought about their old age with the smallest percentage recorded among junior high school students at 39.0%.

Most respondents (56%) [9] of the 870 group of randomly sampled adult residents of Poland in looking back on their life noticed a positive influence of their grandfathers and grandmothers on their life. Most often the respondents claimed that it was thanks to their grandmothers and grandfathers that they felt loved 61%). Majority of them also declared that it was from their grandparents that they received the basis of their faith (59%) and moral values (58%). Grandfathers and grandmothers were also the source of family history (for 55% of all participants), discussion of some historical events (46%) and patriotism (49% learned to love their country from their grandparents) [9]. A

little over half of Poles (53%) claimed that they owe such personality traits as self-discipline, diligence, responsibility and strong will to their grandparents, while $^{2}/_{5}$ (40%) stated that their grandparents taught them some practical skill. One-fifth (21%) felt that their grandparents initiated for them some type of a hobby or that inherited their interests. The number of participants who received an apartment (13%) from their grandparents or inherited something from them (7%) was lower. The large influence of grandparents on their grandchildren's' life was the result of, among other things, the fact that nearly one half of adult Poles (47%) were cared for and looked after by their grandparents as children [9].

A different study [10] showed that nearly $^{3}/_{4}$ of adult Poles (72%) felt that they owed something to their grandmother or grandfather. 16% claimed that they owe them nothing and 8% never met or do not remember their grandparents. In regards to the studies from years 2000 and 2007 a vast majority of respondents declared that they felt gratitude to their grandparents. However, the number of respondents who have had a different opinion on this subject as well as those who have never known their grandparents decreased. This confirms [10] an earlier opinion that the role of grandparents in Poland is growing, a fact most probably caused by the increase in the significance of their role in the process of raising grandchildren.

It seems therefore worthwhile to educate younger generations about aging and old age, about health problems connected with this stage of life, and to provide them with information concerning senior citizens, and to develop a strategy for the positive portrayal and perception of seniors as well as to break currently existing stereotypes concerning old age.

CONCLUSIONS

As a result of the conducted research following conclusions have been formulated:

1. Respondents in general gauged negatively the life of seniors in Poland claiming that, for example, it is easier to live out old age in countries of Western Europe and that the elderly are not respected in society
2. The aging process should be contemplated considering multiple aspects of life: biological, psychological and social.
3. Youth education programs about seniors and old age as well as about ways to counteract their stigmatization should be introduced.

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Conflicts of interest

The authors have no conflicts of interest to disclose.

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Influence of exposure to patient aggression and professional experience on the psychological condition of various groups of healthcare workers

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ABSTRACT

Purpose: To analyze the relationship between the psychological condition of representatives from various professional groups of healthcare workers, the degree of their exposure to patient aggression, as well as with the duration of their professional experience.
Materials and methods: Study participants (n=1498) were employed at open and closed healthcare units within Podlaskie province: 493 nurses, 504 midwives and 501 physicians. The Work Features Evaluation Questionnaire and General Health Evaluation Questionnaire GHQ28 were applied, and the psychological condition of medical staff was examined based on a 30-question survey
Results: When analyzing all of the groups of medical personnel, the mean level of exposure to patient aggression fell within the moderate range. The highest level of aggression was experienced amongst nurses, while the lowest – amongst midwives. The analyzed groups did not differ significantly in terms of the level of their psychological condition. With the exception of physicians, no significant association was observed between levels of patient aggression and the psychological condition of the medical personnel. Amongst physicians, individuals who experienced lower levels of aggression were characterized by significantly higher psychological condition values when compared to personnel exposed to moderate or high levels of patient aggression. No significant linear correlations between psychological condition levels and the frequency of patient aggression or duration of professional experience were noted in any of the analyzed professional groups.
Conclusions: A moderate level of exposure to patient aggression is not the main factor affecting the psychological condition of medical personnel.
Key words: aggression, stress, nurse, midwife, physician

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INTRODUCTION

It is only in recent years that we have realized the consequences of exposure to aggression in the workplace. According to the definition adopted by the European Commission, workplace aggression refers to: "all situations when a worker is offended, threatened or attacked in conditions directly related to his/her job and when these situations directly or indirectly endanger his/her safety, welfare and health" [1]. Aggression may originate from all individuals involved in the functioning of a given organization, including external and internal customers, among them superiors, co-workers and subordinates [2].

Exposure to aggression is relatively frequent amongst professionals who work under strong psychological pressure, among them – healthcare workers. The harmful occupational factors which this group is exposed to include: stress (resulting from being responsible for the health and lives of patients), shift work, interaction with demanding patients and their relatives, as well as unfavorable socioeconomic conditions [3-5]. It is not surprising therefore that the International Labour Organization ranked medical personnel second in regards to their exposure to violence in the workplace [6].

From the viewpoint of organizations, aggression in the workplace may be reflected by a decrease in the quality of offered services. This problem is particularly salient for healthcare units, since the exposure of personnel to aggression may lead to a decline in the quality of patient care, and in extreme situations, even to health- and life-threatening medical mistakes [7,8].

Additionally, exposure to aggression in the workplace negatively influences the psychophysical condition of personnel. According to literature, a relationship may exist between the frequency of exposure to aggression in medical personnel and the occurrence of fatigue, stress, and the lack of work satisfaction [7,9,10]. However, no systematic studies have been performed thus far on the association between one's exposure to aggression and one's psychological condition.

Consequently, the aim of this study was to analyze the relationship between the psychological condition of representatives from various professional groups of healthcare workers, the degree of their exposure to patient aggression, as well as with the duration of their professional experience.

MATERIALS AND METHODS

This study was performed between January 2008 and December 2009 in Podlaskie Voivodeship (North-eastern Poland). The survey included 1498 healthcare workers, among them: 493 nurses, 504 midwives and 501 physicians. The detailed characteristics of study participants are summarized in Table 1. The professional subgroups differed significantly in terms of their mean age and professional experience, as well as their distributions of gender and their employment at open or closed healthcare units.

Table 1. Characteristics of study participants

Parameter	Nurses (n=493)	Midwives (n=504)	Physicians (n=501)	P value
Women	481 (97.57%)	502 (99.60%)	281 (56.09%)*	<0.001
Age (years)	37.58±7.51	39.46±6.42*	39.47±9.38*	<0.001
Professional experience (years)	15.41±8.02	16.81±7.27*	13.61±9.45**	<0.001
Opened healthcare	167 (33.87%)	75 (14.88%)*	102 (20.36%)**	<0.001

Pearson's chi-square test or Fischer's exact test: *,** - significant differences between subgroups

Participation in this study was voluntarily and all of the procedures were accepted by the Local Bioethical Committee of the Medical University of Bialystok.

Respondents were asked to complete the Work Features Evaluation Questionnaire and General Health Evaluation Questionnaire GHQ28. Exposure to eight forms of patient aggression was assessed including: 1) using a raised voice, 2) threats, 3) blackmail, 4) attempts to strike, 5) dangerous attitudes, 6) aggression in the presence of medical personnel, 7) aggression in the presence of other patients, and 8) use of direct physical violence. The frequency of exposure to particular forms of aggression was expressed in points based on the following scale: 0 – never, 5 – several times a year, 10 – several times a month, 15 – several times a week, and 20 – everyday. The sum of the points for all forms of aggression was considered to constitute the overall intensity of aggression

experienced from patients. The maximal level of exposure, corresponding to daily exposure to all eight analyzed forms of aggression, could theoretically reach 160 points.

The psychological condition of medical staff was examined based on a 30-question survey pertaining to general their satisfaction with work, relationships at the workplace, and the psychological status of participant.

The overall exposure to aggression and the psychological condition of the examined personnel were analyzed in regards to the professional group and the duration of their professional experience. The mean values of psychological condition were also compared amongst three subgroups of personnel characterized by different levels of exposure to patient aggression. Based on a quartile distribution of this latter variable, the participants were classified into three classes: those with low (0-3 points, lower quartile), moderate (4-30 points, interquartile range) and high (more than 30 points, higher quartile) levels of exposure.

Continuous variables were presented as arithmetic means and their standard deviations (SD). The normality of distribution was tested with the Shapiro-Wilk test. Arithmetic means amongst the groups were compared using ANOVA and the Tukey post-hoc test. Distributions of qualitative variables were compared by means of the Pearson's chi-square test of Fischer's exact test. Associations between continuous variables were tested with Spearman's rank coefficient of correlation (r). Calculations were performed using Statistica 7 (StatSoft®, Tulsa OK, United States) software, with statistical significance defined as $p \leq 0.05$.

RESULTS

When analyzing all of the groups of medical personnel, the mean level of exposure to patient aggression fell within the moderate range. The highest level of aggression was experienced amongst nurses, while the lowest – amongst midwives (Table 2).

Table 2. Average levels of exposure to patient aggression in various groups of medical personnel

Professional group	n	mean	95% CI	P value
Nurses	493	26.81	24.96-28.65	<0.001
Physicians	501	18.57*	16.94-20.20	
Midwives	504	12.04**	10.50-13.58	
Total	1498	19.08	18.07-20.10	-

ANOVA: *,** - significant differences between subgroups (Tukey post-hoc test)

Distribution analysis revealed that more than half of the participants were exposed to a moderate level of patient aggression. However, the fraction of personnel who were exposed to a high level of patient aggression differed significantly between the analyzed professional groups. This fraction was highest amongst nurses and the lowest amongst midwives (Table 3).

Table 3. Distribution of exposure levels to patient aggression amongst various groups of medical personnel

Professional group	Exposure to aggression level			P value
	Low	Moderate	High	
Nurses	68 (13.8%)	236 (47.9%)	189 (38.3%)	<0.001
Physicians	118 (23.6%)*	289 (57.7%)	94 (18.8%)*	
Midwives	219 (43.5%)**	244 (48.4%)	41 (8.1%)**	
Total	405 (27.0%)	769 (51.3%)	324 (21.6%)	-

Pearson's chi-square test or Fischer's exact test: *,** - significant differences between subgroups

The analyzed groups did not differ significantly in terms of the level of their psychological condition (expressed in points) (Table 4).

Table 4. Average levels of psychological condition in various groups of medical personnel

Professional group	n	mean	95% CI	P value
Nurses	493	136.46	134.46-138.46	0.161
Physicians	499	136.01	133.80-138.22	
Midwives	503	133.78	131.73-135.82	
Total	1495	135.41	134.20-136.61	-

ANOVA: differences between groups insignificant (p>0.05)

With the exception of physicians, no significant association was observed between levels of patient aggression and the psychological condition of the medical personnel. Amongst physicians, individuals who experienced lower levels of aggression were characterized by significantly higher psychological condition values when compared to personnel exposed to moderate or high levels of patient aggression (Table 5).

Table 5. Average (± standard deviation) levels of psychological condition in various groups of medical personnel stratified by exposure levels to patient aggression

Professional group	Exposure to aggression level			P value
	Low	Moderate	High	
Nurses	134.59±22.90	136.20±22.42	137.45±22.81	0.652
Physicians	137.96±22.29*	130.37±24.31	131.79±19.52	0.002
Midwives	134.99±26.82	136.75±24.54	135.01±25.14	0.745
Total	136.53±23.78	134.56±23.97	136.03±23.15	0.348

ANOVA: *significant differences between groups (Tukey post-hoc test)

However, no significant linear correlations between psychological condition levels and the frequency of patient aggression or duration of professional experience were noted in any of the analyzed professional groups (Table 6).

Table 6. Spearman's coefficients of linear correlation between the frequency of exposure to patient aggression or duration of professional experience and the levels of psychological condition in various groups of medical personnel

Professional group	Exposure		Experience	
	r	p	r	P value
Nurses	0.077	0.089	0.017	0.715
Physicians	-0.083	0.063	0.026	0.563
Midwives	-0.084	0.061	-0.024	0.599
Total	-0.013	0.615	-0.002	0.931

DISCUSSION

This study revealed that medical personnel were predominantly exposed to moderate levels of patient aggression. However, particular professional groups from amongst the medical staff differed significantly in terms of the levels of aggression experienced.

Nurses were found to experience patient aggression more frequently than the other professional groups. In the Polish tradition, the medical personnel of this professional group are wrongly considered to be „lower", and their authority amongst patients is markedly lower compared to that of physicians. The authority of nurses is also weakened by the attitude of some physicians. Moreover, it should be remembered that nurses are the professional group with whom patients interact the most. Consequently, nurses are addressed with most of the patient's frustrations, frustrations which sometimes result from the quality of healthcare being improper [11]. This

latter hypothesis was confirmed by a previous study of ours which revealed significant differences in exposure to aggression between nurses employed in open and closed healthcare systems. The level of exposure in this latter group was significantly higher, resulting from the fact that open healthcare patients contacted nurses less frequently compared to hospitalized patients [12]. Studies from other countries confirmed that nurses are exposed to the highest levels of patient aggression [10,13,14].

Physicians who took part in this study experienced significantly lower levels of patient aggression than nurses, however, these levels were still higher than the levels of patient aggression experienced by midwives. In Western European countries, physicians were exposed to the lowest levels of patient aggression when compared to all healthcare workers [13,15]. It should be mentioned, however, that the authority of Polish physicians faced a serious crisis due to the collapse of the entire healthcare system. High profile cases of corruption amongst physicians were also publicized by the media. According to literature, the exposure of physicians to patient aggression is inhomogeneous and related to their specialty and employment. Exposure to violence is significantly higher amongst personnel working with psychiatric and geriatric patients as well as in emergency units [9,10,14-17]. Unfortunately, the design of our study did not allow for the comparison of physicians working in various specializations.

The exposure of midwives to lower levels of patient aggression observed in this study seems to have a complex etiology. Usually, patients contact midwives during the perinatal period. Therefore, this contact is planned and expected, and the pregnant woman and her spouse have more time to prepare for it. Moreover, it is more frequent nowadays that the midwife present during birth is known to the patient, sometimes having been employed by the patient during a previous pregnancy [18]. Finally, it should be remembered that women constitute the majority of midwifery patients, and according to many studies, the level of aggression represented by this gender is significantly lower than by males [10]. There is a lack of published data in regards to the exposure of midwives to patient aggression in other countries. Therefore, it is likely that the problem of patient aggression towards midwives is of marginal importance outside of Poland as well.

As previously mentioned, the results of sporadic studies suggest the presence of an association between the frequency of exposure to patient aggression and the occurrence of fatigue, stress, and work dissatisfaction amongst medical personnel [7,9,10]. In this study, however, no significant relationships were observed between levels of aggression experienced by medical personnel and their psychological condition personnel (besides the physician subgroup). This finding seems to be the result of two factors. Firstly, these are physicians who are mainly responsible for the patient's health. The psychological pressure which results from this responsibility may act synergistically with episodes of patient aggression, decreasing the psychological condition levels in this professional group [19]. In Poland, these two stressors are strengthened by the unfavorable economic situation of the public healthcare system, which forces physicians to search for multiple job positions. Secondly, physicians interact with patients much less frequently than nurses or midwives, especially in closed healthcare units [20]. It is plausible that since they interact with patients less frequently, physicians are less accustomed to the demanding behaviors of patients. As such, their exposure to this form of patient aggression may influence their psychological condition more severely.

However, the relationship between the frequency of patient aggression and levels of psychological condition was not strong even amongst physicians, and its linear character was not confirmed during correlation analysis. These findings are possibly related to the fact that the medical personnel in this study were exposed to predominantly moderate levels of patient aggression. It is very likely that a strong linear relationship between the studied variables would be observed if a sufficiently large sample of medical personnel exposed to high levels of patient aggression was analyzed (personnel employed in emergency or psychiatric units).

CONCLUSIONS

This study revealed that a moderate level of exposure to patient aggression is not the main factor affecting the psychological condition of medical personnel. Nevertheless, further research is needed in regards to this aspect in order to explain the relationship between the exposure of medical staff to aggression and their mental status, specifically when dealing with demanding patients.

Conflicts of interest

The authors have declared no conflicts of interest.

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Obesity and its impact on the course of anesthesia

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ABSTRACT

Introduction: Obesity is a major problem for millions of citizens. The treatment of obesity is a problem of nutritionists, psychologists, physical therapists, internists, surgeons, anesthesiologists, and many other specialists.
Purpose: To determine the influence of obesity on: blood pressure (systolic and diastolic), mean pressure (MAP), the scale of the risk of surgery (ASA) and saturation.
Materials and methods: The study was conducted among 200 patients. The research was prospective and was carried out in the general operating theatre in the Regional Specialist Hospital in Biała Podlaska between May 2011 and July 2012. The study was based on the anaesthetic documentation – anaesthetic information card, observation and analysis of patient records. For the statistical calculations, we used Statistica 10.0 using NIR test. Differences at $p<0.05$ were identified as significant.
Results: The study did not confirm the significant impact of obesity on the deterioration of blood oxygenation. The surveyed men had significantly been higher preoperative absolute risk compared to women. A close relationship between an increased BMI and an increased risk associated with anesthesia was expressed in the ASA score chart.
Conclusion: This study proved that overweight and obesity significantly affected blood pressure (systolic, diastolic), and MAP.
Key words: the scale of the risk of surgery, systolic blood pressure, diastolic blood pressure, mean pressure, saturation

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INTRODUCTION

According to a report by the World Health Organization (WHO) the problem of overweight concerns 1.6 billion people, and 522 mln are struggling with obesity. The accumulation of excessive fat tissue is not only a medical but social and economic problem as well, it appears necessary to take steps to normalize body weight. The definition of obesity is a condition in which the amount of the fat tissue in men is above 25% and in women over 30% of the body weight. Classification of BMI according to the WHO: normal weight - 18.5-24.9; overweight - 25-29.9; 1^0 degree obesity - 30 -34.9; 2^0 degree obesity - 35-39.9, and 3^0 degree obesity -40 and more [1].

Changes in the upper respiratory tract and in the construction of the head and neck, such as a large tongue, short thick neck, swollen throat structure, smaller mouth opening cause that the percentage of failed intubation in obese patients can reach 13%. Obesity causes many changes that affect a reduction in cardiovascular fitness. The advancement of the changes depends on the degree of obesity and on how long the patient is suffering from obesity. In obese young people who were overweight in childhood, circulation may be well adapted to obesity and usually clinical deviations from the norm are not observed, although the proportion of people with hypertension at a young age who are obese now in adulthood is greater than in patients with normal BMI [2- 4].

The aim of the study is to present the problem of obesity and to determine the extent to which obesity affects the process of general anesthesia. The subject of a detailed analysis is the impact of obesity on the risk associated with surgery.

MATERIALS AND METHODS

The research was prospective and was carried out in the general operating theatre in the Regional Specialist Hospital in Biała Podlaska in the period from May 2011 to July 2012. The research was based on the anaesthetic documentation – anaesthesia chart, observation and the analysis of patients' documents.

The study included 200 patients admitted to the operation suite, the patients were from urology, surgery and gynecology wards and were subjected to treatment lasting an average of 1.03 hours. All patients were under general endotracheal anesthesia. For the purpose of further analysis age categorization of the study group was carried out. The average age of the study group was 53.48 ± 18.76 years, while among women 52.54 ± 16.92 years and for men 54.50 ± 20.71 years (Table 1). The average height of the examined woman was 166 ± 8,34cm, while as to men 173 ± 8,58cm. The average weight of women in the study group was 76.44 ± 15.99 kg, men 80.02 ± 14.39 kg. Average BMI values for women are 27.65 ± 5.30 kg/m2 and in the case of men 26.52 ± 4.06 kg/m2.

Table 1. Statement of average values of height, weight, BMI and age of examined patients

Variable	Sex	$\bar{x}$	SD	Min	Max
Age (years)	Females	52,54	16,92	24	87
	Males	54,50	20,71	17	89
Height (cm)	Females	166	8,34	150	190
	Males	173	8,58	159	189
Body weight(kg)	Females	76,44	15,99	50	115
	Males	80,02	14,39	50	112
BMI (kg/m^2)	Females	27,65	5,30	20,02	43,28
	Males	26,52	4,06	19,53	35,16

$\bar{x}$ - average. SD –standrad deviation, min-minimum, max-maximum;

Depending on the classification of the BMI, examined patients were divided into three groups: patients with normal BMI, patients who are overweight and obese patients. Examined men with normal body weight accounted for 40.7% (n = 35), men who are overweight: 32.6% (n = 28), men with obesity of the 1st degree accounted for 24.4% (n = 20) and men with obesity of the 2nd degree: 2.3% (n = 2). (Fig. 1b).

Women with normal BMI dominate in the structure of body weight of women: 41.5% (n= 44). Almost every third woman had the 1st degree of obesity 29.2% (n = 38), and one in four was overweight 25.5% (n = 29). Women with obesity of the 3rd grade accounted for 3.8% of the minimum percentage of women surveyed (Fig. 1a).

The analysis was made due to the parameters such as: blood pressure, mean MAP pressure, the scale of ASA, sex.

In order to qualify a patient for the surgery the scale developed by the American Society of Anesthesiology (ASA) has been used. It assesses the operational risk associated with the risk of serious complications or death of the patient during anesthesia or after it. In this system, on the basis of

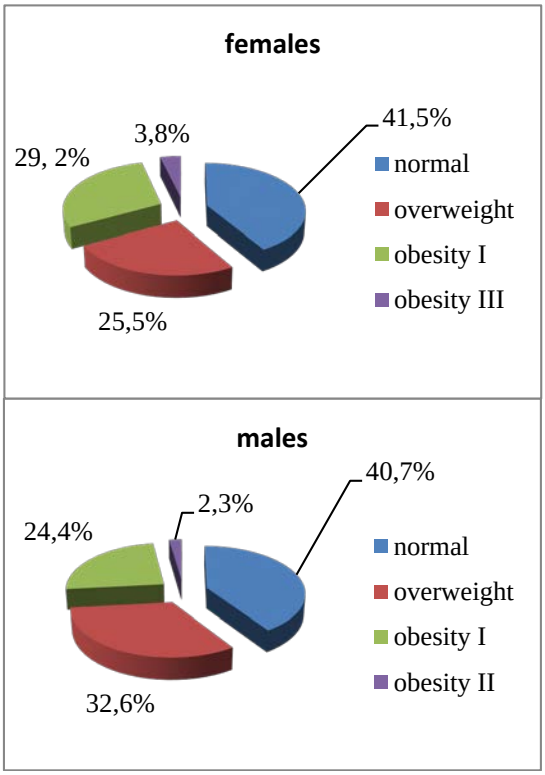

Figure 1. BMI in women (a) and men (b).

preoperative evaluation, patients are classified to one of six groups [5,6]:

ASA 1 – healthy patients;

- ASA 2 – patients with mild systemic disease, which does not compromise normal functioning;
- ASA 3 - patients with severe systemic disease, limiting normal functioning;
- ASA 4 - patients with severe systemic disease that is a constant threat to life;
- ASA 5 - dying patients who will not survive surgery;
- ASA 6 - patients with pronounced brain death whose organs are taken for transplantation;
- E - sudden or urgent surgery.

The examined patients were subjected to the action of the anesthetic. The apparatus used for anesthesia consisted of three basic components: the mixing and supply system of medical gases, anesthetic ventilator and patient monitoring systems. Measurements of systolic and diastolic blood pressure, and mean pressure MAP were carried out with an apparatus for measuring blood pressure. The patient's arm used for measuring pressure was at an angle of approximately 90 degrees to the body. The width of the cuff for measuring blood pressure accounted for 40% of the circumference of the arm.

In the experimental treatments under general anesthesia specialists used non-invasive monitoring of arterial blood oxygenation via pulse oximeter. The degree of saturation of hemoglobin with oxygen (oxygen saturation-SpO_2) and heart rate were assessed [6].

Oxygenation of bariatric patients was carried out in Trendelenburg position also called HELP (Head-Elevated Laryngoscopy Position) with the operating table set up at an angle of at least 25-30 degrees [7,8].

Before induction of anesthesia, each patient was subject to pre-oxygenate, i.e. breathed for at least three minutes with 100% oxygen through an oxygen mask. Breathing pure oxygen allows for the assembly of larger amount of oxygen in the lungs – it can be used for longer-lasting apnea.

The examined parameters were written in the Excel file and subject to statistical analysis. For the statistical calculations we used Statistica 10.0 using NIR test. Differences for which $p < 0.05$, were identified as significant.

The ethics committee of Medical University in Białystok permitted for research and the director of the Regional Specialist Hospital in Biała Podlaska gave consent to analyse patients' medical records.

RESULTS

Table 1 shows the mean systolic values taking into account gender and BMI. The maximum systolic blood pressure both in women and in the group of men was found in individuals with obesity. In people with normal weight and overweight the parameter is within the norm, ranged 121-137 mmHg. Statistical analysis indicates that body weight has a significant effect on systolic blood pressure in the study groups. The systolic blood pressure in obese patients was significantly higher compared to the overweight or a group of the normal weight, both in the group of men and women ($p<0.05$). The highest diastolic blood pressure was found in both obese men and women. Diastolic blood pressure differed significantly in the group of obese and overweight than people of normal weight irrespective of gender ($p<0.01$).

Analyzing the MAP the patients, we found significant differences ($p<0.001$) between women of normal weight and obese women and men who are overweight and obese men at (Table 2).

In obese patients, in addition to the underlying disease as obesity we can often encounter coexistence of other diseases which develop during long lasting weight problems. In the next part of the study we sought to prove whether obese patients are more burdened with other comorbidities than those of normal weight. Men with normal weight had a significantly ($p<0.001$) higher risk compared to women with normal BMI (Table 3).

Table 2. The analysis of the systolic, diastolic, and mean arterial pressure in the examined group, depending on body weight (NIR test, p <0.001)

Variale	**Sex**	**Body weight**									P value
		Normal (NW)			**Overweight (Ov)**			**Obesity(Ob)**			
		NW	$\bar{x}$	**SD**	**n**	$\bar{x}$	**Sd**	**n**	$\bar{x}$	**SD**	
SBP	F	44	121.1	21.1	27	125.2	15.0	43	150.4	21.3	<0.001 NW vs. Ob <0.001 Ov vs. Ob
	M	35	131,0	18,7	28	137,5	24,0	26	150.4	28,0	<0.001 NW vs. Ob 0.032 Ov vs. Ob
DBP	F	44	79,8	8,5	27	78.6	9.1	43	94.0	11.4	<0.001 NW vs. Ob <0.001 Ov vs. Ob
	M	35	83.9	8.3	28	90.2	12.1	26	90.9	12.6	<0.001 NW vs. Ob 0.033 Ov vs. Ob

Table 3. The risk analysis of a surgery associated with the coexistence of diseases (ASA scale) depending on the weight-height rate (NIR test, p <0.001)

Sex	**Body weight**									**P value**
	Normal (NW)			**Overweight (Ov)**			**Obesity (Ob)**			
	N	$\bar{x}$	Sd	n	$\bar{x}$	SD	n	$\bar{x}$	SD	
Females	44	1.6	0.7	27	2.0	0.6	43	2.5	0.6	<0.001 NW vs. Ob 0.002 Ov vs. Ob
Males	35	2.2	0.9	28	2.0	0.8	26	2.7	0.8	0.005 NW vs. Ob <0.001 for Ov and Ob

The next estimated variable is oxygen saturation, the value of saturation for one hour at 10 minute intervals (Table 4).

In the surveyed group of women and men no significant relationship was found. We can only note that with the growth of weight-height rate, the saturation value decreases. Blood oxygen level during surgery was within normal range.

Table 4. Average values of saturation of the examined patients in respective lengths of time by gender and size of the weight – height index

	10'		**20'**		**30'**		**40'**		**50'**		**60'**	
	F	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**
Normal	98,1	97,6	98,3	97,7	98,3	97,5	98,2	97,6	98,2	97,8	98,2	97,5
Overweight	97,2	97,8	97,4	97,7	97,7	97,8	97,6	97,5	97,8	98,0	97,6	97,7
Obesity	96,9	96,0	96,9	96,0	97,3	96,4	97,2	96,2	97,3	96,6	97,3	96,2

DISCUSSION

Obesity is subject to excessive development of excessive growth of fat tissue much above normal values established for age, gender and race. Obesity is a chronic disease with a strong tendency for familial occurrence that enhance environmental factors such as lack of physical activity in combination with a high-calorie diet and cheap, poor quality food [9-13].

Patients whose BMI is above 35, described as extremely obese (morbidly obese) are at particularly high risk of anesthesia due to many burdens and comorbidities, especially circulatory and respiratory and metabolic changes. These

include: hypertension, diabetes, heart failure and respiratory disorders either central or peripheral.

In addition, altered metabolism, impaired plasma proteins relationships, changes in blood pH, and finally impaired function of liver and kidney affect the pharmacology of agents used in anesthesia. To conduct safely anesthesia during surgery in obese patients an anesthesiologist is required to have a lot of experience and technical knowledge [12,14].

Obesity is the most important risk factor for hypertension [11]. It is estimated that 80% of the cases of arterial hypertension in Poland, is associated with an increase of body weight. The impact of obesity on the risk of developing hypertension is particularly strongly expressed in young women [15-18]. The relationship between blood pressure and the risk of cardiovascular events is continuous, constant and independent of other risk factors. The higher the blood pressure cause a greater risk of heart attack, heart failure, stroke, and kidney disease [10,19].

One of the aims of this study was to determine whether body weight has an effect on blood pressure. The analysis clearly shows that body weight has a significant effect on systolic, diastolic, and the MAP in the study groups.

The highest systolic blood pressure both in women and in the group of men was found in patients with obesity. In people with normal weight and overweight the parameter is within the normal range between 121 mmHg - 137mmHg. The highest diastolic blood pressure was also was found in both obese men and women. Diastolic blood pressure is statistically significantly different in the group of obese and overweight from people with normal weight.

World Health Organization report of 2002 on the promotion of healthy lifestyles and minimizing the health risks indicates direct relations with high blood pressure and overweight and obesity. The small reduction in BMI leads to a reduction in blood pressure as well as the risk of other diseases e.g. diabetes type 2 [20].

The study also examined whether obesity is associated with deterioration of blood oxygen saturation. Świątkowska et al. [17] described impairment of ventilation in obese people. With the increase of body weight, the basic energy demand raises, and so the oxygen consumption does. Obesity decreases the compliance of the chest wall and diaphragm, which causes ventilation disorders, more frequently exertional dyspnoea and dyspnoea at rest. In such cases small bronchioles close, accompanied by abnormal proportions between ventilation and perfusion. The decrease of compliance of lower respiratory tract reduces expiratory reserve volume (ERV) and functional residual capacity (FRC), vital capacity (VC) and total lung capacity (TLC). These changes can lead to hypoxia and hypercapnia [21-24]. In obese people functional residual capacity (FRC) is reduced, which tends to decrease arterial oxygen saturation.

Szreter and Gaszyński [2] reported that pre-oxygenate is one of the essential elements of induction of general anesthesia, affecting safety of the patient. There are specific recommendations for the proper and effective conduct of pre-oxygenation [22,25]. This procedure is performed according to the recommendations quoted – i.e. 3 min of passive oxygenation - provides in the majority of patients an obtainment of an appropriate concentration of oxygen in lungs (ETO2> 90%).

Altermatt et al. [23] describe a standard pre-oxygenate in patients with severe obesity as ineffective due to a number of serious changes in the respiratory and circulatory systems. In these patients it is observed, among others, the reduction of FRC, which is considered as the main reservoir of oxygen. In addition, the position of the patient on the operating table affects the further reduction in FRC. Disorders in pulmonary circulation and the relations of perfusion to ventilation affect the development of significant leakage unoxygenated blood in the lungs, up to 10-20%.

It was noted that after the standard pre-oxygenation lasting 3 min, obese patients have safe apnea time (SAP - Safe Apnea Period) almost 2.5 times shorter than compared to non-obese people. A series of studies was conducted on various methods of pre-oxygenation in order to improve its efficiency and to extend the SAP. Passive oxygenation for 5 minutes was compared to 4 min of deep breathing within 30 seconds obtaining similar SAP. It has been shown that obese patient position during passive oxygenation in the HELP position (Head-Elevated Laryngoscopy Position) extends SAP compared with oxygen therapy in the recumbent. It is a medical position in which the patient lies on the back and the head, upper chest and torso are above the level of the lower limbs. This facilitates the introduction of the laryngoscope by reducing the angle between the level of the chest and face. This position also slightly improves mechanical ventilation. The impact of sitting position on the effectiveness of pre-oxygenation in obese patients was also examined [7,23,25].

During the research no statistically significant differences regarding the value of saturation were found. The analysis shows only that it is lower than in those patients with normal weight, but is within the norm.

Our study showed that in obese patients who underwent surgery, comorbidities which develop because of obesity were more frequent.

The research clearly shows that the higher the BMI, the higher the ASA, which means a greater body burden, and thus the risk associated with anesthesia and surgery is higher.

CONCLUSIONS

The following conclusions based on the study have been formulated:

1. Overweight and obesity significantly affect the increase in systolic, diastolic, and MAP. The increase in BMI significantly affects the risk of developing hypertension.
2. The study did not confirm the significant impact of obesity on the deterioration of oxygenation, which may indicate the effectiveness of the treatment of pre-oxygenation and effectiveness of the procedures of intubating patients in the anti-Trendelenburg position.
3. Examined men had significantly higher preoperative absolute risk compared to women. There is close relationship between increasing BMI and an increased risk associated with anesthesia expressed in ASA scoring.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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Analysis of fungal pathogens in the environment of Branicki Palace in Białystok, Poland

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ABSTRACT

Introduction: People spend about 90% of their time indoors. Most health problems associated with indoor air quality are caused by fungi. It is estimated fungi account for 70% of total indoor air microbial pollution.

Purpose: To analyze fungal pathogens isolated from indoor air of Branicki Palace in Białystok, Poland

Materials and methods: The research mycological material consisted of air collected from various rooms in Branicki Palace. Humidity and temperature of the tested rooms were also measured. The monitoring of airborne fungi pollution was done using a SAS SUPER 100 (pbi international) with international measure standards (EN 50081-1, EN 500 50082-1). Biological monitoring of wall surface contamination was performed using the Count-Tact applicator with Count-Tact plates.

Results: A total of 1140 CFU per m^3 of air were cultured in autumn and 580 CFU in winter. From the walls, a total of 124 CFU were cultured in autumn and 397 CFU in winter. CFU values in the investigated rooms ranged from 10 to 220 (mean 47 CFU) in autumn, and from 10 to 90 (mean 29 CFU) in winter. The most commonly isolated pathogens were: *Candida albicans, Aspergillus* sp., *non-Candida albicans,* and *Penicillium* sp.. The number of colonies isolated from the walls of all rooms in winter was greater than in autumn. The most commonly isolated pathogens were: *Aspergillus sp.* and *C. albicans* in autumn*; C. albicans and non-C. albicans* in winter.

Conclusions: In winter, the number of colonies isolated from walls in all rooms was significantly greater compared with autumn. *Candida albicans*, *Aspergillus* sp. and *Penicillium* sp. were the most commonly isolated fungal air pathogens, regardless of season. *C. albicans* and *Aspergillus* sp. were most commonly isolated from walls in autumn, while *C. albicans* and *non-C.albicans* in winter.

Key words: fungi, air pollution, Branicki Palace

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INTRODUCTION

Branicki Palace is one of the most valuable aristocratic residences in Central and Eastern Europe, and the most important monument in Białystok. Its present form dates back to the time of Jan Klemens Branicki [1,2].

The Palace is located where, according to historical documents, in the 15th century stood a mansion belonging to the first owners of Białystok, the Raczkowicz family. In the 16th century, the Wiesiołowski family, the owners of the city at that time, built a two-story castle here. It is believed that Job Bretfus, court architect of King Sigismund Augustus, designed the castle. In the first decades of the 17th century, during another reconstruction, two ground-floor corner extensions were built on both sides of the main building. At the end of the 17th century, the castle was reconstructed by one of the most prominent Polish architects of the time, Tylman from Gameren, at the commission of Stefan Mikołaj Branicki, as Białystok was very seriously damaged during the Deluge [1,2].

The palace was rebuilt after 1841, when it served as an institute for noblewomen. The Palace survived in this somewhat different form until 1944. Until 1939, the facility functioned as a Regional Office. Then, during the German occupation, it was turned by the Nazis into a seat of the Białystok District administrative authorities [1,2]. Since 1950, the Branicki Palace has served as the seat of the Medical Academy (currently Medical University), which conducts systematic renovations and restorations to revive it to its 18th century glory [2]. The renovation works in Branicki Palace revealed the manner in which the mansion was built and extended over centuries (from the 16th to the 20th century) [3]. Part of Branicki Palace is occupied by university administrative offices, while the basement has been successively made available to the public.

With the progress of civilization, indoor air quality deteriorates. People spend about 90% of their time indoors; therefore, it is important to monitor the state of the air. Most health problems associated with indoor air quality are caused by fungi. It is estimated that fungi account for 70% of total indoor air microbial pollution [4].

Therefore, it is important to conduct mycological measurements, which are necessary to show the adverse impact of fungi present inside the Palace on the health of its occupants.

The aim of the study was to analyze fungal pathogens isolated from indoor air of Branicki Palace in Białystok, Poland.

MATERIALS AND METHODS

The research mycological material consisted of air collected from palace rooms, around entrances, and around main entrances to Branicki Palace. Simultaneously, humidity and temperature in the tested rooms were measured.

The monitoring of airborne fungi pollution was done using a SAS SUPER 100 (pbi international) with international measure standards (EN 50081-1, EN 500 50082-1). Sample has a flow rate of 100 liters air/min. At each site, a 100 liters sample was taken with the sampler placed at a height of 150 cm above floor level in the middle of the room, with all windows and doors closed.

Plates from SAS SUPER 100 were incubated. After incubation number of fungal colonies and number of fungi in air volume was counted. In according to producer, at the first part of investigation number of fungal colonies at plates (real number of colonies - RNC) was corrected on statistical probability multiple passage of particle through the same hole (number of colonies corrected). In according to formula, it was estimated CFU (colony-forming unit - number of colonies at 1000 L of air): X = (P x 1000) : V, where : V- volume of air sample , r – number of counted colonies at contact plate, P - corrected number of colonies (in according to producer instrument), X – number of colonies (CFU) at 1000 L (1 m^3) of air. Classification of isolated fungi was made with accordance to the current procedures.

Fungal identification was based on culture appearance and microculture characteristics [5].

We used TSI VelociCheck airflow flow velocity meter to measure relative air humidity, ambient temperature, surface temperature, and dew point.

Biological monitoring of surface contamination was performed using the Count-Tact applicator with Count-Tact plates (bioMerieux) containing medium compliant with the requirements of the Draft European Standard CEN/TC 243/WG2. The Count-Tact plates have a diameter of 55 mm and their surface is covered in slits. The convex meniscus of the agar enables direct collection of material to maintain hygiene of walls, floors, clothing, and equipment. The plates were placed in a special Count-Tact applicator (bioMerieux). The agar was applied directly onto the evaluated surface (force 500 g, time 10s). Following collection, samples were placed in an incubator at 37˚C and incubated for 3 days.

The fungal colonies grown on the plates were counted and subjected to mycological identification. The obtained results are expressed as values of colony forming units per 1 cm^2 for each room, calculated using the following formula:

$\mathbf{X = a : \pi r^2}$; **a** is the number of fungal colonies grown on the plates, **r** is the plate radius in cm.

Statistical analysis was performed using Statistica 10 PL software. Nonparametric methods were used during analysis: Mann-Whitney U test,

Wilcoxon matched pairs test, and Spearman's correlation coefficient. Results with $p<0.05$ were considered statistically significant.

RESULTS

Tables 1 and 2 show the values of measurements performed in autumn and winter inside Branicki Palace in Białystok.

The number of colonies (CFU/m^3) obtained in autumn ranged from 10 in Archives room 1 up to 220 in the basement beneath the columns. Winter CFU values ranged from 10 in Assembly Hall, Archives room 1, Psychology lecture hall, John II basement (in front of PRL basement) and 90 in the basement beneath the columns.

Air humidity in autumn ranged from 26.5% in the hallway leading to Assembly Hall up to 86.5% in John II basement. Indoor air humidity in winter ranged between 25.7% in Assembly Hall up to 67.6% in the basement beneath the columns.

Temperatures in autumn ranged from 16.6ºC in John II basement up to 22.2ºC in the hallway leading to Human Resources offices. Temperatures in winter ranged from 2.2ºC in the basement beneath the columns up to 22.1ºC in Human Resources offices.

In autumn, air circulation fluctuated between 0 m/s in the hallway leading to John II basement and the basement in front of PRL and 0.3 m/s in the hypocaust.

In winter, air circulation ranged between 0.01 m/s in Archives room 2 and 0.22 m/s in the hallway leading to Human Resources offices.

Table 1. Temperature, humidity, and air circulation measurement results and CFU in particular rooms in autumn

Room name	**CFU [CFU/m^3]**	**Temperature [^{0}C]**	**Humidity [%]**	**Air circulation [m/s]**
Assembly Hall	80	21.9	27.4	0.02
Hallway leading to Assembly Hall	80	22.1	26.5	0.06
Room with togas	60	21.4	33.7	0.04
Hallway leading to Human Resources offices	30	21.2	34.8	0.04
Human Resources offices	60	22	35.8	0.01
Hallway leading to office	30	22.1	37.3	0.05
Hallway leading to Archives room 2	30	20.5	48.5	0.02
Hall by entrance to the Palace	30	19.1	29.6	0.13
Office	30	20	43.7	0.06
Archives room 1	10	19	56.0	0.01
Archives room 2	30	18.9	40.6	0.08
Archives room 3	40	19.3	47.1	0.1
Psychology lecture hall	30	21.3	54.5	0.02
Total	**540**			
Hallway leading to John basement	40	19.1	78	0
Room I beneath University Promotion office	30	20.6	59.5	0.02
Hypocaust	90	21.3	64.9	0.3
John basement	40	22.1	57.2	0.01
John II basement (before PRL)	150	16.6	86.5	0.0
Basement beneath the columns	220	19.9	60.2	0.02
Total	**570**			
Outside the Palace	30	1.9	57.1	0.35
Total	**1140**			

Table 2. Temperature, humidity, and air circulation measurement results and CFU in particular rooms in winter

Room name	CFU [CFU/m^3]	Temperature [^{0}C]	Humidity [%]	Air circulation [m/s]
Assembly Hall	10	22	25.7	0.18
Hallway leading to Assembly Hall	30	22	29.4	0.02
Room with togas	40	19.6	33.9	0.03
Hallway leading to Human Resources offices	30	21.1	34	0.22
Human Resources offices	10	22.1	34.4	0.03
Hallway leading to office	30	19	36.1	0.02
Hallway leading to Archives room 2	20	19.1	39.7	0.03
Hall by entrance to the Palace	40	21.5	29.1	0.07
Office	80	20.3	36.2	0.06
Archives room 1	10	19.6	32	0.07
Archives room 2	20	18.4	34.1	0.01
Archives room 3	10	19.3	39.7	0.9
Psychology lecture hall	10	23	27.7	0.02
Total	**340**			
Hallway leading to John basement	20	20.8	33.9	0.1
Room I beneath University Promotion office	20	15.4	35.7	0.02
Hypocaust	60	2.4	63.8	0.02
John basement	30	17.4	35.1	0.03
John II basement (before PRL)	10	21.4	41.7	0.06
Basement beneath the columns	90	2.2	67.6	0.03
Total	**230**			
Outside the Palace	10	-2.9	59	1.03
Total	**580**			

The outdoor conditions at time of measurements were as follows: temperature in autumn and winter: 1.9ºC and 2.9º C, respectively; humidity in autumn and winter: 57.1% and 59%, respectively; air circulation in autumn and winter: 0.35 m/s and 1.03 m/s, respectively.

CFUs in different rooms in autumn and winter are shown in Figures 1 and 2, respectively.

The following fungal genera/species were cultured from the samples collected in Branicki Palace: *C. albicans (CA), non-Candida albicans (N-CA), Penicillium* sp. *(PS), Aspergillus* sp.*(AS), Acremonium sp. (ACS), Ulocladium (U), and Epicoccum sp. (ES). C. albicans* was the most common species, and was only absent in the office and Psychology lecture hall.

Fungal species occurring in single rooms included *Ulocladium* present in the hypocaust (3 colonies), *Epicoccum* sp. in the basement beneath the columns (1 colony), and *Acremonium sp*. in the hallway leading to the office (1 colony). Details are shown in Tables 3.

Figure 3 presents the number of fungal colonies grown in autumn from the walls of Branicki Palace.

A total of 124 fungal colonies, including 75 colonies from the office part of the Palace and the remaining 49 colonies from basement walls, were grown from the samples collected in autumn from the walls of the investigated rooms. The largest number of fungal colonies was obtained from hallway walls: leading to Assembly Hall and Human Resources offices (11 colonies each, mainly *Aspergillus* sp.), in the hall by the entrance to the Palace (8 colonies, mainly *Penicillium sp.* and *Aspergillus* sp.).

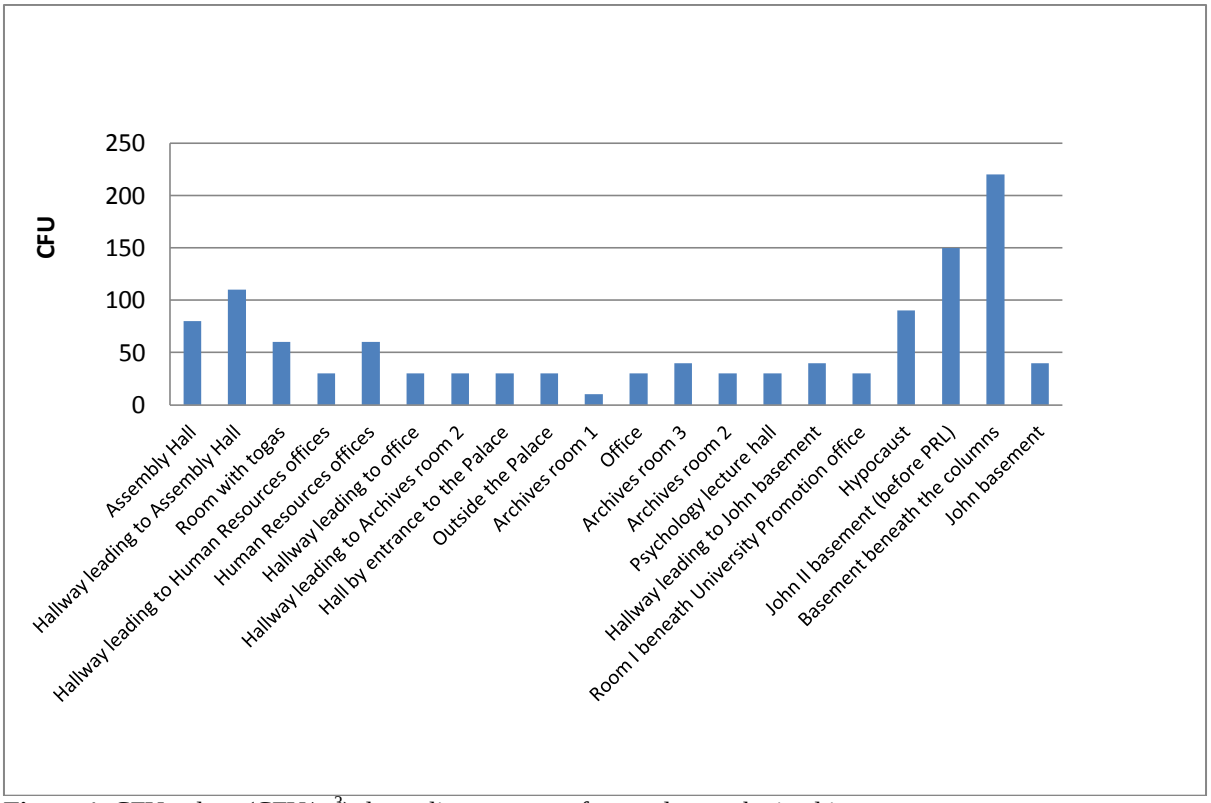

Figure 1. CFU values (CFU/m^3) depending on room, from cultures obtained in autumn

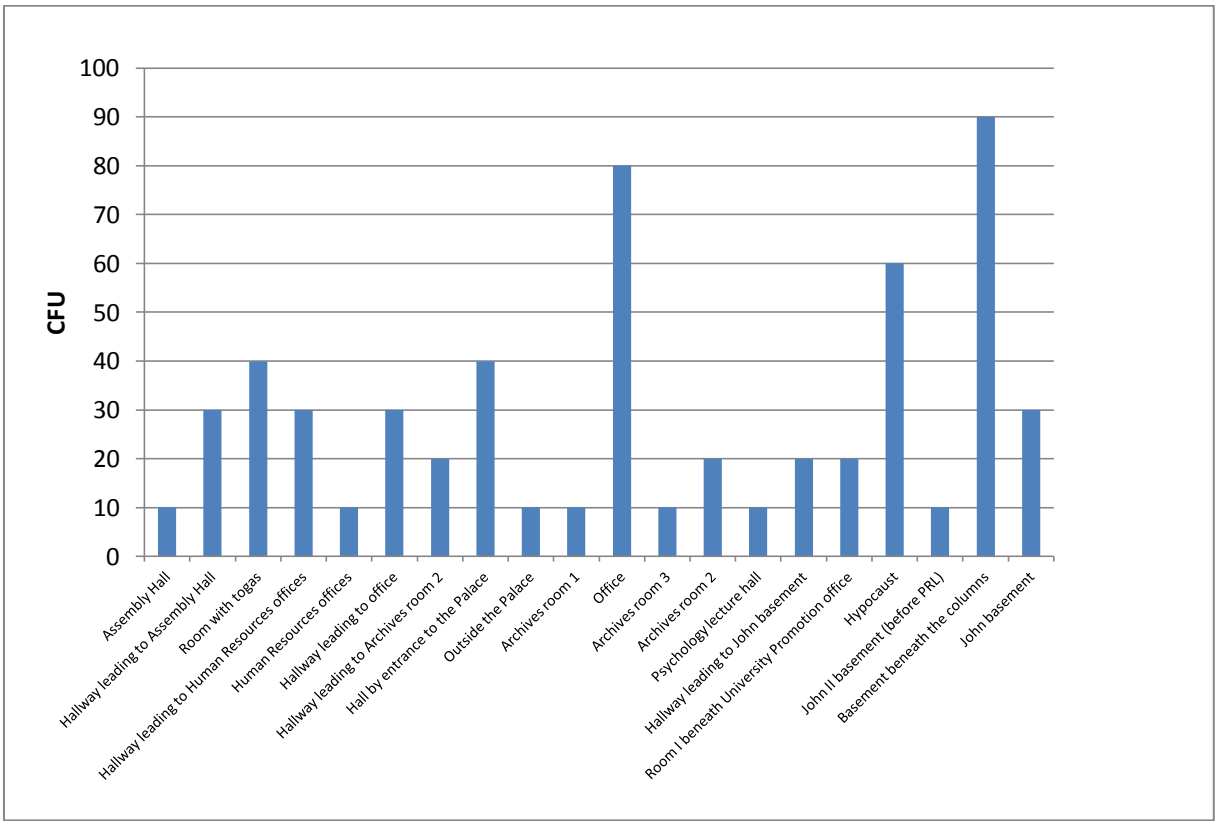

Figure 2. CFU values (CFU/m^3) depending on room, from cultures obtained in winter

Table 3. Fungi types grown in autumn and winter from samples collected in particular rooms

	CA	N-CA	PS	AS	ACS	U	ES	F
AUTUMN								
Assembly Hall	6	2	0	0	0	0	0	0
Hallway leading to Assembly Hall	6	1	0	1	0	0	0	0
Room with togas	2	1	0	3	0	0	0	0
Hallway leading to Human Resources offices	2	1	0	0	0	0	0	0
Human Resources offices	4	2	0	0	0	0	0	0
Hallway leading to office	2	0	0	0	1	0	0	0
Hallway leading to Archives room 2	2	0	1	0	0	0	0	0
Hall by entrance to the Palace	2	1	0	0	0	0	0	0
Outside the Palace	1	0	0	0	0	0	0	0
Archives room 1	1	0	0	0	0	0	0	0
Office	0	0	0	3	0	0	0	0
Archives room 3	2	0	2	0	0	0	0	0
Archives room 2	3	0	0	0	0	0	0	0
Psychology lecture hall	0	0	0	3	0	0	0	0
Hallway leading to John basement	1	1	1	1	0	0	0	0
Room I beneath University Promotion office	2	0	0	1	0	0	0	0
Hypocaust	2	1	2	1	0	3	0	0
John II basement (before PRL)	7	0	3	5	0	0	0	0
Basement beneath the columns	6	6	4	5	0	0	1	0
John basement	2	1	1	0	0	0	0	0
WINTER								
Assembly Hall	1	0	0	0	0	0	0	0
Hallway leading to Assembly Hall	2	0	1	0	0	0	0	0
Room with togas	1	3	0	0	0	0	0	0
Hallway leading to Human Resources offices	2	0	1	0	0	0	0	0
Human Resources offices	1	0	0	0	0	0	0	0
Hallway leading to office	2	1	0	0	0	0	0	0
Hallway leading to Archives room 2	2	0	0	0	0	0	0	0
Hall by entrance to the Palace	3	0	1	0	0	0	0	0
Outside the Palace	2	1	0	0	0	0	0	0
Archives room 1	1	0	0	0	0	0	0	0
Office	5	3	0	0	0	0	0	0
Archives room 3	1	0	0	0	0	0	0	0
Archives room 2	2	0	0	0	0	0	0	0
Psychology lecture hall	1	0	0	0	0	0	0	0
Hallway leading to John basement	1	0	0	0	0	0	0	1
Room I beneath University Promotion office	0	0	0	2	0	0	0	0
Hypocaust	0	0	5	1	0	0	0	0
John II basement (before PRL)	1	0	0	0	0	0	0	0
Basement beneath the columns	3	0	1	5	0	0	0	0
John basement	0	0	0	1	0	0	0	2

Candida albicans (CA), non-Candida albicans (N-CA), Penicillium sp. (PS), Aspergillus sp.(AS), Acremonium sp.(ACS), Ulocladium (U), Epicoccum sp. (ES)., Fusarium (F)

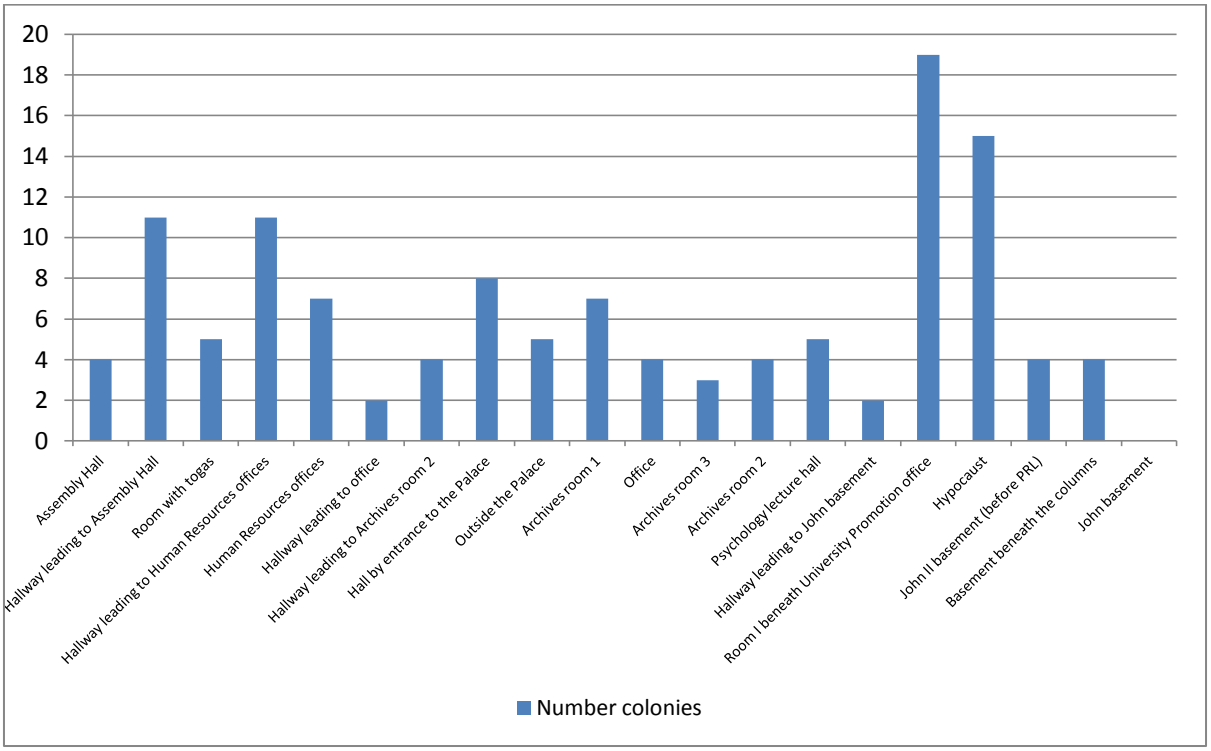

Figure 3. Number of fungal colonies grown in autumn from the walls of Branicki Palace

A total of 19 colonies were grown from the underground part in the hypocaust, and these mainly included: *Aspergillus niger* (9 colonies), 5 colonies of *C. albicans*, and 3 colonies of *Penicillium* sp.. A total of 15 colonies were grown from the walls of John II basement (5 *Penicillium* sp., 7 *C. albicans*, and 3 *Aspergillus* sp. colonies).

A total of 397 fungal colonies were grown from the samples collected in winter from the walls of the investigated rooms; 197 colonies were grown from samples collected in the office part of the Palace and the other 200 were grown from basement wall samples. Most colonies were obtained from the walls of Assembly Hall (51 colonies), the hallway leading to Archives room 2 (35 colonies), and the hall by the entrance to the Palace (30 colonies). In the basement part of the building, the largest number of fungal colonies were grown from samples taken from the walls in John II basement (52 colonies) and the hallway leading to John basement (50 colonies) (Fig. 4). *C. albicans* and *non-C. albicans*, *Penicillium* sp. and *Aspergillus* sp. were dominant.

Mean CFU values were 47/m^3 in autumn and 29/m^3 in winter. This indicates higher fungal colonization of the air in autumn. The impact of room type on CFUs and cultured fungi type is an important aspect. There were differences between the rooms in terms of climatic conditions in successive seasons. The Mann-Whitney U test was used for statistical analysis.

Mean humidity was 48.9% in autumn and 38.4% in winter. We found a significant (p= 0.0045) difference in air humidity between autumn and winter. Humidity was higher in autumn.

Mean air circulation was 0.04 m/s in autumn and 0.09 m/s in winter. We found no statistically significant differences in relation to indoor air circulation between autumn and winter. Details are not shown.

Mean temperature inside the Medical University was 19.5ºC in autumn and 17.2ºC in winter. We found no statistically significant differences in relation to room temperatures between autumn and winter. The temperature range was similar for all rooms, i.e. between 16.6ºC and 22.1ºC.

There were statistically significant differences between the numbers of colonies grown from the samples collected from walls in different rooms. In winter, the number of colonies in all rooms was significantly higher compared with autumn. The level of significance was p=0.0013 (Details are not shown). CFU values ranged between 10 and 220 in autumn and between 10 and 100 in winter. CFU values were higher in all rooms in autumn compared with winter. The level of significance was p=0.0013 (Wilcoxon matched pairs test).

We found a statistically significant (p=0.023) negative correlation (R= - 0.50) between winter air temperature and winter CFU values

(Spearman's correlation coefficient). The higher the temperature, the lower the CFU value in winter. This may be associated with a significant decrease in humidity in winter compared with autumn. Details are not shown.

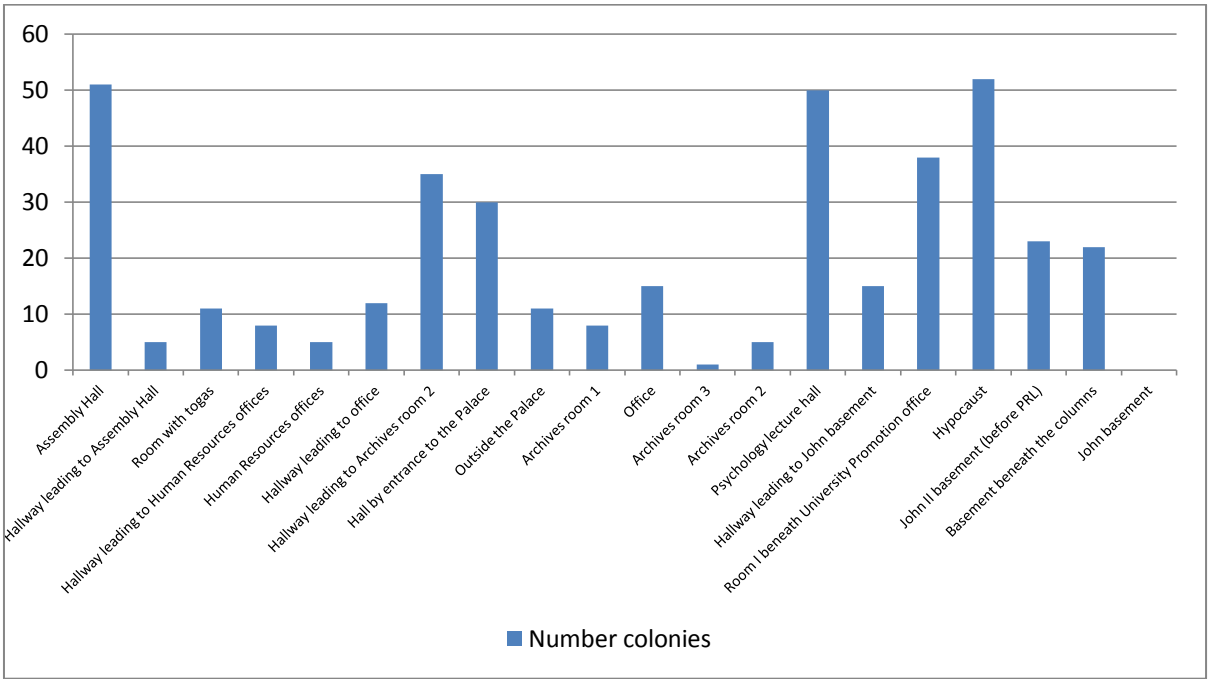

Figure 4. Number of fungal colonies grown in winter from the walls of Branicki Palace

DISCUSSION

It is estimated that fungi account for 70% of total indoor air microflora. Studies conducted in office buildings located in the USA and Brazil have found the presence of three species, i.e. *Penicillium* spp., *Aspergillus* spp., and *Cladosporium* spp. Fungi are a common cause of allergic rhinitis, asthma, conjunctivitis, and gastrointestinal inflammation [4].

Therefore, assessment of air contamination with harmful biological pathogens is an important undertaking.

Our study assessed the presence of fungal pathogens inside Branicki Palace, a historic building, which currently houses the Medical University in Białystok.

The research covered two seasons: autumn and winter. Air samples from rooms in Branicki Palace were collected using the SAS SUPER 100. Physical parameters, such as temperature, humidity and air circulation, which also affect the occurrence of fungi, were also assessed.

CFU values differed between the seasons. The number of colonies (CFU/m^3) obtained in autumn ranged from 10 in Archives room 1 up to 220 in the basement beneath the columns. Winter CFU values ranged from 10 in Assembly Hall, Archives room 1, Psychology lecture hall, John II basement (in front of PRL basement) and 90 in the basement beneath the columns. CFUs were higher in all rooms in autumn compared with winter.

According to the literature, the amount of fungi present in the air fluctuates depending on the season. It was shown that the amount increases in summer and autumn and decreases in spring and winter [6]. The ranges of fungal levels in outdoor air reported in the subject literature are 90-8230 CFU/m^3 in spring; 30-4500 CFU/m^3 in summer, and 40-4370 CFU/m^3 in autumn. Indoor concentrations of fungal aerosols considered within the normal range are 2-1440 CFU/m^3 in spring, 45-2050 CFU/m^3 in summer, 9-580 CFU/m^3 in autumn [7,8].

The results of our measurements were within the normal range observed in this season.

The rooms of Branicki Palace were classified into two groups:

- rooms for public use (offices) – Assembly Hall, hallway leading to Assembly Hall, Human Resources offices, hallway leading to Human Resources offices, office (a room occupied by the director and archives personnel) and hallway leading to office, Archives rooms (1,2,3), Psychology lecture hall, and main hall by entrance to the Palace, basement area – hypocaust (furnace of the floor heating system in the palace), John basement and hallway leading to this basement, two rooms beneath the University Promotion office, basement beneath the columns (temporarily occupied by Municipal Parks and Gardens

employees working to organize the gardens around Branicki Palace).

The bioclimate of office spaces comprises of a combination of physical, chemical and biological factors, which determine the air quality in the work environment in which no production processes or activities that could affect the well-being or the health of the personnel take place. In our studies, rooms conventionally referred to as offices or 'public use' had autumn CFU values ranging between 10 (Archives room 1) up to 110 (hallway leading to Assembly Hall). Winter CFU values ranged between 10 and 80, with a predominance of yeast-like fungi (*C. albicans* and *non-C.albicans)*.

Buczyńska et al. [9] found through their research, conducted in the offices of a company whose employees reported various respiratory symptoms, eye irritation, headaches and fatigue that the number of molds ranged from $0.33x10^2$ up to $3.34x10^2$ CFU/m^3. The highest fungus concentration was noted in a room used as archives. *Penicillium, Cladosporium, Aspergillus, Acremonium, Fusarium,* and *Botrytis*, were grown from the samples taken from these rooms [9].

Ogórek and Pląskowska [10] showed in their study, conducted in rooms for public use (in one university in Wrocław), that the mycological air contamination in the evaluated rooms varied in terms of both CFUs and fungi species composition. CFU values ranged from 37 up to 337 CFU/m^3, and were similar to those obtained in the present study. Research conducted by Mędrela-Kuder at al. [11] in the University of Physical Education in Krakow showed that the highest concentration of fungal spores was found in October and June, with *Aspergillus fumigates* being the dominant species. Assessment of health effects resulting from exposure to harmful and noxious factors present in office spaces is very difficult due to concomitant effects of multiple harmful factors, usually present at low concentrations, but for long periods of exposure [12].

Autumn CFU values for rooms conventionally referred to as the 'basement area' ranged between 30 in room 1 beneath the University Promotion office up to 220 in the basement beneath the columns. In winter, the obtained CFUs fluctuated between 10 in John II basement (before PRL) through 60 in hypocaust up to 90 in the basement beneath the columns. Fungi settle and grow in places where they have advantageous conditions, i.e. damp walls, poor ventilation or limited exposure to light, and these conditions prevail in the basements of Branicki Palace. *Aspergillus* sp. (9 colonies) and *Penicillium* sp. (6 colonies) were the main pathogens isolated from the sampled air.

Trojanowska et al. [13] assessed the occurrence of fungi in the crypts of St. Peter and St. Paul Church in Krakow. The aim of their study was to demonstrate the harmful effects of fungal spores on the health of people performing renovation works in the crypts. A total of 449 mold colonies were grown from the air samples (crypt 1). Penicillium was the most commonly isolated genus. In our studies, a total of 570 fungal colonies were isolated in autumn and 230 in winter from the basement area. *Aspergillus* sp. and *Penicillium* sp. were the most commonly grown fungi. The relationship between fungi exposure and asthma was first presented in 1726 by John Floyer, who described a patient developing asthma after repeated visits to a dungeon [14].

Fungi are organisms that are widespread throughout the globe. They are heterotrophic organisms, which only grow on substrates with adequate amounts of nutrients. In the external environment, their main habitat is the soil, where they feed on dead organic remains of plants and animals. A high relative humidity (more than 70%) and adequate temperatures promote the growth of fungi. Optimum growth temperatures range from 10ºC to 35ºC. Fungi development and release of spores depend on multiple factors, such as: local conditions, climatic factors (temperature, rainfall, wind, humidity), and time of day [14].

The temperature of the evaluated rooms ranged between 16.6ºC and 22.1ºC in autumn, and between 2.4º and 22.1ºC in winter. Indoor air humidity depends on external conditions, which are modified by building structure, ventilation, heating system or the direct activity of the room occupants [15]. Air humidity ranged from 26.5% to 86.5% in autumn and from 25.7% to 67.6% in winter. The obtained results confirm that fungal development is promoted in certain conditions.

We found also a simultaneous occurrence of the same fungi in the air as well as on the walls of the investigated rooms. *Aspergillus* and *Penicillium* were the most commonly isolated fungi and were more frequently isolated from the basement part of Branicki Palace, which had higher humidity levels compared with office spaces. Additionally, these rooms are dark and lack ventilation. The greatest number of *Aspergillus* colonies was grown from the hypocaust, which is a basement area of Branicki Palace, periodically occupied by gardening workers. Exposure to these pathogens may result in a number of serious health consequences.

Molds release mycotoxins, which are secondary metabolites produced under specific environmental conditions. Long-term activity of mycotoxins on the human body can, for example, induce cancer. Aflatoxins and ochratoxins produced by *Aspergillus* are the best-known mycotoxins [16, 17].

Indoor air quality has long been an important research problem. About 90% of our life is spent indoors, suggesting that conditions in such places should not be harmful to humans. However,

many people's health problems are due to the harmful effects of different physical, chemical and biological factors associated with closed areas.

CONCLUSIONS

1. We found differences in the amount and type of fungal pathogens cultured in autumn and winter. CFU values were higher in all rooms in autumn compared with winter.
2. In winter, the number of colonies isolated from walls in all rooms was significantly higher compared with autumn.
3. *Candida albicans*, *Aspergillus* sp. and *Penicillium* sp. were the most commonly isolated fungal air pathogens, regardless of season. *C. albicans* and *Aspergillus* sp. were most commonly isolated from walls in autumn, while *C. albicans* and *non-Candida albicans* in winter.

Conflicts of interest

The authors declare no conflict of interest in this paper.

Financial disclosure

None.

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Preferred patient behaviours related to health

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ABSTRACT

Introduction: Health education is the child of medicine and pedagogy, and they share a common focus on humans. The aim of this study was to assess the preferred behaviours associated with health as well as the health locus of control of the tested patients.

Materials and methods: The study included 300 patients from surgical wards (group I) and 300 from non-surgical wards (group II), studying them using the Health Behaviour Inventory (HBI) and the Multidimensional Health Locus of Control Scale (MHLC) scales.

Results: For the six statements contained in the Sanitary Behaviours Letter concerning proper nutrition, the surveyed patients received the lowest average values. Among the preventive behaviours, participants reported that they complied with medical recommendations, conducted settled family and social life, and reduced their smoking, but that they did not attach sufficient importance to rest or weight control. In relation to the four examined categories of behaviour, general indicators of the severity of health behaviour did not differ significantly between the groups, which both reported a low level of health behaviour. The majority of women expressed the conviction that their health depends on themselves, demonstrating internal health control, while men tended to claim that their health was dependent on fate or luck. Inhabitants of rural areas exhibited internal control and blamed their own health behaviour for their well-being. Urban residents, on the other hand, showed a stronger belief in the influence of others on their health.

Conclusions: The majority of patients showed poor attention to health matters, especially in terms of preferred health practices. However, the less education the participants had and the worse their financial situation grew, the stronger the care for their own health became.

Key words: Health behaviours, patients, HBI, MHLC

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INTRODUCTION

In European culture, an overall focus on health issues was organised by the "father of medicine"– Hippocrates [1]. According to Hippocrates's principles, the concept of health determines well-being, whereas disease and discomfort are dependent on humans' surroundings. The scientific community increasingly took an interest in health, which affected the development of the medical and socio-cultural reality, as they considered the idea of health as the beginning of health education and practical life [1].

Health education is the child of medicine and pedagogy, as they share a common focus on humans. Practical teachings specify norms for actions, verifying them by experiment and eventually recommending them for general practice [1-3].

Illness can be very challenging, especially in the case of chronic diseases, which are often connected with biological functions of the body and can involve impairment or physical disability, as well as changes in the mental, physical, or social functions of a patient. Sometimes delayed treatment worsens the disease, leading to exclusion from social life and dependence on others [4].

Disease is a significant challenge, and one must meet the demands of a new reality in order to face it. Many factors, such as the nature and type of the disease and the patient's age, sex, education, intelligence, personality, and style of coping in crisis situations have been related to health and disease [5].

A disease may change one's current lifestyle. Patients have to take into account their conditions, constraints and opportunities in order to adapt to different situations and be prepared for them. To our knowledge, no comparative studies have been conducted in patients from surgical and non-surgical wards in regard to preferred behaviours associated with health as well as the health locus of control.

The aim of this study was to assess the preferred behaviours associated with health as well as the health locus of control of patients from surgical and non-surgical departments.

MATERIALS AND METHODS

The study was approved by the bioethics committee of the Medical University of Bialystok. The study was conducted between 1 December 2011 to 31 May 2012 in a hospital in Wysokie Mazowieckie in a group of 300 randomly selected patients from surgical wards (group I), including such wards as: General Surgery, Orthopedic Surgery, Trauma, Gynaecology and Obstetrics, and 300 randomly selected patients from the internal medicine wards (group II), including the Department of Internal Medicine and Division of Pulmonology. In the first group, a total of 355 questionnaires were distributed, and the study used 300 questionnaires, whereas in the group II – a total of 345 surveys and the study used 300 questionnaires.

Patients in the study were of age 18 and over, they were staying at least 3 nights in the hospital. They were able to read and write without the influence of psychotropic drugs and pain, had no disturbances of consciousness and agreed to participate in the study. Patients filled out a survey at the best time of the day.

The essential study was preceded by a pilot study, in groups of 50 patients from each ward. The study used a survey containing: general questions - about patients' gender, age, marital status, place of residence, who they lived with, as well as about their social and living conditions; HBI - Juszczyński Inventory of Health Behaviours Inventory [6]; MHLC (The Multidimensional Health Locus of Control Scale) by K. A. Wallstone, B. S. Wallstone, R. DeVellis in Polish adaptation by Juczyński - version A [6]. HBI is designed to study healthy and sick adults [6]. Polish version of this questionnaire was developed by Juczyński. He used also "The General Preventive Health Behaviours Checklist" and "Reported Health Behaviour Checklist". This questionnaire contains 24 statements for determining the severity of the overall rate of health behaviours and the severity of these four categories of behaviour: proper nutrition mainly taking into account the type of food they eat, preventive behaviours regarding following the health recommendations, as well as obtaining information on health and disease, health practices - daily sleep habits, recreation and physical activity, positive mental attitude - the avoidance of strong emotions, stress, or situation affecting in a depressive way [6]. The tested person indicates how often they perform these steps related to health, assessing each of the behaviours listed in the inventory on the scale of five. The numerical values indicated by the tested are counted in order to obtain 24 to 120 points. Higher score indicates greater the severity of the declared health behaviours. The overall rate, when converted into standardised units is subject to interpretation according to the properties characterising the sten scale. Results of 1 - 4 sten scores were treated as low results, however the ones within the limits of 7-10 sten scores as high, which corresponds to the area of about 33% of the lowest results, and the same number of the highest in the scale.

The Multidimensional Health Locus of Control Scale (MHLC)-K. A. Wallstone, B. S. Wallstone, R. Devellis, in Polish adaptation by Juczyński [6] is a tool for a self-report and contains 18 statements concerning generalised expectations in three dimensions of health locus of control: the inner (the belief that control over your own health depends on yourself), the impact of others (the belief that the state of one's health is a result of the

influence of others, mostly medical personnel) and fate (health depends on fate or other external factors). Results are calculated separately for each of the three scales by summing the points up. The scope of results for each of the scales covers the range from 6 to 36 points. Higher the score, the stronger the belief that a given factor has an impact on health.

RESULTS

In surgical wards (group I), 51.3% of patients were women, and the remaining 48.7% were men. In non-surgical wards (group II), the majority were men - 61.3%, and the minority were women - 38.7%. The mean age of the group I was 48.64 years (SD = 19.68; range = 18-78years) and the mean age of the group II was 66.55 years (DS= 12.22; range=18-86 years), and there was an age difference ($p<0.001$).

In surgical wards, the largest group of patients had secondary education (35.7%) or vocational education (34%). Non-surgical ward patients had vocational education - 56%, secondary education - 28.7% or university education - 15.3%.

When analysing the data from the Health Behaviour Inventory (HBI) it was proven that the most severe health behaviours manifested in the practice of health care (average 3.558) and the lowest within normal dietary habits (average 2.773). The scale of HBI was counted for every person in both groups (non-surgical and surgical wards). In six of the statements contained in HBI concerning proper nutrition the respondents received the lowest average values (2.773 with a standard deviation 1.112) for *I eat lots of vegetables and fruits* to the highest (3,080 with a standard deviation of 1.104) for *I avoid salt and heavily salted foods*. Cronbach's α reliability of the scale *correct eating habits* were moderate, equal to 0.594. Table I illustrates detailed results. Among the preventive behaviours the test subjects declared that they comply with medical recommendations (the highest average value 3.092 with a standard deviation 1.079), while at the same time they exhibited little interest *in noting down emergency services telephone numbers* (the lowest of the average 2.825 with a standard deviation of 1.147). The calculated reliability (Cronbach's α) of this scale was moderate and equal to 0.582. Table I illustrates the data. In terms of positive mental attitude the participants of the survey conducted settled family and social life. They did not cope very well with avoiding situations that affected them depressingly (average value of 2.848 with a standard deviation 1.105) and with avoiding anger, anxiety, depression (average value 2.997 with a standard deviation 0.992). The reliability (Cronbach's α) of scale *positive mental attitude* was high and equal to 0.609. The data on the sub-scale of HBI are illustrated in Table 1.

When analysing the average values of the sub-scale of health practices it can be seen that the respondents tried to restrict cigarette smoking - it was the highest score (average value 3.558 with a standard deviation 1.297), in turn, they paid little attention to sufficient rest, or weight control. The calculated reliability (Cronbach's α) of this scale was moderate and equal to 0.465. Details are are shown in Table 1.

The average severity of health behavior indicators presented 31.7% of the patients from surgical wards and 34% from non-surgical wards.

Men in both groups cared for their health a bit more and reached higher values in relation to women. Low indicators were presented by 53.8% of men of the surgical wards and 51.9% of the non-surgical wards, average by 33.7% of men of surgical wards and 39.6% of non-surgical wards conservative, and high by 12.5% of men of surgical wards and 8.4% of the non-surgical wards.

Low indicators were presented by 67.2% of women of surgical wards and 67.1% of non-surgical wards, average by 28.4% of women of surgical wards, and 28.1% of the non-surgical wards, high by 4.3% of women of surgical wards and 4.8% of non-surgical wards.

Respondents lived in the city indicated higher values while the inhabitants of rural areas - the lowest (62.9% of surgical wards and 63.9% of the non-surgical wards. The patients belonging to the middle-age and older age groups (41 and above), cared considerably more for their own health status than younger patients. All respondents in surgical wards belonging to the age group of 31 - 40 indicated the average level of the declared health behaviours. A significant portion of respondents of all ages reached a low level of health care. (Details are shown in Table 2).

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Table 1. The HBI ratio in the entire sample

Question No of IZZ scale		Mean	SD	Cronbach's α	Correlation with the scale
Good eating habits		**17.56**	**3.70**	**0.594**	
1	I eat lots of fruit and vegetables.	2.773	1.11	0.520	0.393
5	I limit the consumption of products such as animal fats, sugar.	2.907	1.04	0.562	0.297
9	I care about proper nutrition.	2.92	1.11	0.541	0.347
13	I avoid eating foods with preservatives.	2.84	1.04	0.562	0.295
17	I avoid salt and heavily salted foods.	3.08	1.10	0.561	0.300
21	I eat wholemeal bread.	3.03	1.02	0.545	0.337
Preventive behaviours		**17.96**	**3.65**	**0.582**	
2	I avoid getting cold.	3.02	1.08	0.532	0.330
6	I have the emergency services telephone numbers noted down.	2.82	1.14	0.562	0.266
10	I follow medical recommendations resulting from my treatment.	3.09	1.07	0.531	0.332
14	I regularly undergo a medical examination.	3.06	1.06	0.513	0.372
18	I try to find out how others avoid diseases.	2.95	0.98	0.548	0.292
22	I try to get medical information and understand the causes of health and disease issues.	2.99	1.05	0.535	0.323
Positive mental attitude		**18.00**	**3.67**	**0.609**	
3	I take seriously the guidance of individuals expressing concern about my health.	3.19	1.03	0.595	0.264
7	I avoid situations that affect me depressingly	2.84	1.10	0.569	0.332
11	I try to avoid strong emotions. stress and tensions	3.01	1.03	0.574	0.320
15	I have friends and a settled family life.	3.02	1.11	0.531	0.419
19	I avoid such feelings as anger. anxiety and depression	2.99	0.99	0.566	0.341
23	I think positively.	3.00	1.03	0.551	0.376
Health practices		**18.04**	**3.39**	**0.465**	
4	I get enough rest	2.82	1.03	0.425	0.222
8	I avoid overworking	2.87	1.03	0.417	0.235
12	I control my Weight	2.83	1.06	0.417	0.235
16	I get enough sleep	2.99	1.02	0.413	0.243
20	I limit smoking	3.55	1.29	0.466	0.167
24	I avoid excessive physical effort	2.95	1.03	0.381	0.303

Analysing the level of health care and preferred behaviour in the two groups of patients with respect to their education, it can be concluded that the results obtained from the study were similar, and the differences were not statistically significant. In the study groups, there was no significant effect on the increase in the level of health behaviour and awareness of the opportunities and the need to maintain health. The largest proportion of patients preferring a high level of health behaviours, according to HBI, were the respondents from surgical wards with vocational education (17.39%), while in non-surgical wards - patients with secondary education (9.3%). High levels of health behavior declared 6% of people with university education, 11.6% with secondary education, and 17.4% with vocational education; from the surgical wards. Two percent of people had university education, 9.3% had secondary education, and 8.8% had vocational education from the non-surgical wards. Low levels of health behavior declared 68.5% of people with university education, 54.6% with secondary education and 32.6% with vocational education from the surgical wards; 75.2% of people with university education, 59.8% with secondary education, and 44% with vocational education from the non-surgical wards.

People on surgical wards who declared good social and living conditions presented low levels of health behavior (55.6%), average (33.3%), and high (11.1%), and people on non-surgical wards presented low (91.7%) and average (8.3%). People on surgical wards who declared average social and living conditions had lower level of health behaviors

(67.6%), average (26.7%) and high (5.7%); and people on non-surgical wards– low (73.1%), average (19.2%), and high (7.7). People on surgical wards who declared very poor social and living conditions presented more often the average level of health behaviors (44.6%), low (33.9%), and high (21.4%).

When interpreting the results of both groups (from the surgical and non-surgical wards), they can be compared to average results of HBI scale. By varying intensification of four categories of the scale broken down into: health behaviour, proper eating habits, preventive behaviour, positive mental attitude and health practices, similar results were obtained in both groups, in relation to each category. Details are presented in Table 2.

Table 2. The results in each category of HBI scale of the respondents from surgical and non-surgical wards

Group	N	Health behaviours indicator		Proper eating habits		Preventive behaviours		Positive mental attitude		Health practices	
		M	SD	M	SD	M	SD	M	SD	M	SD
Surgical wards											
Adults	300	71.22	12.51	17.19	3.80	18.06	3.63	17.81	3.72	18.16	3.52
Men	184	70.51	12.94	17.13	4.03	17.89	3.62	17.66	3.73	17.83	3.78
Women	116	72.34	11.74	17.28	3.42	18.33	3.64	18.05	3.70	18.69	3.01
Non-surgical wards											
Adults	300	72.08	10.99	17.92	3.58	17.86	3.68	18.36	3.63	17.94	3.27
Men	154	70.96	11.40	17.91	3.75	17.34	3.67	18.14	3.76	17.57	3.38
Women	146	73.25	10.45	17.94	3.40	18.40	3.62	18.59	3.47	18.32	3.12

Among respondents from surgical wards, consisting of seven age brackets, a stronger belief in the influence of other people on one's health was found in five of them. In the age groups 20-30 and 31-40 the results revealed a stronger internal locus of control of their health. In terms of age groups, consistent with the division of standardization attempts into three age brackets: 18-25, 26-35, 36 and over, it can be seen that the control of their own health was outlined in a manner similar to the seven groups contained in the questionnaire poll. Thus, only one group (26-35) showed a stronger internal control demonstrating the belief that health depends on the entity (subject) that has an impact on health. Non-surgical wards patients, the localised sense of health surveillance differed from subjects belonging to the surgical wards. The respondents belonging to four age groups, coming from 41 and over, showed coincidence as a determining factor for their health. Details are shown in Table 3.

The respondents from surgical wards showed belief in an external locus of health control.

Test results in non-surgical wards were quite diverse in terms of their health locus of control. Women showed a stronger degree of conviction about internal control of health, and men claimed their health was dependent on fate as the decisive factor. Due to the residence, patients living in villages stated that their own health depended on their own behaviours, thus expressing the fact that the person tested is responsible for their health, which may suggest that they demonstrate internal control of health locus. With reference to patients living in the city, their stronger health locus falls on the dimension of health checks, so-called the impact of others. Details are shown in Table 3.

Analysing the relationship between health locus of control and the test group of patients (surgical wards, non-surgical wards) it may be stated that in both these groups health control prevailed, expressed as the influence of others, which is confirmed by the following Table 4.

There were no differences in the groups of non-surgical ward and surgical ward for variable Internal control, t (598) =1.58, p= 0.116. The surveyed groups differed significantly between each other by the level of impact of others variable. Details are shown in Table 5.

Following the classification of the results, the division of the results in terms of high and low in each of the three dimensions, the largest group of respondents in surgical wards were types: undifferentiated-weak (n=83, 27.7%) and undifferentiated-strong type (n = 78, 26.0%), while the smallest number of patients was classified as a strong internal type (n=17, 5.7%) and a strong external type (n=17, 5.7%), as opposed types. Details are shown in Table 5.

The last area of research concerned verification of the impact of health locus of control dimension on the assessment of work of medical staff (doctors, nurses), and the hospital. It is noticeable the medical staff obtained average marksfrom the largest group of respondents from both wards, in the three dimensions of health checks, in terms of: confidence of patients, the professionalism of doctors and contentment with their work. Details are shown in Table 6.

It was observed that the nursing staff work - in the field of confidence in nurses, their professionalism and contentment with their work, received an average evaluation from the largest number of respondents. In the group of patients from surgical wards, referring to the dimension of the impact of others, there was a slightly different outcome, because the work of nurses was assessed in a comparable way, receiving average and high results, whereas fate - average and low (Table 7).

Table 3. Analysis of health locus of control of respondents in surveyed wards according to their age, sex and place of residence

Group	N	Internal control		The influence of others		Coincidence	
		M	SD	M	SD	M	SD
Surgical wards							
Age							
up to 20	2	15.50	7.77	19.00	2.82	14.00	4.24
20-30	4	18.00	5.88	16.75	3.77	15.75	4.27
31-40	1	20.00	-	18.00	-	17.00	-
41-50	20	17.90	4.62	19.40	5.55	17.20	5.03
51-60	49	18.91	4.48	20.20	5.21	17.95	4.46
61-70	64	19.78	5.49	20.18	5.19	18.64	4.25
70 and over	160	19.13	4.38	20.00	4.44	18.41	4.28
Age groups according to Polish norms							
18-25	4	18.75	6.70	18.00	3.16	14.75	2.87
26-35	4	16.50	3.42	16.25	3.30	15.75	4.27
36 and over	292	19.25	4.68	20.08	4.76	18.39	4.30
Sex							
Female	116	19.61	4.98	20.88	4.85	18.88	4.32
Male	184	18.80	4.49	19.40	4.66	17.83	4.33
Place of residence							
Village	197	18.68	4.65	19.78	4.75	18.04	4.34
Town	103	19.95	4.68	20.35	4.84	18.62	4.37
Non-surgical wards							
Age							
up to 20	20	18.25	4.31	19.75	4.83	18.20	4.23
20-30	55	19.89	5.45	19.54	4.41	19.34	3.99
31-40	49	19.42	4.43	19.02	4.46	17.89	4.64
41-50	38	18.18	4.15	17.631	4.26	18.57	4.54
51-60	40	18.57	3.77	17.72	4.06	18.77	4.19
61-70	34	17.79	3.73	18.11	5.03	18.64	3.86
70 and over	64	17.35	3.45	17.34	3.76	17.60	3.88
Age groups according to Polish norms							
18-25	75	19.45	5.20	19.60	4.50	19.04	4.06
26-35	49	19.43	4.43	19.02	4.47	17.90	4.65
36 and over	176	17.82	3.63	17.64	4.18	18.20	3.98
Sex							
Female	146	19.26	4.81	18.80	4.65	18.73	4.27
Male	154	17.84	3.66	17.92	4.07	18.09	4.09
Place of residence							
Village	147	18.39	4.55	17.69	4.32	18.30	4.12
Town	153	18.67	4.07	18.99	4.36	18.50	4.25

Table 4. Student's *t* - test results - the comparison of Non-surgical Ward group with a Surgical Ward group created from an independent variable - the type of ward calculated in the entire sample. Statistically significant results are shown in bold

Variable	Non-surgical wards		Surgical wards		The impact of Levene's test	variances in both groups	t statistics	df	t test impact	95% confidence interval for the difference	
	Mean	SD	Mean	SD						min	max
Internal control	19.12	4.70	18.54	4.31	0.185	equal	1.58	598	0.116	-0.14	1.30
The impast of others	19.98	4.79	18.36	4.38	0.030	different	4.33	593.47	0.000	0.89	2.36
Coincidence	18.240	4.356	18.410	4.187	0.243	equal	-0.49	598	0.626	-0.855	0.515

Table 5. Health Locus of control (the median) - surgical ward

Type	Surgical wards					Non-surgical wards				
	A	B	C	Total		A	B	C	Total	
				N	%				*N*	%
type strong internal	high	low	low	17	5.7	high	low	low	27	9.0
type strong external	low	high	high	17	5.7	low	high	high	10	3.3
type diminishing the influence of others	high	low	high	22	7.4	high	low	high	39	13.0
typ increasing the influence of others	low	high	low	18	6.0	low	high	low	24	8.0
typ diminishing the influence of coincidence	high	high	low	42	14.0	high	high	low	14	4.6
typ increasing the influence of coincidence	low	low	high	23	7.7	low	low	high	38	12.7
typ undifferentiated-strong	high	high	high	78	26.0	high	high	high	53	17.7
typ undifferentiated-weak	low	low	low	83	27.5	low	low	low	95	31.7
A-internal control B- influence of others C - coincidence										

The level of assessment of nursing staff among the surveyed patients in non-surgical wards, in all health dimensions, was most frequently average, and then low. Study showed that high assessment in all three dimensions of health locus was indicated by the smallest number of respondents. Table 6 shows detailed data.

Evaluation of work of the hospital by the respondents in both groups, with respect to health locus in the three generalised dimensions, was quite varied. High evaluation result was recognized by the surveyed in surgical wards, in terms of recommending a hospital to family and friends, as well as in a dimension called *the influence of others*, while in non-surgical wards, the assessment was related to the three dimensions with average and low result. Table 7 illustrates these data.

It was found in non-surgical wards that the highest evaluation of nurses in regards to patients' confidence (ratio - 18.14), professionalism (ratio - 18.40) and contentment with their work (ratio - 18.37) was given by the respondents having high (strong) attachment to the health practices subscale. Statistically significant were differences in the assessment of confidence in the hospital and recommending it to potential patients, whereas the highest evaluation was given by respondents associated with the positive mental attitude subscale. It should be noted that patients of healthy eating habits subscale and preventive behaviours gave the lowest ratings in terms of work and trust in the staff and the hospital. Details are shown in Table 8.

Table 6. The impact of health locus of control dimension on the evaluation of work of medical personnel and nurses in the surveyed hospital wards

Health locus of control	Surgical wards			Non-surgical wards		
	Low	Average	High	Low	Average	High
	N	N	N	N	N	N
MEDICAL PERSONNEL						
Internal control						
confidence in doctors	86	111	76	104	122	63
evaluation of doctors' professionalism	93	124	83	105	130	65
evaluation of contentment with doctors' work	93	124	83	105	130	65
The impact of others						
confidence in doctors	76	102	95	106	128	59
evaluation of doctors' professionalism	85	108	107	108	130	62
evaluation of contentment with doctors' work	85	108	107	108	130	62
Coincidence						
confidence in doctors	99	120	74	100	102	78
evaluation of doctors' professionalism	99	123	78	105	107	88
evaluation of contentment with doctors' work	99	123	78	105	107	88
NURSING STAFF						
Internal control						
confidence in nurses	91	114	79	102	123	65
evaluation of nurses' professionalism	93	124	83	105	130	65
evaluation of contentment with nurses' work	93	124	83	105	130	65
The impact of others						
confidence in nurses	84	100	102	105	127	60
evaluation of nurses' professionalism	85	108	107	108	130	62
evaluation of contentment with nurses' work	85	108	107	108	130	62
Coincidence						
confidence in nurses	101	100	83	97	117	76
evaluation of nurses' professionalism	105	107	78	99	123	78
evaluation of contentment with nurses' work	105	107	78	99	123	78

Table 7. The impact of dimension of health locus of control on the evaluation of the work in the studied hospital wards

Health locus of control	Surgical wards			Non-surgical wards		
	Low	Average	High	Low	Average	High
	N	N	N	N	N	N
Internal control						
confidence in hospital treatment	44	74	55	38	61	50
sense of security while in hospital	63	94	65	74	96	57
recommending hospital to family and friends	85	114	77	100	124	63
The impact of others						
confidence in hospital treatment	41	61	71	48	60	41
sense of security while in hospital	56	77	89	76	95	56
recommending hospital to family and friends	78	96	102	103	124	60
Coincidence						
confidence in hospital treatment	56	64	51	39	56	54
sense of security while in hospital	70	82	70	71	92	64
recommending hospital to family and friends	93	99	84	94	118	75

Table 8. HBI scale relationship to the assessment of nurses' and doctors' work, as well as the hospital, in regards to the four subscales in the non-surgical wards

Non-surgical ward		Proper eating habits			Preventive behaviours			Positive mental attitude			Health practices			Ratio		
Evaluation criteria		Mean	N	SD	Mean	N	SD	Mean	N	SD	Mean	N	SD	Mean	N	SD
Confidence in nurses	yes	17.0	273	3.8	17.9	273	3.6	17.7	273	3.7	18.1	273	3.5	70.9	273	12.4
	no	18.2	27	3.6	19.1	27	3.6	18.3	27	4.1	18.3	27	3.1	74.0	27	12.6
Professionalism of nurses	high	17.5	219	3.6	18.1	219	3.5	17.9	219	3.6	18.4	219	3.5	71.9	219	12.2
	low	15.5	8	5.7	16.2	8	4.1	15.4	8	4.3	17.5	8	2.4	64.6	8	13.8
	average	16.4	73	3.9	17.9	73	3.7	17.7	73	3.7	17.5	73	3.7	69.6	73	13.2
Contentment with nurses' work	high	17.4	242	3.6	18.1	242	3.7	17.9	242	3.7	18.3	242	3.4	71.9	242	12.3
	low	14.4	7	2.5	15.8	7	1.9	14.4	7	3.4	16.3	7	1.8	61.0	7	6.53
	average	16.2	51	4.3	17.8	51	3.3	17.6	51	3.6	17.4	51	3.9	69.2	51	13.1
Confidence in doctors	yes	17.9	289	3.5	17.8	289	3.7	18.4	289	3.6	17.9	289	3.2	72.1	289	10.9
	no	17.4	11	4.3	17.6	11	3.1	18.2	11	4.3	18.6	11	4.0	71.9	11	13.2
Professionalism of doctors	high	18.0	280	3.5	17.9	280	3.5	18.4	280	3.5	18.0	280	3.2	72.5	280	10.6
	low	11.5	2	0.7	12.0	2	0.0	14.0	2	0.0	12.5	2	3.5	50.0	2	2.83
	average	16.1	18	4.1	16.5	18	4.5	17.5	18	4.5	17.3	18	3.5	67.5	18	14.0
Pontentment with doctors' work	high	18.0	289	3.5	17.9	289	3.5	18.4	289	3.56	18.0	289	3.2	72.5	289	10.5
	low	11.5	2	0.7	12.0	2	0.0	14.0	2	0.0	12.5	2	3.5	50.0	2	2.83
	average	14.6	9	3.8	15.5	9	5.9	15.8	9	4.9	15.6	9	3.6	61.6	9	16.1
Confidence in hospital treatment methods	yes	18.2	149	3.5	18.6	149	3.6	19.4	149	3.7	18.5	149	3.2	74.8	149	10.7
	no	17.5	151	3.7	17.1	151	3.5	17.3	151	3.2	17.4	151	3.2	69.4	151	10.6
Sense of security during a hospital stay	yes	16.9	73	3.9	17.0	73	3.6	17.0	73	3.0	17.0	73	2.8	68.0	73	10.5
	no	18.2	227	3.4	18.1	227	3.6	18.7	227	3.7	18.2	227	3.3	73.4	227	10.8
Recommending the hospital to family or friends	yes	17.9	287	3.6	17.9	287	3.6	18.2	287	3.6	17.9	287	3.2	72.3	287	10.8
	no	16.7	13	3.4	15.3	13	4.5	17.5	13	4.0	17.2	13	4.2	66.8	13	13.6

In surgical wards, in the assessment of nurses' work, in terms of trust (ratio - 18.12) and professionalism (ratio - 18.23), the highest marks were given by patients qualifying to the group of people expressing high attachment to the health practices subscale - including a large attachment to daily habits of sleep, recreation and physical activity. In terms of contentment with their work (ratio - 18.37) a high evaluation was given by patients who showed low commitment to positive mental attitudes, including psychological factors such as: avoidance of strong emotions, stress or tensions that may affect their health. An inverse relationship was noted when evaluating the professionalism of doctors, as the highest evaluation was given by patients with high adherence to health practices. Details are shown in Table 9.

In surgical wards, in the assessment of nurses' work, in terms of trust (ratio - 18.12) and professionalism (ratio - 18.23), the highest marks were given by patients qualifying to the group of people expressing high attachment to the health practices subscale - including a large attachment to daily habits of sleep, recreation and physical activity. In terms of contentment with their work (ratio - 18.37) a high evaluation was given by patients who showed low commitment to positive mental attitudes, including psychological factors such as: avoidance of strong emotions, stress or tensions that may affect their health. An inverse relationship was noted when evaluating the professionalism of doctors, as the highest evaluation was given by patients with high adherence to health practices. Details are shown in Table 9.

Table 9. HBI scale relationship to the assessment of doctors' and nurses' work as well as the hospital in regards to the four subscales in surgical wards

Surgical wards		Proper eating habits			Preventive behaviours			Positive mental attitude			Health practices			Ratio		
Evaluation criteria		Mean	N	SD	Mean	N	SD	Mean	N	SD	Mean	N	SD	Mean	N	SD
Confidence in nurses	yes	17.09	284	3.84	18.00	284	3.6	17.78	284	3.74	18.12	284	3.52	70.99	284	12.5
	no	18.94	16	2.24	19.13	16	3.8	18.31	16	3.32	18.88	16	3.52	75.25	16	11.2
Professionalism of nurses	high	17.39	236	3.76	18.07	236	3.5	17.93	236	3.54	18.23	236	3.51	71.62	236	12.2
	low	16.09	57	3.84	17.84	57	4.0	17.12	57	4.30	17.88	57	3.72	68.93	57	13.9
	average	19.29	7	3.04	19.43	7	3.9	19.43	7	4.04	18.14	7	2.27	76.29	7	10.9
Contentment with nurses' work	high	18.10	10	3.98	18.30	10	3.6	19.20	10	3.55	17.60	10	3.34	73.20	10	12.6
	low	17.31	226	3.78	18.07	226	3.6	18.00	226	3.59	18.26	226	3.57	71.64	226	12.4
	average	16.61	64	3.82	17.98	64	3.5	16.92	64	4.06	17.91	64	3.38	69.42	64	12.6
Confidence in doctors	yes	18.01	290	3.54	17.90	290	3.7	18.38	290	3.62	17.95	290	3.22	72.24	290	10.8
	no	15.30	10	3.83	16.70	10	3.3	17.80	10	3.94	17.60	10	4.74	67.40	10	14.3
Professionalism of doctors	high	18.03	289	3.54	17.91	289	3.6	18.43	289	3.60	17.96	289	3.26	72.34	289	10.8
	low	15.89	9	3.55	17.44	9	3.5	16.89	9	4.14	18.33	9	2.92	68.56	9	13.1
	average	11.50	2	0.71	12.00	2	0.0	14.00	2	0.00	12.50	2	3.54	50.00	2	2.83
Contentment with doctors' work	high	16.33	3	5.51	15.67	3	3.2	17.00	3	3.00	17.67	3	3.06	66.67	3	14.5
	low	18.03	272	3.52	17.89	272	3.7	18.37	272	3.58	17.95	272	3.29	72.24	272	10.8
	average	16.96	25	3.92	17.80	25	3.6	18.36	25	4.25	17.80	25	3.19	70.92	25	12.3
Confidence in hospital treatment methods	yes	17.87	173	3.71	18.84	173	3.6	18.45	173	3.73	18.75	173	3.29	73.91	173	12.1
	no	16.25	127	3.73	17.00	127	3.4	16.94	127	3.53	17.35	127	3.67	67.54	127	12.2
Sense of security during a hospital stay	yes	16.14	78	3.57	17.27	78	3.6	17.18	78	3.98	17.40	78	4.13	67.99	78	13.4
	no	17.55	222	3.81	18.34	222	3.6	18.03	222	3.60	18.43	222	3.25	72.35	222	12.0
Recommending the hospital to family or friends	yes	17.29	276	3.77	18.14	276	3.6	17.93	276	3.68	18.26	276	3.50	71.62	276	12.4
	no	16.04	24	4.03	17.13	24	3.3	16.46	24	3.99	17.00	24	3.65	66.63	24	13.0

DISCUSSION

The present studies show that respondents in the surgical and the non-surgical wards demonstrated a diversity of opinions and beliefs about the impact on their health. Women more often expressed the belief that their health depended on them, showing the internal health control, while men claimed that their own health was determined by fate.

Health behaviours, Ostrowska [7], encompass general habits, customs and attitudes relating to health for the individual as well as society. They are determined, to a large extent, by the social and cultural context, which thus shapes and limits individual preferences. Health behaviours are also determined by age, gender, marital and family status, ethnic background or social, educational, occupational and financial situation (quote 4). One of the primary determinants of attitudes and health behaviours related to maintenance of health or health prevention activities is the level of people's medical knowledge. Shaping the desired 'pro-health behaviours' and recommendations relating to the 'anti-health behaviours' should constitute an integral part of the socialisation process in which the most important role, beside family, should be played by school institutions.

Smoleń et al. [8] surveyed 88 elderly people

in the district of Sanok, aged 60 to 81. More than half of respondents reported that they cared about proper eating, 66.0% of respondents declared that they avoided salt and heavily salted foods, while 74.0% of respondents did not smoke tobacco. Other diseases reported by respondents, were sleep disorders, rheumatoid diseases and diabetes. The study showed that 53.0% of people regularly reported to medical tests, and 80.0% complied with medical recommendations regarding positive health behaviors.

The total of 166 individuals, 98 women and 68 men, took part in Suligi's studies [9]. A number of abnormal eating behaviours were discovered, which are risk factors for excess weight and obesity, lipid disorders, type 2 diabetes, hypertension and coronary heart disease, and other chronic diseases.

Kurowska and Korecińska [10] conducted study among 89 patients before cardiac surgery. The average result of the global HBI questionnaire reached 83.21 points (46-114 points). The standard deviation value was 14.87, which in combination with the average variation coefficient gave 17.88%. The lowest level of behaviours was recorded for healthy eating habits and health practices. Higher average was presented in preventive behaviours and positive mental attitude. The minimum score obtained for proper dietary practices reached 1.5 points, while for the preventive behaviours - 1.68 points. Slightly higher rates were given to health practices and a positive mental attitude, the maximum score - 2 points.

Koziel et al. [11] examined the health behaviours of 394 elderly people. They demonstrated that elderly people, intellectually active, presented generally higher rate of health behaviours, had better eating habits, were often more concerned about preventive behaviours and practices benefiting health and showed a more positive mental attitude compared to their peers in the control group [11].

Kawalec et al. [12] included 75 people who were overweight or had problems with obesity. Only a third of respondents received a high score regarding health behaviour. A negative correlation was shown between body weight and normal eating habits and a positive attitude and a mental age as well as normal eating habits. Those who preferred leisure and used pharmacological treatment for obesity obtained a positive result in terms of presented health behaviours [12].

Zielinska-Więczkowska et al. [13] studied the health behaviours in elderly people with hypertension. They found that the health behaviours of geriatric patients were differentiated by place of residence, education level and to a lesser extent – gender. Clearly, a greater tendency towards health behaviours showed residents of urban areas, older people having higher levels of education and women.

Also, Pieniążek [14] conducted a study on 60 people suffering from hypertension and also showed that the health behaviours of men provoked greater objections than women's.

In the current study, the HBI was used [6]. For the category of healthy eating habits the Ralph Cronbach common indicator was calculated, which was moderate and of 0.594. In this domain, the greatest recognition deserved such issues as: reducing consumption of animal fats, sugar, preserved foods and salt. Another test category was health behaviour. Ratio of these issues according to Cronbach reliability was moderate at 0.582. Especially noteworthy are questions about the possession of emergency services telephone numbers and efforts to avoid diseases. Absolutely important was to examine the issue of positive mental attitude, which makes it possible to avoid a stressful situation or allows to cope with difficult situations. The reliability of these issues for the respondents rated as moderate and according to Ralph Cronbach it was calculated to a value of 0.609. In assessing the issue of health practices among patients, according to Cronbach reliability for these issues, it was calculated - as a moderate and equal to 0.465. The issue concerning limiting cigarette smoking deserves the greatest attention from health practices scale. It should be emphasised that the least attention was drawn to health practices used by the tested patients. In assessing the scale of HBI in terms of gender and the place of residence, the highest percentage of patients indicated a low level of health behaviours, which was not significantly different, except for the largest age group, 31-40 , who remained in surgical ward, in which 100% respondents demonstrated average health behaviours. Definitely, a lower level of care for their own health was found in people living alone, than those who are married or single. Analysing the impact of education and behaviours related to concern for one's health, the decrease in the level of education is followed by the increase in health care. A similar process was observed by analysing the financial situation of the patients. People with difficult social and living conditions were more concerned about maintaining health and vice versa. In this case, there was no major bearing on what type of ward it was.

All patients were tested regarding their beliefs about the impact of their health locus of control. For this purpose the multidimensional health locus of control scale was used [6].

Opuchlik et al. [15] tested 112 people, divided into two groups. The first group consisted of 60 patients with a diagnosis of ischemic heart disease and hypertension, and the second group of 52 patients with hypertension. There were significant differences between the groups in terms of external health locus of control - patients with coexisting ischemic heart disease and hypertension showed a

stronger belief in the influence of other people on their health.

Juczyński [16,17] emphasizes that external health locus of control proves one's belief that their health depends on external factors. People with this sense of health locus of control do not cope well with stressful situations and reveal the conviction about lack of influence on the course of dealing with stress. External health locus of control also prompts the denial of the symptoms of the disease and diminishes the need to observe behaviour which may have a significant impact on the course of treatment and rehabilitation. In contrast, people with an internal health locus of control aim to improve and maintain health, and use social support more effectively.

CONCLUSIONS

The results of this study confirmed that most of the patients had a low attention to health, especially in terms of preferred health practices, but with a decline in education and deterioration of the financial situation the care for their own health increased. The majority of women expressed the conviction that their health depends on themselves, showing the internal health control, men claimed that their own health depended on fate. Inhabitants of rural areas demonstrated internal control and for their health blamed their own health behaviours, while urban residents demonstrated stronger conviction about influence of others on their health.

Conflicts of interest

No conflict of interest has been declared by the authors.

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Barriers to ocular tissue donation in acute clinical settings

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ABSTRACT

Introduction: Nearly all patients who die in Intensive Care Units (ICU's) and Emergency Departments (ED's) are potential corneal donors. However, the number of referrals from these groups remains low.

Purpose: To identify the number of potential corneal donors in four ICUs and one ED and to ascertain how many proceed with donation.

Materials and methods: The electronic medical records of all patients (n=233) who died in the five participating units from July to December 2014 were retrospectively reviewed using existing ocular tissue donor criteria to assess the number of potential donors. The Eye Donor Database and the Potential Donor Audit were also reviewed to determine how many potential corneal donors proceeded with donation.

Results: Out of the 73% (n=170) eligible corneal donors, 79% (n=100) were potential tissue-only donors and 21% (n=36) had the potential to donate solid organs and at least one tissue (corneas). While all 36 potential organ and tissue donors were referred to the Specialist Nurse in Organ Donation (SN-OD), none of the 100 potential tissue-only was referred to Tissue Services. Of the 36 potential organ and tissue donors referred to the SN-OD, only 11 proceeded with corneal donation.

Conclusion: The results of this audit highlight a low conversion rate from a relatively high number of potential corneal donors. There is a need to increase corneal donation awareness among healthcare professionals and the public. It is also recommended the implementation of strategies to maximise the number of referrals.

Key words: Tissue donation, corneal donation, missed potential donors.

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INTRODUCTION

The aim of this project was to audit the ocular tissue donation activity in four Intensive Care Units (ICUs) and one Emergency Department (ED) in a South England NHS Trust from July 2014 to December 2014.

The objectives of the audit were to identify the number of potential corneal donors in the five participating units; to establish how many potential ocular tissue donors were referred to Tissue Services; to ascertain how many notified potential corneal donors proceeded with donation and to identify any barriers to ocular tissue donation.

Improvements in reconstructive medicine have increased the need for tissues such as heart valves, skin, bone, tendons and corneas [1]. Of all human tissues, corneas have the greatest potential donor pool. Due to the avascularity of the cornea, patients with cancer, who would be contraindicated to donate other tissues, are eligible for corneal donation [2]. Corneas can be donated up to 24 hours post-mortem, meaning that the potential for corneal donation is greater than that of solid organs [3]. Despite the high potential of ocular tissue donors in the UK, the number of corneas available for transplant fails to meet the demand [3].

Corneas can be retrieved from either tissue-only donors or organ donors, who have also the potential to donate tissues [3]. For organ donors, the Specialist Nurse in Organ Donation (SN-OD) in liaison with the multidisciplinary team deals with the organ and tissue donation process from the time of referral until retrieval [3]. However, for tissue-only donors, nurses are expected to make the referral to Tissue Services as soon as possible after death. Upon referral, Tissue Donor Coordinators (TDC's) from Tissue Services assess the deceased patient's medical and social history to determine their suitability for tissue donation [3]. TDC's also check whether the deceased had expressed their wish to donate by registering themselves on the Organ Donor Register (ODR). In the absence of both medical contraindications and objections from the Coroner, the TDC telephones the family and offers them the option of tissue donation. Under The Human Tissue Act (HTA) [4], lawful consent is required for the retrieval, storage and use of tissue for transplantation and other scheduled purposes. Relatives must be provided with sufficient and precise information on which to base their decision. If a patient is on the ODR or has written a will expressing their wish to donate, that consent should not be overruled by relatives except in special circumstances. When the wishes of the patient are unknown, consent may be obtained by a person in a qualifying relationship as stated by the HTA [4]. If the family agrees to donation, the TDC arranges the necessary steps to facilitate tissue retrieval and storage for subsequent transplantation [5].

There is limited research on possible barriers to tissue donation activity in ICU and ED. Consequently, the literature review examined international studies from western countries focusing on tissue donation in ICU, ED, hospital wards and hospices conducted from 2002 to 2015.

According to the literature, one of the main reasons behind the shortage of corneas is the high refusal rate. Worldwide studies show refusal rates between 29 % and 72% [6,7]. Nationally, of the 21.1 million British people registered on the ODR, 10.7% do not wish to donate their corneas [8]. When the patient's wishes are unknown, more than 50% of families who give consent to organ donation decline the option of corneal donation [9]. Unlike organ donation, many people are unaware of the option of becoming a tissue donor upon death [1]. According to Rodriguez-Villar et al [1], high refusal rates suggest the need for public campaigns to increase tissue donation awareness.

In the UK, the families who decline eye donation give reasons based on personal views and disfigurement concerns [9]. According to some researchers [10] the symbolism and personal meaning attached to the eyes is important to people. Eyes are associated with beauty and identity and are seen by many as the '*windows to the soul*' [10, pp.62). The findings from a qualitative study [10] exploring the selective refusal of eye donation, suggest that people might be more likely persuaded of the benefits of eye donation and override the social meaning of eyes if the request for eye donation matches their lived experiences.

Muraine et al [7] argue that the shortage of corneas is not mainly due to families' refusals but other logistical difficulties such as problems contacting the relatives as well as lack of identification and referral of potential eye donors. In this French study the consent rate was 71% (n=39/55**),** which might be explained by the presumed consent or 'opt out' system used in France. Presumed consent assumes that everyone will become a donor upon their death unless the individual has previously expressed objection [11]. This is in contrast with the 'opt in' system used in the UK (except Wales), whereby people voluntarily register themselves on the ODR to express their wish to donate. Despite these differences in law and regulations, both systems require approval from the deceased family to ensure that their relative would have wanted to donate [11].

Failure to recognise potential donors has been linked with lack of knowledge among healthcare professionals regarding the medical contraindications and donor suitability criteria [6]. Educational programmes focusing on tissue donation [12] and the implementation of prompts in documentation [13] have been proven to increase the number of referrals. Tissue Services advocate that nurses refer all deceased patients regardless of their

potential for donation [5]. This is thought to minimise the rate of missed potentials due to an incorrect assessment by health professionals, who might not be exposed to donation very often [12].

Discussing the option of organ and tissue donation should be a usual part of end-of-life care [14]. The nurses' role is to offer the option of donation and empower families to make an informed choice based on their loved one's wishes [15]. Nurses looking after patients at the end of their lives are ideally placed to initiate discussions about donation [15]. Yet, many nurses feel hesitant to raise the subject [16,17].

The service evaluation conducted in one British ED department [17] assessed the frequency in which ED nurses initiated discussions about tissue donation with bereaved families over a period of two years. Of the 242 deaths, only 45 families were approached for tissue donation. Similarly, another survey [18] reported that less than 10% of the hospice staff (n=434) hardly ever or never initiated discussions regarding corneal donation with their patients or their families. Some of the barriers for not initiating these discussions included lack of training; anxiety about the possible impact of the discussion on patients and their families and personal perceptions on meaning of the eyes and the belief that donation was not part of the hospice culture.

It is argued [19] that health professionals who have an appropriate knowledge and positive attitudes towards donation are more confident in approaching families. In a service evaluation [12], ED nurses from two Scottish hospitals attended a two-day workshop focusing on the communication skills necessary to request ocular and other tissue donation. Post-intervention, in one of the participating hospitals, the percentage of eligible families approached for eye donation increased from 0 to 77%.

Many studies conclude that educational programmes on donation increases nurses' knowledge and confidence in the topic, which ultimately increases the donation conversion rates [12,16,19]. From the available interventions aimed at increasing conversion rates, modification of behaviour by providing instruction is the most common [20]. Theoretical and practical instruction can take the form of workshops, seminars, staff meetings, conferences, presentations and simulations [15]. However, the efficacy of such educational programmes has not been evaluated [20].

Even though nurses are generally supportive of donation, many of them avoid raising the subject of tissue donation due to anxiety and fear to add distress to the already bereaved families [21]. Whether donation helps or not in the bereavement process is controversial. While some studies indicate that donation might help in the bereavement process [22], others suggest that donation does not have any impact on grief [23]. However, it is generally accepted that most of the families who give consent to donation consider this as a positive experience and that some people would be offended if they had not been offered this option [23]. Regardless whether consent is given or not, the majority of relatives are pleased when sensitive request for donation is made [15].

MATERIALS AND METHODS

An audit was conducted to assess the ocular tissue donation practice. The audit involved retrospective examination of the electronic medical records of all patients who died in the five participating units between periods of July 2014 to December 2014. The records were reviewed using existing ocular tissue donor criteria for eye donation to assess the number of potential corneal donors. Contraindications to ocular tissue donation for transplantation were obtained from the Royal College of Ophthalmologists [5] and the National Blood Service Guidelines [2] and most of them are grouped under the headings listed in Appendix 1. The local Eye Donor Database and the Potential Donor Audit [24] were also reviewed for the same period to determine how many potential ocular tissue donors were referred to Tissue Services, whether consent was obtained and how many of them proceeded with corneal donation. The audit tool can be seen in Appendix 2.Unlike some types of research, audits cannot eliminate confounding factors that could explain the outcomes. Therefore, although the results might seem suggestive, audits cannot establish with certainty whether any improvements in practice are directly related to the changes implemented [25].

Sample

A purposive sample (n=233) consisting of all electronic medical records from patients who died in any of the four adult ICUs or ED during the period from July 2014 to December 2014 was selected for this study. The rationale for selecting this sample was that these acute clinical units covered by the SN-OD had the largest potential for organ and tissue donation. Medical records of patients who died in Neonatal and paediatric ICUs were excluded from this study due to the fact that the lowest age limit to donate eyes set up by Tissue Services is 3 years. Furthermore, as the number of deaths in these units is low, the potential for eye donation is minimal.

Ethical considerations

Audit of practice does not require ethical approval [26]. Permission to conduct this project was gained from the ICU Lead in Research and Development and the managers of all participating units. This involved following the ethical principles

stated in the NHS Trust ethical guidelines. In compliance with the Data Protection Act [27], the confidentiality and anonymity of the patient's data was preserved as the data retrieved did not contain any personal details that could reveal the patient's identity. Electronic medical records were accessed with the use of a personal password; thus ensuring the security of the patient's data.

RESULTS

After using the existing criteria and medical contraindications to ocular tissue donation [2,5], 73% (n=170) of the deceased patients were found eligible for corneal donation (Table 1). Of the 170 eligible eye donors, 79% (n=100) were potential tissue-only donors and 21% (n=36) had the potential to donate organs and at least one tissue (corneas). All 36 potential organ donors who could also donate tissue were referred to the SN-OD. Regardless of the unit in which the patient died, none of the 100 potential tissue-only donors were referred to Tissue Services. From the 36 potential organ-tissue donors, only 11 proceeded with eye donation. The causes for non-proceeding with eye donation from potential organ-tissue donors were: family refusal (n=23), NOK could not be contracted (n=1) and coroner's objection to retrieve eyes (n=1). For graphic presentation of findings please Fig. 1 and Fig. 2 and 3.

Table 1. Outcomes of potential donors

Potential donors	**Referral rate**	**Refusal rate**	**Conversion rate**
Potential organ-tissue donors n=36	100% (n=36/36)	64% (n=23/36)	31% (n=11/36)
Potential tissue-only donors n=134	0% (n=0/134)	N/A	0% (n=0/134)
Potential tissue-only donors & potential organ-tissue donors n=170	21% (n=36/170)	64% (n=23/36)	6% (n=11/170)

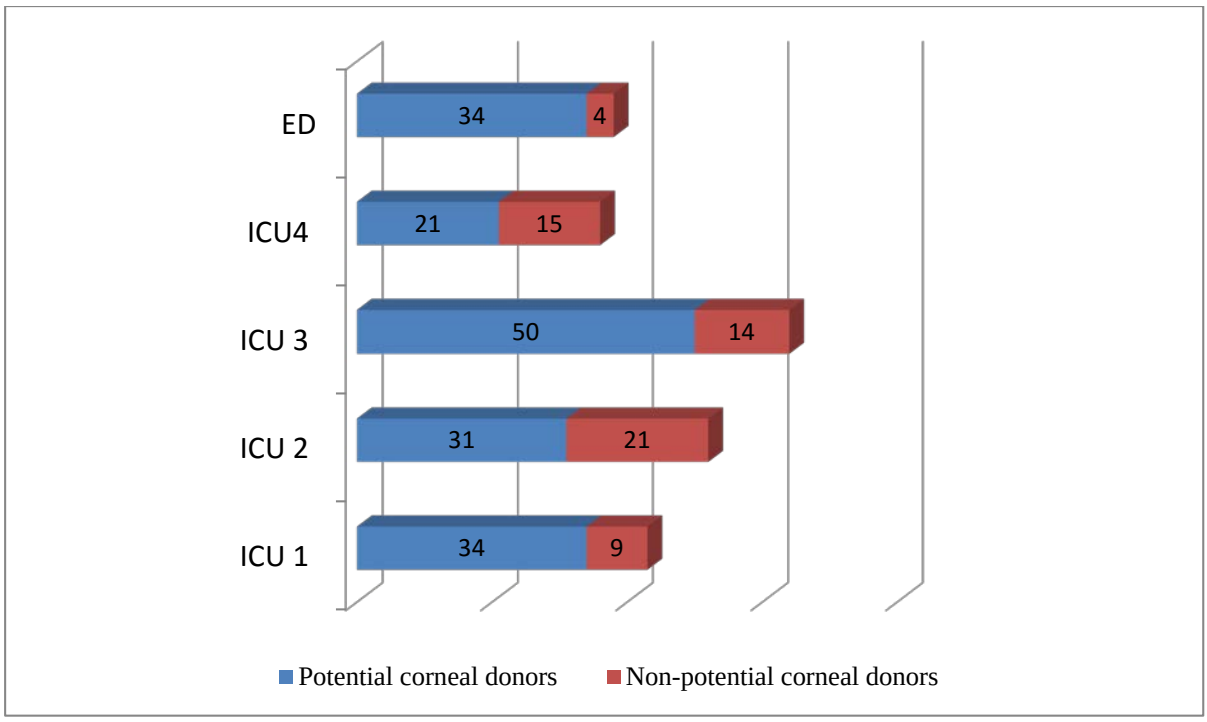

Figure 2. Referral versus non-referral of potential corneal donors according to the unit where the deceased patient died

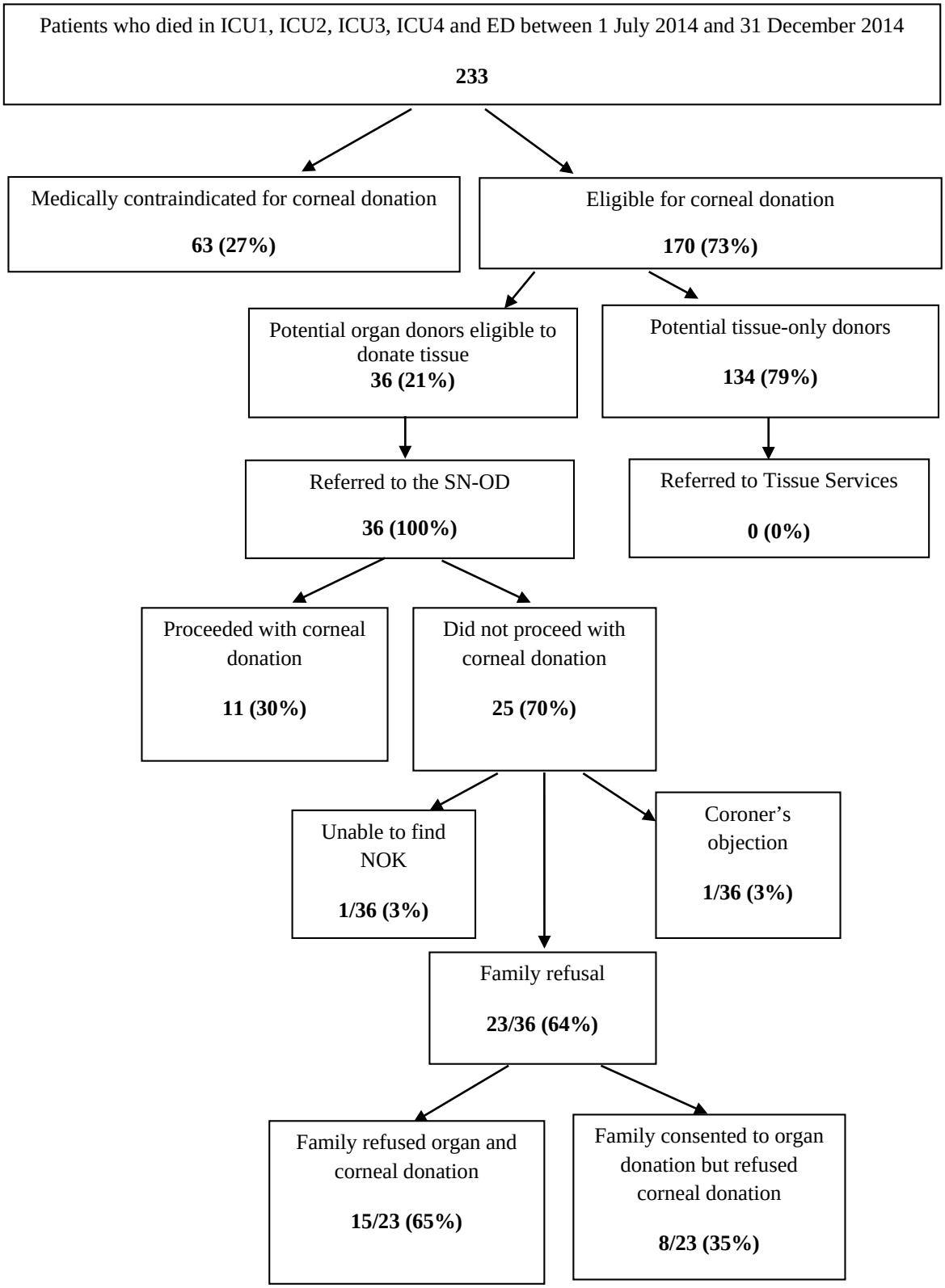

Figure 1. Breakdown of findings

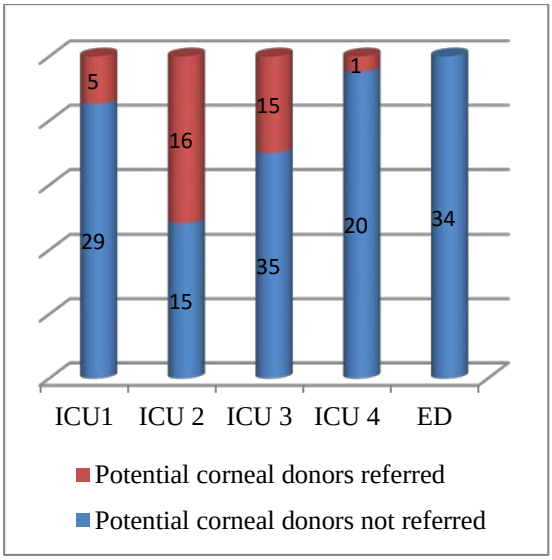

Figure 3. Referral versus non-referral of potential corneal donors according to the unit were the deceased patient died

DISCUSSION

The findings from this audit support previously reported research that missed referrals and family refusals are the two main reasons behind the low conversion rate (6%, n=11/170) . Of the 36 potential organ and tissue donors, only 11 donated corneas, and this was mainly due to the high refusal rate. The 64% refusal rate from potential organ and tissue donors reported in the current study is slightly lower than national rate (70%) [9] but significantly higher than the 29% refusal rate reported by Muraine et al [7]. Nonetheless, taking into account the refusal rate (64%), coroners' objections (3%) and other logistical problems (3%), 51 deceased patients rather than 11 could have donated corneas if all 170 eligible donors had been considered.

It was previously reported [7] that healthcare professionals were not referring potential eye donors. A new referral system was subsequently implemented, which removed the healthcare professionals' responsibility of making the referral to the TDC. This new referral system involved the TDC having to contact the hospital mortuary every morning to obtain a list of all deceased inpatients and assess their potential for corneal donation. After the implementation of the new referral system, the TDC's were able to identify 40.5% of potential eye donors. In the Trust where this audit was conducted a similar referral system was introduced with the exception that the TDC is based in the bereavement office. This referral system is limited by the working pattern of the TDC. As the TDC is not in hospital every day, many potential eye donors might still go unidentified.

Based on the literature, missed referrals might be due to poor knowledge regarding the donor suitability criteria [6] or failure to offer families the option of donation [17]. The local policy advocates the referral of all deceased patients regardless their potential for tissue donation. Therefore, unfamiliarity with the donor criteria should not be a barrier towards the identification of potential donors. The nurses' role in the Trust is to provide families with a leaflet containing information about tissue donation and to inform them that a TDC might call them to discuss this option further. This removes unit nurses' responsibility of having to discuss the option of tissue donation with bereaved families [28]. Nevertheless, nurses still need to raise the subject and to do so they need to understand the benefits of tissue donation, what it involves and how they can support families and cover their emotional and informational needs [29].

From all participating units, ICU had the largest number of proceeding donors. However, while all 36 potential organ-tissue donors were referred to the SN-OD, none of the 134 potential tissue-only donors were referred to Tissue Services, regardless where the patient died. When considering national and local strategies to support organ donation compared to those available to support tissue donation, these results should not be surprising. Unlike tissue donation, organ donation is in the public agenda and has the support of the media, governmental documents, policies and professional guidelines. Clinical Leads for Organ Donation and SN-ODs act as a leaders promoting organ donation within acute clinical areas. Unfortunately, there is a lack of leadership in terms of tissue donation. Nurses' practice regarding tissue donation is said to be influenced by their knowledge and attitudes [19]. In the Trust, clinicians and nurses attend regular teaching sessions and workshops focusing on organ donation. Due to the time limitation of these sessions and the focus being on organ donation, tissue donation is covered very briefly. Based on the lack of training, it is not surprising that the number of families approached for tissue donation is low.

When comparing the referral rates between organ-tissue donors and tissue-only donors, differences in both referral systems need to be considered. While referring a potential organ donor only involves a phone call, referring a potential tissue-only donor requires talking to families, filling in referral forms and faxing these to Tissue Services. In busy units such as ED, finding the time to discuss tissue donation with families and filling in referral forms might be challenging [15,28]. Telling health professionals' about the benefits of tissue donation not only for the recipients but also for the bereaved families might improve staff attitudes and commitment to perform these tasks [19].

CONCLUSIONS

This audit used a purposive sample taken from a single centre therefore the findings from this audit cannot be generalised to all acute clinical settings. Retrospective reviews rely on the available information of the underlying documents [17]. In the context of this project, medical records did not always provide detailed social information, which in some cases would have ruled out the potential for eye donation. It is possible that the number of potential corneal donors might have been overestimated. However, the audit tool for data collection included the basic parameters to measure success such as the number of potential donors, referral rate and consent rate used in the validated PDA tool [24].

Findings from this audit revealed a low conversion rate from a relatively high number of potential ocular tissue donors. Congruent with previous studies, missed referrals and family refusals have been identified as main barriers of corneal procurement. These barriers suggest the need for education of healthcare professionals and the general public. It is also concluded that there is a need for implementation of strategies that maximise the number of referrals and that nurses are trained and encouraged to use these referral systems.

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Conflicts of interest

The authors declare no conflicts of interest in this work.

APPENDIX 1: CONTRAINDICATIONS TO OCULAR TISSUE TRANSPLANTATION

(The Royal College of Ophtalmologists, 2013; National Blood Service, 2013)

1. INFECTIONS
1.1 acquired immunodeficiency syndrome (HIV/AIDS)
1.2 viral hepatitis (A,B,C)
1.3 HTLV
1.4 behavioural risk of contracting HIV, hepatitis or HTLV
1.5 tatoos and body piercing within the 4 months before death
1.6 accupuncture within 6 months before death if performed by a non qualified professional
1.7 imprisonment within the 12 months before death
1.8 beeding disorders treated with blood-derived coagulation concentrates
1.9 viral encephalitis or encephalitis of unknown origin, viral meningitis
1.10 rabies
1.11 congenital rubella
1.12 tuberculosis
1.13 Reyes syndrome
1.14 Progressive multifocal leukoencephalopathy
2. PREVIOUS SURGERY ORTRANSPLANT/MEDICAL TREATMENT
2.1 receipt of an organ, cornea, sclera or other human tissue transplant
2.2 receipt of dura mater or brain/spinal surgery before August 1992
2.3 receipt of human pituitary hormones
3. UNKNOWN AETIOLOGY AND CNS DISORDERS
3.1 Creutzfeldt-Jacob disease and central nervous system diseases of unknown aetiology (e.g., Alzheimer's disease, other dementias, Parkinson's disease, multiple sclerosis, motor neurone disease)
4. MALIGNANCIES
4.1 leukaemia, lymphoma, myeloma, polycythaemia, sideroblastic anaemia and myelodysplastic syndrome
5. EYE DISEASES
5.1 active ocular inflammation/uveitis
5.2 any congenital or acquired disorders of the eye, or previous corneal laser surgery
5.3 retinoblastoma
5.4 malignant tumours of the anterior segment
6. AGE
6.1 There is no upper age limit to donate corneas. However, the NHSBT Tissue Services National Referral Centre excludes patients over 90 to avoid discarding corneas due to poor quality. Therefore, this age limit has also been applied.

APPENDIX 2: DATA AUDIT TOOL
Date of death: ...../...../..... Unit where the patient died:.....

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The anxiety levels in Polish hospital nurses experiencing various emotional disturbances

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ABSTRACT

Introduction: Nurses experiencing a high level of anxiety have an impaired capability of coping with dangerous situations which require long-term effort.
Purpose: The objective of the present study was to determine the relationship between the level of anxiety, satisfaction with life, style coping with stress, and personal and environmental factors, such as: age, material status, education and place of residence of participants.
Materials and methods: The study included 113 women working as nurses, employed by the hospital of Medical University of Gdansk. The methods used to gather the data were: Trait Anxiety Inventory (STAI) by Wrześniewski et al., Scale of Satisfaction with Life by Juczyński, and The Miller Behavioural Style Scale by Miller.
Results: In the group of nurses experiencing various emotional disturbances, the level of anxiety as a state exceeded the normal limits. The place of residence of study participants determined the anxiety level as a state. The general increase of the anxiety level confirmed that the perceived satisfaction with professional life decreased.
Conclusions: The study showed that in case of Polish hospital nurses, personal and environmental factors such as: age, material status, education level and place of residence, have influence on response to stress factors and the choice of style coping with stress. In order to reduce professional-related stress there is the need to implement organizational changes. The nurses should receive psychological and social support in the form of care given by the co-workers, attend courses preparing them to cope with work-related stress and their own negative emotions, learn the principles of assertiveness and styles of coping with difficult situations.
Key words: Anxiety, life satisfaction, cope with stress, nurses

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INTRODUCTION

The positive emotional state of the nurses is one of the key factors influencing their health, satisfaction with life and work, capability of efficient work in situations requiring long-term effort, and the quality of their work [1-7]. Studies conducted thus far have indicated that many nurses have experienced various emotional disturbances, characterised by high anxiety level [8-11]. State anxiety has been defined by Spielberger as subjective feeling of tension, apprehension, nervousness and worry, associated with an arousal of the autonomic nervous system, and characterised by high variability [12]. On the other hand, trait anxiety is the motive or acquired behavioural disposition that predisposes an individual to perceive a wide range of objectively non-dangerous circumstances as threatening and to respond to these with state anxiety levels disproportionate in intensity and magnitude to the objective treat [12]. High anxiety level did not favour the nurses' sense of competence and thus the effect of tasks performed by them. It has been suggested that wellbeing is an important element of life, composed by the level of satisfaction, presence of positive feelings and absence of negative ones.

Shin and Johnson (1978) define life satisfaction as "a global assessment of a person's quality of life according to his chosen criteria", negatively associated with neuroticism and emotionality [13].

The style of coping with stress is a relatively permanent trait of the human character, determining one's behaviour in stress situations. Miller had distinguished two behavioural coping styles: *monitoring* – seeking outside information or focus on information from the inside; facing the stressful situation directly (gathering, processing and use of information on the stressor; confrontational approach), and *blunting* – omitting, denial, repression of information on stressful event and unpleasant states, or deliberate focus on substitute activities, diverting attention from the stressful event or ignoring information, or diminishing it by appropriate interpretation (avoiding information; evasive approach).

Numerous studies have confirmed that people characterised by high vigilance cope better when they receive more information on their professional situation, while people characterised by more evasive approach cope better when they receive less information. Both styles are aimed at reducing negative emotions [14-16].

In the other hand, in the best of our knowledge, there is a gape in the literature and there is a need to investigate whether there are any relationship between such factors as: anxiety state, anxiety feature, the satisfaction with life, styles coping with stress, and personal and environmental factors of the nurse such as: age, material status, education level, place of residence.

The objective of the present study was to determine the relationship between the level of anxiety, satisfaction with life, style coping with stress, and age, material status, education and place of residence of participants.

MATERIALS AND METHODS

The study included 113 nurses, i.e. 10% of all nurses employed in the Hospital of Medical University of Gdansk, who had reported various emotional disturbances. The sample was randomly selected using a list of employees.

The study was carried out in the psychological counselling centre in Gdansk in 2014.

The anxiety level was estimated with the use of C.D. Spielberger's State-Trait Anxiety Inventory (STAI), adapted for Poland by K. Wrześniewski, T. Sosnowski, A. Jaworowska and D. Fecenec and intended for assessment of anxiety as state (Cronbach's alpha of 0.83 to 0.92) and trait (Cronbach's alpha of 0,86 to 0,92) [12].

The satisfaction with life was assessed using The Satisfaction with Life Scale by E. Diener, R.A. Emmons, R. J. Larsen and Sh. Griffin (1985), adapted for Poland by Z. Juczyński (Cronbach's alpha 0.81) [13].

To assess the increase of anxiety and satisfaction with life in the study group, raw results were converted into stem scores.

It was assumed that the stem score of satisfaction with life and anxiety level ≥ 7 indicates a high level of anxiety [4].

To assess the two coping styles, The Miller Behavioural Style Scale /MBSS/(Miller, 1987) was used. Miller proposed "that there are two major modalities for coping with threatening information: monitoring attending to and seeking out information about threatening stressor (s), blunting avoiding or distracting oneself from threatening information". In the interpretation, the average results were compared. It was assumed that the higher the result in the given sub-scale, the more intense the given style in stressful situations [14-16].

Since the distributions of all variables did differ considerably from normal (Kolmogorov-Smirnov test). The statistical analysis of the study results was performed with the use of ANOVA on ranks test by Kruskal-Wallis and Spearman test, using SPSS 20 (Statistical Package for the Social Sciences). The significance level was determined at $p < 0.05$.

All nurses who participated in the study were fully informed and made aware of the purpose of the project. Written consent to participate in the study from all nurses were taken.

RESULTS

Analysis of individual psychological interviews with women working as nurses has shown that they experience a number of emotional problems.

The study participants declared, i.e.: overworking and the associated nervous tension, anxiety and insomnia, frequent anger attacks, frustrations arising from unsolved work-related problems (e.g. conflicts, rivalry, poor organisation of work, etc.), and reduced motivation for work. The collected material served as the foundation for the test scenario.

The statistical analysis included the results of tests of 113 nurses, aged 23 to 58 (average: 34.6), of which 65.5% were women aged 21 to 40 (N=74), 26.5% - aged 41 to 50 (N=30), and 8.0% aged 51 to 60 (N=9).

As many of 55.7% women were single (N=63), 38.1% were married (N=43) and 6.2% lived in conjugal relationships (N=7).

Of all study participants, 34.5% had secondary education (N=39), 54% had B.A. degrees (N=61) and 11.5% had M.A. degrees (N=13). 19.5% of participants lived in the countryside (N=22), 14.2% in cities < 100 thousand citizens (N=16), and 66.4% in cities > 100 thousand citizens (N=75).

Table 1 illustrates the correlation between the intensity of state anxiety, trait anxiety, and satisfaction with life and stress-coping styles, age, marital status, education and place of residence of the participants.

Table 1. Relationships between the level of anxiety, satisfaction with life, style coping with stress, and age, marital status, education, and place of residence of respondents

Variables		Anxiety – state		Anxiety - feature		The Satisfaction with life		Scale style coping with stress			
								Monitoring		Blunting	
		χ	SD	χ	SD	χ	SD	χ	SD	χ	SD
Age	21-40 N=74	6.24	1.97	5.15	2.14	4.77	1.88	4.20	2.26	1.86	1.35
	41-50 N=30	5.67	1.65	4.63	1.59	5.03	1.56	3.33	1.70	1.83	1.14
	51-60 N=9	5.33	0.87	4.67	1.87	4.67	1.50	2.33	1.58	1.44	1.01
p		0,125		0.409		0.716		0.015*		0.623	
Marital status	Single N=63	6.22	1.86	5.35	1.93	4.68	1.78	4.24	2,37	1,82	1.29
	Married N=43	5.91	1.79	4.60	1.92	4.95	1.69	3.44	1.64	1.74	1.27
	Non-marital partnerships N=7	4.86	1.68	3.86	2.34	5.43	2.07	2.43	2.07	2.28	1.11
p		0.121		0.045*		0.492		0.043*		0.437	
Education	Average/Diploma N=39	5.90	1.87	4.95	1.79	4.82	1.62	3.08	1.74	1.71	1.23
	Bachelor degree N=61	6.16	1.91	4.98	2.25	4.77	1.86	4.41	2.33	1.87	1.33
	Master degree N=13	5.70	1.44	5.00	1.08	5.15	1.77	3.31	1.60	1.92	1.11
p		0.601		0.905		0.849		0.013*		0.829	
Place of residence	Village N=22	6.14	1.78	5.22	1.34	4.83	1.62	4.09	2.56	2.04	1.25
	City< 100 thousand N=16	6.94	1.57	5.44	1.15	4.77	1.86	3.37	1.89	1.81	1.04
	City> 100 thousand N=75	5.79	1.87	4.80	2.25	5.15	1.77	3.84	2.08	1.76	1.32
p		0.047*		0.268		0.050*		0.713		0.570	

χ – *average;* SD – *standard deviation;* N – numbers of respondents. *p<0.05 – *differ statistically significantly* (ANOVA rank Kruskal-Wallis)

It was found that the intensity of state and trait anxiety, satisfaction with life and evasive approach did not differentiate the participants in terms of age since the average results of those variables were similar.

Nurses aged from 21 to 40 would more frequently respond with confrontational approach to stressful situations than other age groups (table 1).

A correlation was found between the marital status of the study participants and the trait anxiety level and confrontational approach to stressful situations.

The average level of trait anxiety (5.4) and more frequent response to stressful situations by confrontation (4.2) was found in single women, and it was significantly higher ($p<0.05$) than the level found in nurses who were married or lived in relationships.

In the group of nurses with B.A. degree, the vigilant approach was found significantly more frequently ($p<0.05$) than in women with M.A. degrees and secondary education. It turned out that the participants with B.A. degrees responded more frequently to stressful situations by confrontation than the nurses with M.A. degrees and secondary education (Table 1).

No significant correlation was found between the state and trait anxiety, the satisfaction of life and evasive approach, and the education of the participants.

Furthermore, a correlation was found between the place of residence and the intensity of state anxiety and satisfaction with life. The highest average anxiety level (6.9) was found in the group of women living in cities with less than 100 thousand citizens – it was significantly higher ($p <0.05$) than the anxiety level found in women living in the countryside (6.3) and large cities >100 thousand citizens (5,8).

On the other hand, nurses living in large cities (5.1) declared higher satisfaction with life than those living in the countryside (4.8) and small cities (4.7).

No significant correlation was found between the trait anxiety level, styles of coping with stress and the place of residence of the nurses participating in the study. The highest level of satisfaction with life was found in those participants, whose state and trait anxiety levels were low an average level of satisfaction was found in those nurses, whose state and trait anxiety levels were moderate and the lowest satisfaction with life was observed in the nurses, whose state and trait anxiety levels were high.

No correlation was found between state anxiety level and the evasive ($r=0.13$; $p>0.05$) and confrontational ($r=0.03$; $p>0.05$) approach of the studied nurses.

DISCUSSION

The study showed that professional-related stress was the source of anxiety in the study participants. To confirm this thesis it is worth to point out that, the nurses declared overworking, frustrations arising from unsolved work-related problems and reduced motivation for work. Many previous studies showed that regardless the workplace and culture nurses are confronted with variety of stressors (of which most frequently mentioned were: dying issues and workload) and they should know how identify and effectively cope with them [17]. There is no single method that is effective for every situation and should be preferred. Moreover depending on the country there are variations in coping methods. For Chinese nurses the most commonly used coping strategies were: positive reappraisal, self-control, and planful problem-solving [18], for whereas for New Zealand nurses: self-control, planful problem-solving and seeking social support [19]. Our study showed that in case of Polish hospital nurses, personal and environmental factors such as: age, material status, education level and place of residence, have influence on response to stress factors and the choice of style coping with stress. In our opinion identification of risk factors is crucial because it enables conduct preventive action on target population in higher risk group. Our study showed that state and trait anxiety in the studies group did not reach pathological levels. However, the state anxiety level seem to be somewhat higher in the youngest participants, with the least professional experience. Similar outcome was achieved by Kliszcz et el. [8]. In our opinion it is very probable that younger nurses have limited confidence in their knowledge, experience and skills.

In the study by Borge et al. [11], the comparison of anxiety levels in a group of Norwegian nurses and women working on other positions, who have had breast cancer, indicated that the healthcare professionals would more frequently experience higher anxiety levels than the women who had undergone cancer, regardless of age. In further part of the presented research it was also shown that the correlation between the intensity of state and trait anxiety and the satisfaction with life did not differentiate the participants in terms of age, since the average results of those variables were similar.

Our results were confirmed by the studies on nurses' work satisfaction, conducted by Sand [20], who suggested that experiencing negative emotions affects the satisfaction with life and work, notwithstanding the professional experience.

It should be pointed out that the factor inciting undoubtedly negative emotions and affecting the level of satisfaction with life has been and the low remuneration. In the study by Czekirda

et al. [21], the nurses indicated dissatisfaction with their monthly pay, signalled deterioration of their financial situation and expressed lack of satisfaction with life.

Low pay as the source of stress and anxiety for the nurses has also been confirmed by studies by Klimak et al. [22] and by Zajkowska and Marcinowicz [23], conducted among nurses employed in primary healthcare in Poland and the United States, as well as studies by Zielińska-Więczkowska and Buśko [24]. Dissatisfaction with low remuneration and lack of satisfaction with life was confirmed by the strike of 6 November 2014, Organised by the Committee for Defence of Nurses and Midwifes of the Pomeranian Voivodeship.

The main demands of the nurses included i.e. raising the pay and increasing the number of nurses and midwifes on shift in hospital wards [25].

As per the theoretical premises, the occurrence of negative emotions should trigger the nurses' defensive mechanisms and push them to counteract deliberately. Such deliberate actions are methods of coping with stress. A key to the usefulness of monitoring blunting is the hypothesis that individuals tend to cope better in threatening situations when they are able to utilise their preferred coping modality. That "monitors" tend to cope better when provided with lots of information about a stressful situation, while "blurters" tend to cope better when able to avoid or distract themselves from threatening information [26]. In the conducted studies, the younger nurses (aged from 21 to 40) would more often look for information than others on solving the problem by cognitive transformation or attempt to change the situation.

The second research problem referred to the correlation between the marital status of the participants and the anxiety level, satisfaction with life and styles of coping with stressful situations. The average level of trait anxiety and more frequent response to stressful situations by confrontation was found in single women, and it was significantly higher than the level found in nurses who were married or lived in relationships.

The lower anxiety level in married women and those living in relationships might have been related to the support they received from their partners.

Having a support network gives a sense of safety and intimacy, and makes it possible to ask for advice or solve a problem together, as well as to express emotions. Therefore, it can be an anxiety-reducing factor [27].

Analysing the results obtained for the styles of coping with stressful situations depending on the marital status, it turned out that single nurses saw themselves as persons willing to act to solve a problematic situation by confronting it, while married women and those living in relationships would less frequently confront a problem, focusing instead on substitute activities.

Similar results were obtained by Tabała et al. [28], who examined styles of coping with stress among medical caregivers.

The third research problem referred to the correlation between the intensity of anxiety, level of satisfaction with life and styles of coping with stress, and education. Analysis of data indicated that education was correlated to confrontational approach in stressful situations. Comparing the obtained data, it can be determined that the study participants with B.A. degrees more frequently declared confrontational approach to difficult situations than nurses with M.A. degrees or secondary education. Somewhat different results were obtained by Żuralska et al. [29], who examined styles of coping with stress in nurses working in a hospice. Nurses with B.A. and M.A. degrees would more frequently cope with difficult situations by evasion.

The fourth research problem referred to the correlation between the intensity of anxiety, level of satisfaction with life and styles of coping with stress, and the place of residence. On the basis of obtained results, it was determined that the place of residence is correlated to the intensity of state anxiety and the level of satisfaction with life. Verifying the data, it can be stated that study participants living in cities with less than 100 thousand citizens were characterised by an above-average anxiety level. On the other hand, nurses living in smaller cities declared higher satisfaction with life than those living in small cities and the countryside.

CONCLUSIONS

The source of anxiety in case nurses who participated in the study was professional-related stress. In order to reduce this unfavourable phenomenon there is the need to implement organizational changes to reduce stress-induced anxiety. Our study showed that in case of Polish hospital nurses, personal and environmental factors such as: age, material status, education level and place of residence, have influence on response to stress factors and the choice of style coping with stress.

To efficiently perform their work duties, the nurses should receive psychological and social support in the form of care given by the co-workers, attend courses preparing them to cope with work-related stress and their own negative emotions, learn the principles of assertiveness and styles of coping with difficult situations. Thus, they will be less prone to anxiety reactions, mental and physical disturbances, which will undoubtedly improve their health, satisfaction with work and personal life, and will keep them motivated to continue working in their profession. The nurses' identification with

higher anxiety level would enable early initiation of appropriate preventive psychological treatment, which would improve the quality of their professional lives.

The main limitation of the study was a small number of personal and environmental factors which were analysed.

Conflicts of interest

The author have declared no conflicts of interest in this work.

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A comparative assessment of minors' competence to consent to treatment in Polish and English law

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ABSTRACT

The publication concerns the problem of minors' consent in regard to health services. The authors have provided legal solutions adopted in the UK and Poland. The British case law presented in the first part of the article provides that minors have the opportunity to decide on issues relevant to their own health. The ruling which made a breakthrough in automatic treatment of all children (0-16) in the same way was the Gillick case. Since then the test of actual competence has depended on whether the child is able to make a reasonable assessment of the advantages and disadvantages of the proposed treatment and the type of medical intervention, not on age. The British Medical Association has developed manuals to facilitate proceedings of assessing the ability by the physicians. In turn, the Polish legislator in relation to the consent of minors under 16 to treatment introduces only one criterion: the age. Children under 16 years of age, even if they are competent, are not asked for permission to violate their physical integrity. Legal representatives (in the case of medical examination -- actual custodians) are solely entitled to express the consent. In turn, minors above the age of 16 are entitled to consent together with their legal representatives (the actual custodians). In the case of dual consent, in principle, both entities should actually be capable of expressing it. Reading of the provisions of Polish medical law, however, leads to the conclusion that, in fact, the competence of parents is the most important. In the case of a minor patient's (over 16 years of age) incompetence, consent is made only by his legal representative. In contrast, in the case of a minor's opposition, the doctor does not examine his actual competence, only whether the patient is acting with sufficient discernment and refers the matter to the guardianship court.

Key words: minor, capacity, consent, medical intervention, Gillick competence, maturity, test

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INTRODUCTION

Provisions of international conventions and rules of national law guarantee the right of every person to express his/her opinions freely and to make decisions concerning his/her own health. In Poland these guarantees are embedded in the Constitution and acts of law, whereas in the England they stem primarily from statutes and case law. This study examines the position of the rights of the child within these two legal systems and the limits imposed on their implementation in the context of the child-parent relationship.

Following the definition of the 1989 Convention on the Rights of the Child (Act 1) that a child is a person under 18 years of age we will examine the following questions:

1) What are the limitations imposed on an underage person's capacity to make decisions about issues concerning his/her health within the Polish and the English systems of law? (NB. The United Kingdom consists of three jurisdictions - Scotland, Northern Ireland, and England and Wales; this article is concerned solely with English law, i.e. the law of England and Wales)
2) What are the differences between the solutions to problems of child's competence within the Polish and English legal systems (representing the tradition of common law and civil law respectively)? Do they ensure the same level of opportunity for children to decide, if only in a restricted manner, on issues relevant to their own health (in view of contemporary changes in the understanding of the child-parent relationship and the role of parental responsibility? [1].

The Gillick case and its consequences in the UK

According to the Family Law Reform Act 1969, an adult is a person who has attained the age of eighteen [2]. He is fully competent to decide for himself, entitled to consent to treatment and to refuse the treatment. He may refuse it for rational, irrational reasons or even for no reason [3]. However the consent of a minor who has attained the age of sixteen to any surgical, medical or dental treatment, ie. any procedure undertaken for the purposes of diagnosis, also any procedure (including, in particular, the administration of an anesthetic) which is ancillary to any treatment as it applies to that treatment) which, in the absence of consent, would constitute a trespass to his person, shall be as effective as it would be if he were of full age; it shall not be necessary to obtain any consent therefor from his parent or guardian. Parents shall be responsible for children under the age of sixteen and have the decision-making authority in all cases concerning them [4]. The relationship between parent and child is shaped by the institution of parental responsibility and by the standard of the best interests of the child. The rights that have been granted to the parents in relation to their offspring are for the benefit of the latter, and are justified by the execution of the parents' duties towards children [5]. This means that parents rather than children should make decisions where the best interests' standard is applicable.

This simple model of treatment of all children in this age group has been undermined by case law, most notably by the ground-breaking judgment in the case of Gillick v. West Norfolk & Wisbech Area Health Authority [6]. The facts of the case are as follows. In December 1980 the Department of Health and Social Security issued a revised guidance on family planning services. One of its sections, entitled 'The Young', stated that in some cases (to be treated as exceptional) a doctor or any other professional worker could lawfully prescribe contraception for girls under 16 without parental consent or knowledge. Mrs. Gillick, who was the mother of five daughters under the age of 16, objected to the guidance and instituted a series of proceedings, seeking a declaration that the guidance was unlawful.

Ultimately, the issue was settled on appeal to the highest court of the land, the House of Lords. The applicant raised three issues. The first one concerned parental rights: Mrs. Gillick argued that parental rights should be protected against any infringement, no matter whether authorized by a court ruling or a reference to statutory provision. The second objection concerned criminal law: a regulation that sanctioned the prescription of contraceptives to girls under the age of sixteen *had* to violate public order since a doctor applying the guidelines would commit the offence of aiding and abetting the commission of unlawful sexual intercourse. Finally, the applicant raised the problem of minors' competence, claiming that a girl under the age of sixteen was incapable of an effective expression of consent to treatment, especially with regard to such grave issues as contraception and abortion. Underpinning all these legal challenges was her profound objection to the extension of the principle of confidentiality of doctor-patient relationship to child minors (like her daughters) behind the back of their parents [7].

The Law Lords set aside the Court of Appeal ruling in favour of Mrs Gillick's action by a narrow majority 3:2. In their judgments Lord Fraser, Lord Scarman and Lord Bridge reaffirmed both the right of doctors to prescribe contraceptives to minors under sixteen without parental consent and the right of parents to control a child deriving from parental duty. Yet their statements neither outline the scope of that control nor relate it in any precise terms to the age of the child, besides stating that parental oversight was 'a dwindling right'. The judges merely agree with an earlier ruling that the child's right to make important decisions depends on the child's sufficient maturity and understanding as well as the

type of the consent required. Only if the child is able to make a rational assessment of the advantages and disadvantages of the proposed treatment can his/her consent, if expressed, be properly and fairly described as valid.

In his judgment Lord Fraser lays down some specific guidelines for doctors making an assessment of the competence of the child (ie. a test of the child's sufficient understanding and maturity). The doctor is justified in proceeding without the parents' consent or even knowledge, provided he is satisfied on the following points:

1. that the girl (although under 16 years of age) will understand his advice;
2. that he cannot persuade her to inform her parents or to allow him to inform the parents that she is seeking contraceptive advice;
3. that she is very likely to begin or to continue having sexual intercourse with or without contraceptive treatment;
4. that unless she receives contraceptive advice or treatment her physical or mental health or both are likely to suffer;
5. that her best interests require him to give her contraceptive advice, treatment or both without the parental consent.

According to Lord Scarman, parental consent must be sought if the child in question is not competent to provide it, yet once the competence of the child has been established (ie. the child is found to be 'Gillick competent') the parents cannot revoke the consent of the child by their decision. One very significant consequence of the final ruling in the Gillick case was the undermining of the generally held presumption that children under sixteen lack the capacity to consent [8]. However, it is by no means clear that the Fraser Test addresses in a satisfactory manner the problem of consent.

The New Oxford Dictionary of English (1998) defines consent merely as a "permission for something to happen or agreement to do something". But, as C. P. Selinger points out, this definition has to be distinguished from 'informed consent', namely an understanding of an action agreed to, usually for medical purposes, or, in other words, "*permission granted in the knowledge of possible consequences*" [9].

According to C. Moloney, legally valid consent should consist of the following three elements: it should be given by a competent person, voluntarily and it should be 'informed' [10]. In the case of a child, we must make sure that his/her consent is true (ie. not obtained by deception or threat) [11], that he/she can compare and balance the benefits and the harms of the treatment proposed [12], and is able to understand the advice (its nature and what is involved), including the moral and emotional implications of the treatment [13].

The House of Lords judgement in the Gillick case not only acknowledged the fact that maturity was an evolving concept which entailed a gradual attainment of rights and the child's growing independence from the custodial control of parents but also challenged the medical profession to work out practical measures of assessing child's competence to make decisions for oneself. The challenge did not go unheeded. There followed a spate of guidance and resources that addressed this issue, among them a series of manuals published under the auspices of the General Medical Council and the British Medical Association [14].

According to the BMA Children and Young People Tool Kit, the welfare of children and young people should be the paramount consideration in decisions about their care. Consequently, children and young people can expect:

1. to be kept as fully informed as they wish, and as it is possible, about their care and treatment
2. health professionals to act as their advocates
3. to have their views and wishes sought and taken into account as part of promoting their welfare in the widest sense
4. to be the individual who consents to treatment when they are competent to do so
5. to be encouraged to take decisions in collaboration with other family members, especially parents, if this is feasible
6. to be able to expect that information provided will remain confidential unless there are exceptional reasons that require confidentiality to be breached. In each case the competence of a person under the age of 16 needs to be assessed on a continual basis.

A complementary set of desiderata are addressed to doctors. They are aimed at involving all children and young people in decisions relating to their medical treatment. It is important to recognize when a young person is able to make a valid choice regarding a proposed medical intervention or disclosure of personal medical data and is therefore competent to make a personal decision. Doctors should not judge the ability of a particular child or young person solely on the basis of his or her age. For a young person under the age of 16 to be competent, he/she should have:

1. the ability to understand that there is a choice and that choices have consequences
2. the ability to weigh the information and arrive at a decision
3. a willingness to make a choice (including the choice that someone else should make the decision)
4. an understanding of the nature and purpose of the proposed intervention
5. an understanding of the proposed intervention's risks and side effects
6. an understanding of the alternatives to the proposed intervention, and the risks attached to them
7. freedom from undue pressure.

When assessing a child's competence it is important to explain the issues at hand in a way that is suitable for their age. A young patient may be competent to make some, but not all decisions, and clinical staff should promote an environment in which young patients are enabled to engage in decisions as much as they are able. The child's or young person's ability to play a full part in decision-making can be enhanced by allowing time for discussion [15]. The competence of a child is assessed by a doctor or other member of the medical staff [16]. General practitioners who have known the young patient for a long time should asses it – they are well placed to assess their development and maturity but because these change, it is unwise to rely on any assessment that is not contemporaneous. Health professionals who assess competence need to be skilled and experienced in interviewing young patients and eliciting their views without distortion. The treating doctor may be the most appropriate person, but other members of the health care team who have a close rapport with the patient may also have a valuable contribution to make [17].

The evidence provided by guidance and advice materials like BMA Children and Young People leaves no doubt that we are in the midst of a massive change in the way children are involved in the decisions concerning their health and wellbeing. Arguably, one of the catalysts of this transformation was the Gillick case, a legal dispute that went all the way to the highest court where it was decided by the narrowest of margins. As the judgement in that case rebalanced the parent-child relationship, paving the way for 'child emancipation', we may wonder if, as a consequence, it has left the parents with little or no chance to effectively oppose a decision of their child, even if they are convinced it is unreasonable and harmful to the child's best interests.

One of the key issues in the subsequent developments is the applicability and 'bite' of the concept of the Gillick competent child. From a logical point of view it would seem that once the Gillick competency is resorted to it should work both ways – with regard to the child's capacity to consent to treatment and his/her capacity to decline it. In practice, that would mean the adoption of the same procedure in either case, i.e. when the child consents to or refuses treatment. Although this principle was expressly formulated in Re W (A Minor) (Medical Treatment: Court's Jurisdiction) [1992] FCR 785 [18], the two types of situation are indeed treated differently in case law. When a child gives his/her consent, neither the parents not the court are able to override it. However, when a child refuses treatment while his/her parents (or guardians) and ultimately the court take the view that the treatment should be gone through, the child's refusal can well be overridden. The typical justification of the decision to dismiss the refusal is that (only) the proposed treatment will safeguard the child's best interest. This argument is evoked in a number of cases, including Re R (a Minor) (Wardship: Consent to Treatment) [19], Re W (A Minor) (Medical Treatment: Court's Jurisdiction)[20] and Re C (a minor) (Detention for medical treatment) [21].

Apart from the judicial affirmations of the best interest standard, probably the most important attempt to specify it can be found in the BMA Children and Young People Tool Kit. The authors of that guidance gave it the form of an ambitiously broad test aimed at ascertaining with maximum objectivity of what would be in the child's actual best interests. It follows the generally held assumption that a person's interests are best served by measures that offer the hope of prolonging life or preventing damage to health, but admits that these considerations do not suffice in each and every case. So, in addition to the basic postulates, a comprehensive best interest judgement should take into account [22]:

1. the patient's own wishes, feelings and values (where these can be ascertained)
2. the patient's ability to understand what is proposed and to weigh up the alternatives
3. the patient's potential to participate more actively in the decision, if he is provided with additional support or explanations
4. the patient's physical and emotional needs
5. the clinical opinion about the effectiveness of the proposed treatment, particularly in relation to other options, and where there is more than one option, which option is least restrictive of the patient's future choices
6. the likelihood and the extent of any degree of improvement in the patient's condition if treatment is provided
7. the risks and likely side effects of the treatment or non-treatment
8. the views of parents and others who are close to the patient about what is likely to benefit the patient
9. relevant information about the patient's religious or cultural background
10. the views of other health care professionals involved in providing care to that person, and of any other professionals who have an interest in juvenile welfare.

It seems, however, that the appearance of such an impressive instrument to assess the child's best interests has not persuaded the courts to give up their discretionary approach, especially when they deal with contested refusals of treatment by self-willed minors. So the judgement in Re C (a minor) (detention for medical treatment) [1997] 2 FLR 180) [23] expressly affirms the court's right to set up its own kit to test child competence. One such test, distinctly suited to situations with recalcitrant youngsters refusing treatment and thus putting their lives in danger (as in a case of an anorexic teenager), was devised the judges in Re C (refusal of

treatment)[24] and Re MB (medical treatment) [25]. That test crucially requires the patient to "*show an ability to comprehend and retain treatment information relevant to the decision, especially as to the likely consequences of having or not having the treatment in question, to use it, and to weigh it in the balance when arriving at a decision*"[26]. The test has three stages: 1) comprehending and retaining the information relevant to decision, 2) believing it, 3) weighing it in the balance to arrive at a choice [27].

Finally, in exceptional cases where there is a real threat to the life of the patient refusing treatment, the court may adopt a paternalistic attitude and put aside not only all both liberal-minded competence tests but also the veto of noncompliant parents, eg. in Re M (Medical Treatment: Consent)[28] (the refusal of a 15-year-old girl to the planned heart transplant was overthrown by the consent of her mother), Re S (A Minor) (Consent to Medical Treatment) [29] (the court overruled the refusal to undergo a blood transfusion for a 15-year-old girl suffering from a rare blood disease, life-threatening if left untreated), and Re E (A Minor) (Wardship: Medical treatment) [30] (when a 15-year-old Jehovah's Witness and his parents refused a blood transfusion, the court replaced the child's decision with its own). These examples, though exceptional, show that in situations where the best interests of child are directly and gravely endangered the court can intervene and set aside not only the Gillick test, but also override the rights of parents to decide for (and even with) their child.

Assessing actual competence of minors under Polish law

A notable difference between the English and the Polish systems of law concerns the treatment of minors' consent. Under English law the full right of consent to treatment – medical, surgical or dental – is acquired at the age of sixteen, while under Polish law a person in the 16 to 18 age bracket still needs the additional consent from his/her parent or guardian. Nevertheless, the English approach, as defined by a succession of court judgments, leaves room for exceptions. Even in situations when the child is over sixteen and fully competent by virtue of the Gillick test the courts, as the foregoing examples demonstrate, can override his/her refusal to treatment. It seems then that a crucial point in any comparative analysis of the two systems – the English, rooted in common law, and the Polish civil law – in this area is the actual competence of minors. The differences are most pronounced in their treatment of minors under sixteen. In the following review of the Polish legislation, this issue will be discussed first. Next, we will try to find out how the actual competence of minors is defined in Polish law.

(I) Under Polish medical law, there is no need to refer to the test for actual competence for patients under the age of 16. In accordance with Article 17 (2) of the Act of 6 November on Patients' Rights and the Commissioner for Patient's Rights 31] in relation to Article 32 (2) of the Act of 5 December 1996 on the Professions of Doctor and Dentist [32], a declaration of intent made by a minor's legal representative or actual custodian substitutes his/her declaration of intent; consequently, the latter's competence test is not needed [33]. If however the need to examine a minor under 16 does arise [34] the consent to medical intervention might also be given by his/her custodian [35].

Article 25 (2) of 5 December 1996 Act on the Profession of Doctor and Dentist, is an exception here [36]. In the event of a medical experiment involving a minor under 16, it imposes a mandatory o assessment of his/her competence to give informed consent for his/her participation in the experiment. Other pieces of legislation that deal with specific medical matters, for example the Act of 1 July 2005 on Harvesting, Preserving and Transplanting Cells, Tissues and Organs [37] state that a designated bone marrow or haematopoietic cells donor who is a minor with no full legal capacity cannot be subjected to treatment (eg. harvesting) unless his/her legal representative gives the appropriate consent backed by permission from the local Family Court. Art 12 (2) stipulates further that for interventions of this kind consent is required from minors who have attained the age of 13. The competence test invoked in this legislation is one performed by the Family Court as part of its judicial proceedings, and not by a medical practitioner.

However, the Act of 7 January 1993 on Family Planning, Protection of the Human Foetus and Conditions for the Permissibility of Abortion defines the status of a minor in a slightly different way [38]. In accordance with Article 4a (4) of the Act, the pregnancy of a minor over 13 may be lawfully terminated [39] if due consent in writing is obtained from both the minor and her legal representative; in cases where the pregnant girl is under thirteen, she has the right to express her opinion, but it is the Family Court that is authorized to make a decision. A literal interpretation of the provisions of this Act suggests that the competence test on a minor over thirteen may as well be administered by a doctor [40].

As the foregoing examples indicate in the case of some distinct types of medical intervention the Polish legislator permits the lowering of the age threshold for informed consent, though not without bringing in some additional conditions to ensure its validity and effectiveness. At the same time, with regard to more common, run-of-the mill medical interventions, Polish law de facto tends to simplify, or deemphasize, the procedure of getting consent from minors under sixteen. So for instance, children, even if they are competent, are not asked to give their

consent to acts that may amount to the violation of their physical integrity [41]. And, Article 31 (7) of the Act on the Profession of Doctor and Dentist obliges the doctor to give a patient under sixteen appropriate information (adequate to his/her age and understanding), but only if that information is believed to be important for the carrying out of the diagnosis or the therapy. There can little doubt that this provision was intended primarily to ease the child's cooperation with the medical staff during treatment rather than to obtain his/her informed consent.

A different, and more reasonable, approach to the problem of minors' consent is taken by Code of Medical Ethics (*Kodeks Etyki Lekarskiej*)[42]. In accordance with Article 15 (2) of the Code doctors should try to obtain also a minor's consent if he/she is able to give informed consent. The discrepancy between the demands of Code and the rules laid down in statutory legislation with regard to doctor's duties in treating a minor has eventually been resolved by the Constitutional Tribunal. In a ruling from in 1993 the Tribunal upheld the principle that statutory law should have priority over professional ethical guidelines. The latter have no binding force even though they are agreed upon by the medical community [43].

Another dispute, which has been raging in the literature on medical law, [44] concerns the rigidity with which Polish law treats the issue of minors' age. So Professor Marek Safjan has long argued that the fixed age threshold is no more than an ancillary reference point, which merely creates the presumption that a person is able to make autonomous decisions, and should give way as to the actual competence to take autonomous decisions (i.e. give one's consent) as the most important competence determinant [45]. He believes that this revaluation carries no risk of excessive empowerment of a minor because his/her consent will always be balanced by that of his/her parent (legal representative), and the potential conflict between them will have to be resolved by the Family Court.

Similarly, Professor Małgorzata Świderska points out that children have different degrees of competence and it is vital to take it into account when a medical intervention is planned. A child that can understand what is being done him/her when his/her physical integrity is invaded without prior explanation and permission may develop a lasting trauma [46]. Meanwhile, Professor Rafał Kubiak criticises the fixed age threshold from yet another perspective. He claims that the law is inconsistent in allowing a child as young as thirteen to co-decide on abortion and at the same time denying older children their say on relatively less serious issues like the use of contraception or undergoing a gynaecological examination [47].

The problem of reasonable involvement of minor patients in medical decision-making that affects them was also examined by the Constitutional Tribunal. In its judgment of 11 October 2011 [48] the Tribunal found that the wording of a number of Polish legislative acts concerned with the rights of minor patients [49] was not incompatible with the Polish Constitution or the Convention on the Rights of the Child [50]. It should be noted that the Tribunal assesses solely the compatibility of various legal acts; assessments of their subject matter, purpose or adequacy are beyond its remit [51]. This reminder does not imply that the Polish laws fall short of the minimum standards and goals formulated in international conventions. It merely indicates that there are things the Tribunal's judgment does not say, namely that the Polish legislator still has some way to go to implement the *de lege ferenda* postulates of increasing the autonomy of minor patients, especially those who are below sixteen.[52].

(II) Only minors over sixteen years of age are eligible for an assessment of the actual capacity to give consent. For those below sixteen the institution of independent consent is unavailable under Polish law. A child in that age bracket is not denied the right to give consent, but he/she can only exercise it jointly with his/her legal representative (and, if a medical examination is required, also with his/her actual custodian) [53]. The concept of dual consent is aimed at involving the minor in the decision making process related to the medical treatment provided to him/her. At the same time, dual consent, which bundles two declarations of will, invites the adult participant to examine the minor's decision. So far this procedure looks both respectfully reciprocal, yet if the two are not able to come to an agreement, the Family Court takes over and puts an end to a consensual settlement. All previous decisions become invalid and the discordant duo have to submit to the decision of the Court, a third party with the sole authority to give consent [54].

The issue of patient's actual competence is debated both in the field of medical law [55] and medical ethics [56]. The view of medical ethics that has focused most attention starts with the premise that informed consent may be provided solely by a patient capable of giving consent, i.e. a patient who is able to understand the information provided to him/her, and who, after thinking it over, freely and voluntarily consents to the medical intervention [57].

Such an obligation is not stipulated *expressis verbis* in medical law. That the Polish legislator did grant minors above sixteen the right to express his/her objection, but did not cast it in stone may result from a certain distrust about allowing too much autonomy to the underage patient. It has to do with a widespread and rather prejudiced perception of the patient's reaction to information about

treatment and his/her competence. When he/she objects, people tend to think that he/she is incompetent (otherwise why would he refuse to give permission for a medically justified intervention) and the matter must be referred to the Family Court for a final, correct decision. Alternately, when the patient follows medical advice and gives his/her consent to the suggested treatment, this decision is treated as proof of his competence. Yet the perceived rightness or wrongness of the patient's decision is not a criterion of actual competence [58]. This misperception, which consists in looking to the outcomes for proof of competence, is characteristic of both Polish and English jurisprudence, as demonstrated by the Gillick case.

That patient should not only fulfil the formal conditions laid down in civil law (the capacity to perform acts in law is dependent on the age and the fact of being incapacitated or not), but also possess the actual competence to give consent [59]. The latter is in fact a process outlined in Article 31 (1) of the Act on the Profession of Doctor and Dentist: the doctor should disclose to the patient all the relevant information about the treatment and allow him to consider it from various personal and health-related perspectives before he makes up his mind. At the same time the doctor should talk to the patient to see whether his/her awareness and understanding is sufficient for informed consent. This formula of building and testing informed consent is generally accepted for adult patients, but it is not clear whether doctors are obliged to conduct a similar competence test for minor patients who have attained the age of sixteen.

Article 32 of the Act on the Profession of Doctor and Dentist obliges a medical practitioner who is to treat an underage patient or a patient incapable of giving informed consent to seek consent from their legal representatives. If the patient does not have such a representative or it is impossible to overcome the patient's objections to treatment, the necessary permission must be obtained from the Family Court. The wording of these clauses indicates beyond any doubt that the legislator distinguishes between two categories of patients, those that are incapable of giving informed consent and minors (patients of or above sixteen are also considered minors). Similarly, Article 17 (2) of the Act on Patients' Rights states that the treatment of minors, the completely incapacitated or those incapable of giving informed consent requires in each case the consent of their legal representative. These direct references make it absolutely clear that Polish medical law does recognize the actual competence of the patient as a criterion – separate from the criterion of age – of assessing the effectiveness of consent [60].

However, this clarification of the priorities of the law does not make things easier for the doctor in charge of the competence test, especially when he deals with an underage patient who declines treatment. Polish law declares respect for an objection from a minor who has attained the age of sixteen, but, as soon as it is raised, suspends its validity by referring the issue to the Family Court, which takes over, irrespective of the decision of the minor's legal representative [61]. If the court then asks for a medical opinion, the doctor's remit is hardly clear. Both Article 17 (3) of the Act on Patients' Rights and Article 32 (6) of the Act on the Profession of Doctor and Dentist define the competence in question as "having sufficient understanding", while in other texts dealing with the institution of consent the legislator uses the term "incapability to give informed consent". Obviously, the incongruous legal formulas cause uncertainty about the focus and content of the actual competence test.

Minors in the sixteen to eighteen age bracket are just one of many groups – such as the incapacitated, the mentally ill or the mentally handicapped – entitled to use their right to refuse a proposed medical treatment. Such solution for the problem of patient's competence to state an objection is justified axiologically [62].

However, their objection is not allowed to stand. Each veto triggers a court hearing aimed at reviewing the standpoints presented by the doctor, the patient and the patient's legal representative. The court's role is to conduct a comprehensible and reliable assessment of personal and health-related situation of the patient and, if possible, use the proceedings to convince the parties that a particular medical intervention is purposeful [63].

There are also other arguments raised which allow to limit oneself to assessment of "sufficient understanding" instead of "actual competence". In the course of such proceedings the court may wish to clarify what kind of medical opinion it wants, an assessment of sufficient understanding or an assessment of actual competence. The need for recognizing differences and making distinctions is not limited to the area of judicial practice. So Beata Janiszewska argues that the justification of the right to object and the right to give consent must be based on two different sets of premises. Furthermore, the assessment of their validity could also be done in more ways than one, taking into account the Polish legal context. For instance, the objections raised by minors need not be verified too rigorously [64] for they do derail the medical intervention (as in the case of an objection by a competent adult): it is merely suspended pending the decision of the Family Court [65].

The practical conclusion would be that the objection by a minor above sixteen does not require a prior assessment of his/her actual competence to give consent. It is enough to make sure that he/she has sufficient understanding of the facts and consequences of the treatment. Finally, it may be

noted that both Polish and in English British law make a telling distinction between the negative and the affirmative realization of the right to give consent. Moreover, in both the legal systems as a rule objections raised by minors are not subjected to as rigorous a scrutiny (the assessment of the minor's actual competence) as are controversial cases of affirmative consent.

CONCLUSIONS

National systems of law are supposed to reflect rights encased in the framework of international conventions. The UK seems to have gone further than Poland in carrying out the postulate of adopting national legal norms to the requirements of the European Convention on Bioethics, which dispenses with rigid age limits and calls for greater involvement of the minor in the decision-making process concerning treatment.

Fixed-aged limits guarantee certainty and consistency in treatment, and the administration of the test depends on adult assessment, which may result in arbitrary and unprincipled behavior toward a child [66]. Whether it has the capacity to consent depends less on its maturity – the capacity to understand, more on court's or doctor's decision – whether the child is making a wise decision [67].

The Polish legislator in relation to the consent of minors above sixteen introduces the right to decide on their medical treatment without having to undergo any competence test. However, that implies a presumption that they are all competent, although we know that some of them are not. The latter would only lose their right to decide if they submitted themselves to a test and were found 'incapable of giving informed consent'. Professor B. Janiszewska sums up and explains the apparent incongruity as follows: in the eyes of the law the assessment of a person's *incapability* to give informed consent is highly relevant, while the assessment of a person's very capability to give consent is not (presumably it can be taken for granted) [68].

Conflicts of interest

The authors declared no conflicts of interest.

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Medical Association, First Edition, p. 6-9. Available from: www.bma.org.uk [cited 2014 Aug 5]. However speaking about children in general one has to remember about the regulations of Mental Capacity Act 2005 (and 2007) provided for those who lack mental capacity. While most of the Act (with three exceptions) applies to young people aged 16–17 years, who may lack capacity within section 2(1) of the Act to make specific decisions, it does not generally apply to people under the age of 16. There are two exceptions: 1) the Court of Protection can make decisions about a child's property or finances (or appoint a deputy to make these decisions) if the child lacks capacity to make such decisions within section 2(1) of the Act and is likely to still lack capacity to make financial decisions when they reach the age of 18 (section 18(3)); 2) offences of ill treatment or willful neglect of a person who lacks capacity within section 2(1) can also apply to victims younger than 16 (section 44). See: Department of Constitutional Affairs, Mental Capacity Act 2005. Code of Practice. Issued by the Lord Chancellor on 23 April 2007 in accordance with sections 42 and 43 of the Act, https:// www. gov.uk/ government/ uploads/ system/ uploads/ attachment_data/file/224660/Mental_Capacity_ Act_ code_of_practice.pdf :216, 217 [cited 2015 March 3].

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39. Under Polish law, abortion is permitted if pregnancy results from prohibited act (like rape), or constitutes a threat to pregnant woman's life and health; there is high probability of severe and irretrievable damage on foetus or incurable disease which poses threat his/her life. (Polish)
40. See the grounds for 30 October 2012 ECHR judgment on P and S versus Poland, (application no. 57375/08) which can be interpreted in that way that to perform a legal abortion, in practice, a written declaration of minor over 13 made in the presence of three witnesses was required along with a notarial confirmation. (Polish)
41. However, the intervention of the guardianship court is required if, in the doctor's opinion, legal representatives (or actual custodians in relation

to that examination) refuse to give the consent hence act against the child's interest. The intervention is possible particularly in the situation stipulated in Article 34 (6) of the Act on the Profession of Physician i.e. if undertaking particular medical actions on the minor is crucial to remove the danger of loss of life, heavily body damage or heavy health disorder. See: K. Baron, Zgoda pacjenta, Prawo i Prokuratura 2010, No 9, p. 42 ff. K. Baron suggests that the intervention of the guardianship court is also needed when such a danger does not exist. The issue, however contrary to what she thinks, is regulated in the Polish Family and Guardianship Code (Art. 97 § 2 KRiO, Art. 109 KRiO).

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49. The provisions of the aforesaid Act on the Profession of Physician and of the Act on Patients' Rights were challenged. In addition, the petitioner referred to Article 22 (4) of 19 August 1994 Act on the Protection of Mental Health (Dz. U. Nr 111, poz. 535 ze zm.) which also stipulates a fixed age threshold i.e. 16 years of age, after which the patient is entitled to express his/her parallel consent to be admitted to a psychiatric hospital.
50. The convention adopted by the UN General Assembly on 20 November 1989 Dz. U. of 1991, No. 120, poz. 526 and of 2000, No. 2, poz. 11. (Polish)
51. See: Śliwka M. Uwagi krytyczne do orzeczenia TK z 11 października 2011 r. dotyczącego leczenia małoletnich pacjentów, Lex No. 142282, Also K. Szczygieł, T. Szekalski, Pozycja małoletniego, op. cit., pp. 300-302; K. Bagan-Kurluta U. Drozdowska, Prawo do samostanowienia dziecka w zakresie leczenia. Orzecznictwo sądów angielskich w sprawach zgody dziecka na leczenie i zabiegi medyczne z polskiej perspektywy, in: Człowiek i prawo międzynarodowe. The book dedicated to Professor Bogdan Wierzbicki, eds. M. Perkowski, J. Szymański, M. Zdanowicz, Białystok 2014. (Polish)
52. For example, Prof. E. Zielińska suggested, in relation to works on the Act of the Patients' Rights, that the child below 16 should be entitled to receive medical treatment without the need to obtain permission from his/her legal representatives if due to medical problem s/he suffers it would not be in the child's interest (i.e. it would not serve his/her good) to notify the legal representatives. E. Zielińska, Ekspertyza na temat poselskiego projektu ustawy o ochronie indywidualnych i zbiorowych praw pacjenta oraz o Rzeczniku Praw Pacjenta (druk sejmowy No 283), Zeszyty Biura Analiz Sejmowych Kancelarii Sejmu 2008;2:38. (Polish)
53. See: Art. 17 (1) and (2) of the Act on Patients' Rights in relation to Art. 32 (5) and Art. 34 (4) of the Act on the Profession of Physician.
54. See: Art. 32 (6) of the Act on the Profession of Physician and Art.17 (3) of the Act on Patients' Rights.
55. See: Safjan M. Prawo i medycyna, op. cit., p. 55; K. Michałowska, Charakter prawny i znaczenie zgody pacjenta na zabieg medyczny Warszawa 2014, p. 100 ff.; B. Janiszewska, Zgoda na udzielenie świadczenia zdrowotnego, op. cit., p. 432 ff.; U. Drozdowska, W. Wojtal, Zgoda i informowanie, Warszawa 2010., pp. 19-24. (Polish)
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59. It makes the institution of consent in medical law closer to so called natural capacity to perform acts in law, see more: W. Krzymowski, Naturalna zdolność do czynności prawnych w prawie medycznym, Przegląd Prawniczy Uniwersytetu Warszawskiego 2013, vol. 1-2, p. 298 ff. (Polish)
60. A contrario B. Janiszewska, Zgoda na udzielenie świadczenia zdrowotnego, op. cit., p. 477 ff. (Polish)
61. It is worth highlighting that the aforementioned provisions are formulated differently, therefore, some problems in interpretation arise, see more: T. Dukiet-Nagórska, Świadoma zgoda pacjenta w ustawodawstwie polskim, Prawo i medycyna 2000;6-7:92. (Polish)
62. Similar solutions are presented in the Act on the Protection of Mental Health, see Art. 22 (2) of the 19 September 1994 Act, Dziennik Ustaw, 2011, No. 231, poz. 1375 ze zm. See more: M. Safjan,

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Anaphylaxis during peri-anesthetic period - review of research

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ABSTRACT

Peri-anesthetic anaphylaxis, mediated by immunologic, nonimmunologic, or undefined mechanisms is a severe and rapid clinical condition that can be lethal. Anesthesiologists use a myriad of drugs during the provision of an anesthetic. Muscle relaxants and latex account for most cases of anaphylaxis during the perioperative period. Symptoms may include all organ systems and present with bronchospasm and cardiovascular collapse in the most severe cases. Management of anaphylaxis includes discontinuation of the presumptive drug (or latex) and anesthetic, aggressive pulmonary and cardiovascular support, and epinephrine. The paper presents the pathophysiology, the most common causes and the management of anaphylaxis occurring during anesthesia, based on a review of available literature.
Key words: anaphylaxis, anesthetics, intraoperative anaphylaxis

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INTRODUCTION

Anaphylaxis is an acute life-threating immunologic or non-immunologic reaction that results from the sudden systematic release of chemical mediators from mast cells and basophils.Allergic anaphylaxis includes both IgE-mediated and IgG/IgM immunologic–mediated reactions [1,2]. Nonallergic anaphylaxis indicates the lack of a specific antibody or immune response, although the exact etiology for such reactions is unknown [3,4].

During the provision of modern anesthesia techniques, anesthesiologists use a myriad of drugs. Anaphylaxis can result from hypersensitivity to any of the agents administered in that time. Not surprisingly allergic reactions are among the major factors that contribute to morbidity and mortality during anesthesia and to changes in postoperative care. The incidence of anaphylaxis during provision of anesthesia is very difficult to estimate - criteria for inclusion vary in different studies and countries - and has been calculated to range from 1 in 3.500 to 1 in 25.000 cases, with mortality rate of up to 6% [4].

Among the agents most commonly causing anaphylaxis are: muscle relaxants (69.2% cases of perioperative anaphylaxis) latex (12.1%) and antibiotics (8%). Whereas latex anaphylaxis is decreasing because currently very few products being used in the operating theatre contain latex, there is a group of drugs increasingly seen to cause anaphylaxis - the medical blue dyes [5]. The identification of a causative agent may be challenging because of multiple drugs administered [3,6]. The paper presents the pathophysiology, the most common causes and the management of anaphylaxis occurring during anesthesia, based on a review of available literature.

MATERIALS AND METHODS

For the purposes of this study Medline database was used, provided by Ovid, Elsevier Ebsco. It was searched for the key words: "anaphylaxis", "anesthetics", "intraoperative anaphylaxis". The search returned 37 articles, of which 18 were selected for analysis of scientific articles published between 1994 and 2013.

Diagnosis

Both kinds of anaphylaxis present with similar clinical symptoms, though some distinguishing features exist:

- allergic anaphylaxis, particularly IgE-mediated, often is more severe with subsequent administration of the causal drug; in contrast – the severity of non-allergic anaphylaxis tends to be similar with repeat administration of the causal drug
- nonallergic anaphylaxis is more likely dose-dependent (i.e., lower doses or slower rates of administration may not result in reactions)
- a pretratment regimen may be effective in nonallergic anaphylaxis, but pretreatment is generally of limited value with allergic anaphylaxis

One must bear in mind that some drugs (eg. protamine or muscle relaxants) may result in both allergic and nonallergic anaphylaxis [1].

Diagnosis of peri-anesthesia anaphylaxis may be hampered by the limited ability of the affected subject to describe symptoms and skin manifestations may be masked by surgical drapes. Respiratory signs are often blunted by the bronchodilatory properties of inhalation anesthetics, and pharmacologically induced hypotension is common.

Anaphylaxis always should be considered if immediate, unexpected hypotension develops, with or without bronchospasm, following parenteral administration of a therapeutic agent or the induction of anesthesia [2]. Typically there is a profound drop in arterial blood pressure, often requiring active treatment, e.g. use of vasoconstrictive agent [7]. Although the hemodynamic changes occurring during anaphylaxis and anaphylactoid reactions may vary, the major factors causing cardiovascular abnormalities are universal and result from an initial loss of intravascular fluid and vasodilation, which may be followed shortly by vasoconstriction and then myocardial depression. Fluid shifts to the extravascular space, due to increased vascular permeability, can result in a loss of 50% of vascular volume within 10 minutes [8,9].This loss of blood volume leads to compensatory mechanisms that involve the secretion of catecholamines, such as norepinephrine and epinephrine; activation of the angiotensin system, with conversion of angiotensin I to angiotensin II and increased production of these agents; and the production of endothelin-1, a potent vasoconstrictor peptide that was previously found to be elevated in patients with heart failure, stroke, or hypotension. Increased levels of endothelin-1 indicate that that the endothelium responds to hypotension with increased production of this agent. Because anaphylactic episodes are dynamic, the cardiovascular status can change during different stages of the event. For example, during the initial phase, systemic vascular resistance can be reduced, whereas during the later phases of progressing shock, systemic vascular resistance can rise, presumably through the compensatory vasoconstrictor response or the administration of endogenous vasoconstrictive agents, or both. Cardiac output, which can initially be increased, characteristically declines as the event progresses. Central venous pressure may be normal during the early phases of the event and then should

consistently fall with progression of the reaction. The same occurs with pulmonary capillary wedge pressure.

Other manifestations of anaphylaxis during anesthesia include:

- pruritus, flushing, swollen lips-tongue-uvula, periorbital oedema, conjunctival swelling (skin/mucosa)
- increased peak inspiratory pressure, increased end-tidal CO_2, decreased oxygen saturation, bronchospasm (respiratory system)
- tachycardia, bradycardia, arrhythmias, cardiac arrest (cardiovascular system)
- decreased urine output secondary to ATN (renal system)
- DIC (hematologic system)

Differential diagnosis of peri-anesthetic anaphylaxis should, among others, include: asthma, arrhytmia, hemorrhage myocardial infarction, overdose of vasoactive drug, pulmonary embolus or sepsis [9]. The clinical diagnosis of anaphylaxis can sometimes be supported by the elevated concentrations of serum mast cell tryptase. Blood samples should be ideally collected as soon as the patient has been resuscitated and stabilized. To assess a baseline concentration of trypatse, one sample should be obtained 24 h after reaction. The normal range is 1-11.4 ng/ml Patients with suspected anaphylaxis should be referred to a specialist clinic for further investigation alongside with copies of perioperative records and investigations [10].

Causal agents

Muscle relaxants are used to facilitate endotracheal intubation and to optimize surgical exposure anaphylaxis is caused both by IgE antibodies and, more commonly, by direct mast cell degranulation. Because many over-the-counter drugs, cosmetic and food products contian ammonium ions, which are also a pait of molecues of many muscle relexants, anaphylaxis may develop on the first exposure to a muscle relaxant in a sensitized patients. Benzylisoquinolinium compounds, such as d-tubocurarine, metocurine, doxacurium, atracurium, and mivacurium, are more likely to cause direct mast cell degranulation than aminosteroid compounds such as pancuronium, vecuronium, rocuronium, and pipecuronium. Cisatracurium, a benzylisoquinolinium compound and an isomer of atracurium, and succinylcholine have the lowest potency of direct mast cell activation [11].

O**pioids**

Narcotics used in anesthesia are common causes of flushing and urticaria following intravenous administration. Morphine causes nonimmunological histamine release, and meperidine causes nonimmunological histamine release more often than any other opioid. There are reported cases of IgE-mediated reactions to these opioids. Fentanyl belongs to the phenylpiperidine group and does not cause nonimmunological histamine release, but there are a few reported cases of IgE-mediated anaphylaxis to fentanyl. There is cross-reactivity between different opioids of the same family, but not between phenylpiperidine derivatives [1].

Induction drugs

Barbiturates

The incidence of anaphylaxis to thiopental is estimated to be 1 in 30,000 administrations. Though IgE-mediated hypersensitivity reactions to thiopental, a thiobarbiturate, have been described, no reports of IgE-mediated hypersensitivity reactions to methohexital, an oxybarbiturate, have been described [11].

Propofol

Propofol (2,6-diisopropylphenol) is currently formulated in a lipid vehicle containing soybean oil, egg lecithin, and glycerol. The incidence of anaphylactic reactions with this formulation is 1 in 60,000. ropofol is formulated in a lipid emulsion containing 10% soybean oil, 2.25% glycerol, and 1.2% egg lecithin. The egg lecithin component of propofol's lipid vehicle is a highly purified egg yolk component. Ovalbumin, the principal protein of eggs, is present in the egg white. Skinprick and intradermal testing with propofol and with its lipid vehicle (Intralipid) were negative in 25 patients with documented egg allergy. The measles-mumps-rubella vaccine does contain small amounts of egg-related antigens (ovalbumin), which are grown in cultures of chick-embryo fibroblasts. However, the measles-mumps-rubella vaccine has been given to egg-allergic children without any episodes of anaphylaxis. Therefore, current evidence suggests that egg-allergic patients are not more likely to develop anaphylaxis when exposed to propofol [1,12,13].

Etomidate and Ketamine

Etomidate is perhaps one of the most immunologically safe anesthetics. There are reports of IgE-mediated reactions to ketamine, and an intradermal skin test has been used in one patient [13].

Benzodiazepines

The Cremophor EL solvent was responsible for most reactions to benzodiazepines. Diazepam is more likely than midazolam to cause an anaphylactic reaction because of the propylene glycol solvent that replaced Cremophor EL. The active metabolite desmethyldiazepam may be responsible for the cross-reactivity with other

benzodiazepines. Midazolam is a safe drug, because it does not have any active metabolites. Although anaphylactoid reactions to midazolam have been reported, no serologic or cutaneous testing was performed. In addition, midazolam has been used safely for the induction of anesthesia in patients with drug allergy [8,13].

Inhaled Anesthetics

There are no reports of anaphylaxis related to volatile anesthetics. However, these drugs have been associated with hepatic injury due to an immune-mediated toxicity [4].

Antibiotics

Antibiotics frequently are administered before, during, or immediately after anesthesia and surgery. The most commonly implicated antibiotics resulting in reactions are b-lactam antibiotics and vancomycin [2,13]. There is a rise in severe allergic reactions to teicoplanin – an antibiotic of choice in the UK for orthopedic surgery [10].

Nonsteroidal anti-inflammatory drugs

Aspirin and NSAIDs are the second most common cause of drug-induced anaphylaxis (after antibiotics). Anaphylactic reactions to NSAIDs are unrelated to other reactions caused by these drugs, such as respiratory reactions and exacerbations of chronic idiopathic urticaria. True anaphylactic reactions to NSAIDs appear to be medication specific in that some patients who have had an anaphylactic reaction to one NSAID [2,4,14]. The onset of reaction is usually up to 10 min after i.v. administration, 15-30 min from rectal administration and 30-60 min after oral administration [15].

Latex

Natural rubber latex sensitivity is the second most common cause of perioperative anaphylaxis. The absence of a history of reactions or prior anesthesia should not eliminate the suspicion of latex causality, because latex allergy may develop from multiple medical and nonmedical sources. The prevalence of latex allergy increased in the later part of the 20th century. Individuals at high risk for latex allergy include health care workers and patients who have spina bifida, urogenital abnormalities, and multiple prior surgeries. Anaphylaxis caused by latex is more likely to be delayed or to occur later during the procedure compared with muscle relaxants or induction agents. Latex gloves and catheters are the most common medical sources of significant exposure [11]. Latex reactions may occur immediately with latex contact or may be delayed from 30 to 60 min [2,14]. Intraoperative latex anaphylaxis may be related to the administration of drug through a latex port prior to surgery, or during the surgical procedure itself. Latex reactions have also been reported to occur during dental procedures from latex gloves or dams, during obstetrical or gynecologic examinations and during latex condom use. Spina bifida patients are potentially at risk during each surgical procedure because of the numbers of procedures they undergo [4].

Other Drugs

Protamine, antiseptics (chlorhexidine, povidone iodine), diagnostic dyes and iodinated contrast agents may also induce anaphylaxis.

Management of perioperative anaphylaxis

Management must be immediate, because anaphylaxis is life threatening and may produce cardiovascular collapse. It consists of withdrawing the offending drug, interrupting the effects of the preformed mediators that were released in response to the antigen, and preventing more mediator release. Immediate discontinuation of the anesthetic, administration of intravenous epinephrine and an expansion of intravascular volume are the key points of perioperative management of anaphylaxis [7]. Epinephrine is the drug of choice in the treatment of anaphylaxis, because its $[alpha]_1$ effects help to support the blood pressure while its $[beta]_2$ effects provide bronchial smooth-muscle relaxation. The early administration should be the rule. Epinephrine is used at 5- to 10-µg IV bolus (0.2 µg/kg) doses for hypotension and at 0.1- to 0.5-mg IV doses in the presence of cardiovascular collapse. Even if given promptly, epinephrine alone may not be sufficient for the treatment of severe anaphylactic shock. The cardiovascular effects of a continuous infusion of epinephrine are more pronounced than with an intravenous bolus injection. However, boluses can rapidly achieve high epinephrine concentrations and stop mast cell mediator release. Studies support the use of pure alpha -adrenergic agents such as methoxamine10 and metaraminol6 for the treatment of anaphylaxis refractory to epinephrine [9].

Airway support with 100% oxygen will compensate for the increased oxygen consumption. IV crystalloid (2–4 L) replacement will compensate for the peripheral vasodilation that often accompanies anaphylaxis. Histamine 1 blockers (e.g., diphenhydramine 0.5–1 mg/kg), histamine 2 blockers (e.g., ranitidine 150 mg or cimetidine 400-mg IV bolus), bronchodilators (e.g., albuterol and ipratropium bromide nebulizers), and corticosteroids (e.g., hydrocortisone 1–5 mg/kg) should be given. Histamine 1 blockers are used in the early phases of anaphylaxis, but once cardiovascular collapse occurs, their role is controversial. Corticosteroids can decrease the airway swelling and prevent recurrence of symptoms, as seen in biphasic or protracted

anaphylaxis. Hydrocortisone is the preferred steroid because it has a fast onset. One must remember though that their effects have never been evaluated in placebo- controlled trials [7]. Extubation should be delayed, because airway swelling and inflammation may continue for 24 h. Broncho-dilators should be continued during bronchospasm. Histamine 1 receptor antagonists should be continued in the presence of urticaria and angioedema, and a histamine 2 receptor antagonist should be added to a histamine 1 receptor antagonist in the setting of hypotension [1,3,15,16].

CONCLUSION

Peri-anesthetic anaphylaxis is a severe, life-threatening, generalized or systemic hyper-sensitivity reaction. Recognition and immediate treatment are particularly important, because anesthetized subjects are at greater risk for adverse outcomes caused by the physiologic effects of anesthesia. The complexity and severity of anaphylaxis is such that no single algorithm can adequately treat all cases. Immediate discontinuation of the anesthetic, administration of intravenous epinephrine and an expansion of intravascular volume are the key points of perioperative management of anaphylaxis. Vigilance for the signs of anaphylaxis and consideration of risk factors, with possible modification of the agents used, likely will reduce the morbidity and mortality associated with these reactions [1,11,15,17]. Thus, the need for systematic screening before surgery and the awareness and expert advice to anesthesiologists seems to be critical [18].

Conflicts of interest

The authors declare no conflicts of interest in this work.

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Neuromobilization and kinesiotaping as modern methods used in physiotherapy

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ABSTRACT

Kinesiotaping and neuromobilization techniques are classified as physiotherapy methods in other words, these are the methods used to treat a patient with the use of movement. Both kinesiotaping and neuromobilization can be used as a separate form of therapy or may be complementary to other methods of physical therapy. It is true to say that positive effects are likely to appear after the very first therapy sessions. **Key words:** Kinesiotaping, neuromobilization, rehabilitation, physiotherapy

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INTRODUCTION

There are many forms of effective therapy in rehabilitation that are applied by fully qualified physiotherapists and are well accepted by patients. Among these are undoubtedly kinesiotaping and neuromobilization techniques. These techniques are more and more frequently used while treating a patient suffering both from acute and chronic pain. They are counted among physiotherapeutic methods or, in other words, methods used in movement therapy. Positive effects can be often observed already after the very first therapy sessions. Both kinesiotaping and neuromobilization can be treated as separate forms of therapy, but they can also be applied as an addition to other methods of physical therapy [1-3].

Neuromobilization

Neuromobilization belongs to manual therapy methods which deal with the nervous tissue and the tissues surrounding the nervous system. These techniques substantially restore the plasticity of the nervous system – the ability to move structures that surround the nerve tissue, and restore the ability of nerve tissue to tension and stretch [2,3].

Normalizing the neuromechanics is considered as the main goal of neuromobilization therapy. The locomotor dysfunction may lead to the neuromechanic disorder which leads to impaired plasticity of the nervous system and consequently the nerve cell physiology is also disrupted. Neuromechanic disorders arise due to external causes (external pressure, uncomfortable, poor posture) and internal (swelling, intervertebral disc diseases, tumors, sore muscles) [3,4].

Before introducing neuromobilization therapy any contraindications should be excluded. To such contraindications belong: acute damage of the peripheral and central nervous system, the nervous system and spine's tumors, unstable neurological symptoms, fever, congenital anomalies of the spine and peripheral joints, lack of cooperation from the patient [3,5].

Because neuromobilization is mainly based on restoring proper neuromechanics, the treatment with the use of this method should take place at the earliest possible stage of the disease when irreversible morphological changes have not occurred yet. Its main purpose is to improve neuromechanics through the mobilization of peripheral nerves, spinal nerves or nerve roots. Neuromobilization techniques are designed to restore the proper neuromechanics of peripheral nerves and the central nervous system [6].

In neuromobilization the clinical examination is mainly based on: exteroceptive and proprioceptive sensation tests, muscle reflexes testing, palpation examination of cerebellum, the study of cerebellum tension test (tension testing), testing the cerebellum mobility (mobility tests) [7,8].

Tension tests are tests that stretch the nerve or spinal cord by setting the joints running around these structures in such a way that the adaptation of the nervous system was the largest one. In contrast, the mobility tests trigger the transfer of the nervous system by setting the tested section of neural tissue at rest, moving the tissue around the nerve is by stretching the nerve proximal and distal to the injury. In the mobilization techniques, the starting position is defined by the positive tension test or a mobility positive test. The performed technique must be adapted to the current state of the patient and should never cause the pain. In the early period of treatment we usually apply two series consisting of a few seconds of impulsations at a frequency of 2-4 per second. With slowly improving functional status of the patient the treatment time series are prolonged to 20-30 seconds. But in chronic states there should be used voltage of 10-60, which usually last from 1 to several seconds. The main principle which should always be followed is that both during and after therapy the patient should not feel pain [4,5].

As for upper limb treatment we apply a tension test of the median nerve, radial nerve tension test, the tension test of the ulnar nerve [4].

Concerning lower limb one should apply tension test of sciatic and tibial nerve, the tension test of sagittal and sciatic nerve, femoral nerve tension test, the tension test of the obturator nerve [4].

The position of limbs to carry neuromobilization can be modified by e.g. adding traction, increasing or decreasing the angular positioning of the joints. The applied procedure depends on clinical symptoms [1,4]. Properly performed neuromobilization treatment can reduce pain, decrease nerve tissue oedema, restore normal neuromechanics, reduce the tension of autonomic sympathetic system [4].

Kinesiotaping

The inventor of this revolutionary method of treatment is a Japanese chiropractor Dr Kenzo Kase. The assumption of his therapy was to use such a treatment that could affect the patient, not only during a visit but also afterwards. He concluded that the excessively tightened, hardened muscles very often interfere with the biomechanics of joints. In his point of view massage can relax the muscles but do not bring long-term effects. He designed the strip of elastic cotton and a little acrylic adhesive material which were stuck to cramped muscles and thus it prolonged the effect of the treatment. Dr Kenzo Kase called the tape

Kinesio-Taping which can also be expressed as the movement therapy, because the area covered with patches was stimulated during muscular work. The flexibility of the tape makes every patient freely move around and perform activities of daily living [9,10].

Kinesiotaping system in Europe began to grow mainly in Germany, Italy and Portugal, but these applications were not fully understood by Europeans, which is why in May 2007 instructors from Europe decided to introduce a modification concerning both teaching content and the method's name. According to them the kinesiology taping method will have better implementation in the field of myofascial and muscular chains. The concept has been defined as kinesiology taping [11].

The theory of kinesiology taping uses the sensory impact of the patch on the body in order to run compensation abilities. The weight and thickness of the patch are close to skin parameters. The elongation of the patch reaches 130-140% which means the patch does not restrict motion. It does not contain latex and is waterproof. It is also hypoallergenic, it does not cause any adverse skin reaction. If it is well stuck on the skin of the patient and may last for up to 7 days. The crucial problem of a patient is the essence of kinesiology taping. Musculoskeletal dysfunctions are associated with impaired myofascial structure and soft tissue. Proper evaluation of these disorders is the basis for the application of the patch [11,12,15,16].

The patch is applied to the stretched area of the body. After returning to the starting position the tape lifts lightly the skin. Properly applied tape makes the skin folded increasing at the same time the space between the dermis and the fascia, which improves blood and lymph circulation [10,17].

Kinesiotaping is associated mainly with sports due to its high efficiency and the opportunity to continue training despite the injury, but it is also used in terms of the pain of the spine, the Achilles tendon dysfunctions as well as in the case of lymphoedema, the instability of the joints, the shoulder or knees pain, in posture corrections , in the states after sprains and dislocations of joints, to improve proprioception, as well as to reduce the risk of injury during sports activities [10,11,18].

There are six main techniques for the application of the patch, which differ concerning the degree of tapes' stretching, the stretching of the skin area to which the patch is applied. In kinesiology taping there are certain applications used: a corrective, muscular, ligamentous, lymphatic, functional, fascial [12,13,17].

The corrective method requires stretching the tape by 25-75%, depending on the severity of pain. Muscle technique which is commonly used is a technique in which the patching takes place in a set of maximum muscle stretch which is laid along the muscles. The ligamentous method uses the tape enlargement from 25 to 100% and is used in the trigger points. The aim of lymphatic technique is to improve blood and lymph circulation – this method also reduces inflammation. The patch voltage in this method is 15%. The functional method uses tape tension achieved by the maximum motion range in the joint, which helps the weakened muscle. The last fascia method is the most difficult to conduct, because we apply it to correct the fascia settings. In such a case the patch tension between 0-75% is applied here [11,14,19].

Although tapes are relatively cheap, because a five-meter roll bought at a pharmacy or medical shop costs 35-50 zł ,applying them by oneself will not bring any results. To make the method successful with the therapeutic effect one should visit the appropriately trained physiotherapist who knowing the rules and methods in different diseases is able to apply the tape properly on selected muscles [13,20-22].
This method is becoming more and more popular in some rehabilitation centers and sometimes is refunded by the National Health Fund.

CONCLUSIONS

Using neuromobilization techniques in diseases of the musculoskeletal system is effective provided that patients are properly diagnosed and pathological changes are of functional rather than structural disorder. These techniques should be used if we get a positive test results in tension and mobility

Kinesiology taping is considered as a physiotherapeutic method perfectly complementing the therapy. Each application of the tape works 24 hours a day and the patient is provided with full comfort of wearing the tape - can take a bath or a shower, enjoy sports and so on. These advantages, combined with a feeling of wellbeing, make more and more people use this form of therapy. Physiotherapists improve their qualifications in order to develop their own solutions appropriate to every patient's specific therapy in accordance with its objectives. The essence of kinesiology taping's therapeutic effects is the right way of tape application and not the tape itself.

Observing the opportunities of kinesio-taping it can be concluded that by means of this therapy certain solutions to patients' problems and disorders can be found. We can provide help even in such cases which were difficult for physiotherapy to bring positive effects e.g. among women with aches and pains in pregnancy or in people suffering from lymphoedema. However, kinesiotaping is still most popular among athletes who have been using tapes and patches for medical purposes around the world.

Finally, it is worth mentioning that none of the two methods require long work with the patient during a single therapeutic session. This is positively viewed mostly by the patients that most frequently see the physiotherapist due to pain. It should be remembered that both the neuromobilization method and kinesiotaping are considered to be one of the components of treatment and better results are obtained after using them as methods of supportive treatment not as a monotherapy.

Conflicts of interests

The authors declare no conflict of interest in this work.

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Physical activity of students from selected countries. Studies review.

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ABSTRACT

Purpose: The aim of the presented study was the comparison of physical activity of students from selected countries. The key of paper selection was to find various kinds of students groups from different countries and different cultures. The author compared results of students' physical activity.
Materials and methods: The paper compare the previously published papers about physical activity of students from selected countries. All respondents were examined using as an instrument the International Physical Activity Questionnaire (IPAQ), a standardized questionnaire which enables the investigation and comparison of activity of various population groups.
Results: Analysis of results of the study showed a great differentiation among students from individual countries. In each examined group of students, males proved to be the most active gender; however, among countries characterized by the highest physical activity, the results obtained by females were sometimes higher than those concerning males from countries characterized by lower activity. The study showed that the most active students are Americans and Czechs, whereas students from Croatia and South Africa show low physical activity.
Conclusions: The conducted analyses demonstrated that in each country in the study the level of total activity is higher among males than females. The differences in the results of the summary MET value in males remained within the range 2,800 – 6,500 MET, while in females - within the range 1,700 – 5,900 MET. Male students were usually characterized by a high level of physical activity, whereas female students by a moderate level. Among Polish students, similar to their contemporaries from other countries, the level of total physical activity was higher among males than females. Polish students were most often characterized by a moderate level of physical activity.
Key words: International Physical Activity Questionnaire, physical activity, students

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INTRODUCTION

Today, physical activity is commonly considered as one of the best methods for the prevention of diseases, especially those referred to as civilisation diseases. It plays a tremendous role in counteracting depression, and strengthening self-esteem. Physical activity prevents, among others, ischemic heart disease, overweight, obesity [1] and is also an important factor preventing selected types of cancer. Studies show [2] that physically active women are at 20-30% lower risk of the development of breast cancer, compared to physically passive women. Regular physical activity may also decrease the risk of contracting colorectal cancer by 40-50% [3].

Despite an increasingly greater social awareness concerning the positive effect of physical activity on health, the percentage of active population still leaves a lot to be desired. According to the World Health Organization, at least 60% of the world's population do not meet the WHO requirements for the recommended physical activity, which leads to a sedentary life style [1].

While seeking the causes of the lack of activity, and factors determining participation in various forms of physical activity, studies conducted among different social and occupational groups are of great importance. Among the best instruments used for this purpose is the International Physical Activity Questionnaire (IPAQ), a standardized questionnaire which allows investigation and comparison of various groups aged 15-69 (Booth, 2000). The researchers confirmed that the IPAQ is one of the best diagnostic instruments for the study of physical activity, its greatest advantage being simplicity and a uniform research procedure [4].

The IPAQ enables the recognition of physical activity of various groups. Studies conducted with the use of this questionnaire, both in Poland and worldwide, allow comparison of the results and, subsequently, seeking models of behaviours favouring a health promoting life style. In the presented article, the author draws attention to studies of physical activity carried out with the use of the IPAQ, which were conducted among groups of students from the selected countries.

REVIEW OF STUDIES

In order to present the results of the physical activity of students from Poland, the study was selected with the largest population examined [5]. This study showed great differences in the respondents' physical activity. The largest group (43.6%) demonstrated a moderate level of physical activity. Slightly more than one- third (35.5%) of male and female students performed intensive physical activity. The smallest group of respondents were characterized by the lowest activity; nevertheless, they constituted 20% of all the respondents examined (Tab. 1). Differences were also found according to gender, males being the most physically active group.

Among all respondents, the most popular form of spending leisure time are: watching television, playing computer games, and using the Internet. In addition, it was confirmed that students spend 300 min/daily, on average, in a sitting position. The above-presented results show changes from activities undertaken outdoors in the fresh air, towards activities undertaken at home, usually in a sitting position. These conclusions should become an impulse indicating a high risk of development of civilisation diseases.

Table 1. Level of physical activity among Polish students [5]

Low	20.8 %
Moderate	**43.6 %**
High	35.5 %

Li-Ming Chiang [6] conducted studies aimed at comparing the level of physical activity of students from Taiwan and the United States. Among the main conclusions was the information that American students represent a higher level of activity than the Taiwanese. A high level of physical activity was observed among the majority (54.1%) of American students, and slightly more than one-third (35%) of the students from Taiwan (Tab. 2). Similar results were obtained in both nationalities with respect to moderate physical activity (38.6% of Americans and 39.9% of Taiwanese). Low physical activity was noted in only 7.2% of American, and as many as one-fourth of students from Taiwan (25%). In addition, American students showed a considerably higher mean MET min/week value (6,227), compared to the students from Taiwan (4,079.7 MET min/week). Similar results were obtained among female students, the representatives of the United States showed a higher mean MET min/week value (5,921.5) than their contemporaries from Taiwan (3,786.3 MET min/week.) (Tab. 3). Among both American and Taiwanese students, males obtained higher mean MET values than females (Tab. 3).

Table 2. Level of physical activity among students from the United States and Taiwan [6]

	American students	**Taiwanese students**
HIGH	**54.1 %**	35 %
MODERATE	38.6 %	**39.9 %**
LOW	7.2 %	25 %

Table 3. Mean MET min/week value obtained by students from the Unites States and Taiwan, according to gender [6]

Students from the United States		**Students from Taiwan**	
Males	Females	Males	Females
6,227	5,921.5	4,079.7	3,786.3

No significant differences in physical activity of both genders were observed during studies conducted among students from Croatia [7]. Females obtained an overall value on the level of 45.1 - 54.1 MET/hour/week, while males - 49.3 - 58.7 MET/hour/week (Tab. 4).

Female respondents showed a higher physical activity in the area of household and gardening activities (6.3-8.3 MET/hour/week), whereas males were more active during their leisure time (15.9-22.7 MET/hour/week).

Croatian students proved to be the group showing a very low physical activity. More than one-fourth of females (25.1%), and nearly one-fourth of males (24.6%) did not satisfy the recommendations by the WHO concerning the recommended amount of physical activity. More than one-third of females (37.9%), and exactly 37% of males were defined as not meeting the physical activity requirements on the level which would condition positive health benefits.

The results of the above-presented studies show how important is the need for greater health promotion among Croatian students.

Table 4. Mean MET/hour/week value among Croatian students of both genders [7]

Males	**Females**
49.3 – 58.7	45.1 – 54.1

Pengpid and Petzer [8], while carrying out studies of students from South Africa, also found a low level of physical activity. The results showed that only 19.4% of respondents undertook physical activity of a high level. The largest group were students who showed a moderate physical activity (47.6%). One-third of all the respondents (33%) were classified on a low level of physical activity (Tab. 5).

In the case of students from South Africa, no significant differences in individual levels of activity were found between males and females.

Table 5. Level of physical activity among students from South Africa [8]

Physical activity	**Females**	**Males**	**Total**
Low	36.3%	30.5%	33%
Moderate	**46.2%**	**48.6%**	**47.6%**
High	17.3%	20.9%	19.4%

Alarming signals related with low physical activity of students from South Africa were also indicated in studies by Bloemhoff [9]. While commenting on the results of the study, the researcher simply used the expression ‘epidemics of physical inactivity’. It was found that as many as 30% of all respondents were defined as physically inactive. The primary goal of the study was comparison of the differences between physical activity of Caucasian and black respondents. The results confirmed that black students were more active (2,522.7 MET min/week), compared to their Caucasian male and female contemporaries (2,167.6 MET min/week). It was found that among all respondents black males were most active (3,756.1 MET min/week), more than one-third of them showing high activity (35.9%). Males characterized by moderate activity constituted the largest group (39.1%), while the smallest group (25%) were students with low physical activity.

Among male Caucasian students, for whom the overall value MET min/week was 2,698.5, exactly a half of the respondents (50%) showed high physical activity, and a considerably lower percentage (26.3%) were defined as moderately active, whereas the smallest group (23.7%) constituted males showing low physical activity (Tab. 6).

Also among female respondents, black students proved to be more active (1,893.7 MET min/week), although - which is interesting - the largest group (38.5%) among which were women with a low level of physical activity, while the smallest group (24.8%) was characterized by high activity. Moderately active students constituted slightly less than one- third (36.7%).

The least active group (1,681.1 MET min/week) were Caucasian female students. Also in this case, the majority (42.4%) were women showing low physical activity, and the smallest group (27.1%) – respondents who demonstrated high activity. In the middle (30.3%), a group of Caucasian female students was found with moderate physical activity.

The comparison of individual results revealed great differences in physical activity between both genders. Among males, the mean

value was 3,002.3 MET min/week, and among females – only 1,754.7 MET min/week.

In addition, only 26% of all female respondents showed physical activity on a high level, whereas 40.5% of them were inactive students. Among males, 24% of respondents were defined as inactive, while nearly a half (44.9%) were those showing a high level of physical activity.

Table 6. Mean MET min/week value among Caucasian and black students from South Africa [8]

Black students		**Caucasian students**	
Females	Males	Females	Males
1,893.7	3,756.1	1,681.1	2,698.5

The results of studies conducted among students from India [10], demonstrated that 84.5% of respondents met the requirements of moderate or high physical activity. A low level of physical activity (below 600 MET min/week) concerned only 15.4% of students. The highest percentage of students (43.2%) undertook moderate physical activity, and a very large group (41.3%) were also respondents who showed high physical activity.

The largest group among males (51.7%) were students who undertook high physical activity, while the smallest group (13.8%) – respondents who showed low activity. Approximately one-third of students (34.5%) were classified as moderately active. The majority of females (50.3%) were moderately active, followed by highly active students (32.9%), while only 16.8% of female respondents showed low activity (Tab. 7).

Table 7. Level of physical activity among students from India [10]

Level of physical activity	**Females**	**Males**	**Total**
High	32.9%	**51.7%**	41.3%
Moderate	**50.3%**	34.5%	43.2%
Low	16.8%	13.8%	15.4%

Favourable results were also obtained in studies conducted among Czech students, who were compared with students from Beijing [11].

Both males and females from Olomouc in the Czech Republic showed a twice as high mean value of MET/min/week, compared to their Chinese contemporaries (Tab. 8). Female respondents from the Czech Republic obtained mean values MET/min/week equal to 5,296, while the students from Beijing - 1981 MET min/week. Among males, Czech students obtained the mean value 6456 MET min/week, whereas the Chinese - 2846 MET min/week.

Table 8. Mean value MET/min/week for students from Olomouc and Beijing [11]

	Students from Olomouc		**Students from Beijing**	
	Females	**Males**	**Females**	**Males**
Mean value MET/min./ week	5296	6456	1981	2846

Moreover, it was found that the largest group of respondents from the Czech Republic (66.8%), were classified as those who showed high activity. The majority of respondents from China (52.5%) proved to be moderately active.

The above-presented results may also be confirmed by the percentage of inactive students, who in Olomouc constituted 5.8%, while in Beijing as many as 15% of respondents.

The presented results demonstrated differences in the levels of physical activity among various countries and cultures. Individual models may be used, both as examples for which one should reach, and those which should be avoided in order to strengthen health promotion through physical activity. The study shows the importance of physical activity and its influence on health in different countries and cultures.

Studies carried out on the groups of students demonstrate that even at this age individual societies encounter the problem of insufficient activity among the young population. As has been previously mentioned, this type of deficit leads to many serious diseases. The results of the presented study reveal the great importance not only of physical activity, but also the organization of own time in such a way as to limit sitting. They also evoke awareness of the methods and sectors in which prophylactic actions should be undertaken. It is also believed that all subsequent social and occupational groups examined in a similar way will be an invaluable source of information for the improvement of the state of health of individual societies.

CONCLUSIONS

The results of studies concerning physical activity of students from selected countries allow draw the following generalizations:

1. The level of overall physical activity of males was higher than that of females in each of the presented countries.
2. Great differences were observed in the results of summary MET value:

a) in males within the range from 2,800 – 6,500 MET
b) in females within the range from 1,700 – 5,900 MET
3. Male students were mostly characterized by a high level of physical activity, while females students – by a moderate level.
4. Among Polish students, similar to their contemporaries from other countries, the level of total physical activity is higher among males than females.
5. Polish students most frequently undertake moderate physical activity.

Conflicts of interest

The authors declare no conflict of interest.

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Television as a source of information on health and illness – review of benefits and problems

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ABSTRACT

Despite the dominating and expansive role of the Internet, global reports on mass media still find television as the most popular source of information on health. The following paper is an attempt to systematize the knowledge concerning television broadcast dedicated to the subject of health and illness. The authors aimed to identify the benefits and limitations resulting from the use of the audiovisual means to convey information on health; diagnosing potential threats and explaining trends and possibilities of making use of the television to educate and improve health awareness of the viewers. A critical review of 47 papers published in Polish and international scientific journals in years 2010 – 2014 has been performed. They were categorized into 8 following sections: 1) health information in medical television series; 2) subject of health in reality television programmes and medical talk-shows; 3) health in television news programmes; 4) television and the issue of physical activity and nutrition; 5) television and selected stimulants (cigarettes/alcohol); 6) television and information about cancer and other diseases; 7) public service announcements concerning health/PSA; 8) television and health education/ edutainment. In the light of the conducted review, the television presents itself as a promising source of information on the topic of health and illness which, provided one maintains a cautious attitude as well as moderation, influences the level of knowledge of the viewers, identification of simple symptoms and constitutes an important source of education in terms of prevention and avoiding risk behaviours.

Key words: television, health, health information, health education

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INTRODUCTION

Reed Hastings, CEO of Netflix (online film library) announced during a conference introducing the platform to Latin American market that a conventional television would become extinct within next 16 years. According to Hastings, by 2030 the terrestrial, linear television will be long forgotten and replaced by its Internet counterpart [1]. At the same time, the recent Nielsen Audience Measurement report claims that an average American does not seem to resign from the traditional television, and spends 5 hours and 11 minutes daily in front of the silver screen [2]. The report indicates that the European audience appears to be slightly more temperate. An average French or German spends over 3 hours (about 200 minutes) in front of the television, whereas for a Dutchman it is 184 minutes and for a Swede merely 165 minutes. In 2014, the Polish viewer stood out from previous nationalities by devoting 4 hours and 20 minutes of their day to watching television. And what is worth pointing out, this value is higher than the TV-audience research conducted in 2012 and 2011 [3]. At the same time, Poles are not reluctant to admit that television is their primary source of entertainment and the way they spend most of their free time [4]. Since being exposed to audiovisual content proves to be undisputed element of everyday activity, it is almost certain that the viewer may encounter health information in a television broadcast. What is more, this information will be trusted and the television (apart from consulting a doctor, family, available literature, and with time the Internet) will be considered by the viewer as available and conventional source of their knowledge on health and illness. It has been emphasized in American and British studies conducted at the end of 20th century [5,6] and in the first decade of 21st century [7-8]. The latter have especially indicated which television formats may be a potential source of medical information (news programmes, series, talk-shows, advertising). Accordingly, the studies show that the television, next to press and radio, is the medium for health information and may provide the viewer with medical knowledge. However, there seems to be an open question whether visual depiction of the aforementioned issues may shape health behaviours of the viewer and their actual idea on topics related to health. Analyzing the content of television programmes, the researchers may only speculate, and the question concerning the potential influence on perception and opinion of the viewer in terms of health is still open [8]. At the same time there is a serious lack of scientific summaries for this issue in Poland and the above review tries to complete and fill this gap.

This paper aims to attempt to systematize the knowledge concerning television broadcast dedicated to the subject of health and illness. In the light of the mentioned research, the authors made an a priori assumptions that the television is medium for such information.

In reference to the above-mentioned discussion, the objective of this paper is to identify the benefits and limitations which result from the use of television in the following aspects:

- conveying information on health and illness,
- diagnosing potential threats,
- explaining trends and possibilities of television to educate and improve health awareness of the viewers.

Methodological assumptions

There has been conducted a critical review of current publications in Polish and international journals which presented research in the scope of the identification of benefits and limitations resulting from the use of the medium of television. In order to establish the time frames for the assembled literature, the documents were narrowed in terms of the date of publication that is years 2010 – 2014. Empirical, observational, cross and prospective studies, of which majority were American, were taken into consideration. The research which focuses on other formats except television (a short film, a feature film, a documentary, a para-documentary, theatrical performance) were excluded. The review does not incorporate studies which concentrated on advertising and its influence on the viewer and their buying decision process in terms of health (commercials of pharmaceuticals, dietary supplements, nutrition products, alcohol, etc.). It has been established that the persuasive character of advertising messages is contradictory to informational role of television in terms of health, which is the subject of this study. In the review there were accepted publications of *entertainment-education* (E-E) which in television broadcast employ persuasion and manipulation techniques, such as: *product placement* or *framing*, or which use *public service announcement (PSA)* in the context of health. They serve to educate, prevent risk behaviours and may constitute a source of information, therefore they were considered a valuable addition to the review. The criterion for exclusion was also: 1) research published in other language than Polish or English; 2) research being a review of literature and research methods; 3) papers investigating other values of television than the informational and educational ones, for instance the relation of "watching television" and the results that this activity may bring to health, that is obesity, lack of physical activity, depression, etc.

For purposes of this analysis, the source of literature concerning informational potential of television in terms of health and illness were the following electronic databases: Medline/Pubmed, ScienceDirect, Google Scholar, Web of Knowledge

and Polish Medical Bibliography. There were also analyzed articles found on the Internet websites of the publishers of scientific journals: Elsevier, Springer and Lancet. Additionally, there were used the following websites: American Journal of Public Health, International Journal of Health Communication, Global Media Journal as well as Journal of Global Mass Communication. The search was narrowed by the use of key words, such as: "health", "health information", "television", "health education", "media" in both, Polish and English languages. In consequence, there were obtained nearly 130 documents out of which 47 were selected as they met the conditions for inclusion: they included the uses and benefits and/or limitations of the presence of topic of health in television broadcast.

In order to systematize the literature with regard to the topic, the qualified documents were divided into 8 categories: 1) health information in medical television series; 2) subject of health in reality television programmes and medical talk-shows; 3) health in television news programmes; 4) television and the issue of physical activity and nutrition; 5) television and selected stimulants (cigarettes/alcohol); 6) television and information about cancer and other diseases, 7) public service announcements concerning health/PSA; 8) television and health education/edutainment. This distinction allowed to view the subject in the most wholesome manner.

Health information in medical television series

Medical television series and their educational potential in the aspect of health seem worthy of attention for several reasons, namely: popularity, high ratings, approachability and topical diversity as well as attractive place in broadcast programming. The studies which analyzed the content of medical television series most frequently focused on the following four titles: *Grey's Anatomy* [9-15,17], *ER* [9-15,17], *Scrubs* [9,12,13,15] and *House M.D.* [9,11-17]. In many cases, tuning for any of the above-mentioned did not necessarily was the result of searching for medical information. There were different motivations of which the most frequent was seeking entertainment. Nevertheless, the educational potential of such programmes appears in a way "after the fact" when the viewer is given the chance to confront health-related issues, and then to treat the series as reference for fresh knowledge. More often than not, it will be a chance for them to look into the hospital everyday life, observe it through the eyes of doctors and see their point of view. It is important for the viewer to stay reasonable and remember that even the most realistically depicted situation on screen is nothing else but a fiction feature [9].

Ye and Ward [10] examined 127 (from 2000 to 2007) episodes of two television series *Grey's Anatomy* and *ER* in terms of the most frequent medical issues that were featured there. They concerned whole body injuries, cardiovascular diseases and cancer. The injured comprised equally of men and women. Less numerous were the elderly, but there was a balance between white and African-Americans. The researchers stressed that both TV series focused on portraying medical issues from the perspective of medical personnel, however, the series also appeared to provide educational value for wide group of viewers.

In the study conducted by Moeller et al. [11] it was debated whether the medical television series correctly present first aid rules in the event of tremor. 364 episodes of four of the most popular series broadcast in American television (*Grey's Anatomy*, *House M.D.*, *Private Practice*, *ER*) were analyzed. 65 instances of tremor were identified. It appeared that in over a half the first aid was executed incorrectly. Merely 21% of the reactions were assessed as correct. The Canadian authors conclude that inaccurate depiction of first aid rules by the actors playing the roles of medical personnel may cause disinformation of the society and reinforce life-threatening behaviour.

Similar conclusions are reached by Foss [12] who examines the issue of medical error and its representation in medical television series. The author demonstrates that this topic is not attractive for the plot, and even if it happened to appear in the script, the medical error resulted from three reasons: insufficient experience of a young doctor, erroneously functioning system or temporary personal problems. According to the author, ignoring the problem of medical errors leads to trivialization of the whole issue as well as leads the viewer to come to wrong conclusions.

The research concerning the assessment of knowledge provided by the medical series was also carried out by Hirt et al. [13]. The scholars analyzed eight of the most popular medical television series produced in years 1990 – 2009. On analyzing 177 episodes, they arrived at a conclusion that fragments of *ER* and *Scrubs* may serve as an educational material for the fresh students of Medicine and the rest of medical personnel. As opposed to *House M.D.* and *Grey's Anatomy* which mainly concentrate on professional ethics and teamwork skills.

Chung [14] introduces interesting study on the relation between watching medical series and the standpoint of the viewer in terms of health, as well as about the reception of information from such source. In the study conducted in the period of January 2007 – December 2009 took part 11,555 respondents who were asked to indicate monthly frequency of watching 4 medical series (*Grey's Anatomy*, *ER*, *House M.D.* and *Strong Medicine*). Then, they were asked to express their opinion in reference to several pessimistic statements related to health, which were, among others: "It appears that

almost everything may cause cancer", "There are so many recommendations for cancer prevention that it is hard to say which one should be trusted", etc. The last element of the study concerned respondents referring to health issues which in their opinion are the most important and are visible to them. The issues were, as follows: cancer (33.1% of indications), cardiovascular diseases (27.3% of indications), diabetes (12.5% of indications), mental health (10.8% of indications) and HIV/AIDS (9.1% of indications). Conclusions presented by Chung show that the viewers who spend more time on watching medical series (so-called *heavy viewers* – 35 hours and more a week) more often demonstrate pessimistic opinions about health than people who are less active viewers. It may result from the fact that the series lack wider context and information on illness prevention, and fictional characters die more often than in reality, which may in turn cause confusion and disproportion. Moreover, *heavy viewers* tend to assess chronic diseases pessimistically, such as cancer or cardiovascular diseases and to undermine the initiative of dealing with these issues which, eventually, may result in lack of reaction in own life-threatening situation.

The problem of fiction feature and its reflection of reality in medical series was investigated also by Lapostolle et al. [15]. 18 episodes of *House M.D.* series, which were aired in France in 2011, served as research material which they analyzed paying particular attention to diagnostic strategies employed by the main character and his team. The French researchers observed 225 diagnostic interventions of Dr. House's team (14 in each episode, on average). The most common diagnostic methods were, as follows: magnetic resonance imaging (MRI, 13; 72%), blood test (11; 61%) and biopsy (10; 56%). There also appeared surgical interventions, treatment of infections and steroid treatment (9 each, 50%). Two patients died (11%). According to the researchers, situations presented in the series are unreal and do not reflect reality. The fact that the reality presented in series contradicts everyday hospital life may result in lack of understanding in patients, their unjustified claims and in disappointment. The average ratings for the series *House M.D.* in France in the period of the study amounted to 8.4 million of viewers.

At the same time, such improbable cases which Dr. House deals with inspired doctors from Marburg University Clinic. According to their account in *Lancet* [16], medical journal, thanks to the analogical symptoms of a character in one of the episodes of *House M.D.*, the doctors managed to diagnose correctly their patient with unusual coronary heart disease. The patient was admitted to the hospital with an acute heart failure (class IV NYHA) and the cause for his condition was unknown (earlier the patient complained about oesophagitis, fever, intensifying problems with hearing and sight). Medical history of the patient indicated that in November 2010 he had underwent a hip replacement surgery. The ceramic-on-ceramic prosthesis was changed for its metal-made equivalent. Professor Schaefer, head of the team of doctors, personally a big fan of the series *House M.D.*, compared the symptoms of his patient and the fact of endoprosthesis replacement with one of the episodes (season 7, episode 11) of *House M.D.* series. The character in the series also experienced inexplicable heart problems. Dr. House's diagnosis – cobalt intoxication from the metal hip implant. The doctors in Marburg ordered hip x-ray and tested the level of cobalt and chromium in blood and urine of their patient. The results showed that norms were exceeded threefold. It turned out that the metal endoprosthesis was damaged by the remnants of the previous one and, as a result, eroded. The patient underwent another surgery and was given a new hip prosthesis. The level of cobalt and chromium was stabilized, heart functions improved by 40%, part of the symptoms subsided, and the patient slightly regained sight and hearing. In Marburg University Clinic, the series *House M.D.* still serves as a resource for students of Medicine.

The usability of medical series for scientific and educational purposes among students of Medicine was additionally analyzed by Weaver and Wilson [17]. 386 students of University of New South Wales in Sydney were to refer to the problem of professionalism and ethics of the characters of medical series as well as assess the accuracy of presented situations with the hospital reality with which they were familiar. The study indicated that medical programmes prove to be a valuable source of information for students and may be useful in various forms of education, especially concerning professional ethics.

Alongside medical television series and their educational potential in terms of health there is interesting research on feature television series. As the authors of *Time to Change* report claim, the series help the viewers to understand issues related to psychology and increase awareness of the topic of mental health [18]. The characters from the series more often (in comparison with a parallel study from 2010) face psychological issues and the screenwriters make sure they are authentically and accurately portrayed. The report says that the viewers of *Homeland*, or one of the oldest British soap operas, namely *Coronation Street* in 54% expressed their understanding towards mental problems of characters in the series. 48% of viewers admitted that the series helped them change opinion about people who suffer from mental illnesses, and 31% stated that the series inspired them to raise the topic of the presented condition with their friends, family or co-workers.

Subject of health in reality television programmes and medical talk-shows

Similarly, a strong influence was observed in the context of reality shows. Such programmes, devoted to the subject of plastic surgery and appearance makeovers continue to enjoy unabated popularity. Two studies conducted by Markey and Markey [19] evaluate the influence of media messages included in like programmes and other television broadcasts on the interest level of plastic surgery. The participants of the first study (sample: 1,170 people watching reality show, of average age 19.77, women: 59%), on whom the programme made a positive impression would be able to undergo a plastic surgery in order to change their appearance. The second study (sample: 182 people, women: 51%) showed that the participants who watched a television programme concerning the topic of plastic surgery would be willing to change their appearance by plastic surgery more often than the participants who did not watch a programme of this type.

Additional format perceived as a potential source of health information is a medical talk-show. Seeking the answer to a question of the quality of such information were Korownyk et al. [20] who analyzed two of the most popular programmes of such type in the United States, namely *The Dr Oz Show* and *The Doctors*. 40 episodes of each series were examined in respect of health-related recommendations directed at the viewers. In *The Dr Oz Show*, there were identified 479 of such recommendations, whereas in *The Doctors* 445. The most common advice given during *The Dr Oz Show* concerned diet (39.2%, 188/479), and in *The Doctors* – medical consultation (17.8%, 79/445). The Canadian researchers selected 160 pieces of advice from both programmes and proved that the medical information presented there was insufficient (the lack of clearly formulated benefits or possibilities of damages which can result from the proposed solutions), and nearly half (46%) of recommendations concerning health was not supported by any medical evidence (39% for *The Dr Oz Show*; 24% for *The Doctors*), or was contradictory (15% for *The Dr Oz Show*; 14% for *The Doctors*). The researchers do not dispute the importance of medical talk-shows in respect to informing and educating the viewers, however, they recommend moderation in undertaking health-related behaviours that these endorse.

Health in television news programmes

Television news programmes are the most common source of health information for Americans [21]. Lee et al. [22] analyzed the content and manner of conveying information to the viewers in local news programmes (n=416) and proved that the news stories which concerned therapy development or positive aspects related to health were mainly presented by the use of longer video material, whereas information on deteriorated health was conveyed through statistics and short trend descriptions. In a similar manner was treated information on prevention and health policy. Most news related to health lasted no less than 30 seconds.

According to the studies by Luth et al. [23], television is a valuable medium for communicating health information and should become a partner to all the institutions related to health. Luth et al. underline mutual benefits resulting from such cooperation. Presenting their results, the researchers conclude that media messages in news programmes are often factually imperfect, unclear and incohesive (the scholars conducted the analysis of media messages connected to H1M1 virus pandemic in the region of Alberta, Canada; n=47). The viewers received information concerning the queues, lack of vaccines, poor preparation of the system, alarming announcements on high incidence, which in authors' opinion did not constitute valuable health information and caused unnecessary confusion among the viewers. The authors claim that if state institutions had worked out an appropriate information policy with the media, the commotion could have been avoided.

A good instance of such cooperation is illustrated by Pribble et al. [24]. Examining the quality and intensity of providing information on West Nile virus in television news programmes, the researchers recorded 1,371 pieces of material concerning the virus. They noticed that the material which featured a conversation with a public health expert, an epidemiologist or other health care representative was much more valuable information for the viewer. The cooperation of the two entities improves the quality of information as well as communication in crisis situation.

Television and the issue of physical activity and nutrition

In spite of the common trend of keeping fit (fitness, jogging, physical exercises) and presence of this topic in television messages, the analyzed material from years 2010 – 2014 does not provide original papers which investigate the influence of television on the increase of physical activity of the viewers. The issue was raised by Hamer et al. [25] who did not prove such dependence. 6,733 of adult women and men who participated in the study did not confirm that sport events which were watched on television motivated them to increasing physical activity. In fact, the study showed that men who spend more time on watching sport on television tend to have symptoms of obesity. Similar results were obtained by Lau et al. [26], who compared health behaviours of men before and after the football world championships in 2006 (before the finals 500 men were interviewed via telephone; after – 530). The comparison demonstrated that watching the finals resulted in increased consumption of

snacks and alcohol, which led the researches to a conclusion that international sport events broadcast via television should have elements of health education as well as incentives to change the bad habits.

The papers devoted to the relation between television and diet produce other results. Media, such as television may influence nutrition choices of the recipients and their knowledge concerning the harmfulness and positive effects of particular products. Northup [27] carried out research on 591 students (average age of 22.09) asking about the correlation between television that they watch and the knowledge on healthy nutrition and eating habits which they presented. Surprisingly enough, the study showed that the respondents who watch more television demonstrate worse understanding of the issues related to healthy nutrition, and their attitude to this topic does not lead to correct decision-making in terms of nutrition which appeared contrary among respondents who devote less time to watching television. The scholar suggests that the reason for such phenomenon may be the fact that a person who spends many hours in front of television encounters various, often contradictory information concerning diet (a commercial encouraging to buy a candy bar and a recommendation of a doctor in a news programme to avoid sweets) and as a result their knowledge on a healthy diet is poorer than the person who is not exposed to such contradictory messages.

Simultaneously, the analysis of the content of television programmes for children conducted by Jenkin et al. [28] revealed the employment of numerous marketing techniques in promoting food products on television which partly explains the results obtained by Northup. Jenkin et al. mention depiction of logos of producers of sweets or products recognized as unhealthy, the influence on the sense of taste, subliminal techniques depriving the viewer of conscious thought, or combining food products with the idea of fun, good mood, positive emotions which are all openly presented in a television broadcast.

A group which also obtains knowledge on nutrition from television are teenagers. For five years, Roseman et al. [29] had been analyzing the content of television messages aimed at the group aged 11 – 14 on Disney Channel. On this channel, the youth could mainly encounter snacks (prevailing group of 41%), whereas breakfasts, lunches and dinners appeared with less frequency. 42% of presented products is not recommended by the U.S. Department of Agriculture (MyPlate program – being a specific dietary guide for Americans), vegetables and fruit constituted 24% of all the messages concerning food. The scholars are concerned about such low percentage of products which are recommended for children. They suggest that this prevailing number of products of low nutritional value in the programmes for teenagers may result in bad eating habits in the future.

Comparable analysis of the content of television programmes popular among teenagers (average age: 14.4) conducted Eisenberg et al. [30] The researchers described negative attitudes towards people with distorted body weight presented in favourite programmes of the youth from Minnesota (the group comprised of 2,793 people). Out of 30 various programmes submitted by the scholars, half included elements of stigmatization based on appearance of people performing in them. Negative comments directed at characters with distorted body weight appeared more often in programmes aimed at youth (55%) than those addressed to all the viewers (8.3%). This disproportion led the scholars to a conclusion that reinforcing negative attitudes in programmes for youth may intensify the phenomenon of stigmatization in everyday life and bring negative reactions towards such people (the scholars noticed a higher vulnerability of boys to condemn, reject and ridicule people with distorted body mass – 63.6% vs. 36.4% of girls).

Television and selected stimulants (cigarettes, alcohol)

The research demonstrates that the presence of stimulants such as cigarettes and alcohol in television messages leads to increased initiation of their use. There is a dependence between the display of tobacco brands in television series and films as product placement and reaching for a cigarette by a viewer [31]. Format and context, thanks to which information gets across to the viewer, is a deciding effectiveness factor of such information in terms of stimulants. In their studies, Nelson et al. [32] revealed relatively constant presence of the topic of tobacco in American media in years 2004 – 2010. However, it appeared that this issue is more common for press than television which, additionally, more often presents the detrimental effects of smoking than other media. MacKenzie et al. [33] took an interest in the context in which tobacco smoking occurs. Their study was based on the analysis of news content concerning incidence of lung cancer. Out of 157 discussed cases, in 107 (68%) were presented the ill who were non-smokers. They were depicted as innocent victims of tragic coincidence who got lung cancer despite the fact that they were responsible and did not smoke. The researchers claim that such display may result in stigmatization of smokers, and in consequence may lead to neglecting the treatment and losing the will to improve their condition. Therefore, the depiction of cancer as a deserved "punishment" cannot be a method used to influence the viewers and may result in an outcome opposite to intended.

There are several ways of depiction of alcohol in television broadcast, namely: real-time use, presumptive use, presence of a specific brand or

indirect association. Lyons et al. [34] analyzed the occurrence of alcohol in different forms in five the most popular British television stations between 18:00 and 22:00 (prime time) over the period of 3 weeks in 2010. Alcohol was present in 40% of the analyzed programmes (soap operas, series, feature films and sport). In 21% of the programmes there were used particular brands of alcohol. Three of the most frequent brands were: Heineken, Carlsberg and Budweiser. It leads to a conclusion that such frequent appearance of alcohol in television broadcast may cause the increase in its use by the viewers.

Television and information about cancer and other diseases

Television broadcast may effectively shape the knowledge and health behaviour in reference to cancer prevention. It has been proved by Lemal and Ven den Bulck [35], who examined a dependence between reports on cervical cancer and the fear of it among women aged 18 – 85. The women who every now and then encountered the information on cervical cancer reported increased fear of developing the disease. The more information there was, the more the anxiety rose. And with frequent information about cancer it increased three-fold. The research by Niederdeppe et al. [36] confirmed that local television stations provide relatively more information concerning cancers than local press, and at the same time television messages contain less information on minimizing the risk of developing cancer.

A completely unprecedented situation which caused worldwide information resonance and influenced thousands of women to undergo preventive medical tests was the news concerning a well-known American actress who decided to have double mastectomy. "The Angelina Jolie effect", as the reaction of women towards breast cancer prevention was dubbed, appeared long-lasting and had global resonance, also thanks to the television [37]. When on 14 May 2013 *The New York Times* published actress' letter [38] in which she described her dilemma, how she had made her decision and then the several week process of preparation to the surgery, actually, there was no television newsroom which would not comment on this topic. The news about actress' decision spread around the world and according to researchers of "Angelina effect" [37,39,40] it caused massive interest in detection, prevention and treatment of breast cancer. Evans et al. [39] indicate a substantial rise of referrals for genetic tests for detecting BRCA1 gene mutation responsible for increasing risk of developing breast cancer. Data collected from 12 clinics and 9 medical laboratories indicate nearly two-and-a-half-fold rise of said referrals in June and July of 2013, from 1981 (2012) to 4847 (2013) and remaining on the level of about twofold increase until October 2013. On May 14, Google's browser recorded 69,225 hits for "preventive mastectomy" which denotes 795-fold rise in comparison to Tuesday before the announcement in *The New York Times* [40].

Over 25 years (1984 – 2008), Kang et al. [41] found how the form and the manner of informing about the Alzheimer's disease has changed. The analysis of 1,371 mentions of the disease showed that currently such information is presented to the viewers in the form of personal accounts of celebrities, politicians or well-known people who developed Alzheimer's, which was of no such significance in the past. Additionally, issues like circumstances, causes, symptoms and diagnostics appear to be given less attention in broadcasts nowadays than it was in the past. As the authors conclude, attention of the viewer must be drawn by a familiar character and their story, not the disease itself. Nevertheless, the scholars agree in terms of educational potential of such messages, both on individual and social level.

Television and public service announcements (psa)

Public service announcements (PSA) are non-commercial messages which aim to improve the knowledge, attitudes and/or behaviour of the recipients in terms of a particular issue. The study conducted by Martiniuk et al. [42] indicates the effectiveness of PSA in educating students (aged 9 – 11) and inducing positive attitudes towards epilepsy. In a group of 803 students, 406 (51%) saw the message concerning epilepsy. They reported increased general knowledge of the condition than their peers who did not see the announcement ($P<0.001$), and demonstrated more positive attitude towards epilepsy ($p<0.001$). After a month, their level of knowledge on epilepsy did not diminish despite the fact that the advertisement was not broadcast any longer on television.

There can be found a range of studies [43-46] which claim that public service announcements in mass media may bring positive changes or may contribute to prevention of negative effects of health behaviours in large populations, and may constitute a reliable source of health information. Public service announcements mentioned in this paper establish the following: motivation to stop smoking cigarettes [43,44]; heart diseases prevention as well as stroke prevention [45] and education on effects of consumption of products considered unhealthy [46]. The analyzed studies show that public service announcements on television may effectively influence health behaviours of the viewers. There is a conviction that media campaigns which concern harmfulness of sugary beverages increase awareness of health problems connected with excessive consumption of sugar and contribute to a change of eating habits among the recipients of the campaigns [46]. The conducted studies show that messages

motivating to stop smoking or to limit the alcohol consumption generally achieve their aim, however, the effects are usually short-term. In order to obtain the intended effect, it is suggested that public service announcements which concern health were supported by other television formats (talk-shows, news and educational programmes) which could supplement public service announcements which are limited by time. In comparison of the above-mentioned public service announcements on television, one may find interesting the results of a one-year campaign on knowledge of symptoms of stroke among the Japanese. Miyamatsu et al. [45] examined its effectiveness. 1,960 randomly chosen residents of 2 cities who were aged 40 to 74 underwent an interview via telephone which assessed their knowledge in terms of early symptoms of stroke. The interview took place before and after the campaign. Before, 53% of respondents correctly chose five early symptoms of stroke. The study demonstrated that after a year-long television campaign, the awareness of the said symptoms had improved to 63% and that women provided the correct answers more often than men.

Television and health education

Television participation in educating its viewers in terms of health issues was the subject of fourteen studies which were published in years 2010 – 2014. Television programmes were considered as valuable source of new, useful and practical information for the viewers [47-49] and the fact that it is provided through an audiovisual broadcast adds an undisputable educational value. People of lower social status and lower education indicate that television is their main source of health information [47,49]. What is more, television constitutes an effective source of health information for foreigners [48]. Women who base their knowledge of health on television decide to undergo mammography more often than those who obtain their information through the radio or the Internet [49]. Much the same happens with colonoscopy. Television message may prompt to reject myths concerning organ donation and provoke discussion on that matter [50-51]. Additionally, television may offer an effective way to reduce risky sexual behaviours through shaping pro-health behaviours [52] and constitutes a significant factor in changing eating habits [53]. The audiovisual television broadcast is particularly attractive for children as it combines informational and educational function with entertainment thanks to which it expands the possibilities of approaching problems and situations which go beyond the traditional curriculum.

The entertainment which is designed to educate the viewer is called *edutainment* (*entertainment-education*; *E-E*). This tool aims to make a difference in public sphere in respect of knowledge, attitudes and awareness of a specific topic or problem by the use of television series, talk-shows or other format of television entertainment. The effectiveness of this tool in terms of television series related to health was attempted to be measured by Kim et al. [54], and Van Leeuwen et al. [55] who arrived at similar conclusions: E-E strategies are a promising educational tool which application results in positive effects for health education. The scholars found a significant relation between the content received by the viewers and their knowledge and awareness of the threats. The conclusions proposed by the researchers appear particularly valuable for the health promotion sector of health care and for public health institution which may strengthen effectiveness of their activity by introducing elements of *edutainment* to their educational programmes.

CONCLUSIONS

In view of the mentioned research results, television introduces new dimension to health education and is perceived as a serious source of health and illness information. Its undisputed asset of accessibility and range make it possible to reach a vast and diversified group of viewers. On the one hand, this mass access may be a blessing, on the other – a curse as the strength of the broadcast messages is not the content but the mere fact of making it public. Thus, many researches of the medium express their justified concern and underline low quality and insufficient factual level of television messages which refer to the topic of health.

However, what is undeniable is a fact that the accessibility of television allows various social groups regardless of age, education and place of residence to receive health-related messages. A wide spectrum of television formats which contain health information increases the probability of encountering such content every time the viewer decides to turn on their television set. The television viewing figures of news programmes are promising as for many viewers they constitute the main source of health information. The presented review of available studies shows that medical television series may educate the viewers in terms of: identifying some symptoms of an illness, getting to know the reality of hospital life, diagnostics procedures, observing the duties of doctors and medical personnel. What is more, the series provide valuable educational material for the students of Medicine as well as may serve as a support in medical practice of doctors and specialists. Nevertheless, the recipients ought to be aware that the series are fiction features and do not aim to faithfully reflect the reality (despite consulting specialists), that is why, one should not overly believe the situations presented on the screen. Therefore, appropriate distance and moderation is also recommended in such formats as: reality shows

and talk-shows devoted to health issues. One needs to be aware of their entertaining character and to treat information they convey with caution. Taking that into consideration, a high factual content is presented by public service announcements (PSA) and programmes based on *edutainment* strategy which present measured, verified messages consulted with the specialists which may effectively build health awareness of the viewers.

The present review indicates the need for further documenting of benefits and threats which result from communicative function of television in terms of health issues. Additionally, there is an insufficient number of studies which could affirm the relation between the television broadcast and undertaking physical activity, or the influence of audiovisual content on nutrition choices or health behaviours of the elderly. What is noticeable is a substantial disproportion between the interest in the topic by the scholars from the Unites States and Eastern Europe, and Poland in which the role of television in respect to health education seems insufficiently examined.

As the present studies focus on health information distribution, there is a more and more distinct trend to use platforms and tools based on social interaction to communicate issues of health and illness. Being a one-way medium, television lacks significant asset which is present in social media – more and more serious player in communications market. Combining audiovisual mass medium with tools which facilitate the ongoing monitoring of recipients as well as reaction to them in real time may provide a chance to maintain status quo of television and to defer the nightmare scenario presented by Reed Hastings in Mexico City.

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Aggression in children and adolescents in rural Poland - where to look for the cause?

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ABSTRACT

The aim of this study was to analyze the causes of aggressive behaviors among children from rural areas, including the role of the environment. We used Pub Med and Google Scholar electronic databases for a literature review. Publications written in English and Polish were included in the analysis. The following keywords were used: aggression, children and adolescents, rural areas. Aggression is a type of negative behavior with the intent to harm or destroy. It usually arises as a direct or delayed effect of frustration or deprivation. The place of residence strongly affects the determinants of risky behaviors in children and adolescents. The most common risk factors for violence among rural children and adolescents include improper parental conduct, failures at school, health-threatening behaviors, violent scenes seen by young people in television programs and films. The changes currently transpiring in rural areas to the traditional family model and increased access to media determine the adoption of behaviors with elements of aggression; although it seems that in rural areas, these phenomena occur much more slowly than in cities. Thus far only a few studies indicated that aggression occurred more frequently among children and adolescents from rural areas. This phenomenon requires further research. **Key words:** aggression, child, adolescent, rural population

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INTRODUCTION

In the current times of an unrestrained flow of news, we are bombarded by the mass media with muggings, homicides, assaults, and thefts, which are not limited to large urban areas around the world, but occur also in seemingly peaceful rural areas and frequently involve children and adolescents.

Aggression is a type of negative behavior with the intent to harm or destroy. It may be a sign of difficulty controlling negative instincts and impulses directed towards other people, situations, or beliefs. It usually arises as a direct or delayed effect of frustration or deprivation [1].

There are several theories explaining the development of aggressive behaviors in children and adolescents. One of them is Dollard's frustration theory that assumes aggression is always a consequence of frustration. Other theories include Freud's drive theory of aggression, a theory of aggression as a socially learned phenomenon based on imitation, as well as a system theory based on socially negative adaptation processes [1].

As indicated by numerous literature data, we have inherited the tendency towards aggressive behaviors from our ancestors. Nature has equipped us in defense mechanisms, which are activated when faced with threatening situations. Originally, the mechanisms underlying aggression were necessary for obtaining food and defending against the aggression of others. Some of the mechanisms underlying the development of aggression have survived to date, which is reflected by its continuous presence in everyday life.

Recent studies on the genetic background of aggressiveness, i.e. the tendency towards aggressive behaviors, have shown that, as in the case of intelligence, aggression is genetically determined, and its inheritance depends on a number of genes. Aggression in the developmental age period, like in adults, results from genetic and environmental factors. According to some authors, the origins of a child's aggression could be in the fetal period, when anxiety at home, maternal diseases, and stress significantly affect the emotional balance of the developing fetus [2].

The development of aggressive behaviors may be divided into three periods, depending on age. The first period is characterized by rebellion against adult authorities, truancy, and emotional instability. The second period mainly involves lies, theft, and vagrancy. Agression in the third period may take the form of hooliganism, crime, moral derailment, as well as advanced neurosis.

The forms of aggression vary significantly and are age and gender dependent. According to the simplest classification, we distinguish verbal and nonverbal aggression. Physical aggression is definitely more common among boys, whereas verbal aggression dominates among girls.

Following the examples of aggressive reactions observed in the environment plays an important role in the genesis of aggressive behaviors [3]. Emotional ties between family members have significant effects on children's development and may affect the development of their personality, both in a motivational and destructive way, depending on the upbringing style used by the parents. The increase in aggressive behaviors among children and adolescents frequently results not only from observing abnormal behaviors of adults (parents, teachers) or peers, but is also associated with information from the media or the Internet, which are also widely available in rural areas.

The aim of the study was to analyze the causes of aggressive behaviors among children from rural areas, including the role of the environment.

MATERIALS AND METHODS

We used Pub Med and Google Scholar electronic databases for a literature review. Publications written in English and Polish were included in the analysis. The following keywords were used: aggression, children and adolescents, rural population.

RESULTS

Causes of aggression among children and adolescents in rural areas

As a settlement unit, villages differ from cities in terms of housing type and density, economic and administrative functions, as well as the professional structure of the population.

Strong territorial differences in the living conditions in rural areas have become a characteristic feature of the last decade. Rural areas close to large urban agglomerations develop very rapidly, and their attractiveness in terms of potential investments, settlement as well as the development of technical infrastructure is very high.

The existing differences in rural areas determine the development of children and adolescents. The significantly greater role of family in shaping the principles of social life in rural areas results from the norms and conditions specific in this environment. Greater attachment to family, respect for the work of parents, and, frequently, hard work from an early age instills in young people the principles of proper life and respect for the values achieved in life.

The most common risk factors for violence among rural children and adolescents include improper parental conduct, failures at school,

health-threatening behaviors, violent scenes seen by young people in television programs and films [4]. It seems essential to ask about the reasons why teenagers begin to use violence and derive satisfaction and pleasure from the suffering and humiliation of others.

Other factors that increase the risk of violence include individual characteristics of the persecutors, factors associated with the peer group, and with the victims themselves [5].

Social risk factors for violence in rural areas also include poverty, living in small crowded apartments, high unemployment, low level of education, easy access to drugs and alcohol, criminal activity of gangs in the neighborhood, as well as lack of interpersonal bonds, which perhaps is more pronounced in rural areas than in urban environments.

Other reasons leading to aggression include the desire to release tension in difficult situations at home or school, with which students are unable to cope (conflicts with other students or teachers). Aggression can also be the result of a child's need to release their internal emotional state.

Lack of ability to communicate with the people around them, difficulties in overcoming everyday problems, and a reluctance obey the adults in their lives can also trigger aggression in children and adolescents [1].

Failure to fulfill school tasks and obligations, negative peer relations, and lack of position and acceptance among classmates also affect the development of aggressive behavior in students [6,7].

In our study, which included 755 students from rural areas, we observed a higher percentage of aggressive behaviors among children and adolescents from poor families (70.2%). Aggressive behaviors among the evaluated children and adolescents were most common in the group of students who reported everyday conflicts at home (88.2%) [8].

Dodge et al. showed that frequently repeated quarrels, aggression, and hostility among family members had a negative impact on children at all stages of development. As a result of repeated domestic violence directed at children, these behaviors will be repeated by the abused child at school or, similarly as in the home, the child will become a victim of such behaviors in the peer group [9,10].

In addition to the home, the school environment is also the place of a child's socialization.

School violence frequently begins early, even in the first grade of elementary school. It may be physical or verbal or a combination of the two. The fact that children experiencing school violence at this age rarely talk about their problems with their parents, and that long-term functioning in a violent environment leads to a number of mental and somatic disorders in a child is quite alarming. The perpetrators of violence develop and, with time, perpetuate negative behaviors, which can later result in conflicts with the law [11].

A rural community is usually characterized by more intense neighborly contacts as well as by stronger expression of values related to tradition. People from rural areas are more willing to offer assistance, and social control is also greater. This environment also has its negative sides, including higher unemployment, limited access to education and culture, as well as growing social helplessness.

Strong territorial differences in the living conditions in rural areas have become a characteristic feature of the last decade. Rural areas close to large urban agglomerations develop very rapidly, and their attractiveness in terms of potential investments, settlement as well as the development of technical infrastructure is very high. A large percentage of rural children attend urban schools.

Aggressive behaviors depending on the child's age

Aggression can occur in children as young as two years old, regardless of their environment. During this period, children have a natural tendency to explore the world, gradually become independent, and broaden their interests. This is associated with a child's increased physical and cognitive activity. Excessive control over the child and limiting the child’s freedom induces rebellion and anger. The birth of younger siblings may make some children feel hurt and rejected. This induces aggression against both the newborn child and the mother.

Some children, wishing to attract attention or express their dissatisfaction and anger, repeat vulgarisms they had heard. Poor resilience to failure and difficult situations that a child cannot cope with can also lead to aggression. A child's abnormal behavior is frequently inadvertently reinforced by their parents, who fulfill the child's unreasonable demands, for example.

Aggressive behavior is more common and stronger in early-school-age children, i.e. aged 6-12 years, than in preschool children. This results from the fact that they face a new situation associated with starting school, and consequently, with increased requirements set by their parents and teachers, as well as with confronting their achievements with those of their peers, who frequently come from backgrounds with better development.

Due to the lack of extended families, currently also in rural regions, children have to cope with stress related to day care centers and preschools from an early age. This is very difficult for the vast majority of children. Frequently, 3-year old children are confronted with their peers in a

preschool setting for the first time. A new group with completely unknown children gives rise to the inevitable first verbal conflicts, pushing, and snatching each other's toys. Thus, the first aggressive behaviors are revealed. It is typical of children to direct aggression against substitute objects, which are more accessible and defenseless. These often include toys, animals, plants, and younger children.

The process of socialization of aggression in accordance with gender patterns develops between 3 and 10 years of age. Girls most often show verbal and indirect aggression, trying to restrain it. Physical aggression is more typical for boys due to their socially praised self-defense skills. The duration of anger in young children is very short as other stimuli divert their attention from unpleasant experiences. However, with age the unreleased anger lasts longer and the stimuli diverting attention become less effective. The process of adaptation of a small child to the world of prohibitions entails a lot of frustration. Anger, resentment, and tendencies towards aggression occur in children when they wish to do something they are not allowed to do.

Under the influence of educational processes at school age, a child starts to develop restrains that help inhibit and reduce aggressive behaviors typical for preschool children.

Targeted aggressive behaviors in the form of verbal and physical aggression against certain people or objects come to the fore. Screaming becomes a common form of communication, while kicking, pushing, etc. become ways of attracting attention. Continuous shoving, name calling, and teasing can be observed among teenagers. This phenomenon is known as collective unconscious aggression, which results from the impairment of normal peer contacts.

As children develop and gain life and social experience, they can store a lot of aggressive behaviors which they display in difficult situations.

During adolescence, violence and aggression are used to test oneself, frequently in combination with the desire to impress peers, gain their recognition of one’s importance and strong position in the group. Typical aggressive behaviors during adolescence include criticism, name-calling, swearing, as well as destroying other people’s property or limiting the activities and development opportunities of others.

Role of family in the development of aggressive behaviors in children from rural areas

Each environment in which a child is raised has its own unique educational specificity; however, family occupies a special place among these different environments as this is where so-called primary socialization takes place. The most important interactions between family members, such as emotional tensions resulting from impaired communication and unsolved family conflicts or the lack of understanding or time to solve the growing family problems can lead to aggressive behavior [1].

Currently, the traditional family model has been changing both in urban and rural areas; however, the process is slower in the latter. These changes are reflected, among other things, by a reduced number of children per family, an increased number of divorces and extramarital births, and an increase in the average maternal age at childbirth [12]. Most city dwellers adopt the European family model, i.e. parents plus one child, which is associated with continuous haste and professional career aspirations. A large family model is typical for rural areas and this type of model is significantly impacted by religious education and the fact that rural women are less professionally active, therefore they can focus on the upbringing of children. Furthermore, grandparents, who due to retirement are able to devote more time to their grandchildren than their busy parents, play a significant role in the upbringing of children and adolescents. Most often, grandparents have an important role in multigenerational families by passing knowledge about customs, national history and culture to their grandchildren.

Each child is greatly influenced by their family, therefore all types of relationships with parents can either enhance or minimize aggressive behaviors. Parental inhibitions, an improper emotional atmosphere, a highly directive approach, increased severity of verbal and physical punishment in response to a child's social and cognitive immaturity have a significant impact on increasing aggression [13].

The occurrence of domestic aggression usually results from a feeling of insecurity and lack of parental engagement in issues concerning children and adolescents. Lack of closeness and emotional coldness in the parent-child relationship often affect a child's future contacts with peers, which are characterized by a lack of empathy.

Parental behavior towards children very frequently has significant, if not decisive, impact on the expression of aggressive behaviors. Frequent use of punishment, lack of emotional support, and an overbearing attitude towards children may disturb their cognitive and social development. Another issue is abnormalities in interpersonal communication between family members, which when accumulated could cause an increase in destructive feelings in children and adolescents. Positive parental behaviors, support of their child, acceptance, and the warmth of the family home promote the development of cognitive processes in children, as well as influence their acceptance by the peer group [14].

Adolescents use different ways to cope with stressful situations, and the mechanisms underlying the adaptive processes may vary depending on gender. Emotional disturbances may manifest in the form of aggression in boys, and in the form of various ailments in girls [15,16]. Girls become the victims of indirect violence (emotional violence, such as exclusion from a group, or verbal violence, such as slander) as opposed to direct physical violence, which is more common for boys [17]. According to Van der Wal, indirect violence promotes depression more than direct violence, which applies to both sexes [18]. Cooperation with aggressive children requires knowledge of their family-related conditions, their environment, and their modification in order to achieve results.

Lack of emotional bonds between parents and their children results in a lack of a child's identification with the system of norms and values presented by the parents. The presence of an aggressive person, i.e. a person showing a constant tendency towards severely aggressive behavior, can be another cause of the development of aggression. Such a person frequently becomes a role model for a child, especially when they hold a high position in the family, have some power, and are considered competent. Tolerance of aggressive behaviors by parents is another factor likely to influence the development of such behaviors in children. This may be in the form of acquiescence to such behavior or even encouragement of aggression or a lack of condemnation of negative behaviors.

There is a common belief that aggression mainly originates from an inadequate family environment as well as the child's personality. It seems that parental interest shown to children by spending time with them and caring about good relationships are the best ways to prevent aggression among children and adolescents. The significantly greater role of family in shaping the principles of social life in rural areas is a result of the norms and conditions specific in this environment.

Role of school in the development of aggressive behaviors in children from rural areas

School is another environment important in shaping the attitudes of children due to its long-term impact on their development. It is an educational environment that consciously directs a child's development and shapes their personality. It is also possible that school can have disturbing effects on a child's personality, enhancing anxiety and aggression against school or anything that is connected with this institution. Such aggression can be directed towards teachers, school subjects, or peers, with a clear intention to harm [19].

By being distant from the family environment, school loosens the relationship with the local community. Large schools themselves trigger students' aggressions. School premises and its surroundings often become a place for drug trafficking. Naturally, schools are trying to protect students from unwanted visitors by means of monitoring, intercom, magnetic cards, or security guards.

It should be emphasized that school is the basic link in the educational system as well as an important element of the local social environment in rural areas.

There are multiple school-related sources of violence: they can be the result of teacher-student relationships; they can cause failure to do well in school; they can be the result of marks, teachers' punishment systems, behaviors that harm students' dignity and humiliate them, a teacher's lack of acceptance of students, undervaluing students' work, haste, and excessive requirements for students [20].

Peer violence may result from the atmosphere at school, when teachers do not take into account a student's personality, an environment without friends, and no one with whom to overcome the daily hardships of school [20].

Deliberate teasing of schoolmates is the most common form of violence. A number of studies indicate that teasing schoolmates can have serious consequences for both sides later in adult life. According to Donaldson, people involved in intimidation are most often isolated (irrespective of the side they were on). Furthermore, the cycle of intimidation and being intimidated is replicated later in life [21].

School violence is frequently of an organized nature. The groups set their own secret rules, laws, and ways of acting and communicating. They divide themselves into perpetrators and guards. Identifying perpetrators is difficult. Groups of older aggressors pressure younger students to persuade them to take their side [22].

Interest in this issue grows occasionally, usually when tragic cases such as suicides of students unable to cope with their increasing problems are revealed by the mass media. Violence at school is usually hidden, and long-term exposure to violence has negative effects on students and can lead to impaired psychosocial development in the future [22,23].

Bullying is one of the most common forms of violence among students. It involves a conscious, intentional act to cause others distress or pain. If repeated systematically in the absence of the balance of power, these activities can cause the victim to gradually become weaker than the bullying person or group [24,25].

Violence and aggression at school can also be the result of inappropriate relationships between teachers and students. According to Poraj, this includes an improper assessment process of the

students' knowledge as well as limiting their independence. This process is further affected by overcrowded classrooms, students' anonymity, strong focus on the curriculum, students' overload with schoolwork, and as well as limiting the natural activity of adolescents [3]. The dignity of a student is the least respected by teachers. It is quite common for students to become an object of scorn, excessive criticism, humiliation, etc. Furthermore, lack of recognition of their achievements is also common [3].

Other causes of increased violence among adolescents include a sense of the perpetrators' impunity, the presence of violence in the socio-political and economic sphere of life as well as in the immediate surroundings, destructive peer groups, transfer of the patterns of domestic violence, improper parental behavior, negative behavioral patterns shown in the mass media, a sense of alienation, and parental unemployment and poverty [26].

Among our respondents from rural areas in Podlaskie Province, the highest percentage of students who showed aggressive behaviors was observed in grade III of gymnasium (53.0%). In the study group of 755 rural students, aggressive behaviors were shown by 28.1% of girls and 73.1% of boys. There was also a correlation between students' aggressive behaviors and their marks. The conducted study indicates that the highest proportion of respondents declaring aggressive behaviors (75.0%) was observed among students with poor marks. There was also a correlation between aggressive behavior among respondents and their attitude towards school. Other authors found that 77.3% of rural students with a negative attitude to school showed aggressive behaviors [8].

School measures aimed at preventing violence among students should be multidirectional. Proven and effective early prevention programs should be promoted, starting from older elementary school grades and continuing in subsequent grades in gymnasium. These programs should be targeted to reduce violence and unlawful behaviors.

Role of the media in shaping aggressive behaviors in children and adolescents from rural areas

Aggressive behaviors in children and adolescents are significantly impacted by the mass media, which are a reflection of global culture and socio-political processes. The media are also a source of knowledge, information, and behavior patterns for children and adolescents. They influence the psychology of young audiences, often by presenting explicit scenes from life, as well as by showing and commenting on negative facts from around the world. Violence has become a commodity that sells well in movies, books, and computer games.

There seem to be two possible mechanisms underlying the development of educational difficulties resulting from watching aggression on television: behaviors within the scope of the perspective sphere or the incidental sphere. Behaviors within the scope of the perspective sphere shape or release undesirable social behavioral patterns, e.g. acceptance of aggression or brutality. Behaviors within the scope of the incidental sphere, on the other hand, suggest ways and circumstances to repeat aggressive behaviors [27].

According to Clarke, there are as many as five consequences of watching violence on television or computer screen, and these include imitation, desensitization, agitation, and new cognitive elements (e.g. exposure to violence can result in scenarios of aggressive behaviors). Therefore, watching TV intensely and for long periods of time plays a significant role in the process of shaping the attitudes, accepted norms, and life values of children and adolescents [28].

The number of children and adolescents, including those from rural areas, that use the Internet and play computer games has been increasing continuously due to the rapid development of multimedia technologies.

The materialistic lifestyle promoted by the media, which escalates the immoral behavior of adolescents, also seems important. Furthermore, advertisements of alcoholic beverages, beer in particular, which are present during each commercial break, increase alcohol consumption among adolescents. The mass media considerably affect the consciousness of adolescents by shaping their behaviors and decisions. Manipulation techniques that target the young generation are developed by the best specialists, especially since children and adolescents often have their own money, which they spend as suggested by someone who seems to have authority [29].

CONCLUSIONS

The phenomenon of aggression among children and adolescents is one of the threats of modern times. This phenomenon is increasing. There has been a decline in the age of juvenile offenders and aggressors, who outdo each other in search of different methods and forms of action.

Aggression spreads rapidly and has become a concern for a number of elementary educators. Although it is present in all schools, not all teachers are able to properly identify aggressive behaviors or their causes among students. They are often unaware of risks associated with such behaviors. Unfortunately, aggression is perceived as a behavior arising through a modeling process, i.e. imitation of behaviors from the immediate surroundings.

Supporting families, promoting the strongest possible bonds with children, and spending time together with family are of great importance for the prevention of violence among children and adolescents. This is particularly important as the family environment has a decisive influence on the development of children, by shaping their self-esteem and teaching them how to cope in difficult situations. A properly functioning family is still a child's basic protective factor against aggressive behaviors.

It should be emphasized that school is the basic link in the educational system as well as an important element of the local social environment in rural areas. Factors related to the functioning of the education system in rural areas, such as limited access to preschools, kindergartens or the Internet, have major effects on significantly lower educational opportunities for children and adolescents from the rural environment. Greater differentiation in the qualifications of rural teachers, and possibly lower standards of education, is also an important factor.

However, since rural school is a relatively small environment, all students, teachers, and parents know each other, which is definitely an advantage. Teachers' familiarity with students and their homes is incomparably greater than in cities, where teachers only meet their students at school, and see their parents during school meetings.

School is also a place where children and adolescents encounter a number of problems they have to face. These often include homework, problems with acceptance in the peer environment, and, frequently, lack of proper support from teachers. At the same time, school is a place where children can start to fulfill their life aspirations, achieve their first goals, and take further actions aimed at self-realization.

The increasing liberalism in everyday life, a sense of meaningless existence, distrust, and lack of motivation to learn or work are all disturbing phenomena that promote aggressive behaviors among rural children and adolescents. A shift of attention towards acquiring material goods, and consequently pushing moral or spiritual values into the background, may also be observed in some adolescents. Therefore, a close relationship between children and adolescents and their parents as well as their school teachers is very important. It allows for an accurate and rapid diagnosis of the existing problems of everyday life. A correct diagnosis allows to take the appropriate measures to eliminate aggressive behaviors both inside as well as outside the school environment in modern rural areas.

Conflicts of interest

None declared.

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Current aspects in postoperative cognitive dysfunctions, including otolaryngological procedures

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ABSTRACT

Area disorders typically affect executive function, memory, attention, and verbal processing. Factors known to influence postoperative cognitive impairment are: age, preoperative cognitive functioning, and type of anesthesia. Current research into POCD is focused on cardiac and gastric surgery. A rapidly developing surgical technique is endoscopic surgery; specifically, endoscopic transnasal surgery, where a "dry" operating field is required. To date there is little research assessing the impact of this type of surgery on the development. POCD. In the current study we determine the possibility of occurrence of POCD, and investigate its prevention, in the aforementioned surgical situation. General ways to show existing research on POCD in the context of skull base surgery. Hypothetically, less tissue injury is associated with less inflammatory reaction and thus with the reduction of cognitive dysfunctions. Analysis of operating methods (such as derating RR and HR) and their potential impact on POCD. POCD is a temporary postoperative disorder and correlates with poor recovery after surgery. The causes of POCD are multifactorial; however, the immune response following surgery may be the initial factor to initiate the damage-causing ischemic response. Careful anesthesiological and surgical procedures lower the likelihood of POCD.

Key words: Cognitive disorders, memory disorders, endoscopy, anesthesiology, postoperative complications

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INTRODUCTION

A common and clinically important complication of surgery is postoperative cognitive dysfunction, or POCD. POCD is a mild form of ischemic brain damage that occurs in the postoperative period and is characterized by impaired concentration and memory problems, which may persist for months or even years after the surgery. Studies of POCD are extensive, encompassing multiple surgical specialties ranging from cardiac surgery to minor outpatient interventions. Significant well-known risk factors for the development of POCD include: type of surgery, duration and type of anesthesia administered during surgery, advanced patient age, history of alcohol abuse, and use of anticholinergic medications. At present, the incidence of POCD is difficult to determine because formal criteria for correct diagnosis and evaluation are lacking. Many studies have attempted to systematize the definition of POCD and its timing. There is general agreement that POCD consists of subtle disruptions of thought processes, which may have a significant impact on the patient's health; however, a precise definition is yet to be established.

Early POCD, i.e. that which is observed within the first few days of surgery, has previously been assessed using the Post-operative Quality of Recovery Scale [1]. The results of this study indicate that although the disorder is transient in nature, for most patients the cognitive impairment fails to resolve within 3 days post-surgery.

Previous POCD studies focused on cardiac surgery because, until recently, cognitive impairment after cardiac surgery was considered to result from physiological disturbances associated with the cardiopulmonary bypass technique. In 2011, a study was conducted in 644 patients, which indicated that cardiac surgery and associated procedures were principal predictors of early (up to 7 days after surgery) POCD [2]. Research has since shown that the immune system is a key element in the pathogenesis of POCD after cardiac surgery [3]. Also in support of this hypothesis, are the findings of a recent study that suggest inflammatory neuronal changes may be fundamental in the mechanism of postoperative cognitive dysfunction [4]. The relationship between the choice of anesthesia and the occurrence of POCD has also been studied, and epidural anesthesia was found to be safer and less likely to result in POCD than general anesthesia [5].

There are increasing possibilities for a large number of minor surgical interventions to be carried out on an outpatient basis. Although the benefits of such procedures are well established, outpatient surgery presents another challenge: the expectation of prompt recovery soon after surgery. Cognitive complications, including delirium and POCD, have been reported to be less common in outpatient surgery [6].

Interestingly, the type of anesthesia used has also been hypothesized to influence the development of POCD. However, previous studies, including those specifically related to outpatient interventions, failed to provide sufficient evidence to conclude whether intravenous anesthesia (propofol) vs. inhalational reduces the risk of delayed cognitive dysfunction [7]. Cerebral oxygen saturation (SCO2), which represents oxygen balance in the brain, has also been shown to be an effective prognostic factor for POCD [8].

The frequency of perioperative cognitive dysfunction (POCD) in orthopedic patients varies from 16% to 45% [9]. Certain studies indicate that the possibility of monitoring patients using near infrared spectroscopy (NIRS) during lumbar spine surgery in a prone position may be helpful in reducing the risk of POCD.

Current techniques and physician awareness of POCD risk are expected to increase pressure on the need for optimization of surgical and anesthesiological procedures. In the current article we review the literature related to POCD, with a particular focus on specific risk factors in otolaryngological surgery.

Definition and differential diagnosis

POCDs are transient clinical phenomena defined by Bedford as "adverse cerebral effects of anesthesia on old people" [10]. In 2008, Chung and Assmann published case studies of two young people with POCD, confirming that POCD may in fact occur at any age [11]. After ambulatory surgeries, these patients caused serious road accidents in the direct postoperative phase. According to recent data, 40% of patients older than 60 years of age suffer from POCD after surgery; however, in the 3 months following surgery only 10% of patients older than 60 are diagnosed with POCD [12]. Impairments in attention, memory, executive functions, and some verbal functions extends the recovery period after surgery and negatively affects the patient's ability to function effectively in family and society. Nowadays, as the result of the development of modern surgical techniques, which enable doctors to carry out extensive surgeries in increasingly older patients, POCD is likely to occur much more frequently.

Cognitive functions are mental activities used for spatial orientation, to acquire information about oneself, to analyze a situation, to formulate conclusions, and to make decisions and execute action [13]. The most frequent symptoms occurring in the course of POCD are memory and spatial orientation disturbances, as well learning, thinking, attention and speech disorders. POCD must be distinguished from delirium, central anticholinergic syndrome, dementia, and akinetic crisis [14].

Epidemiology

Most studies of POCD published to date relate to cardiac surgery, particularly that requiring cardiopulmonary bypass. Current research on the effects of anesthesia on cognitive abilities focuses on: the type of anesthesia, whether it is local or general, duration, and type of formulation used. The age of respondents and their preoperative cognitive functioning also is also of interest.

Data concerning the incidence of POCD vary, since they depend on the definition of POCD, the patient sample and control group, the measurement method used, and the method of statistical evaluation [14-16]. Krenk [17] presented data showing that POCD may refer to all age groups, but in patients older than 60, the symptoms persist longer and lead to the limitation of normal activity. Monk [18] reported that on the day of hospital discharge, POCD had been diagnosed in 36.6% of patients aged 18–39, 30.4% of those 40–59 years old, and 41.4% of patients older than 60. All patients had undergone extensive surgeries (i.e. surgery scheduled under general anesthesia that was expected to last 2 h or longer); however, none underwent cardiac surgery. Three months after discharge, POCD was still reported in 12.7% patients older than 60. Previous studies reported that a higher incidence of the disorder is typically observed in certain patient groups, e.g. those with cardiovascular disease or subclinical dementia [19-21].

Many years of research has confirmed that POCD is a temporary phenomenon. In most patients diagnosed with POCD, cognitive impairment lasts for up to 3 months after the operation. For the minority of patients, POCD symptoms may be sustained for far longer, potentially becoming a permanent condition which will have a major impact on quality of life. Steinmetz [22] documented, following an 8.5-year study, that POCD is correlated with increased mortality rate, disability leading to premature disability benefits, and additional social encumbrances for society. It is important to identify early signs of cognitive impairment. Monk [18] also reported risk of death is increased if POCD was observed when patients were being discharged from hospital (Cox proportional Hazard Ratio 1.63).

Diagnostic methods

POCD is diagnosed using psychometric tests. The recommendations of the 1995 consensus indicate the results of several tests should be considered in the diagnostic process, and these are described in Table 1. In long-term studies, tests such as the Stroop Test, paper and pencil memory tests, or fourfold tests are typically used [23]. Interestingly, there is evidence to suggest that the selection of tests and the order in which they are administered, may have a significant impact on study outcomes [24]. It is recommended that tests evaluating the level of predisposition to anxiety and depression be used in parallel, as these conditions may subsequently affect cognitive function.

Table 1. Methods used in neuropsychological evaluation

Test	**Definition**
Rey Auditory Verbal Learning Test	Assesses the level of verbal learning and memory. It gained great popularity due to the simplicity and ease of testing and comprehensibility for most age groups.
Trail Making Test: A and B (TMT)	Assesses concentration, divisibility, mental flexibility and variability comments.
Grooved Pegboard Test	A test of manual dexterity and motor coordination.
Digit Span Test	Assesses the capacity and efficiency of working memory.
Wisconsin Card Sorting Test (WCST)	Measures executive function, understood as human oversight functions.
Stroop Test	The original version tests reading speed, verbal memory and executive functions.

Full neuropsychological assessment often lasts more than 2 hours. This presents another difficulty, as the stress associated with surgery can falsify the actual performance level of cognitive ability [25].

The Short Cognitive Performance Test (SKT) is a potential alternative [26]: it can be performed within 15 minutes and is based on the speed of processed information. It examines changes in cognitive abilities such as attention, concentration, and memory. The test is simple and attractive, and is therefore greatly popular among researchers [27]. Chung [28] uses a driving simulator to gain quick diagnostics of cognitive disturbances.

The Post-operative Quality of Recovery Scale (PQRS) is also used in many studies. The Postop QRS is a measurement tool to assess many factors influencing the post-surgical convalescence [29, 30]. It is a frequently used method, which takes only 5 to 6 minutes to conduct. The results obtained from this survey show the condition of the patient, but cannot be used to indicate the presence of neuropsychological disorders.

Pathogenesis and risk factors for POCD

The mechanism underlying the development of cognitive dysfunctions after a surgery and anesthesia is not clear. As mentioned above, animal experiments indicate that the immune response occurring as a result of surgery may play a role. In a study of mice undergoing surgery, Terrando [31] proved that the activation of the TNFα/NF-κB-dependent inflammatory cascade and consequent cytokine release leads to a disturbance of the integrity of the blood-brain barrier. This facilitates macrophage migration to the hippocampus and results in a weakening of memory functions. Both TNFα (tumor necrosis factor) and NF-κB (a protein complex that acts as a transcription factor) play a key role in regulating the immune response to infection [32]. The study also demonstrated that activation of anti-inflammatory anticholinergic signal cascade blocks this mechanism and cognitive functions remain unimpaired.

Clinical observations indicate that POCD more often occurs after extensive surgeries in which general anesthesia was used, after re-surgery, and following operative complications. These observations support the idea that the inflammatory component is a significant factor in the development of cognitive disorders.

The impact of the drugs used in general anesthesia on cognitive functions depends on the pharmacodynamics and pharmacokinetics of these substances; however, what is clear is the shorter the drug action, the shorter the duration of POCD immediately after surgery. At present, there is no evidence to suggest that these drugs cause “chronic” POCD. Twin studies have not provided any evidence of neurotoxicity of the applied anesthetics [33]; in addition, there are no data proving that POCD occurs less frequently following local anesthesia, as compared to general anesthesia.

A patient’s age is a very important risk factor for POCD. The ability of the central nervous system to compensate in response to anesthesia decreases with age. Imaging examinations performed in elderly people often reveal ischemic foci without clinical symptoms (silent brain ischemia), which is predisposes these patients to POCD [34]. Another risk factor is alcohol abuse, as shown by Hudetz [35] in a randomized study. Low education level also corresponds to high likelihood of POCDs [23, 36]. The significance of genetic factors is also a subject of discussion [16].

Prevention of POCD

When assessing the need for extensive surgeries, especially in elderly people, the benefits and potential negative consequences should always be properly balanced and the potential occurrence of POCD should be taken into account. In such situations it is useful to determine the patient’s preoperative cognitive status.

POCD occurs more often and is more intensive after extensive surgeries (e.g. cardiac surgery, using cardiopulmonary bypass). To try to prevent cognitive disorders, it is important to prevent intra- and postoperative complications. To what extent minimally invasive surgical techniques prevent cognitive disorders has not yet been studied; however, hypothetically, less tissue injury is associated with less inflammatory reaction and thus should correlate with a reduction in cases of cognitive dysfunctions [18,37]. As mentioned above, generally, it is assumed that the shorter action of the anesthetic, the shorter the duration of POCDs. Remembering this, we should critically analyze the present premedication practice; for example, midazolam (dormicum), which may result in cognitive disorders. In his publication, Dressler [33] demonstrated that after 1 or 2 hours of general anesthesia with propofol/remifentanil and premedication with midazolam, memory disorders occurred on the first day after surgery [38]. With regard to the modern concept of perioperative proceedings, which assumes early patient cooperation after the surgery (fast-track treatment), the above-mentioned limitations of cognitive functions receive negative evaluation. On the other hand, we still do not have evidence that techniques other than general anesthetics reduce the incidence of POCD [39].

In many areas of surgery, progress is connected with the development of endoscopic techniques, which often create special requirements for general anesthesia. Endoscopic transnasal surgery, in which bleeding during the surgery must be kept low, is a special challenge. Little bleeding and good visibility in the operating field has been achieved by maintaining a low heart rate (HR) and gradually lowering the mean arterial blood pressure (MAP) [40]. The anesthetics used in such endoscopic surgeries were propofol andremifentanil or sevoflurane and esmolol [41]. The influence of controlled hypotension during endoscopic procedures on middle cerebral artery peak systolic velocity was additionally evaluated when good, bloodless conditions of the operating field were achieved [42]. More than half of patients operated standard flow rate fell below the lower limit of normal and end-diastolic velocity was below the limit of even 60% of patients in these conditions, as is apparent from earlier studies could be a risk of ischemic brain tissue. Previous studies have demonstrated a correlation between middle cerebral artery peak systolic velocity and cerebral blood flow; as such, it is possible that increased risk of cerebral ischemia might have occurred in these conditions. No neurological disturbances were found in any of the patients in the postoperative period; however, cognitive functions need to be monitored in patients

who have undergone this kind of surgery. Other works by the same research team indicate that lowering the middle cerebral artery peak systolic velocity was directly caused by a reduction of the hemodynamic parameters of the cardiovascular system, not the set of drugs used for general anesthesia. Although lowered RR (blood pressure) and HR (Heart Rate) parameters were maintained within the limits commonly regarded as safe, the blood flow velocity occasionally dropped below the lower limit of the normal range and blood flow velocity parameters lowered unevenly, which (according to some scholars) may prove approximating the phase of failure of cerebral blood flow autoregulation mechanisms [43]. In another study [44], the serum concentration of S-100 and NSE (neuron-specific enolaze) proteins was evaluated, as these are considered to be markers of nervous tissue injury. Increased concentration of NSE was found in 5 of 6 patients who had a drop of middle cerebral artery peak systolic velocity below the lower limit of the normal range. Although neurological complications were not observed, the results of the presented studies point to the need to evaluate the possibility of POCD occurring in patients treated with transnasal endoscopic surgery. In this case, POCD may be connected, not with the extensiveness of the operation but rather with potential hemodynamic disorders and perfusion.

Developments in the cerebral circulation during several hours of free maintenance of heart function and hypotension should be the subject of further studies. Could rate evaluating the safety margin used methods of intraoperative anesthesia, and their impact on the further functioning of the patient. It is important that future studies on this disorder focus on measures to prevent the occurrence of POCD. Although many studies have attempted to elucidate whether electroencephalography (EEG) monitoring of the depth of anesthesia may contribute to limiting POCD [45, 46], to date this question remains unanswered and should be the subject of future studies.

CONCLUSIONS

POCD is both widespread and common. Its occurrence depends on a variety of factors. POCD is difficult to define and the exact investigational strategy remains uncertain due to the extensiveness of the phenomenon. Most studies conducted so far agree that the risk of POCD increases concurrently with the patient's old age, diseases of central nervous system, cardiovascular disorders and extensive surgery. POCD is a temporary postoperative disorder and correlates with poorer recovery after the surgery. Importantly, careful anesthesiological and surgical procedures lowers the likelihood of POCD. The dynamically developing area of minimally invasive surgery, especially endoscopic transnasal surgery in which a "dry" operating field is required, calls for research into the occurrence of POCD following this type of surgery and methods of prevention. The management strategy for POCD should be multimodal, and involve close cooperation of the anesthesiologists, surgeons, geriatric specialists, psychologists and the patient's family members. This network will promote early rehabilitation and avoid loss of autonomy by postoperative patients. Future clinical research should concentrate on factors that are likely to provide a better understanding of POCD.

Conflicts of interest

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Denticles. A literature review

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ABSTRACT

Denticles are pulp degenerations in the form of calcified deposits of mineral salts, usually found in molars and lower incisors, as well as in impacted teeth and deciduous molars. Denticles may come in various sizes, from microscopic particles to larger mass that almost obliterate the pulp chamber and are visible only on X-ray images. Denticles form as a result of chronic inflammatory lesions, but may also be caused by injuries and conservative treatment. They are most frequently found in necrotic foci. Denticles may cause problems for root canal treatment, as their presence might make it difficult to obtain proper access to the pulp chamber bottom and the canal orifices. There is also the increased risk of bending or breaking the endodontic instruments. Sometimes, denticles fill the entire space of the tooth chamber and pushing the pulp to the edges of the chamber. Denticles can cause pain due to the pressure on the nerves and blood vessels supplying the internal tissue of the tooth. The presence of large denticles might eventually lead to necrosis of the pulp. Denticles accompany certain diseases, such as dentin dysplasia, odontodysplasia or Albright hereditary dystrophy. **Key wards:** teeth, denticles,

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LITERATURE REVIEW

The tooth pulp is a dentin-forming tissue. Initially, the pulp is responsible for the formation of the primary dentin, and in the fully formed tooth for the formation of secondary dentin. Denticles may be caused by fibroblasts by differentiation of secondary fibroblasts into cells producing hard tissue [1]. Also, the aging of the organism reduces the size of the tooth chamber due to the formation of the tertiary dentin and dental pulp atrophy. It starts with the apoptosis of odontoblasts and fibroblasts, and the accumulation of hydroxyapatite crystals. This is accompanies by the reduction of the perfusion due to the narrowing of the apical foramina caused by cement depositions. Furthermore, the number and diameter of nerve fibers is reduced and the blood vessels become calcified. Dental pulp inflammation also causes deposits of impaired secondary dentin and the formation of denticles or deposits of mineral salts, either loose or connected to hard tissue, called denticles or pulp stones [1,2,3]. Pulp stones also accompany a number of diseases, among others: end-stage renal failure, dental dysplasia, Ehlers-Danlos syndrome, Ellis-van Creveld syndrome, dentinogenesis imperfecta, van der Woude syndrome or Marfan syndrome. A correlation has been determined between the presence of denticles and the enamel pearls, taurodontism, dilaceratio and crooked roots [5]. Komorowska and Bany report that physiological or pathological stimuli to the pulp may result in the formation of increased mineralization sites usually referred to as denticles. Various reasons of the formation of increased mineralization sites in the pulp have been reported [6].

There is a number of classifications of denticles. One of the most popular classifications is based on the structure of denticles. According to Kmieć, the following types are distinguished:

- genuine denticles - highly shaped
- alleged denticles - low formed [4].

A characteristic feature of genuine denticles is their similarity to dentin [4]. They have more or less regular dentinal tubules extending from the Tomes fibers. They are usually found around the apical foramina, but are less frequent than alleged denticles [2]. According to Bargholz, all genuine denticles are anomalies related to the protrusion of dentine structures into chamber [1]. Bargholz defines genuine denticles as anomalies related to the invagination caused by the protrusion of the dentine structures into the chamber. Furthermore, Bargholz writes that the total protrusion may take the form of dens invaginatus. This claim is supported by numerous authors of English-speaking reports. According to White, the invagination in the crown is formed due to the incorrect protrusion of the enamel organ into the dental papilla, which results in the formation of a fold of the hard tissues of the tooth, lined with enamel. The final form of the defect may be the dentinoma, most frequently located in the incisors [7]. However, according to Allen, dentinoma is a very rare condition [8]. Furthermore, Cuevas-Nunez reports that the nature of the dentinoma remains largely unknown. Dentinoma is probably the effect of an epithelio-mesenchymal interaction during the tooth development [9]. The enamel lining the invagination of the crown is usually thin, deficient and often does not form at all. The invagination of the root develops as a result of the protrusion of the Hertwig epithelial root sheath and is most frequently found in mandibular first premolars and second molars. In most cases, tooth in tooth does not give any clinical symptoms. The crown morphology is usually normal, sometimes a sulcus forms on the incisal margin, or a particularly deep and wide *foramen cecum* with prominent lingual cusp [7,10].

The structure of alleged denticles is not similar to dentine. Alleged denticles consist usually of concentric running lines of calcification, with dead or calcified pulp cells in the central parts. The calcifying clots in the dental pulp blood vessels might also result in the formation of alleged denticles [2].

Another classification of denticles is based on their position with respect to dentin. In terms of the ratio of pulp stones to the dentin wall, the following types of denticles are distinguished:

- free denticles (interstitial denticles) - surrounded completely by the pulp,
- adjacent denticles (parietal denticles) - partially connected to the dentin,
- intradentinal denticles (intratissular denticles) - fused with canal wall and completely surrounded by dentin [2].

In terms of dimensions, the denticles are classified as:

- compact denticles - visible on an X-ray image,
- scattered denticles - not visible on X-ray image and detected by histopathological examination [11].

Furthermore, Bargholz also distinguishes:

- fibrous denticles - formed from the remains of the epithelial cells of the Hertwig epithelial root sheath, with odontoblasts arranged concentrically around,
- radial denticles - reticulin fibers surround the denticle, penetrate its structure and connect with the surrounding tissue,
- lamellar denticles - with loose connection of individual dentin layers. They are connected to the pulp blood vessels, often located in the center of the pulp stone [1].

The main cause of formation of the pulp stones is difficult to determine. Pulp stones often appear in teeth that appear normal in every respect [2]. According to Barańska-Gachowska, denticles might form in the course of chronic pulp

inflammation and after conservative treatment [2]. A large number of histopathological tests confirm that the presence of pulp stones is not necessarily related to the pathological symptoms of the pulp. The formation of pulp stones is affected by a number of factors and the exact cause remains unclear [1]. The Department Of Histology of the Jagiellonian University Medical College examined the ultrastructure of the denticle using electron microscopy. In the denticle, collagen fibers were observed, both individual and in bundles following different directions. The collagen fibers were not arranged uniformly and did not run perpendicular to dentinal tubules. Such arranged results in the less compacted tissue of the tubular space as compared to normal dentin. The authors hypothesized that the structure and the formation of the denticle were determined by the disorder of the layout and arrangement of collagen fibers in the tooth bud [12].

One of the factors contributing to the formation of calcium deposits that build up pulp stones is the necrosis of pulp cells induced by external stimuli, usually mechanical ones. Excessive masticatory load, occlusal trauma and parafunctions favor the formation of denticles. The concentric formation of denticles of teeth with broken crown was confirmed in 50% of examined patients [1].

The calcium deposits in the pulp are also caused by thermal injuries. Those injuries lead to the necrosis of tissues that are surrounded by the pulp to encapsulate and calcify in order to separate the necrotic tissue from healthy tissue [1].

Other causes of pulp stones include the dispersed mineralization in the pulp tissue. It consists in dispersed calcification in the form of mineral deposits along the blood vessels and collagen fibers [1].

Increased pulp mineralization was also observed in teeth affected by decay. The deeper the tooth decay, the larger size and number of pulp stones [1].

The reduction of blood supply to the pulp as a result of surgical procedures is also reported as a cause of formation of denticles [8].

In their study, Gao and Yang wrote that the bone morphogenetic protein (BMP) that belongs to the transforming growth factor family, is able to induce the growth of bone and cartilage if transplanted into tissue other than bone tissue. It also plays a significant role not only in bone formation, but also in the differentiation of normal tissues with tooth buds. BMP can play an important role in the epithelio-mesenchymal interactions during the tooth development. The disruptions in the BMP expression may lead to the formation of odontogenic tumors, including denticles [13].

Galler et al. in their study of the impact of the TWIST1 transcription factor in the pulp homeostasis in mice showed that TWIST1 inhibited the RUNX2 factor responsible for intensifying the mineralization process. They also observed that TWIST1 acted in protective capacity, preventing the formation of denticles [14].

Pulp stones usually form without symptoms and are detected by chance on X-ray images. On the X-ray image, a denticle might appear as a tooth set in another tooth, hence the name "tooth in tooth" [15]. Denticles may form in the vicinity of nerve fibers which, when pressed by the developing denticle, can induce spontaneous dental pain imitating trigeminal neuralgia or dental pulp inflammation. The diagnosis is posted on the basis of the X-ray image on which isolated shading is visible, after excluding other possible causes [2].

On the X-ray image, denticles take the form of round or oval shades in the tooth cavity. Digital radiography provides high quality images [16]. Denticles vary in size, from microscopic particles not visible on traditional X-ray images, to well-visible with 2-3 mm diameter [17]. Calcifications smaller than 200 μm in diameter are not visible on an X-ray image [5]. Denticles are structures that take various shapes, capable of absorbing X-rays similarly to dentin [3]. The size and number of pulp stones increase with age. Interestingly, denticles can form not only in erupted deciduous and permanent teeth, but also in unerupted teeth [2]. Ingrid Różyło-Kalinowska showed an X-ray image of the denticle of tooth 17. Różyło-Kalinowska pointed out that the image can be interpreted as either a denticle, an artifact, dental calculus deposits, enamel pearl or internal resorption foci. Therefore, X-ray is unable to provide an unequivocal clinical diagnosis [18]. The Chair and Department of Orthodontics of the Pomeranian Medical University conducted a study on the frequency and location of denticles on dental panoramic radiographs. The presence of pulp stones was found on 51.5% of examined images. On the majority of images, denticles were found only in pulp chambers, usually in molars with restoration. First molars were the location of over 50% of denticles. In 91.6% of examined patients, the pulp stones were observed in multirooted teeth. The studies indicate that the most frequent location of denticles are multirooted teeth, mainly the first molars with restorations [19].

Clinical management of denticles is difficult. Where pain is present, it will involve the removal of the pulp with the denticle [2]. One of the methods of eliminating denticles from the tooth cavity is with ultrasounds. Clinical trials show, however, that piezoelectric method is more efficient. The terminal of the piezoelectric device is applied to the side edge of the denticle and round motion is performed until the pulp stone is loosened. The denticle may also be filed from the root canal, provided that the entire length of the file fits along the denticle [20]. Also, the denticle may be broken off with a dental chisel or excavator. After the extraction, root canal treatment can be performed

using any method.

Dentists and other doctors often cooperate in the process of diagnosing and treating patients with denticles. The joint diagnostics is applied to the elimination of foci of inflammation and paroxysmal pain of the head and the bony face of unclear etiology. In his report, Łukomski described a case where a neurologist referred to dental consultation a 45-year-old patient with a diagnosed left trigeminal neuralgia. The patients complained on paroxysmal pain in the mandible and the jaw, occurring at various times during the day and night; the pain was radiating and had uniform intensity, and receded without intervention. The patient had suffered from the pains for 9 months. The X-ray examination indicated the presence of a denticle in the cavity of tooth 38 that was the direct cause of the recurring pain. The pulp stones located in the vicinity of nerve fibers press the fibers, thus inducing spontaneous pain similar to acute pulpitis or trigeminal neuralgia [21]. Krupiński indicates that one of the key errors related to denticles is the incorrect diagnosis. This error occurs frequently with pain in teeth without restorations and/or dental caries. In the case reported by the author, the patient with the denticle consulted with laryngologist (suspected otitis media) and neurologist (suspected trigeminal neuralgia) [22].

In conclusion, it should be pointed out that the presence of denticles might make impossible the appropriate dental management, often causing a break of the dental instrument in the cavity or the canal, incomplete filling of the root canal, pushing the material outside the apex of dens, or perforation of the cavity or the root. Teeth with denticles are a major issue in the dental practice. The increasing accuracy of the imaging diagnostics of the masticatory system enables early detection of denticles and their location in the pulp, and thus the appropriate clinical management.

Conflicts of interest

The authors declare no conflict of interest in this work.

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Nutrition and peritoneal dialysis patients – a review

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ABSTRACT

Introduction: The Peritoneal Dialysis (PD) is a preferable treatment option of the renal replacement in patients with chronic renal failure (CRF) end stage.
Purpose: The purpose of this study was to review of articles published related to the contribution of nutrition to health promotion of patients undergoing haemodialysis.
Materials and methods: A review of the Greek and international literature on the subject was Performed through the electronic databases Medline, Google Scholar, Scopus and the Association of Greek Academic Libraries Link (Heal-Link), using as key words the following terms: haemodialysis, renal failure, peritoneal dialysis, nutrition. Most of the articles used in this literature review were recently published. Only few old - dated articles were included in the study and the reason was their significant contribution to the field. The exclusion criteria for the articles were the languages except from English and Greek.
Results: Patient's diet must contain 1.3 g of protein per kilogram of body weight per day. Consumption of foods rich in carbohydrates should be limited. Patients should consume foods with the adequate quantity of phosphorus and potassium. Finally, they should have their sodium levels and fluid intake checked because sodium causes severe thirst that can lead to excessive fluid intake. As a result, the patient experiences swelling, shortness of breath and high blood pressure.
Conclusion: Patients who undergo peritoneal dialysis must be checked regularly and pay special attention to their diets.
Key words: haemodialysis, renal failure, diet, peritoneal dialysis, nutrition

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INTRODUCTION

Chronic kidney failure is a disease which is increasingly recognized as a public health problem. It is usually characterized by an asymptomatic period which is potentially detectable [1]. Chronic kidney disease is common, and its prevalence increases significantly with age, and particularly in women. However, the classification of disease is not gradual according to age and gender, as well as with the level of proteinouria [2].

Furthermore, it is more common in the elderly than in young people due to atheromatosis of renal vascular disease. Over 70% of patients' cases suffering from chronic kidney disease are due to diabetes mellitus, hypertension and atherosclerosis. Patients who suffer from the disease have to maintain contact with a renal medicine specialist for their rehabilitation therapy of renal function in an early stage for, it is manifested that the final stage of the disease is associated with increased mortality and morbidity [3].

It is evident that in Greece there is a greater frequency of new patients for haemodialysis per million populations compared to 24 European countries in 2004. It possessed the 3rd position worldwide for the corresponding frequency in renal replacement therapy after the USA and Japan. The classification of Greece in the 8th place regarding the global comparison of the prevalence of renal replacement therapy, although more favorable, it remains very high and indicates the size of the increased number of 13 patients in end-stage chronic renal failure in our country [4].

Patients who suffer from kidney failure have great chances to be malnourished or develop malnutrition, which contributes to the patients' morbidity and mortality. Due to this fact, the present study attempts to show the contribution of nutrition in the health promotion of patients undergoing haemodialysis. The assessment of their nutritional status may be particularly difficult in this population on account of the changes as regards the metabolism of proteins and carbohydrates, disturbances of salt and water balance and other factors in comparison with the general population [5].

The purpose of this study was to review of articles published related to the contribution of nutrition to health promotion of patients undergoing haemodialysis.

MATERIALS AND METHODS

A review of the Greek and international literature on the subject was performed through the electronic databases Medline, Google Scholar, Scopus and the Association of Greek Academic Libraries Link (Heal-Link), using as key words the following terms: haemodialysis, renal failure, peritoneal dialysis, nutrition. Most of the articles used in this literature review were recently published. Only few old - dated articles were included in the study and the reason was their significant contribution to the field. The exclusion criteria for the articles were the languages except from English and Greek.

Chronic kidney disease

Chronic renal failure is defined as the damage of the kidneys. Proteinouria, haematouria or anatomic abnormality and the glomerular filtration rate (GFR) < 60 ml/min/1.73 m2 is at least present in cases for ≥ 3 months. The renal failure is irreversible and only a small number of people can follow a conservative treatment. The disease is classified into 5 (five) stages that depend on the glomerular filtration rate (GFR) and the presence of kidney damage (Table 1) [2].

Table 1. Stages of chronic kidney failure

STAGES	**DESCRIPTION**	**GFR (ml/min/1.72m^2)**
1	Kidney damage with normal or increased GFR	≥ 90
2	Kidney damage with mild decrease in GFR	60-89
3	Moderate decrease in GFR	30-59
4	Severe decrease in GFR	15-29
5	Kidney failure	< 15 or dialysis

All patients, regardless of their age, gender and proteinouria or albuminouria, when the GFR 60 ml/min </1.72 m2, are considered to have at least moderately severe chronic failure.

The number of proteinouria is a major risk factor for both the evolution of chronic kidney failure and cardiovascular disease. It is known that many other risk factors play a role in the development of the atherosclerotic lesion, which is responsible for the appearance and growth of many cardiovascular diseases [4,5]. Adverse health effects are linked with the effects that exist in a reduced glomerular filtration rate and in particular if it does not change with the passage of time [6].

The early stages of kidney failure are often asymptomatic, despite the accumulation of several metabolites. Some symptoms include: malaise, loss of energy, loss of appetite, insomnia, noctouria and polyouria due to reduced ability to concentrate, itching, nausea, vomiting and diarrhea, hallucinations due to, polyneuropathy, restless legs syndrome, bone pain due to bone metabolism disease, hallucinations and tetany due to

hypocalcaemia, symptoms due to salt and water retention (distal or pulmonary edema), and symptoms caused due to anemia are amenorrhea in women, erectile dysfunction in men [7].

Haemodialysis

Haemodialysis is a sustained vital process for the treatment of patients suffering from end-stage renal disease. Its objective is to restore the kidney function by reversing the dramatic uremic symptoms and also help patients' functional condition to increase the chances of their survival [6].

This is mainly achieved by the formation of a haemodialysis system whose ingredients and concentrations are formed approximately close to normal values that need the body. Particular emphasis is placed on individual adaptation of haemodialysis. A method of calculating the amount of dialysis is to calculate the Kt/V. Kt/V is an initial value that is indicative of the dose of the dialysis. The Kt/V is best described as the fractional clearance of urea as a function of volume distribution [8].

The link for the haemodialysis of artificial kidney during the first days of dialysis along with the concentration of sodium is set deliberately low to avoid volume overload problems such as hypertension and cardiovascular failure. Much evidence indicates that the correction of chronic acidosis is a clinical benefit regarding the bone metabolism and nutrition [7].

Therefore, a major risk factor for patients on dialysis is malnutrition. The mortality is affected by serum albumin levels. The lower the serum albumin level is, lesser than 4.5 g/dl, the higher the risk of mortality is [8].

Nutritional assessment

Patients that suffer from kidney failure have great chances to be malnourished or develop malnutrition, which contributes to their morbidity and mortality [9].

Malnutrition in conjunction with age, gender, and the respective functional disorders plays an important role in the progress of patients' situation [10].

The assessment of their nutritional status may be particularly difficult in this population on account of the changes as regards the metabolism of proteins and carbohydrates, disturbances of salt and water balance and other factors in comparison with the general population Most of the factors that lead to malnutrition in patients undergoing peritoneal dialysis involve one or a combination of the following ones [9]:

- decreased food intake, either due to psychological factors (depression) or physical factors (inadequate treatment of uremia, side effects from drug use, infections, changes in the sense of taste), and even financial reasons.
- increased nutritional needs or losses due to protein degradation process, inflammation in the process of hemodialysis and shortage of acid during dialysis
- changes in metabolism and endocrine disorders (increased catabolism, reduced anabolism).

Except for losses that are obvious, energy requirements are greater in CRF end-stage (up to 35-40 kcal/kg) due to the increased basic metabolism affected by the sympathetic nervous system. When calories are inadequate, amino acids are used to meet the needs. As a result, increased protein levels are required [9, 11].

Last but not least, vegetable sources of proteins that exceed the daily requirements are deprived in urea, other nitrogenous bases, phosphate, and sulfuric acid. These waste products accumulate in patients with uremia and lead to muscle catabolism, bone loss, and vascular calcification. Health and nutritional status improvement are the main objectives for patients undergoing haemodialysis. Their nutrition status must be assessed. Regularly by their medical expert with the cooperation of the dietician [12].

Obviously, if energy consumption is either above or below the needs of the individual in the long run, then, obesity or marasmus may appear. Protein intake should be sufficient for maintaining the structural integrity of the human organism. The laboratory measurements of serum proteins are vital for the patients' nutritional status. Similarly, the vitamin and mineral intake must be sufficient to meet the needs of the enzymatic function of the human body [13].

Vitamins are important cofactors that regulate the metabolic pathways, by which lipids, proteins and carbohydrates are produced and processed. Patients in peritoneal dialysis are more liable to disturbances of water-soluble vitamins. So, they often need to take vitamin supplements. Vitamin E as well, which is a fat-soluble vitamin is associated with various degenerative conditions [14]. These failures are caused by inadequate dietary intake, decreased absorption due to certain drugs, metabolic changes that differentiate the needs and increased losses through the solution of peritoneal dialysis [15].

Peritoneal dialysis diet

In 2000, the National Kidney Foundation revealed results as (KDOQI) **Kidney Disease Outcomes Quality Initiative** for kidney disease with clinical practice guidelines regarding nutrition in chronic kidney disease. These guidelines continue to form the basis of nutrition care in adults with chronic kidney disease. However, if need be, the doctor along with the dietitian will discuss with the patient about some changes in his diet. In addition

to the nutrients, the patient's needs in vitamins and iron ought to be covered [16].

Proteins

The Diet KDOQI guidelines recommend 1.2 g protein/kg/day for adult maintenance for patients that undergo haemodialysis and 1.2-1.3 g/kg/day for adults under chronic peritoneal dialysis. These Nutritional guidelines KDOQI recommend an energy intake of 35 kcal/kg/day to maintain nitrogen balance. For this reason, it is essential that the Agency and the body be strong and this will be achieved by increasing the daily dietary protein intake [17,18].

Lean meat, oily fish, eggs and dairy products are some of the food rich in protein. However, they contain phosphorus and their consumption should be regulated by the dietician [19].

The presence of the dialysis fluid in the body causes satiety resulting in decreasing the patient's appetite. It is essential the patient increase the frequency of meals and consume small amounts of food more often. This is more preferable than two or more heavy meals per day. Moreover, decrease in appetite may be noticed in cases of infections or anemia. For this reason, the contribution of dietician is very important in order these needs to be met [20].

Carbohydrates

It is manifested that patients under haemodialysis may often experience glucose tolerance resulting in hypoglycemic or hyperglycemic episodes. One of the causes can be either the delayed action of insulin due to the resistance of tissues in it, or insulin resistance in uremia. This glucose tolerance rarely requires the administration of insulin. Thus, the patient should have the carbohydrates in his diet controlled. The recommended dietary regimen for patients is 50-60% of their total calorie-intake and it ought to be high in fiber [15]. What's more, a conducted survey revealed that diet low in carbohydrates and high in fat improves glycemic control and prevents the progression of kidney failure [21].

However, food rich in carbohydrates such as bread, cereals and sugar consumption should be limited by the patient to avoid gaining excessive weight and calorie intake in the body [22].

Fats

Special attention must be given in uremic patients regarding dietary fat intake because the main cause of death is atherosclerosis. The recommended dietary intake of fats is approximately 30% of total calories. Saturated fats must be less than 10% and cholesterol 250-300mg/day [21,23].

Potassium

Patients who undergo haemodialysis must pay particular attention to the consumption of fruit and vegetables for, they are high in potassium. Hyperkalemia (High Potassium in blood) occurs suddenly without warning signs leading to the onset of cardiac arrest, if the value of potassium in the blood plasma is greater than 9mEq/L. For this reason, biochemical levels of potassium and dietary intakes must be closely checked. The patient under haemodialysis three times per week is able to receive up to 1.5-2, 5g and an uric patients 2g (= 51mEq) of potassium a day [24,25].

Phosphorus and calcium

Phosphorus intake should be limited. High levels of phosphorous in patients undergoing peritoneal dialysis can cause heart problems, bone and joint disorders and skin ulcers [26].

Furthermore, the level of phosphorus in blood must remain at low levels in order osteodystrofy to be avoided. Phosphorus increases while calcium decreases in blood with the passage of time. As a result, the calcium is removed from bones. As a consequence, bones become more fragile and susceptible to fractures. This imbalance of phosphorus-calcium occurs from the first stages of kidney disease, long before some form of dialysis is required. Nevertheless, symptoms usually become apparent much later [24].

Dialysis along with phosphorus-binding agents removes more phosphorus from the blood and can provide extra calcium. The patient might need to reduce the amount of phosphorus intake which is difficult because plenty of foods rich in phosphorus are very good quality protein sources. The patient should understand that the more adjusted the level of phosphorus intake is, the greater the benefit to bone health will be [26, 27].

Foods high in phosphorus are dairy products, cheese, eggs, *small* fish and beverages like coca - cola [28,29].

Vitamins and minerals

Vitamins and minerals are essential for normal body function and development. Studies in adults under haemodialysis provided clues for low blood concentrations of water-soluble vitamins and minerals. That was because of the inadequate intake, increased losses and needs [30].

The recommended dietary intake should achieve the 100% of the dietary reference intake amount of thiamine (B1), riboflavin (B2), Pyridoxine (B6), vitamin B12 and folic acid. Also, the dietary intake of 100% of the recommended Dietary intake should be the goal for vitamins A, C, E and K, copper and zinc [27,29].

It is recommended that the intake of these metals must be checked every 4 to 6 months, because

patients whose dietary intake is very low or for those that undergo haemodialysis for prolonged periods of time, or for those whose laboratory or clinical data indicate the lack in minerals may need supplements [30].

Liquids-Sodium(salt)

The diet around peritoneal dialysis is not so limited as regards sodium and fluids in relation to haemodialysis. When the patient suffers from kidney failure, the kidneys produce less urine than usual or not at all. As a result, the amount of water in the body cannot be regulated and so, the fluids are retained. It is essential the patient's levels of sodium and fluid intake must be checked because sodium causes intense feeling of thirst and can lead to excessive fluid intakes. As a consequence, there is swelling, shortness of breath and high blood pressure [9,27].

In general, the fluid intake that must be consumed by the patient is 500-700mL, in addition to the volume of urine that he eliminates round in a 24-hour period. Moreover, the patient's body weight, the presence of edema and blood pressure ought to be taken into consideration. Many patients prefer to eat dry foods so as to be able to enjoy the liquids that are allowed such as tea, coffee, juice, fruit [9, 20].

CONCLUSIONS

The provision of nutritional interventions will result in improving or maintaining the quality of life of patients that undergo dialysis. This improvement in quality of life is probably facilitated by the provision of skilled supportive interventions that focus on patients. [27,31] Thus, patients can cope with the symptoms of decreased renal function and reduce stress and anxiety.[30] Apart from the improvement of nutrition status, patients feel more optimistic and positive for the treatment of kidney disease [8]. Therefore, they are less depressed and stressed. It is manifested the patient improves in most of the subcategories of quality of life in kidney disease.

Conflicts of interest

The authors declare no conflicts of interest in this work.

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On carriage, trauma and the odd occurrence

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ABSTRACT

The author presented a phenomenon "être frappé" or "*the odd occurrence experience*". This phenomenon was described by Claude Bernard (1813-1878), is a sudden awareness of an idea or phenomenon, which was totally "hidden" or "unseen" before. The author presented also pictures of carriages and accidents.
Key words: phenomenom, odd occurrence experience

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"Love and marriage, love and marriage
Go together like a horse and carriage
This I tell you brother
You can't have one without the other"….
(JAMES VAN HEUSEN, SAMMY CAHN)

While staying in the Wynnstay Hotel, a Georgian former posting inn, dating from 1727, I found myself looking at a drawing hung on the hotel's wall: "The leading road coaches leaving the white horse cellars, summer season 1888. The engraving was dedicated by special permission to his Grace, the Duke of Beafort, printed by Harington Bird.

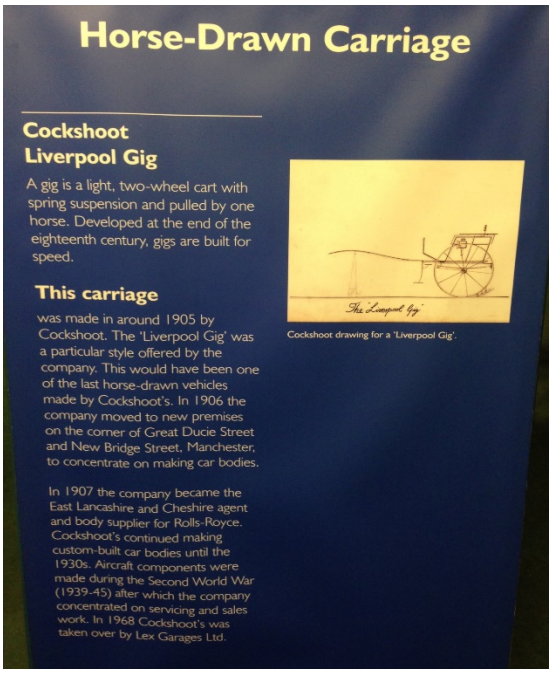
Picture 1. was taken by the author

A few days later' while visiting the Museum of Science and Industry in Manchester, I have observed a model of an old carriage there:

Picture 2. was taken by the author

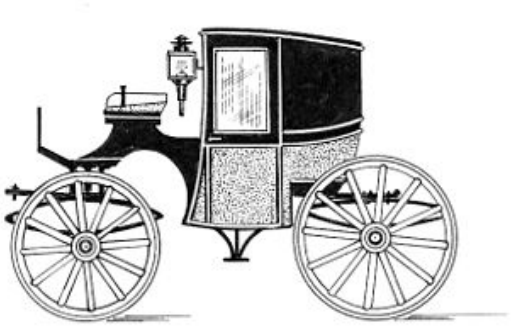
And in another room, these two models: Picture no. 3 and 4 were taken by the author.

Picture 3. was taken by the author



Picture 4. was taken by the author

After the name of the Scottish jurist Lord Brougham, a light, four-wheeled horse-drawn "Brougham carriage" was built .It was built by the London coachbuilder Robinson & Cook in 1838. Another variant, was called a brougham-landaulet, which had a top collapsible from the rear doors backward.



Picture 5 was copied from Wikipedia.

"The Brougham horse-drawn carriage, before becoming redundant with advancing technology, was an invention that changed the world" [1].

The "être frappé" or "the odd occurrence experience", a phenomenon described by Claude Bernard [1813-1878], is a sudden awareness of an idea or phenomenon, which was totally "hidden" or "unseen" before.

The usually "midnight experience ", might be a religious, behavioral or a scientific one. After conceiving this new idea, or this new revelation, there is a long way to prove it (if it is a scientific innovation) or a long route of mystical or religious conversion [2].

Than I recalled Henri de Toulouse-Lautrec's "*Alphonse de Toulouse- Lautrec-Monfa Driving his Mail-Coach in Nice"*, aroused some forgotten idea: driving in this coach or carriage, might be not so romantic and innocent.

Picture 6. was copied from: [3]

These recollections on carriages and coaches, led me to a few medical reminiscences: The known psychiatrist Philipp Pinel (1745- 1826) is often depicted as the father of modern psychiatry [during the French Revolution]; in his treatise entitled "Nosographie Philosophique" (1798), "he described the case of the philosopher Blaise Pascal (1623-1662) who almost drowned in the Seine when the horses drawing his carriage bolted.

During the remaining eight years of his life, Pascal *had recurring dreams of a precipice on his left side and would place a chair there to prevent falling off his bed. His personality changed, and he became more apprehensive, scrupulous, withdrawn, and depressive*" [4].

The famous German mathematician-astronomer Carl Friedrich Gauß (1777-1855), did not leave Gottingen for almost twenty years. He was convinced to take part in a ceremony in which the new railway station and the line to Cassel were opened. He was taken by a horse-carriage: the horses were frightened by the train's noise, the carriage turned down, the driver was terribly wounded but Gauss was physically unhurt. This event had deeply touched him: he was always regarded as hypochondriac, although he was afflicted with 'real' health problems: sudden deafness and later in his life, severe cardiac insufficiency [5].

There is no question that Napoleon's chief surgeon, Baron Dominique Jean Larrey (1766-1842), the father of modern military surgery, invented and initiated transportation to the wounded soldiers, out of the battlefield to the rear hospitals. The "Flying ambulances" (ambulance volante), were apparently, horse carriages [6].

Thomas Hodgkin (1798- 1866) was a British physician, who held radical political views. "He promoted the education of working-class men and became a founding member of the Senate of the University of London in 1836. He was concerned about the effects of colonisation on indigenous cultures. This led to his arriving at Guy's in a carriage 'with a half naked native American', much to the displeasure of Benjamin Harrison, Treasurer of Guy's. It was perhaps because of this incident in 1837 that Hodgkin failed to win an appointment to the permanent clinical staff of Guy's" [7].

"*A chariot is a type of carriage driven by a charioteer using primarily horses to provide rapid motive power. Chariots were used in militaries as transport or mobile archery platforms, for hunting or for racing, and as a conveniently fast way to travel for many ancien*'" [8].

I have visited several times, Wilfred Owen's (1893–1918) house in Oswestry. His anti-military poems sounds so relevant today [9]:

"I Know The Music

All sounds have been as music to my listening:
Pacific lamentations of slow bells,
The crunch of boots on blue snow rosy-glistening,
Shuffle of autumn leaves; and all farewells:

Bugles that sadden all the evening air,
And country bells clamouring their last appeals
Before [the] music of the evening prayer;
Bridges, sonorous under carriage wheels.
Gurgle of sluicing surge through hollow rocks,

The gluttonous lapping of the waves on weeds,
Whisper of grass; the myriad-tinkling flocks,
The warbling drawl of flutes and shepherds' reeds.

The orchestral noises of October nights
Blowing symphonetic storms
Of startled clarions
Drums, rumbling and rolling thunderous and.

Thrilling of throstles in the keen blue dawn,
Bees fumbling and fuming over sainfoin-fields. "

Gustave Flauber's Emma Bovary [10], became a symbol of a neurotic hallucinating and free woman: "*Emma having sex behind drawn shades in a hackney carriage circling round and round Rouen, to the bewilderment of onlookers. She and her new lover are unseen, but unseen in flagrante delicto, and unheard except for the lover angrily hectoring the coachman to press on. Here as elsewhere, eros travels recklessly. Heeding Flaubert's metaphoric cues, Stevenson reads the blind journey as a dirge timed to the beat of horses' hooves and conducted by a death wish. The scene harks back to the agricultural show, only one or two harvest seasons past in her neighbors' calendar, but long enough ago for Emma to have descended from the Romantic stage to a harlot's mobile boudoir*" [11].

"Deb" ,one of the patients of Professor Jean-Martin Charcot (1825 – 1893), lived " more evocatively in my imagination as "*the lady in the carriage" , a title drawn from Charcot's description of her symptoms, and from the associated photographs which capture static moments of her frenzied and compulsive dance*" [12].

The Dutch pediatrician, professor Simon van Creveld (1894-1971), and his wife, survived the Nazi concentration camp …. "*There is an anecdote, of uncertain veracity, concerning the delineation of the Ellis-van Creveld syndrome. It is said that Ellis and van Creveld met fortuitously in a railway carriage while travelling to a medical congress and that in the course of the conversation they realized that they were both contemplating publication of an account of the same disorder. They agreed to publish a joint description of the condition that now bears their names, Ellis being accorded priority for the sake of euphony and by virtue of his alphabetical precedence* " [12].

Tragically, carriage became the background of murder: in 1832, the famous French anatomist and orthopedic surgeon, Dr. Jacques Mathieu Delpech (1777-1832) was shot dead by a patient he had operated for variocele as he was riding back to Montpellier in an open carriage. The famous Austrian –Jewish pianist Henri Herz (Vienna, Jan. 6, 1806- Paris, Jan. 5, 1888) accompanied the violinist Lafont, in a tour, through Germany Holland and France, but this was suddenly terminated by the tragic death of Lafont, who was thrown out of his carriage and instantly killed [13].

Picture 7**.** 1924 Horse & Carriage Accident Tandem Driving Art Print Halftone Illustration George Hunt Sporting Print [14].

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Female genital mutilation in light of Polish criminal law

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ABSTRACT

Introduction: Female genital mutilation is a practice that causes devastating physical, psychological, and social consequences for girls and women. Female genital mutilation is internationally recognized as a violation of the human rights of girls and women.
Purpose: To examine whether women are appropriately protected against female genital mutilation under Polish criminal law, in particular, whether a special criminal offence should be created.
Materials and methods: The international legal acts, reports and other online available data related to female genital mutilation have been examined. The provisions of the Polish Penal Code and the relevant regulations of English criminal law have been analysed. Moreover, judgements of the Polish courts and the literature have also been the subject of research.
Results: In Poland, there is no special legislation on female genital mutilation. However, female genital mutilation is punishable under general criminal law provisions. Female genital mutilation is a criminal offence and can be prosecuted as a form of grievous bodily injury or as a form of bodily injury and impairment to health.
Conclusions: A legislative action is needed to ensure that acts of female genital cutting are criminalized irrespective of the place of their commission. The Polish criminal lawmaker should make female genital mutilation exempt from the condition of double criminalization.
Key words: female genital mutilation, female circumcision, infibulation, penalization of female genital mutilation, grievous bodily harm, violence against women

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INTRODUCTION

Female genital mutilation is a global health issue that can have devastating physical, psychological, and social consequences for girls and women [1]. The term 'female genital mutilation', commonly abbreviated to FGM, refers to procedures that intentionally alter or cause injury to the female genital organs for non-medical reasons. Female genital mutilation consists of partial or total removal of the external female genitalia or other injury to the female genital organs [2]. This mutilation is sometimes referred to as female circumcision [3].

There are a few types of FGM. According to the World Health Organization (WHO) modified typology of 2007, which replaced the typology of 1995, there are four following types of FGM:

- Type I: Partial or total removal of the clitoris and/or the prepuce (clitoridectomy).
- Type II: Partial or total removal of the clitoris and the labia minora, with or without excision of the labia majora (excision).
- Type III: Narrowing of the vaginal orifice with creation of a covering seal by cutting and appositioning the labia minora and/or the labia majora, with or without excision of the clitoris (infibulation).
- Type IV: Unclassified: All other harmful procedures to the female genitalia for non-medical purposes, for example, pricking, piercing, incising, scraping and cauterization [4].

  Recent estimates indicate that around 10% of cases are infibulations. This is the most severe form of FGM, also known as pharaonic FGM, as opposed to so-called sunna FGM that can refer to the first and second type [5].

The World Health Organization emphasizes that 'Female genital mutilation has no known health benefits. On the contrary, it is known to be harmful to girls and women in many ways. First and foremost, it is painful and traumatic. The removal of or damage to healthy, normal genital tissue interferes with the natural functioning of the body and causes several immediate and long-term health consequences' [6].

The immediate consequences include: severe pain, bleeding, shock, wound infections (including, for example, gangrene, as well as blood-borne viruses such as, for example, HIV), inability to urinate, injury to vulval tissues surrounding the entrance to the vagina, and damage to other organs nearby, such as the urethra and the bowel. It is not unknown that a girl or woman die from the effects of such mutilation of her genitals. The long-term health consequences comprise: chronic vaginal and pelvic infections, abnormal periods, difficulty passing urine, and persistent urine infections, kidney impairment and possible kidney failure, damage to the reproductive system, including infertility, cysts and the formation of scar tissue, complications in pregnancy and newborn deaths, pain during sex and lack of pleasurable sensation, psychological damage, including low libido, depression and anxiety, flashbacks during pregnancy and childbirth, and the need for later surgery to open the lower vagina for sexual intercourse and childbirth [7]. There are also observed psychological and mental health problems. Victims of FGM report that genital mutilation is an extremely traumatic experience, which stays with them for the rest of their lives. Moreover, they report feelings of betrayal by parents, as well as regret and anger [8].

It is important to appreciate the scale of the problem. The World Health Organization estimates that between 100 and 140 million girls and women worldwide have been subjected to one of the first three types of female genital mutilation. On the basis of the most recent prevalence data, it is estimated that 91.5 million girls and women above 9 years old in Africa are currently living with the consequences of female genital mutilation. There are an estimated 3 million girls in Africa at risk of undergoing female genital mutilation each year, which makes approximately 8000 girls per day. Types I, II and III of FGM have been documented in 28 countries in Africa and in a few countries in Asia and the Middle East. In Africa, countries with high prevalence rates are, for example, Somalia, Egypt and Mali. Some forms of female circumcision have also been reported from other countries, including among certain ethnic groups in Central and South America. Growing migration has increased the number of girls and women living outside their country of origin who have undergone female genital cutting or who may be at risk of becoming victims of this practice [9].

A natural question arises, namely, why such an abhorrent, horrendous and barbaric practice still happens in the 21st century. Female genital mutilation is carried out for cultural and social reasons, and, sometimes, for religious reasons [10]. It is usually considered necessary to raise a girl properly and to prepare her for adulthood and marriage. A circumcision ceremony has been traditionally held as a rite of passage from childhood to womanhood, however, it can be noticed in recent decades that younger and younger girls have been cut; it even happened that a week old baby–girl was genitally mutilated [11]. Many communities believe that partial or total removal of female genital organs reduces a woman's libido and discourages sexual activity before marriage, and thus it ensures and preserves a girl's or woman's virginity. It is also thought to restrain sexual desire, and thereby ensuring marital fidelity. Women sometimes express an opinion that FGM in the form of infibulation is meant to enhance men's sexual pleasure. It is also believed that cutting makes a girl beautiful by making her genital part of body smooth. In some

communities, the practice is associated with religion, i.e. it is seen as a religious obligation [12]. However, even though the practice can be found among Muslims, Christians and Jews, none of the holy texts of any of these religions prescribes female genital mutilation. Moreover, the practice pre-dates both Christianity and Islam. The role of religious leaders is important in this field. The attitude of contemporary religious leaders varies. Some of them still support the practice, while many others, especially those living in Europe [13], participate in efforts to eliminate the practice. Girls and young women living in traditional communities, both in their countries of origin or in European states, are under pressure to undergo the procedure. Young women living in remote communities in less developed countries especially, in particular in African countries, are under a very strong social pressure to be cut to become a member of their society. Cases even happen, where mutilated women say that it stinks when a non-circumcised woman comes into the room. Female genital mutilation is often a social convention and it is difficult for families to abandon it without support from the wider community. Anyone departing from the norm may face condemnation and ostracism. It is believed that nobody will marry a girl who has not been circumcised. Having their daughter married and getting a dowry from the husband's family is a key factor for many families to continue the practice [14].

The circumcision is usually made in an abhorrent and terrifying manner. It takes place in a house or shelter or even under a tree where some or many girls are brought together. They are cut during the same ceremony and usually with the same tool, such as a knife, a piece of broken glass, a razor blade, scissors or even a sharp stone. The tools are frequently not sterilized. No anesthesia is used. The cutting is usually performed by a traditional circumciser (usually an older community member). Assisting women often close the eyes of the screaming girl and stuff a cloth into her mouth. To cool down the sharp pain, a raw egg is broken on the wound and to stop bleeding, traditional herbs and thorns are put on the wound. Some thorns are used to sew up the wound [15]. Hygiene conditions are terrible. No gloves are worn during the operation and hands may not be washed at all. The circumciser's finger nails are used as pincers during the operation. Rings and amulets are rarely removed before the operation [16]. If the infibulation is not proper, i.e. not tight enough, that is the girl's family regard the remaining hole (the vaginal opening) as too large, the procedure is repeated [17]. The custom is that the groom deinfibulates his bride with his penis. If the man is not able to do it, he uses a little knife or the woman is deinfibulated by a midwife [18]. In some areas the 'opening up' occurs as part of a ceremony and in the presence of female relatives of the bride and groom to verify that the bride is a virgin at the time of marriage [19].

As stated above, the mutilation of female genitals is traditionally performed by a non-professional circumciser. However, in recent years, a phenomenon of so-called medicalization of the practice has occurred. There has been an increase in the proportion of FGM operations carried out by trained health-care providers. For example, today in Egypt 94% of women arrange for their daughters to undergo the 'medicalized' form of FGM. WHO and UNICEF point out that this approach may reduce some of the immediate consequences of the procedure, such as pain and bleeding, but it also tends to obscure its human rights aspect and could hinder the development of long-term solutions for ending the practice [20].

While infibulation and reinfibulation (usually after giving birth) are forms of female genital mutilation and therefore illegal, an opposite intervention to female genitals, called defibulation, is legal and may be necessary. Medical services in some countries offer so-called surgical 'reversal' to the women and girls who were subjected to genital cutting. As stated at the official website of the National Health Service in the United Kingdom, 'Surgery can be performed to open up the lower vagina. This is sometimes called "reversal", although it cannot restore sensitive tissue that has been removed. Surgery may be necessary for women who are unable to have intercourse, as the vagina is too narrow. In addition, some pregnant women who have had FGM will need to have their lower vagina opened up before labour, to allow a safer birth. [21]. A different and controversial issue is a clitoral reconstruction. Some doctors offer such reconstructive surgery. Dr Barri from Barcelona, in Spain, is one of them. In an interview made by a BBC reporter, he explained that 'The aim of the operation is to restore the clitoral anatomy and its function. It means removing all scar tissue, and then identifying the remaining clitoris and replacing it in the natural place. It isn't complicated surgery.' Dr Barri learned how to carry out the operation when he studied in Paris. The technique was pioneered by a French surgeon. There is, however, some criticism of such operations. Some experts say that the claims are not anatomically possible and the operation cannot possibly work. Dr Barri's reply to the criticism was this: 'I've never seen any mutilated woman without remaining clitoris. Whenever we need to remove the whole clitoris - for example in the case of cancer - it's not an easy thing to do. Normally the patients, at least the ones that survive the FGM, will always have a remaining clitoris. So they can always benefit from replacing it in the right place.' Moreover, Dr Barri emphasized that, apart from a physical outcome of the operation, there is a psychological effect and 'that's about not being different any more'. But his opponents claim that carrying out such operations

undermines the campaign to prevent FGM [22].

DISCUSSION

As stated by the WHO, 'FGM is recognized internationally as a violation of the human rights of girls and women. It reflects deep-rooted inequality between the sexes, and constitutes an extreme form of discrimination against women. It is nearly always carried out on minors and is a violation of the rights of children. The practice also violates a person's rights to health, security and physical integrity, the right to be free from torture and cruel, inhuman or degrading treatment, and the right to life when the procedure results in death. [23].

There are many international and regional documents aiming at the protection of the human rights of girls and women. The documents established in the forum of the United Nations Organization include, for example, the Universal Declaration of Human Rights of 10 December 1948, the Convention on the Elimination of all Forms of Discrimination against Women of 18 December 1979, the Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment of 10 December 1984, and the Convention on the Rights of the Child of 20 November 1989. The relevant regional documents include, for example, the European Convention for the Protection of Human Rights and Fundamental Freedoms of 4 November 1950, and the African Charter on Human and Peoples' Rights (Banjul Charter) of 27 June 1981 [24]. The international and regional bodies have not stopped their efforts to eliminate female genital mutilation and continue to enact legal instruments aiming at preventing and combating the practice. The latest legal instruments include, for instance, the UN General Assembly resolution of 20 December 2012 on eliminating female genital mutilation and the UN General Assembly resolution of 18 December 2014 on intensifying global efforts for the elimination of female genital mutilations [25]. The World Health Organization plays a key role at the international level and undertakes many actions to eradicate FGM [26]. The European Parliament is also concerned about the practice of FGM and therefore passed the resolution of 24 March 2009 on combating female genital mutilation in the EU and the resolution of 14 June 2012 on ending female genital mutilation [27]. In the first resolution, the European Parliament called on the member states of the European Union to: regard any form of FGM as a crime, irrespective of whether or not the woman concerned has given any form of consent, and to punish anybody who helps, encourages, advises or procures support for anybody to carry out any of these acts on the body of a woman or girl; pursue, prosecute and punish any resident who has committed the crime of FGM, even if the offence was committed outside their borders (extraterritoriality); and adopt legislative measures to allow judges or public prosecutors to take precautionary and preventive measures if they are aware of cases of women or girls at risk of being mutilated.

A few years ago the Council of Europe passed a significant legal act concerning, among other things, the practice of FGM. This is the Convention on preventing and combating violence against women and domestic violence, adopted by the Council of Europe Committee of Ministers on 7 April 2011. The Convention opened for signature on 11 May 2011 on the occasion of the 121st Session of the Committee of Ministers in Istanbul; that is why it is called the Istanbul Convention [28]. It is the first European legally-binding instrument specifically devoted to violence against women. The Convention explicitly makes an act constituting female genital mutilation a criminal offence. This is the first time a document in the form of an international treaty has created a special criminal offence of female genital mutilation. Article 38 of the Convention, entitled 'Female genital mutilation', states: 'Parties shall take the necessary legislative or other measures to ensure that the following intentional conducts are criminalised: a) excising, infibulating or performing any other mutilation to the whole or any part of a woman's labia majora, labia minora or clitoris; b) coercing or procuring a woman to undergo any of the acts listed in point a; c) inciting, coercing or procuring a girl to undergo any of the acts listed in point a.' As given in the Explanatory Report to the Convention, lit. a) criminalizes acts of FGM, including when performed by medical professionals, as enshrined in the WHO World Health Assembly Resolution 61.16 on accelerating actions to eliminate female genital mutilation. Lit. b) covers the act of assisting the perpetrator to perform acts of FGM by coercing or procuring a woman to undergo FGM. Lit. c) criminalizes the act of assisting the perpetrator to perform acts of FGM by inciting, coercing or procuring a girl to undergo FGM. The provision under lit. c) is limited to girl victims only and includes situations where anyone, in particular parents, grandparents or other relatives coerce their daughter or relative to undergo the procedure [29].

At the official website of the Council of Europe, it is stated that many girls and women in Europe are affected or threatened by FGM and this is a fact that has long remained unacknowledged. Girls and women are either at risk of being taken to their parents' country of origin or of undergoing the procedure of FGM in a Council of Europe member state. Further, it is stated that in Europe there is widespread ignorance as to what constitutes FGM and the devastating impact it has on women's lives. They go on to say that the Istanbul Convention recognizes the existence of FGM in Europe and that introducing national legislation on FGM is the first step in recognizing the severity of this practice and

ensuring that such acts are appropriately prosecuted [30]. The Convention requires states parties to criminalize and prosecute, among other behaviours, female genital mutilation, whether the mutilation is carried out in their territory or abroad by or against one of their nationals or permanent residents. States parties shall ensure that their jurisdiction over FGM cases is not subordinated to the condition that the acts of FGM are criminalised in the territory where they were committed (Article 44). This means that the condition of double criminalization (the rcondition of dual criminality) is not applicable. States shall ensure that the offence of FGM is punishable by effective, proportionate and dissuasive sanctions (Article 45). The provision of Article 46 provides for aggravated circumstances that should be taken into consideration at sentencing. Thus, a severe sentence should be imposed on, for instance, re-offenders and in cases where the victim is a child.

The Istanbul Convention is supposed to gain a global extent as it is open for signature by the member states of the Council of Europe and the non-member states which have participated in its elaboration and by the European Union, and for accession by other non-member states. The Treaty entered into force on 1 August 2014, after having been ratified by 10 states, including 8 member states. It establishes a specific monitoring mechanism in order to ensure effective implementation of its provisions by the parties. As of 11 February 2015, the total number of ratifications or accessions is 16. Poland signed the Convention on 18 December 2012 but has not ratified it to date [31].

It is worth mentioning the International Day of Zero Tolerance for Female Genital Mutilation. The day is marked each year on 6 February. Zero Tolerance Day originated on 6 February 2003, when the first lady of Nigeria officially declared “Zero Tolerance to FGM” in Africa during a conference organized by the Inter-African Committee on Traditional Practices Affecting the Health of Women and Children. Since then, this day has been observed around the world [32]. The UN General Assembly in the resolution of 20 December 2012 called upon its member states to continue to observe 6 February as the International Day of Zero Tolerance for Female Genital Mutilation and to use the day to enhance awareness-raising campaigns [33].

The legislative measures made at international and regional levels, as well as many summits [34] and conferences about the negative consequences of female genital mutilation have brought some effects. Studies carried out on the behalf of the WHO indicate that the number of FGM cases worldwide has decreased [35]. It is estimated that there is 33% less chance a girl will be cut today than 30 years ago [36]. The national legislation on criminal law plays an important role in preventing female genital cutting. This is especially important in the continent with the highest prevalence rates of FGM, i.e. in Africa. Most African countries have either laws that specifically prohibit the practice of FGM (for instance, Egypt, Senegal, Tanzania) or no specific laws, but existing general provisions of penal codes which can be applied to FGM [37]. To illustrate the situation in another continent, a case from the United States of America can be examined. In the United States, the first criminal conviction for an act consisting of female circumcision was in January 2006. An Ethiopian immigrant was convicted of the genital mutilation of his 2-year-old daughter and was sentenced to 10 years in prison. According to the factual findings, he used scissors to remove his daughter's clitoris in his family's apartment in 2001. At that time, federal law specifically banned the practice of genital mutilation, but many states did not have a law addressing it. Georgia lawmakers passed an anti-mutilation law in 2005. The accused was not tried under that law since it did not exist when he performed the circumcision. He was found guilty of aggravated battery and cruelty to children [38].

In most European countries female circumcision is punishable as a criminal offence. However, most Council of Europe member states do not have specific legislation on female genital mutilation [39]. A recent study on FGM in the European Union and Croatia showed that in all EU member states, legal provisions dealing with bodily injury, mutilation and removal of organs or body tissue, are applicable to the practice of FGM. In some countries, however, a specific criminal law has been enacted to address the problem of FGM. These countries are, for example, Austria, Belgium, Cyprus, Denmark, Italy, Spain, Sweden and the United Kingdom. In 1982, Sweden was the first European country to adopt specific legislation on FGM. It was followed by the United Kingdom in 1985. It should be emphasized that there is no substantial evidence that specific criminal law provisions are more effective in prosecuting and punishing acts of FGM. The study outcomes showed that a limited number of criminal cases on FGM have been brought to courts in Denmark, Sweden, France, Italy, Spain and the Netherlands and that the majority of these cases took place in France, where FGM is punishable under general criminal law and a specific criminal law on FGM is not deemed necessary. However, a gradual trend across EU member states is the introduction of FGM-specific criminal legislation, as stated in the report [40].

The situation and legislation in the United Kingdom (UK) is worth presenting because this state has carried out many actions, including awareness-raising campaigns, and launched many programs, including prevention programs [41], to face the problem of FGM. In the United Kingdom, clear information on FGM is easily available online and

this is of great practical significance. It is estimated that up to 137,000 women and girls living in England and Wales could have undergone FGM [42]. According to another source, it has been estimated that each year over 20,000 girls under the age of 15 are at risk of FGM in the UK, and that 66,000 women in the UK are living with the consequences of FGM. To help girls and women who have been subjected to FGM, there are a number of specialist clinics within the National Health Service that offer a range of healthcare services, including reversal surgery [43]. To prevent and combat the practice, legislative measures have been established. In English criminal law, female genital cutting has been punishable as a special criminal offence since 1985, when the Prohibition of Female Circumcision Act was passed. In 2003 the Female Genital Mutilation Act was enacted which came into force on 3rd March 2004. It applies in England, Wales and Northern Ireland and does not extend to Scotland where a relevant statute of 2005 is in force. The Female Genital Mutilation Act 2003 changed, among other things, the terminology from circumcision to mutilation. Moreover, it introduced the principle of extraterritoriality, which has the effect that an act is punishable even if committed in a country where the practice is not considered illegal. This statute also increased the maximum penalty for FGM from 5 to 14 years' imprisonment. Under section 1(1) of the FGM Act 2003, 'A person is guilty of an offence if he excises, infibulates or otherwise mutilates the whole or any part of a girl's labia majora, labia minora or clitoris'. Subsection (2) makes an exception for necessary surgical operations and operations carried out in connection with the labour or childbirth. Section 2 provides for an offence of assisting a girl to mutilate her own genitalia ('A person is guilty of an offence if he aids, abets, counsels or procures a girl to excise, infibulate or otherwise mutilate the whole or any part of her own labia majora, labia minora or clitoris.'). However, a girl carrying out an FGM operation on herself does not commit an offence. Section 3(1) establishes an offence of assisting a non-UK person to mutilate overseas a girl's genitalia (A person is guilty of an offence if he aids, abets, counsels or procures a person who is not a United Kingdom national or permanent United Kingdom resident to do a relevant act of female genital mutilation outside the United Kingdom). For example, a person commits an offence when he arranges by telephone from his home in England for his UK national daughter to undergo FGM abroad by a foreign national who is not a permanent UK resident. According to the provisions of the FGM Act 2003, it is also an offence when, for instance, a person in the UK advises his UK national brother over the telephone how to carry out genital cutting of his daughter abroad. Under section (4), there is an offence when, for instance, a permanent UK resident takes his permanent UK resident daughter to the doctor's surgery in another country so that an FGM operation can be carried out [44]. It has been pointed out in the British media that despite FGM being outlawed years ago no-one has been prosecuted so far [45]. The main reason for this has been evidential problems [46] due to the familiar and very intimate character of the issue. It was not until 21 March 2014 that the first UK prosecutions over female genital cutting were announced by the Crown Prosecution Service. It was alleged that following a patient giving birth in November 2012, a doctor at a London hospital repaired FGM that had previously been performed on the woman (by stitching the woman back up (a 1.5 cm stitch), i.e. of sewing up the woman's vagina following the birth, and in this way re-doing the mutilation, i.e. reinstitution of FGM known as reinfibulation, which she suffered as a six-year-old girl in Somalia), thus carrying out FGM himself. The second accused has been charged with the offence of intentionally encouraging FGM. The doctor maintained that it was one simple figure-of-eight stitch to stop the patient bleeding. On 4 February 2015 both accused were acquitted by a jury. Following this, the prosecutors were accused of pursuing a "show trial" and the defense barrister said that the doctor had been "hung out to dry and made a scapegoat" for hospital failings [47].

Poland is a party to many international and European conventions concerning human rights. It ratified, for example, the Universal Declaration of Human Rights, the Convention on the Elimination of all Forms of Discrimination against Women, the Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment and the European Convention for the Protection of Human Rights and Fundamental Freedoms. Poland also signed, but at the moment this paper is written (i.e. February 2015) has not ratified the Council of Europe Convention on preventing and combating violence against women and domestic violence. In Poland, there are no provisions referring *expressis verbis* to female genital mutilation. No legal act enacted by the Polish lawmaker mentions female genital mutilation. Under Polish law, however, there are regulations related to violence against women. The Act on Counteracting Domestic Violence can be seen as the most important act, devoted specifically to this problem [48]. Many provisions of the Family and Guardianship Code aim at the protection of children. There is the National Program for Counteracting Domestic Violence, but it does not mention the problem of female genital cutting. There is no special action plan dealing with female genital mutilation. Moreover, there is not even any data available on FGM prevalence in Poland.

The issue of female genital mutilation in light of Polish criminal law has not been the subject of an analysis made by Polish criminal law researchers so far. The examination of the Polish

criminal law literature has shown that there are no papers on this issue and not even any references to FGM in the commentaries to the Penal Code having as the subject provisions on bodily injury. The examination of the case law has shown that there are also no references to FGM in the judicial decisions. It should be mentioned here, however, that there exists a concise report entitled 'The current situation of female genital mutilation in Poland', available online, which has been made within the framework of the European Institute for Gender Equality and covers the situation as of February 2012 [49]. In this report there is a three-sentence-long reference to criminal law.

The examination of the regulations of Polish law has shown that there is no special criminal law legislation on female genital mutilation. This does not mean, however, that the acts of female genital mutilation could not be prosecuted under Polish criminal law. The research carried out has led to the conclusion that a case of female genital mutilation could be qualified as a type of bodily injury and thus prosecuted. Under Polish criminal law, there are three types of bodily injury that is serious, medium and light. There are three relevant criminal offences in Article 156, Article 157 § 1 and Article 157 § 2, respectively. Prior to a detailed analysis, relevant provisions (or parts of them) of the Polish Penal Code [50] should be presented. Article 156 § 1 states: Whoever causes grievous bodily injury in a form: 1) which deprives a human being of sight, hearing, speech or the ability to procreate, or 2) of another serious crippling injury, a serious incurable illness or a serious long lasting illness, an illness actually dangerous to life, a permanent mental illness, a permanent total or substantial incapacity to work in an occupation, or a permanent substantial bodily disfigurement or deformation is liable to imprisonment from 1 to 10 years. Article 156 § 3 reads: If the consequence of an act specified in § 1 is the death of a human being, the perpetrator is liable to imprisonment from 2 to 12 years. The provision of Article 157 § 1 is the following: Whoever causes bodily injury or impairment to health, other then specified in Article 156 § 1, is liable to imprisonment from 3 months to 5 years. Article 157 § 2 states: Whoever causes bodily injury or impairment to health lasting no longer than 7 days, is liable to a fine, penalty of restriction of freedom or imprisonment up to 2 years. The provisions of both Articles criminalizing unintentional conduct have been left out here as irrelevant in this discussion. It is obvious that the subject of penalization is an intentional act of female genital mutilation. Which of the above given provisions would be applicable in a particular case depends on the form of female genital mutilation. Female genital mutilation of type I, II and III (in medical terminology: clitoridectomy, excision and infibulation) should be qualified as serious bodily injury in terms of criminal law. It seems that female genital mutilation of type IV, so acts such as, for example, piercing or incision, can be generally qualified as medium bodily injury. It seems likely that the consequences of female genital mutilation of this type would last longer than seven days and therefore the act in question would not be covered by Article 157 § 2 which penalizes so-called light bodily injury. However, the right decision can only be taken on a case by case basis and it will depend on expert medical advise. To make it clear, female genital mutilation of type I, II or III is covered by Article 156 § 1 (grievous bodily injury) and female genital mutilation of type IV is covered by Article 157 § 1 (bodily injury and impairment to health). In any form, female genital mutilation is a criminal offence under Polish criminal law.

There are a few specific issues to discuss as to the right legal qualification of the act of the perpetrator. As presented above, Article 156 § 1 of the Polish Penal Code is very casuistic, i.e. its structure is very expanded. At charging and especially at convicting a perpetrator, not only the number of article and/or paragraph, but also the number of point, if applicable, should be given. Moreover, in the justification of judgment, it should be specified what the caused grievous bodily injury consists of. For this reason, a detailed analysis of Article 156 § 1 in reference to the types and consequences of female genital mutilation should be made. A few concrete forms of grievous bodily injury should be taken into consideration. First of all, female genital mutilation can be immediately associated with the deprivation of the ability to procreate. The consequence in the form of infertility may occur, although it does not necessarily follow in every case. The example of the continuity of the African population and of many African women who arrange the cutting for their daughters proves that they are able to be inseminated and to deliver a baby. The long-term health consequences comprise kidney impairment and possible kidney failure. The latter could be recognized as 'another serious crippling injury'. Bearing in mind the above-named possible long-term consequences of female genital mutilation, a serious incurable illness or a serious long-lasting illness also comes into play. To give an example, AIDS is a recognized serious and incurable illness. To be infected with HIV resulting in AIDS is a real danger, for instance when the cutting is performed with the same instrument on a few or more girls during the same ceremony, as often happens.

Even in a case where genital cutting was not followed by a special impairment to health, which can be the case where the mutilation was carried out in an appropriate way, in particular by using a sterilized tool, it can still constitute a kind of grievous bodily injury. When creating the criminal offence of grievous bodily injury and defining its scope, the Polish lawmaker used, among other

things, the aesthetic criterion. Thus, grievous bodily injury may consist of a permanent and substantial disfigurement of the body or a permanent and substantial deformation of the body. It seems that on the basis of this criterion, every female genital mutilation of type I, II or III may be qualified as grievous bodily injury. An analysis is required to state which term, disfigurement or deformation, would be more suitable. At the beginning, it should be noted that little attention has been given to this form of grievous bodily injury in the criminal law literature. The authors, especially those of commentaries to the Penal Code, tend to focus on other kinds of grievous bodily injury. This is possibly because of the greater practical significance of those other kinds. It can be supposed that the judiciary relatively rarely deal with bodily disfigurement or deformation. The examination of many judicial decisions (those of appeal courts and the Supreme Court), which were delivered in the period of the application of the current Penal Code, did not yield to find any judgment related to grievous bodily injury in the form of disfigurement or deformation. In the Polish criminal law literature, disfigurement is usually defined as causing external changes to the body that contradict the commonly accepted esthetic of the body [51]. Disfigurement is associated with the appearance of the body and does not consist of an anatomical change [52]. Deformation consists of causing changes in the anatomical shape of the body [53]. These changes modify the normal shape of the body [54]. Both disfigurement and deformation may concern any part of the body and not only the face or other usually uncovered body parts [55]. However, they have to be substantial to be caught by the criminal offence of grievous bodily injury. Moreover, both disfigurement and deformation have to be permanent, as provided for in Article 156 § 1 of the Penal Code. The feature 'permanent' is not to be understood as irreversible. It does not matter for the liability of the perpetrator that disfigurement or deformation can be repaired through an operation [56]. It is commonly known that the achievements and possibilities of contemporary plastic surgery are very high.

It is not always easy to differentiate between disfigurement and deformation. They are both very evaluative features. As to the issue of female genital mutilation, it seems that deformation rather than disfigurement comes into play. It should be emphasized that disfigurement is a more evaluative feature than deformation. The anatomical structure of the body of both men and women is identical throughout the world. There are, of course, differences in posture and shape of particular body parts, so some ethnic or racial groups have typical distinguishing features. Thus, deformation is easier to catch and is less disputable. Furthermore, there are different modes of perception of what beauty is. What is beautiful for one group of people can be ugly and nasty for another group. And so it is in the case of female genital mutilation. Genital parts of a woman's body are appreciated in the vast majority of communities and people groups worldwide. However, they are considered bad and ugly in many African communities which practice female genital mutilation. One of the reasons for mutilation is a wish to make a girl beautiful. Moreover, there is a common belief that there is something bad between a woman's legs which has to be cut out. In conclusion, any form of female genital mutilation of type I, II or III, even only partial removal of the clitoris, should be classified as deformation of a woman's body. It follows from this conclusion and the above statements that particular kinds of grievous bodily injury may coincide in a given case. From the perspective of criminal law, there may be cases where a perpetrator causes two or more results described in one provision. What is important is that the perpetrator has caused a grievous bodily injury. This fact, however, should be reflected in the judgment justification. Furthermore, the extent of criminal consequences of an act should be taken into account at sentencing.

If a consequence of genital mutilation is the death of a woman or girl, the perpetrator shall be punished with a more severe penalty. There are two different possible situations. Firstly, in a criminal proceedings, the perpetrator's behaviour would be qualified as the criminal offence described in Article 156 § 3 of the Penal Code if he carried out female genital mutilation of type I, II or III, so one of those forms which can be covered by grievous bodily injury. The second situation seems to happen more rarely and is not covered by one provision of the Penal Code. Bearing in mind many possible forms of female genital mutilation are classified as type IV, it is not excluded that the victim dies of the effects of genital mutilation of type IV because of infection or bleeding. In such a case, the perpetrator's behaviour would be qualified as the criminal offence described both in Article 157 § 1 and Article 155 of the Penal Code. Article 155 states: Whoever unintentionally causes the death of a human being is liable to imprisonment from 3 months to 5 years. To put it simply, a perpetrator intentionally performs female genital mutilation but he does not intend to cause the woman death, which, however, occurs.

With regard to the phenomenon of female genital mutilation, it is particularly important to ensure that acts of female genital cutting are criminalized under Polish criminal law irrespective of the place of their performance. The experience of European states with a higher percentage of foreign population and having the collected data on FGM prevalence rates shows that it is common practice to take a girl abroad to the country of origin of her parents or grandparents to be cut there. This usually happens during the summer holidays, so the girl has time to heal before returning to school. There are

even the terms 'cutting holidays' and 'cutting season' in use to refer to this practice [57].

According to the principle of territoriality, described in Article 5 of the Polish Penal Code, acts of female genital mutilation would be prosecuted if committed in the territory of Poland, irrespective of the nationality of the perpetrator. The criminal responsibility for offences committed abroad is regulated in Chapter XIII. of the Polish Penal Code. The first rule states that the Polish statutes on criminal law are applicable to a Polish national who commits an offence abroad (Article 109). It should be here noted that statutes on criminal law include the Penal Code and other legal acts containing provisions on criminal law. So, if a Polish national takes his daughter to Africa and there carries out mutilation on her, he commits an offence which is punishable and may be prosecuted under Polish criminal law. In a case where a foreigner, i.e. a person who does not have Polish nationality, carries out female genital mutilation abroad, i.e. outside the territory of Poland, there are two situations to differentiate. First, a foreigner mutilates the genitals of a girl who is a Polish national (Article 110 § 1). Second, a foreigner mutilates the genitals of a girl who does not possess Polish nationality (Article 110 § 2). In both situations, the Polish statutes on criminal law are applicable to this foreigner, i.e. he is punishable and may be prosecuted under Polish criminal law. However, there is a requirement applicable to the second situation, namely, the perpetrator stays in the territory of Poland and it has not been decided to extradite him. Furthermore, Article 111 § 1 of the Polish Penal Code sets a condition which has to be met to prosecute an offence committed abroad. This is the condition of double criminalization, also called the requirement of dual criminality. Thus, the prosecution of both a Polish national and a foreigner depends on the criminalization of female genital mutilation in the state where the act took place. This condition is not applicable to a Polish public functionary who commits an offence in connection with performing his duty or to a person who commits an offence in a place being under jurisdiction of no state, for example, in Antarctica (Article 111 § 3). The conclusion is that in the current state of the law, the admissibility of prosecution in Poland of female genital mutilation carried out abroad depends on the criminalization of female genital mutilation in a given state. Thus, Polish law does not give adequate protection to every potential victim of female genital mutilation, despite the fact that many states, including states in Africa, where the FGM prevalence rate is the highest, have criminalized female genital mutilation. The Polish legislator has to amend the Penal Code to ensure that acts of female genital mutilation are punishable in every case, wherever they are committed. This aim could be achieved by the inclusion of female genital mutilation into Article 112 of the Penal Code, which relates to only a few offences described in it and enshrines the applicability of the Polish statutes on criminal law and thus the criminal prosecution irrespectively of provisions applying in the place where the act was committed. However, it will not be necessary in the case of the ratification of the Istanbul Convention by Poland. In this case, Poland as a party to the Convention would be obliged to criminalize acts of female genital mutilation. According to Article 113 of the Polish Penal Code, the principle of double incrimination is not applicable to offences which have to be prosecuted by Poland by virtue of an international agreement.

CONCLUSIONS

In Poland, there is little knowledge on the subject of female genital mutilation. In fact, the mass media only provide some information on cases abroad from time to time. For example, on 6 February there was some mention in the media of the International Day of Zero Tolerance for Female Genital Mutilation [58]. The phenomenon of female genital mutilation is seen as a foreign problem and not ours. It is thought of as something happening in Africa, far away. It is even widely believed that the phenomenon of female genital mutilation does not exist in Poland. However, it can be supposed that similar ways of thinking existed in other member states of the European Union prior to women who had been subjected to female genital mutilation beginning to appear in hospitals to deliver babies. An explanation for this attitude of Polish people is a relatively small number of foreigners in Poland. In fact, immigration to our country of people, especially women, from countries where genital cutting is a common practice, is very limited. According to the data of the (Polish) Central Statistical Office and the Eurostat, as of 2011 foreigners made up only around 0.15% of the population of Poland. The percentage of foreigners in Poland was the lowest in the European Union [59]. The statistical data collected by the (Polish) Office for Foreigners shows that at the end of 2013, around 121,000 foreigners had permission for residency, which made up around 0.3% of the population of Poland [60]. The vast majority of foreigners do not come from countries with a high FGM prevalence rate. From this, however, the conclusion should not follow that female genital mutilation does not occur in Poland. The nature of this crime should be kept in mind and therefore the occurrence of the so-called 'dark number' or 'dark field' should not be forgotten. Moreover, it should be noted that foreigners coming to Poland from the European Union states may have European Union citizenship and therefore be classified as such, even if they are of African origin. It is interesting to mention that the number of current applications for permission for residency in Poland

on the grounds of marriage with a Polish citizen is increasing and the applications are mostly from Turkey, Nigeria, Egypt and Tunisia [61]. As we know, some of these countries are heavily affected by the phenomenon of female genital mutilation.

It may be true that the risk that any given girl or woman will be subjected to genital cutting in Poland is low. However, it is very important to prevent the phenomenon of female genital mutilation even if only one girl or woman was in danger of being subjected to genital circumcision. Health care workers have to be prepared for how to deal with cases of female genital mutilation. This affects not only gynaecologists and midwives, but also other medical professionals. The consequences of female genital mutilation are of a varied nature and include chronic infections and the like. Psychological assistance is important as well. An awareness-raising campaign addressing the general public must be made in the media. Furthermore, training for health care workers and teachers, in particular those employed in nursery schools, needs to be conducted, so they are careful and sensitive to the problem of female genital mutilation. An informative action should be undertaken irrespective of any change in the field of criminal law. It will be more effective than any legislative change. An awareness-raising campaign, aiming at a deterrent effect, must specifically target groups of potential perpetrators. It seems enough to say clearly that female genital mutilation is a criminal offence and is severely punishable, without giving the number of the article in the Penal Code; the name of the offence, whether a special offence of female genital mutilation or an offence of grievous bodily injury, has much lesser importance for laypeople.

To summarize the legal aspects, the following should be stated. Female genital mutilation is punishable under Polish criminal law. In the current state of the law, female genital mutilation is a criminal offence and can be prosecuted as a form of grievous bodily injury (which it seems would be the case in most actual situations) or as a form of bodily injury and impairment to health. Thus, female genital mutilation is punishable under general criminal law provisions. There is no special legislation on female genital mutilation. One could consider it desirable to create a special criminal offence of female genital mutilation. It could be argued that the introduction of such an offence to the Penal Code would make female genital mutilation more recognizable and its criminality more obvious. On the other hand, it can be argued that the example of some other European states provides no evidence for an increase in the effectiveness of the prosecution in the case of special legislation. The situation in France and in the United Kingdom, presented above, confirm this thesis. To conclude, it is up to the legislator to decide whether it is rational to create a new criminal offence. In the current situation in Poland, where, fortunately, no cases of female genital mutilation appear in courts and therefore no potential legal problems arise, it seems more important to prevent female genital mutilation through performing an adequate awareness-raising campaign, among other things through informing new foreigners granted with asylum or the right to residency about the criminality of carrying out female genital mutilation. However, as indicated in the above analysis, a legislative action is needed to ensure that acts of female genital cutting are punishable irrespective of the place of their commission. Thus, the Polish criminal lawmaker has to amend the Penal Code and to abolish the condition of double criminalization as regards female genital mutilation.

Conflicts of interest

None to declare.

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The extent and manner of passing the information concerning the surgical implantation of cells, tissues or organs to the recipient of the transplant under the Polish law

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ABSTRACT

The purpose of article is to present, analyse and evaluate the effective legal regulations concerning the extent and manner of passing information about surgical implantation of cells, tissues or an organ to the recipient of the graft. The prospective recipient of the graft should possess extensive knowledge concerning the suggested medical intervention by way of implantation of cells, tissues or an organ as well as data regarding the subsequent medical procedures that follow. Therefore, information obtained by the patient ought to be as exhaustive as possible. That is to say, it must contain any data that would enable the prospective recipient to make a reasonable decision whether to agree to the intervention or not while being fully aware of what they give their consent to and what might be expected. Information should be presented in a manner that is intelligible and comprehensive for the prospective recipient of transplant, which shall be assessed individually, on the basis of current intellectual abilities of the patient.

Key words: transplantation, legal regulations, recipient, patient, medical law

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INTRODUCTION

Transplantation surgeries constitute a common medical practice in Poland. They are thought to be an effective method of treatment in case of extreme failure of organs. Organs which can be transplanted include kidneys, liver, heart, pancreas, lungs or intestines. Multi-organ transplantations are also possible. For many patients transplantation is a chance to save life or restore health. One should bear in mind, however, that such surgeries are extremely complicated and involve risk, as it often happens. There is considerable danger of the occurrence of adverse complications in the recipient's condition, including death. The application of medical treatment by way of implantation of cells, tissues or an organ involves a risk not only during the surgical intervention itself but also afterwards, during further procedures which are aimed at reducing the possibility that the graft is rejected. This is connected with the necessity of taking medication by the recipient until the end of their life. Thus, the patient's decision regarding the application of this method of treatment must be deliberate and made on the basis of exhaustive information so as it could be fully aware. Due to the fact that transplantation intervention is a specific kind of surgery, the extent and manner of passing information to the prospective recipient of the graft is vitally important.

The focus of this paper is the presentation of legal regulations concerning the extent and way of passing information about the implantation procedure of cells, tissues or an organ to the recipient of the graft which are effective in Poland.

The purpose of article is to analyse and evaluate the aforementioned legal regulations.

MATERIALS AND METHODS

The following sources have been used herein: the Act of 1 July 2005 on Recovery, Storage and Transplantation of Cells, Tissues and Organs [1]; the Act of 5 December 1996 concerning the Professions of General Practitioner and Dental Practitioner [2]; the Act of 6 November 2008 on Patient's Rights and on Patients' Ombudsman [3].

The research method applied herein is a dogmatic-legal one, which consists in analyzing effective legal regulations. The discussion of the content of legal norms is accompanied by the review of the jurisprudence and judicial decisions.

RESULTS AND DISCUSSION

1. General remarks

Surgical transplantation of cells, tissues and an organ is a specific medical treatment. Owing to its nature the legislator passed a separate legal act that contains legal provisions concerning this kind of surgery. The circumstances and preconditions allowing for the transplantation to be performed have been set out in detail in the Act of 1 July 2005 on Recovery, Storage and Transplantation of Cells, Tissues and Organs, hereinafter referred as Transplantation Act [1]. The aforesaid regulations refer to both the recipient and the donor of the graft. The Act determines, among other things, the extent of information which should be passed to the prospective recipient of the graft. It seems important to point out that, whereas the extent and manner of passing information to the prospective donor of the transplant is strictly defined in the Act, the provisions regarding the recipient are very concise and contained exclusively in Art. 12 section 1 paragraph 9 of the Transplantation Act [1], pursuant to which the prospective recipient should be informed about "the risk involved in the procedure of removing cells, tissues or an organ as well as about the possible consequences of the removal for the condition of the donor". In connection with the above, a number of questions arise, e.g. should information for the prospective recipient be restricted to this extent? Are these two items of information sufficient for the prospective recipient to make an informed decision regarding his or her undergoing a surgical implantation of cells, tissues or an organ? Moreover, in the Transplantation Act there is no provision regulating the way of passing information to the prospective recipient of the graft. Thus, a fundamental question emerges: what kind of information about surgical implantation of cells, tissues or an organ ought to be given to the recipient of the transplant? And in what manner must information be passed under the Polish law?

Transplantation surgery of cells, tissues and an organ is a specific medical treatment that is carried out mostly subject to the provisions of Transplantation Act [1]. Other legal regulations set forth in separate legal acts are also applied, even if to a limited extent. Particularly, such provisions are contained in the Act of 5 December 1996 on the Professions of General Practitioner and Dental Practitioner, hereinafter referred as Medical Profession Act [2], and in the Act of 6 November 2008 on Patient's Rights and on Patients' Ombudsman, hereinafter as the Act on Patient's Rights [3]. One should not disregard the fact that implantation of cells, tissues and organs is a medical treatment characterized by increased risk. In many cases it involves surgical treatment during which doctors and other persons assisting them are obliged to follow all procedures specific for each medical intervention. Legal preconditions for carrying out medical interventions are set out in the Act of 5 December 1996 on the Professions of General Practitioner and Dental Practitioner. The said Act, among others, imposes an obligation to

obtain the patient's consent for the medical intervention and defines the kind of information the patient should be provided with. Furthermore, it must be pointed out that the recipient of the graft is a patient who enjoys certain rights, including the right for information and the right to give informed consent for a medical intervention. The provisions set out in the aforesaid acts apply to transplantation surgery as regards the matters not regulated, or regulated in a limited scope, in the Transplantation Act, having regard to the nature and essence of carrying out transplantation surgery of cells, tissues and organs.

2. The extent of information concerning implantation surgery involving cells, tissues or an organ to be passed to the recipient of the graft

Informing the patient is a statutory obligation. Pursuant to Art.34 read with Art.31 section 1 of the Medical Profession Act [2] and corresponding as for the content with Art. 18 section 2 read with Art. 9 section 2 of the Act on Patient's Rights [3], medical intervention may only be performed after obtaining the patient's consent, prior to which the doctor is obliged to provide him or her with information regarding their state of health, diagnosis, suggested and possible diagnostic or medical methods, foreseeable consequences of their application or desistance, the effects of the treatment and prognosis. Moreover, subject to Art. 13 section 1 par. 9 of Transplantation Act [1], the doctor is obliged to inform the recipient of the graft about the risk involved in the procedure of removing cells, tissues or an organ as well as possible consequences of such removal for the donor's health.

Irrespective of the fact that the legal regulation seems quite explicit, it is a complex issue to define the necessary extent of information to be passed in order to allow for an assumption that the recipient's consent given on such basis is fully informed. While analyzing the issue a number of concerns may arise. Particularly, it should be noticed that "the extent of information passed to the sick person might vary depending on their intellectual abilities, frame of mind and sensitivity but also on the kind of medical intervention, its urgency and necessity [4].

The patient, among other persons also the prospective recipient of the graft, must be informed in particular about their state of health, diagnosis, suggested but also alternative methods of treatment that may be applied. Due to the fact that not every method of treatment is in common use in Poland, one may wonder whether the doctor is obliged to take into consideration also the methods of treatment which are not in domestic practice, but may be offered by foreign hospitals. Such methods, even if well-known to the doctor and far more effective, are not used in Poland for various reasons, mostly due to the lack of specialized equipment or shortage of financial resources. The above may refer to medicaments, which are only available abroad and the patient might import them on their own account. Reflecting on this issue, with particular regard to the nature and consequences of transplantation surgery, one may conclude that the patient should enjoy the right to exhaustive information concerning all methods of treatment available worldwide so as they could consciously make a well-informed decision. One cannot exclude the possibility that the patient has the opportunity to obtain medical help abroad. The patient's right to free choice cannot be limited. It should be unconditionally up to the patient what decision will be made. So that the decision could be well-informed, the patient must be exhaustively informed by the doctor, both in respect to any possible methods of treatment which can be applied in this case, but also about all the consequences that may result from each method, including the extent and scope of potential complications. The patient must be able to consciously participate in the choice of the optimal method in their case. As it is emphasized in judicial decisions, if the doctor mentioned here above fails to comply with the obligation to inform the patient, then Art. 31 of Medical Profession Act [2] is in breach. Such failure also deprives the patient of their right of choice and participation in decision-making process in respect to the way of treatment. Thus, "standard consent" for a medical intervention to be carried out by use of one of available methods cannot be considered as "informed consent" [5]. This approach deserves approval. After all, it is vitally important that the patient, being able to take advantage of a several alternative ways of treatment, should choose the one which is the most beneficial for him or her and involves the least possible inconvenience. It seems proper to emphasize that every human being is unique and the same method of treatment, even if in principle from medical point of view appears the most advantageous, for many reasons may not be the best choice in case of a particular patient. It is the patient that should decide whether to choose this method because this decision could affect the whole life of the patient. Obviously, the doctor must assist the patient in the decision-making process. The above refers also, or even mainly, to a patient whose life or health can be saved, among other methods, by transplantation of cells, tissues or an organ.

What is more, pursuant to Art.31 section 1 of the Medical Profession Act [2], a doctor should inform the patient about foreseeable consequences of applying a specific method of treatment. This information is of great importance for the person who is about to make a decision whether to undergo transplantation surgery. Having regard to the

specific nature of transplantation, the prospective recipient of the graft ought to be aware of the consequences of the implantation surgery itself as well as be informed about further treatment which is one of the inevitable consequences of implantation surgery. The treatment is not over at the moment of performing the transplantation surgery, but requires further procedures, i.e. taking certain medicaments. Hence, there may appear a query what can be understood by the term "foreseeable consequences". What kind of consequences of surgical transplantation must be revealed to the prospective recipient of the graft by the doctor? It is not clear whether it concerns all consequences that may be imagined, including the unusual and uncommon ones whose occurrence is not likely, or rather only the typical consequences within the average risk that is inherent to performing the aforesaid medical intervention. This issue is quite controversial and it used to be analyzed in many judicial decisions.

In its decision of 28 September 1999, the Supreme Court awarded that the doctor should inform the patient about all the consequences of the medical intervention, both those which "are normally the result of the intervention, i.e. desirable and compliant with the purpose of treatment, and others which are considered side-effects". In the opinion of the court, information ought to include in particular these consequences which are predictable, especially if such consequences consist in a significant and material detriment to health and which - as side-effects - occur rarely or sporadically but cannot be excluded, and ought to estimate the degree of probability of their occurrence. In such event it can hardly be required that information enumerates all the possible symptoms of the consequences caused by the medical intervention and contains their description. It is sufficient that the patient receives general information about the kind of possible consequences of the surgery, whether they pose a threat to the patient's life and how they may affect correct functioning of the patient's body [6].

In another decision the Supreme Court adjudicated that it cannot be expected that the doctor notify the patient about all complications that may occur, particularly about those which occur exceptionally. The Court clarified that such a warning could result in unnecessary deterioration of the patient's condition and it might lead to unjustified refusal to give consent for the surgery [7]. In the decision of 20 November 1979, likewise, the Supreme Court decided that the doctor should explain the typical consequences of the surgery to the patient, but he or she need not, or even should not for the sake of the patient's well-being and health, acquaint the patient with atypical consequences, not connected with the standard risk involved in the surgery, which may happen in case of rare undesirable complications [8]. The said line of judicature has been maintained up to now. The Supreme Court in its decision of 8 July 2010 stressed the fact that one cannot expect from the doctor to warn the patient against all potential complications, especially those which happen extremely rarely and are of incidental nature. A similar position was expressed in other court decisions [9,10,11]. Thus, in judicature there has been consolidated a concept according to which it is admissible, or even advisable, to limit information passed to the patient so as not to exceed the scope of typical and usual consequences of the surgery.

On the other hand, it seems important to point out that adopting the criteria of commonness regarding the results of the medical intervention still leaves a lot to desire and is not precise enough. There might be a number of concerns related to the extent of information to be obtained by the patient. Undoubtedly, it is vital to determine the meaning of 'usual' or 'typical' consequences of surgical implantation of cells, tissues or an organ. As it is stressed by jurisprudence, the criterion of 'being typical' first appeared in German research, according to which this term refers to risks known to medicine but of relatively low frequency. Practically, 'the range of commonness' used to be apprehended as 'rigid average', very often presented by measure of percentage, which does not reflect the facts due to the development of medicine and varied professional skills of the team responsible for the surgery. Therefore, incident rate for an outstanding specialist could equal to 1% but for other doctors – to 5% or more. It has also been noticed that development of technology in medicine results in some changes in risk assessment. The level of risk which may be considered typical becomes modified with time [12]. Having regard to the above, one should admit that the notion of 'being typical' must be assessed on an individual basis in each case. It seems necessary to take into consideration all circumstances, such as in particular the patient's state of health and coexisting diseases that may affect the risk involved in the medical intervention, medical qualifications and experience of the operation team as well as the medical equipment used in the hospital.

Yet one more fact needs to be emphasized, namely – that the patient should be informed about the possibility of adverse consequences of operation which, even though infrequent, are gravely hazardous for the patient's health or pose a threat to his or her life [11]. The above mentioned opinion of the Supreme Court, which can hardly be contested, becomes justified especially in case of transplantation surgeries, where possible complications may often result in serious adverse consequences for the recipient of the graft, including such consequences that put the patient's health or even life at risk. Undeniably, the recipient

of cells, tissues or an organ should be aware of the possibility of such complications of the operation.

Moreover, in the judicial decisions another fact is pointed out – there is a difference in the doctor's obligation to inform the patient about possible complications of the planned operation. The situation is incomparable when it comes to an operation aiming at improving health and when the operation is necessary to save the person's life. In the latter case, the doctor must not inform the patient about facts which could adversely affect the patient's frame of mind and thus increase the risk involved in the operation [13]. In the court's assessment, the extent of information to be passed to the patient depends also on the nature of the surgery, i.e. whether in this particular case the indications for the transplantation are absolute – it is a life-saving operation – or the indications are relative [14,15].

According to the Supreme Court, in the event of operation which is absolutely necessary, the doctor should explain to the patient only the purpose and kind of surgery as well as its typical consequences [5,14]. In the court's opinion, for the sake of the patient's well-being and health, the doctor needn't, or even ought not, acquaint him or her with atypical consequences, beyond the normal risk involved in the surgery, which might occur in exceptionally complicated cases. If the operation is necessary to save the patient's life, the doctor ought not inform the patient about complications which occur only sporadically because this could adversely affect the patient's morale and lead to unjustified refusal to give consent for performing the operation or increase the risk involved in the operation [10,13]. In the Supreme Court's view, in case of life-saving medical intervention it does not follow from the obligation to provide the patient with information pursuant to Art. 34 section 2 read with Art. 31 section 1 of the Medical Profession Act [2] that all possible effects of the operation must be enumerated [16]. Such an approach, as it appears, allows for restricting information provided to the patient and, consequently, enabling the doctor to decide about the extent of information, in a way. Therefore, the patient's picture of the facts will not be sufficient and their decision will not be fully informed. It is vitally important in case of the recipient of transplant since quite often transplantation is a life-saving intervention. As it was mentioned before, the method of treatment entails considerable risk of which the patient should be aware. While making such an important decision, it seems essential that the patient should be in possession of all information which may enable them to make a proper choice. For the above reasons, one may reasonably assume that the prospective recipient of the graft should have the extensive knowledge of the suggested surgical implantation of cells, tissues or an organ as well as the subsequent medical procedures. Therefore, information obtained by the patient must be as exhaustive as possible and concerning foreseeable consequences of applying or failing to apply transplantation as a form of medical treatment. The doctor is not obliged to inform the patient about exceptional, unlikely or unexpected consequences of the intervention [17]. Additionally, it seems that the technical issues, complex medical procedures and irrelevant details having no impact on the patient's consent might be ignored. The abundance of useless information is likely to hinder the patient from selecting information that is essential for them. It would be advisable to inform the prospective recipient mainly about life-threatening complications or those of particularly hazardous nature. Importantly, information passed on a standard basis ought to be accompanied by the data which is material for the individual patient. The sick person must be informed about any circumstances that may affect their decision [18]. Obviously, information should be passed in a way that does not have adverse impact on the patient's morale leading to unjustified refusal of consent for the transplantation.

Let us notice that the court's position according to which it is admissible to diversify the extent of information depending on the significance of a particular doctor's action for the patient's life and health (i.e. the kind of indications for performing this action) arouses some objections in doctrine. According to M. Świderska, a circumstance that a certain intervention is a life-saving surgery should not lead to the exclusion of reliable information. As it is argued by the Author, 'this is not sufficiently justified by so called patient's welfare interpreted exclusively from the point of the medical ethics' principle *salus aegrotii suprema lex esto'* [19]. The court's standpoint was also challenged by P. Daniluk, who claims that 'it is based on paternalist rationale and allows for limitation of information for the sake of peculiarly interpreted welfare of the patient' [20]. In the Author's view, one cannot approve of, as it is a far-reaching interpretation, an approach that the practitioner not only is under no obligation but also is not expected to pass exhaustive information to the patient in the event such action could adversely affect the patient's morale and consequently result in their decision not to undergo a life-saving treatment. An approach like this entitles the doctor to unauthorizedly make the extent of information contingent upon the kind and significance of this particular surgery [20]. According to M. Nesterowicz it cannot be required that the practitioner notify the patient about all complications which might occur, especially about the ones happening 'extremely seldom'. The way of instructing the patient upon obtaining their consent for the intervention must depend on the kind of

surgery [21]. Simultaneously, the Author declares that the patient ought to be informed about the consequences of the treatment and the degree of probability that they might occur, in particular if they cause major and substantial health deterioration, regardless of how infrequent or sporadic they might be [22]. In M. Nesterowicz's opinion, which can hardly be challenged, the practitioner must find balance between the patient's right to be informed and the obligation not to cause harm by "excessive information which may rarely become fact" [4]. As far as it concerns the recipient of the graft, M. Nesterowicz unambiguously concludes that such person should be informed by the doctor about the full hazard and all consequences of the surgery, including those more or less probable but nevertheless typical and fairly likely to occur [23].

To sum up the discussion regarding the extent of information about the transplantation treatment in relation to the prospective recipient of the graft, it seems proper to point out that the purpose of passing information to the patient prior to the intervention is to acquaint the sick person with their state of health and consequences of treatment. Therefore, information must contain any data that may enable the patient to make a decision whether or not give their informed consent for the treatment while being fully aware of what they agree to and what may be expected. It is necessary that the patient know what their consent entails and be aware of the risk involved in the medical intervention and its consequences, especially those which may result in grave complications, not excluding life-threatening ones. The principle of the patient's right for the truth is in force and the obligation to comprehensively inform the patient burdens the doctor [10]. The extent of the obligation to inform the patient depends on what a reasonable person in the prospective recipient's position should realize so as to be able to make an informed and prudent decision whether to undergo the suggested treatment [24].

Moreover, in *ex vivo* transplantation, it is the doctor's responsibility to inform the recipient about risk involved in the procedure of recovery of cells, tissues or an organ as well as about possible consequences of the recovery for the donor's state of health. Extending the scope of information with the details specifying the consequences of explantation on the part of the donor is supposed to make the recipient aware of the fact that their decision concerns not only themselves but also causes some implications for another person. The obligation to inform the patient in this regard follows from the nature of transplantation surgery in which both persons participate - the recipient and the donor.

3. The manner of passing information about surgical implantation of cells, tissues or an organ into the recipient's body

In the Transplantation Act [1] there are no legal regulations determining the way of passing information concerning surgical implantation of the graft in regard to the recipient. Therefore, the provisions of the Medical Profession Act [2] and the Act on Patient's Rights [3] shall apply.

Pursuant to Art. 34 section 7 read with Art. 31 section 1 of the Medical Profession Act [2] and Art. 9 section 2 of the Act on Patient's Rights [3], there exists an obligation to pass 'intelligible' information. However, it needs to be stressed that in no legal act does the legislator set out what should be understood by this term. Hence, it is the right thing to reflect on the way of passing information to the prospective recipient of the graft so that it can be described as 'intelligible'. This issue appears vitally important as the failure to provide 'intelligible' information is equivalent to the lack of the patient's informed consent for the treatment [24].

It is stressed in the jurisprudence that 'intelligible' information is such that is comprehensible for the patient [28]. However, as it follows from the practice of the Patients' Rights Ombudsman Office, 'patients often have difficulties understanding the content of the consent which they sign, due to specialist or vague terminology that is used in such documents' [26]. So as to be passed in a comprehensive way, information should be adjusted to intellectual capacity of the specific patient, their ability to comprehend both the facts put forward and words used by the doctor [27]. Then, the extent of information provided to the patient can vary depending on this particular person's needs and abilities [27,29]. At the same time, it must not be overlooked that hermetic professional jargon is not appropriate in this situation since, basing on various *terminus technicus* might be incomprehensible for the general public' [29]. The practitioner should, as long as it is possible, use simple expressions and avoid so called professional jargon, i.e. medical terms or phrases known to the medical professionals only [30]. One ought to use such words, terms and phrases that the prospective recipient of the graft is able to fathom given their intellectual capacity, age, education as well as concentration level. As it is stressed by M. Świderska, not the professional value of the communication is substantial here but its comprehensibility [25].

One needs to bear in mind that the way of passing information must be adjusted to the specific situation. Information ought to be presented to the prospective recipient of the graft in a straightforward manner, which is to be assessed individually, on the basis of current intellectual

ability of this patient. It seems impossible to conceive a model or standard explanation pattern which, when followed, guarantees that information complies with the requirement of 'intelligibility'. The practitioner should take into account the fact that information that is clear for one person might be absolutely incomprehensible for someone else [30].

The doctor is obliged to inform the patient in a true and fair manner. Any attempt of manipulating the patient is unacceptable [29, 30]. The prospective recipient of the transplant should understand what he or she is giving consent to and what choice is being made.

Although such obligation does not directly follow from legal regulations, it appears proper to pass information about the surgery to the prospective patient in the course of individual conversation. The above does not exclude the possibility of handing over a brochure or leaflet concerning the transplantation as a treatment method, which provides a chance to broaden the patient's knowledge that subsequently might be useful while making the decision as for the treatment method. One needs to emphasize, however, that the said brochure is only an auxiliary means [25]. It may prepare the patient for the conversation with the doctor, but it may not replace such personal communication. In the course of conversation the prospective recipient of cells, tissues or an organ has the chance to ask questions and have their ambiguities clarified.

Information for the prospective recipient of transplant may be passed orally. There is no provision of law that requires written mode. However, one cannot exclude the possibility that there are no questions on the recipient's side. Here, it must be noticed that in the event that the prospective recipient of transplant does not ask the doctor any questions, one cannot treat it as equivalent to their resignation of being informed. The patient has the right to expect that they obtain information sufficient for making the decision whether or not undergo a surgical implementation of cells, tissues or an organ without requesting for it.

CONCLUSIONS

The extent and manner of passing information about the surgical implantation of cells, tissues or an organ into the recipient's body stems from the legal regulations set forth in the following acts: the Act of 1 July 2005 on Recovery, Storage and Transplantation of Cells, Tissues and Organs [1]; the Act of 5 December 1996 concerning the Professions of General Practitioner and Dental Practitioner [2]; the Act of 6 November 2008 on Patient's Rights and on Patients' Ombudsman [3]. The prospective recipient of transplant, in compliance with the law, should be informed about the state of health, diagnosis, suggested and possible diagnostic and treatment methods, foreseeable consequences of their application or failure to apply, treatment results, prognosis, risk involved in surgical removal of cells, tissues or an organ and its possible consequences for the donor's health.

The prospective recipient of the graft should possess extensive knowledge concerning the suggested medical intervention by way of implantation of cells, tissues or an organ as well as data regarding the subsequent medical procedures that follow. Therefore, information obtained by the patient ought to be as exhaustive as possible. That is to say, it must contain any data that would enable the prospective recipient to make a reasonable decision whether to agree to the intervention or not while being fully aware of what they give their consent to and what might be expected.

Information should be presented in a manner that is intelligible and comprehensive for the prospective recipient of transplant, which shall be assessed individually, on the basis of current intellectual abilities of the patient.

Conflicts of interest

None.

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A rare case of severe cognitive impairment which prolonged after first lacunar infarct in right internal capsule

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ABSTRACT

Lacunar infarcts have been defined as small lesions within a diameter of 1.5 centimeters causing mild symptoms. However, we treated a patient showing prolonged, severe disturbance of the cognitive function after a lacunar infarct. The 85-year–old woman was found lying on the floor of her house, and she was transported to our hospital. Computed tomography (CT) revealed a right lacunar infarct, and magnetic resonance imaging (MRI) showed severe periventricular hyperintensity (PVH) of her brain. Her severe consciousness disorder showed improvement, but severe cognitive impairment including disorientation remained when she was transferred to another hospital. These findings suggested that the reserve capacity of her brain was minimal. The addition of a lacunar infarct to a severe situation like this might induce severe cognitive impairment. **Key words:** lacunar infarct; periventricular hyperintensity; poststroke dementia

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INTRODUCTION

Strokes are divided into three types: cardiogenic, atherothrombotic, and lacunar infarcts. Cardiogenic infarct is caused by emboli from the heart. Atherothrombotic infarct occurs due to occlusion caused by thrombus formation on arterial walls or thrombus separation from arterial walls such as in the internal carotid and middle cerebral arteries. Lacunar infarct occurs due to occlusion caused by a microthrombus or lipohyalinosis in a penetrating artery in the basal ganglia, thalamus, and pons. In addition, the diameter of a lacunar infarct is less than 1.5 cm; therefore, the symptoms are mostly mild [1,2].

However, if lacunar infarcts occur repeatedly or frequently, they may lead to cognitive impairment or dementia [1,2]. Some causes of cognitive impairment or dementia induced by repeated lacunar infarcts have been suggested. One is a diffuse white-matter lesion, and another is subclinical Alzheimer's disease. These may be associated with cognitive impairment or dementia caused by repeated lacunar infarcts [1].

We encountered the rare case of an elderly patient who showed marked deterioration of the cognitive function and prolonged cognitive impairment after her first lacunar infarct at the right internal capsule. We discuss the cause of the symptoms.

Case presentation

The patient was a right-handed, 85-year-old woman. Since she had been living alone without difficulties or problems, and her family considered that her cognitive function was within the normal range. One evening, a visitor found her lying on the floor of her house, and the left corner of her mouth was sagging. Therefore, stroke was suspected and she was transported to the emergency department of our hospital. She was in a semicoma during transportation; that is, she showed the avoidance of painful stimulation by withdrawing her upper limbs, indicating a consciousness level of 100 on the Japan Coma Scale (JCS) [3].

On admission, her blood pressure was 161/86 mmHg, pulse was 71 beats per minute, and oxygen saturation was 99%. Neurological findings on admission showed left hemifacial paralysis and left hemiparesis (Manual Muscle Test [MMT] [4]; left upper and lower limbs: 0 (no contraction of muscle) -1(only contraction of muscle). The Japan Coma Scale (JCS) indicated a consciousness level of 30, with her eyes opening on repeated calls with painful stimulation. On routine hematological and blood chemical tests, the white cell count was 8,100 per mm^3, platelet count was 230,000 per mm^3, hemoglobin was 11.9 g/dL, activated partial-thromboplastin time was 22.2 sec, prothrombin activity was 106%, sodium was 139 mmol/L, potassium was 4.4 mmol/L, urea nitrogen was 28.6 mg/L, creatinine was 0.95 mg/dL, aspartate aminotransferase was 20 U/L, alanine amino-transferase was 14 U/L, total cholesterol was 208 mg/dL, C-reactive protein was 0.2 mg/L, and electrocardiographic findings were normal. Computed tomography (CT) (Fig. 1) indicated only a single lacunar infarct at the posterior limb of the right internal capsule without brain atrophy.

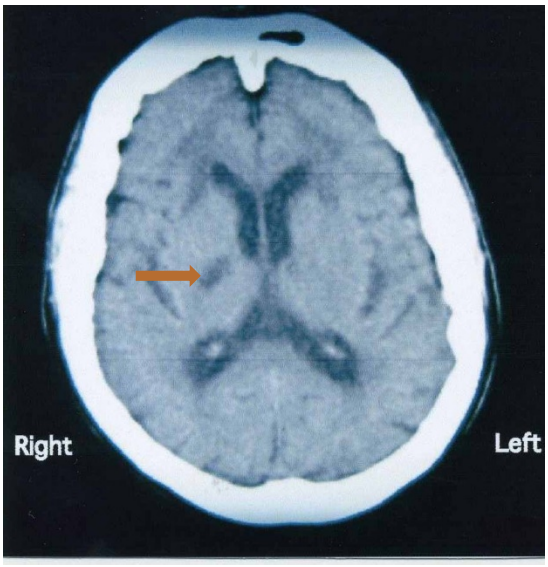

Figure 1. CT of the brain. A CT image obtained on the fourth hospital day showed a right lacunar infarct at the posterior limb of the internal capsule (arrow).

However,N-isopropyl-P-^{123}I-iodoamphe-tamine single photon emission CT (123I-IMP SPECT) analysis (Fig. 2) showed that cerebral blood flow (CBF) was not reduced in any brain area. Furthermore, there was no difference in CBF between the left and right in any brain area.

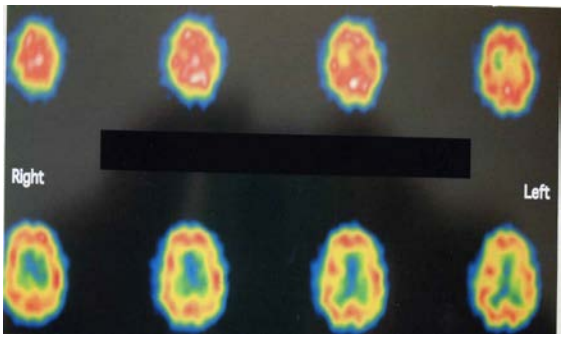

Figure 2. ^{123}I-IMP SPECT scan of the brain. ^{123}I-IMP SPECT images obtained on the seventh hospital day did not show any abnormality.

Magnetic resonance imaging (MRI) (Fig.1C) at 1.5 Tesla indicated periventricular

hyperintensity (PVH) which showed a grade-3 PVH pattern using Fazekas' method [5,6], although MRI did not indicate lacunar infarct because the patient underwent MRI studies directly after the infarct had developed. Magnetic resonance angiography (MRA) showed stenosis of the middle cerebral artery (MCA).

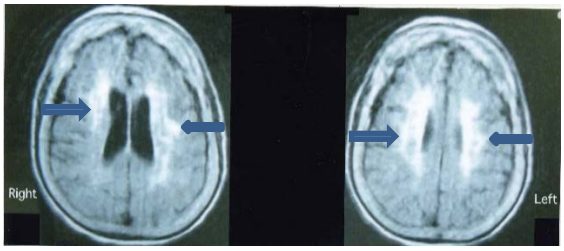

Figure 3. MR flair images. MR flair images showed severe PVH (grade 3 using Fazekas' method), obtained directly after the patient's admission (arrows).

Paralysis continued to worsen after admission. The MMT score of the left upper and lower limbs fell to 0, and thereafter remained at that level. Furthermore, she could not move her right lower limb because of disuse atrophy and severe lumbar pain due to osteoarthritis. Therefore, she could not sit upright on a bed. During the first month, the patient's consciousness ranged from 3 on the JCS (she opened her eyes, but she could not state her name or birthday) to 10 on the JCS (she opened her eyes when called). In addition, the score on the Mini-Mental State Examination (MMSE) [7] continued to be "0". During the fifth month, her consciousness remained at 3 on the JCS, and then she began to respond with a simple greeting and she talked in a simple way to those around her, for example "I am hungry" and "Is it bath time?", but could not respond to any other questions. The MMSE score remained at 0 until discharge. During admission, she often had a fever due to chronic urinary tract infection, but the symptoms had improved at the time of discharge. She was transferred to a rehabilitation hospital six months after admission. The memory of this patient continued to show severe disturbance as the MMSE score was "0" points.

DISCUSSION

This patient could live independently prior to admission, but she was very elderly (85 years old), and head MRI indicated severe PVH. This patient suddenly showed a disturbance of consciousness immediately after developing her first lacunar infarct at the posterior limb of the right internal capsule, and eventually demonstrated severe cognitive disorder. It has been reported that severe cognitive disorder could result from stroke and neural degeneration. However, it has not been reported that the first lacunar infarct, as in this case, could lead to the sudden onset of severe cognitive disorder.

In this patient, SPECT analysis of her brain did not indicate a decrease in cerebral blood flow and did not show a remote effect of the infarct, although MRA of her brain indicated MCA stenosis.

However, this patient showed severe PVH (grade 3 using Fazekas' method). PVH could be induced by a hypoxic environment in the brain [8]. White matter lesions such as PVH are associated with an increased risk of dementia [9]. Therefore, her brain functions showed subclinical deterioration caused by PVH. This patient showed deterioration of the consciousness level (100 on the JCS) directly after right lacunar infarct. Her conscious level improved, but her cognitive function continued to show severe disorder, and she could not respond to simple questions (where are we? What day is today?), as the data of MMSE showed. In this patient, a lacunar infarct of the right internal capsule induced severe symptoms, but a similar finding has not been reported.

The area where this patient suffered the infarct passed through the ascending and descending fibers composed of the projecting fibers connecting the cerebral cortex with the basal ganglia, brain stem, and cerebellum. Therefore, the reason for the severe paralysis of the patient's left upper and lower limbs is damage caused by the lesion of one of the descending fibers; in other words, the pyramidal tract (corticospinal tract). In addition, because the patient also had consciousness disorder as well as limb paralysis, it is a strong possibility that the lesion had spread to the circumference of the pyramidal tract, that is, the area of the ascending fibers.

However, the pyramidal tract cannot affect the cognitive function, because it is a pathway for motor neurons. Therefore, in this patient, we suggest that the damage of the projecting fibers from the brain stem, ascending fibers, caused deterioration of the consciousness and cognitive function.

In this case, the pathway damaged by the lacunar infarct may be associated with the ascending reticular activating system (ARAS) [10]. ARAS is a complicated network controlling arousal, projecting to the brain cortex and bypassing the thalamus from the upper brain stem or basal forebrain [10].

Impairment of consciousness similar to this case after lacunar infarct in these networks has not been reported. However, this patient was advanced in age (85 years old), and so we are of the opinion that her brain plasticity was very low level. In addition, her brain showed severe PVL on MRI. These findings suggest that there may have been few fibers projecting from the brain stem or basal forebrain to the cortex. Thus, her spare brain capacity may have been very limited. In addition, the patient developed severe symptoms due to this lacunar infarct. It is known that lacunar infarcts

cause mild symptoms, but this case adds new findings regarding such infarcts.

CONCLUSIONS

Based on these inferences, we conclude that the fibers of the internal capsule may provide a clue to the consciousness and cognitive function of the advanced elderly with severe PVH. Following lacunar stroke, the advanced elderly with severe white matter lesions require particular attention.

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Pathological external resorption caused by impacted tooth

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ABSTRACT

Tooth resorption can be associated with physiological or pathological loss of dental hard tissues. The process of resorption is usually asymptomatic and may lead to substantial tooth damage. We presented a case of pathological resorption of a molar tooth due to pressure from an impacted tooth. A considerable loss of hard tissues and impossibility to perform conservative treatment caused the loss of two molars. **Key words:** external resorption, impacted tooth

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INTRODUCTION

Resorption is the process associated with physiological or pathological loss of dental hard tissues. Apart from physiological resorption in milk teeth there is also a pathological process observed both in primary and permanent dentition [1]. Resorption can be external and internal, depending on whether the pathological process begins on the surface of the root cement or at the tooth cavity [2, 3].

There is no universal division of external resorptions. Fuss et al. have divided resorptions according to the causative factor, including pulpitis, periodontitis, orthodontic treatment, trauma, pressure and ankyloses [4]. Lindskog and Heithersay have distinguished three groups of causes: damage, infections and hyperplastic resorptions [5]. Ne et al., taking into account clinical radiological and histopathological manifestations, have presented four types of external resorption: external surface resorption, external inflammatory root resorption, replacement resorption and ankyloses [2]. Malmgren et al. have established a four-grade radiology-based classification of resorption: grade I – irregular root contour, grade II - less than 2 mm of the assessed original root length, grade III - between 2 mm and one third of the assessed original root length, grade IV - exceeding one third of the assessed original root length [6].

The most common type of external resorption is inflammatory root resorption, caused by external pressure exerted on the tooth by the force of the orthodontic movement, coexistence of tumors, cysts and impacted teeth [2].

The process of external resorption due to pressure begins from the cementum. Damage that follows involves cementoblasts and cementoid (paracement), covering cell cement which becomes vulnerable to the action of osteoclasts. The balance between the apposition of cementoblasts and resorption of osteoclasts is impaired [3]. The external root resorption can be transitory or progressing. The former state is observed during orthodontic treatment or abnormal eruption path of the tooth pressing on the adjacent teeth. In such cases, elimination of the pressure inhibits the process of resorption [2].

However, further stimulation of phagocytes promotes resorption. According to Trope, a chronic pressure and infection seem to maintain the process [7].

External tooth resorption due to pressure induced by another tooth is relatively rare. Cases of resorption caused by an impacted tooth [8-10] or supernumerary tooth [11] have been reported. The process of resorption is usually asymptomatic, causing tissue damage and in consequence tooth loss. We describe a case of molar tooth loss as a result of pathological resorption caused by an impacted tooth.

Case report

A male patient, 37, presented himself at the Department of Oral Surgery, Medical University of Białystok due to temporary pain of tooth 47. The patient complained of aches of 12 months duration. Ten years earlier the tooth had been treated for caries. The medical history of systemic diseases and drug history were unremarkable. The patient had no history of orthodontic and periodontal treatment or bleaching. No facial injury was noted. The extraoral examination did not reveal any abnormalities. In the intraoral examination single upper and lower teeth were missing. The tooth 47 showed extensive filling and considerable pathological mobility (I^o in Entin scale). A panoramic radiograph revealed totally impacted tooth 48, located horizontally, class C2 according to Pell and Gregory [12]. The impacted tooth caused resorption of the adjacent tooth 47 root. Damage involved hard tissues of the distal root and fragments of the mesial root (Figure 1 and 2).

Figure 1. Panoramic radiograph of the patient - resorption of tooth 47 roots

Figure 2. The extracted tooth 47

The patient was referred to endodontic consultation. However, the consultant disqualified tooth 47 from endodontic treatment due to a

considerable degree of resorption. A decision was made to extract the teeth 47 and 48. The patient gave written informed consent for the suggested treatment. The procedure was scheduled and performed in local anesthesia. Both the surgery and the postsurgical treatment were uneventful.

DISCUSSION

Resorption is a complex pathology resulting in a loss of mineralized dental tissues. The root surface deprived of the protective layer of cementoblasts attracts clastic cells which demineralize cement and then remove organic matrix via phagocytosis [3,13]. The clinical course of resorption is usually asymptomatic and is thus detected accidentally during clinical or radiological examination. One of the first visible symptoms is increased tooth mobility or pink discoloration of its crown. The process of resorption due to pressure may lead to considerable tooth damage, but even then the pulp remains vital for a long time and pathologically unchanged. Only when blood supply to the pulp is disrupted pain appears. External resorption can be confirmed by a radiographic image. The periodontal crevice becomes wider, osseous lamella of the alveolus and tooth structure are discontinued, leading to irregular, "worn away" course of the mesial and distal wall of the root [2, 14].

Resorption can show a varying dynamics, being most rapid after luxation and replantation of immature teeth [7]. After dental injuries in children and adolescents, replacement resorption usually takes place. In this process hard dental tissues are replaced by the alveolar process bone, which is unfavorable and leads to ankylosis [15]. Also inflammatory resorption can have a dramatic course. Bacteria and their toxins located in the canal pulp and in dental canaliculi induce osteoclast formation. The root surface becomes sinuately dissolved and its complete resorption occurs within a few months [16].

External resorption is a side effect of bleaching procedures. This refers mainly to pulpless teeth bleached from the side of the pulp chamber using hydrogen peroxide, sodium perborate and urea peroxide. Causes of this complication are not well known and may be associated with the type of the bleaching material [17]. Moreover, both periodontitis and periodontal procedures may activate the process of resorption through damage to the layer of cementoblasts [3].

In the current clinical case, the patient presented himself due to temporary pain and increased mobility of the tooth. Radiological diagnosis showed the presence of a horizontally located impacted tooth, whose crown was in a close contact with tooth 47 roots. Hard tissues of tooth 47 were considerably damaged. Resorption defect was classified as Malmgren class IV, being the highest advancement grade assessed by radiology [6]. Severe tissue damage might have caused looseness of the tooth and pulp necrosis, which was painful. The patient had never had facial trauma, orthodontic or periodontal treatment or bleaching. Tooth 47 had never undergone endodontic treatment. The clinical and radiological examinations suggested that resorption was caused by chronic pressure exerted by the impacted tooth.

The pressure exerted by impacted teeth, supernumerary teeth, cysts or tumors can be the cause of external resorption. Pressure-induced resorption is frequently observed when upper canines are impacted, causing atrophy of hard tissues of the incisors [8, 9, 14]. Improperly situated supernumerary tooth may lead to damage and loss of molar [11]. Tooth resorption caused by growing tumors are characteristic of lesions of low growth dynamics, such as enameloblastomas or giant-cell granulomas. Odontogenous tumors may cause resorption in the form of sharply cut off or having rough edges root apex. The irregular rough root surface defect may indicate aggressive nature of tumor [18].

Low-grade resorptions can be treated conservatively with calcium hydroxide preparations showing a bactericidal effect and affecting the site of resorption through dentine canaliculi. High pH of calcium hydroxide neutralizes lactic acid produced by osteoclasts, which prevents dissolution of the root organic components. Moreover, the alkaline environment inactivates collagenase and acid phosphatase, and causes an increase in the activity of alkaline phosphatase, which plays a major role in the formation and repair of hard tissues [2, 19, 20].

In more extensive resorption lesions, endosurgical treatment should be applied, in which granular lesions are surgically removed, and resection, hemisection or radectomy are performed, with a simultaneous filling of bone defects with synthetic substitutes [2, 20].

Elimination of the pathological factor is the most effective treatment of pressure-induced resorption. In the presented clinical case, conservative treatment had to be excluded due to marked injury of hard tissues of the lower molar. For the same reason, the decision was made to extract both the impacted tooth and tooth 47.

CONCLUSIONS

Pathological resorption of teeth shows complex etiology. In most cases, the pathology is clinically asymptomatic, and thus difficult to predict and eliminate in everyday clinical practice. In the presented case, a long-term asymptomatic course of resorption caused a loss of two molar teeth. This indicates that regular radiological diagnostic procedures are necessary for early

detection of resorption lesions and for institution of appropriate treatment.

Conflicts of interest

The authors declare no conflicts of interest.

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The physiological impact of physical activity on psychological stress

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ABSTRACT

Stress is one of the single most significant factor for many physical and psychological dilemma. Long-term exposure to stress or chronic stress can lead to serious physical and psychological problems such as headaches, fatigue, depression, anxiety, stomachache, heart problems, chest pain, asthma, hypertension, liver dysfunction, diabetes, arthritis, suppressed immune system , skin conditions, irregular ministerial cycle, infertility, accelerated aging process, and premature death. As under perennial and /or continual stress condition the body releases excessive cortisol hormone that results in aforementioned issues. Physical activity may beneficial for mental and physical body system. Under intense or endurance exercise however increase total cortisol released levels far above the moderate training modalities which can be a destructive factor for people under extreme negative stress and can make worse stress health risk conditions. Thus, caution is need to be considered for people with negative stress. Nonetheless, according to the American physical activity guideline 10 minutes moderate aerobic exercise such as walking in division of 2×10 min or 3×10 min per day that can be performed throughout the week, seems to be helpful alternative for all adult in part people with psychological negative stress. **Key words:** stress, physical activity, health

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INTRODUCTION

Stress is a normal physical and emotional response to events that make a person feel threatened and upset. When the body perceive a threat, nervous system in an emergency action that is called “fight – or – flight”, responds by releasing a huge amount of stress hormones, including adrenaline and cortisol in blood stream which result in faster heartbeat, rapid breathing and more oxygen consumption, higher blood pressure, muscles stiffness, back and shoulder muscular pain in short-term period [1] . Knots in the in the shoulders and neck muscles can restrict blood flow to the heart and other major organs which can lead to poor circulation and high blood pressure [2]. Long-term exposure to stress or chronic stress can lead to serious physical and psychological problems such as headaches, fatigue, depression, anxiety , stomachache, heart problems, chest pain, asthma, hypertension, liver dysfunction , diabetes, arthritis, suppressed immune system , skin conditions, irregular ministerial cycle, infertility , accelerated aging process and premature death (Figure 1) [3,4,5] .

Figure 1. Stress cycle

Research have equally suggested that stress can make worse certain symptoms of diseases [6]. Chronic stress also can specifically cause to unhealthy eating in forms of both increased appetite in terms of overeating that leads to weight gain or a lack of appetite and not eating enough that cause to weight loss [7]. In this respects, researches show that chronic stress can not only increase absolute cortisol levels, but more importantly it disrupts the natural cortisol rhythm from hypothalamus in some persons. Cortisol is normally released in a specific rhythm throughout the day that is high in the mornings in which helps individual to get out of bed and start the day and gradually taper off throughout the day, so that people feel tired at bedtime and can fall asleep [8]. High levels of cortisol results in increased appetite, causing a person to overeat that called stress eating in some cases [9,10]. Consequently the blood sugar raises, glucose gets into cells harder that makes cells less sensitive to insulin in which increases fat storage in part in belly and liver that raises the level of fatty acids and triglycerides in the bloodstream resulting hormonals imbalance such as reduced TSH levels that leads to reduction the ability in fat burning whereby makes individual obese and talented to the diabetic specially type 2 diabetic [10,11]. Some other people in contrast who are under lot of stresses due to extreme anxiety feel fullness at the most of time and may simply forget to eat, due to putting food as a low priority compared to other events in their lives that leads to skipping meals and often results in weight loss in which can have serious consequences on health such as hypothyroidism or underactive thyroid for example [7]. As previously mentioned, under stress condition the body releases excessive cortisol hormone which inhibits thyroid-stimulating hormone (TSH) in the pituitary gland that can also inhibit conversion of the thyroid hormone T4 into T3. Low level of T3 leads to hypothyroid symptoms that is cased for several other body health disturbance such as continuously fatigue, difficulty breathing , musculoskeletal disorders, osteopenia ,osteoporosis and more seriously coma may result [12-14] .Therefore, ongoing stress can be detrimental and can cause serious harm on bodily system but recognizing the stress’ roots and managing stress can greatly improve the quality of life as negative attitudes impact on all aspects of the physical, spiritual, and mental wellbeing so finding healthy as well as positive ways to deal with stress will aid to the overall well-being [15] . Hence, to effectively manage stress, it is best to devote attention to all aspects of life, including spiritual, social and physical demands [16]. Further, eating a healthy diet in the form of a balanced nutritional diet can be so beneficial since a well-nourished body is better prepared to cope with stress throughout the day [17]. Also, according to the American Heart Association (AHA), physical activity can improve the quality of life mentally as well as physically, so that can lower the overall negative stress level but how much exercise is needed to reduce stress? And what type of exercise can help with stress? [18]. Hence, practically specific guidance may require to great deal with negative stress toward a positive outcome and changes.

The physiological effect of physical activity on stress related factors

Physical activity increases general health and well-being through improving sense of self-esteem which accounts as a psychological key benefit of exercise [19]. During exercise the brain produces endorphins a neurochemical substance that act as natural painkillers to improve to decrease overall levels of tension, elevate mood and improve sleep [20]. Cortisol hormone equally releases from the adrenal glands in response to physical stress. In response to the moderate to intense training, cortisol makes fuels to use through a process that called gluconeogenesis to generate new glucose in the liver whereby glycogen (storage form of glucose) levels increases thus increasing blood glucose. In addition to this process, cortisol increases muscle protein breakdown and fat from adipose tissue into bloodstream, depleting the energy storages to release these fuel to produce energy during physical activity [21]. In fact, exercise represents a physical stress that challenges homeostasis [22]. It is believed that ,exercise habits is kind of protection from harmful effects of negative stress on physical and mental health and preliminary evidence suggests that physically active people have lower rates of anxiety and depression than sedentary people but causality is not clear [23,24]. Undue intense or endurance exercise however increase total cortisol released levels far above the moderate training modalities which can be a destructive factor for people under extreme negative stress by itself because chronic stress elevates cortisol hormone separately. This mixed of high level cortisol due to chronic exercise and negative stress dramatically will result suppression in immune system, bone loss, loss of menstrual cycle, Type 2 diabetes and hypertension [25,26]. This is why U.S. physical activity guidelines for Americans in 2007 and 2008 years stated that “to promote and maintain health, all healthy adults aged 18 to 65 years old need moderate-intensity aerobic physical activity 30 min on five days each week or vigorous-intensity aerobic physical activity for a minimum of 20 min on three days each week or an equivalent combination of moderate - and vigorous-intensity aerobic activity. They also recommended that“ moderate aerobic activity can be performed in episodes of at 10 minutes, and preferably, it should be spread throughout the week” [27,28]. The last section of American physical activity recommendation has significant meaning, although it points out to all healthy adults, yet it can apply to the clinical condition such as psychological stress since it can be perform at episode of 10 min in the form of 2×10 min or 3×10 min per day at several days per week that seems to be a helpful strategy in a controlled level for a person with negative stress. Among different mild to moderate exercises walking as a simple natural activity can help to reduce stress since gives individual time to think as well as time to get away from stressors [29]. In fact, the power of walking as a stress-reliever and mood enhancer is often underestimated [30].

CONCLUSION

Stress is one of the single most significant factor for many physical and psychological dilemma. Long-term exposure to stress or chronic stress can lead to serious physical and psychological problems. Physical activity increases general health and well-being however intense exercises could be harmful for individual who under extreme stress and caution is need to be considered for exercise applications among people with negative stress. As intense exercises can increase total released cortisol levels far above the moderate training modalities that can be a destructive factors for people under extreme negative stress and make worse stress health risk conditions in them.

Conflicts of interest

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How dose walking exercise affect serum lipids in underweight female adults?

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ABSTRACT

Introduction: Fat profile is an extremely important substrate for muscle contraction, both at rest and during exercise as yet, there is still no clear consequence of exercise on lipid profile regulation in underweight subjects and thus the purpose of this study was to compare lipids serums in underweight young women (BMI≤ 20) before and after walking intervention.

Materials and methods: 20 underweight young non-athlete women volunteered to participate in this study and then they were randomly assigned into two exercise (E: n=10, BMI=17.8±1.2, age: 21.1±1.7yr) and control (C: n=10, BMI=17.5 ±1.1, age: 21.9 ± 1.2) groups. Pre and post assessment were contained somatic (age, height, weight, BMI) and lipids profile (FBS, LDL, HDL, triglycerides and total cholesterol) measurements. Exercise programme was consisted of 30-minute supervised walking exercise at 60 % HR max at intensity equal with 40% VO_2max 3 days per week for 2 months.

Results: Data analysis showed post-BMI as well as body weight did not altered in comparison with pre - exercise programme ($p>0.05$). Subsequently all post - lipids variables included FBS, LDL, HDL, triglycerides and total cholesterol were elevated compared with pre- intervention walking exercise ($p< 0.05$.)

Conclusions: This study outlined that walking programme can be a stimuli toward ideal weight in slim individual because an increased lipids profile as indicators of an increased body mass in underwent individual who are at risk of diseases such as anorexia nervosa shows this notion. However, more investigation with longer duration is needed to justify this conclusion.

Key words: walking exercise, serum lipids, underweight women

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INTRODUCTION

Regular exercise decreases energy balance through an increase in energy expenditure or an increase in fat oxidation through favorable changes in plasma lipid profile [1]. Fat is an extremely important substrate for muscle contraction, both at rest and during exercise [2]. Evidence suggests that when measured at the same absolute workload after training, lipid oxidation is increased in exercised population for example in men [3]. Chronic exercise that referred to as "training" does not also induce a sustained reduction in TG levels, because discontinuation of regular exercise in well-trained individuals for 2-3 days leads to a robust increase in plasma TG concentrations [4].

Moreover, fat oxidation rates increase from low to moderate intensities and then decrease when the intensity becomes high. Maximal rates of fat oxidation have been shown to be reached at intensities between 59% and 64% of maximum oxygen consumption (VO_2max) in trained individuals and between 47% and 52% VO_2max in a large sample of the general population [5] .Various levels of walking are linked to metabolic effect, for instance, we recently have shown that 30 min walking exercise a few time in a week elevates basal metabolic rate in slim women with Anorexia Nervosa [6]. However, despite of several research into the effects of exercise on lipid metabolism in obese people or male individual, there is still no clear consequence of exercise on lipid serums regulation in underweight subjects. Hence, this study is aim to investigate the lipids serums responses in underweight young women (BMI≤ 20) due to a designed -walking intervention to achieve to a learning outcome.

MATERIALS AND METHODS

Participants

20 underweight young women volunteered to participate in this study and then they were randomly assigned into two exercise (E: n=10, BMI=17.8±1.2, age: 21.1±1.7yr) and control (C: n=10, BMI=17.5 ±1.1, age: 21.9 ± 1.2) groups. The participants were sedentary and were not familiar with physical activity term before this investigation. They had poor appetite but otherwise healthy .They were not using any medication that could affect the study variables and they had not any history of muscular injury or cardiovascular diseases also. Initially, subject provided written informed consent that was approved by local committee of ethics.

Procedures

Anthropometric Measurements

In pre- intervention measurements the age was recorded by years (± yr) and the height was measured in centimeter (±cm) using a standard vertical height board. A digital weighing scales was used to assess body weight in kilogram (±kg) and the body mass index (±BMI) as an indicator of body fatness was determined by dividing the body weight (in kilograms) by the height (in meters) squared (BMI =kg/m^2).The participants had a regular menstrual cycle and did not take oral contraceptive during the study period.

Blood Sampling

Blood samples (10 ml of blood) were taken for lipid profiles including FBS, LDL, HDL, triglycerides and total cholesterol between 8 to 11 am after an overnight fasting. Serum obtained after clotting and centrifuged at 1500 rpm for 30 min at $4^{0\,C}$ within 2h. FBS (fasting blood sugar), total cholesterol, and triglycerides were assayed using standard enzymatic procedures. Cholesterol components (HDL-C and LDL-C) were estimated by a homogeneous assay (HDL& LDL, Plus, and Roche Diagnostics, Japan) on the Hitachi 911 analyzer.The same technician performed blood cholesterol (HDL-C & LDL-C) test before and after exercise programme.

Exercise Intervention

Exercise intervention was consisted of 30-minute supervised walking exercise at 60 % HRmax at an intensity equal with 40% VO_2max 3 days per week for 2 months in an indoor track and field ground. Maximal heart rate was estimated using the formula of (220– age) before the exercise intervention using 10 min intermittent walking by a chest polar belt (Polar Electro Oy, and Finland) and a stopwatch [7]. Heart rate using digital polar belt was monitored during the training sessions. Participants in control group were asked to continue their own former daily routine during the study period.

Statistical Analysis

Descriptive Statistics were used to determine mean and standard division (X ± SD) and paired *t* – test with an alpha level set at $p<0.05$ was used to all comparisons.Variables were compared between pre and post assessments using Statistical Package for the Social Sciences (SPSS) (version 18; SPSS Inc., Chicago, IL USA).

RESULTS

From somatic variables can be realized the exercise (E) and control (C) group were not different in average of age (21.1±1.7 vs 21.9 ± 1.2 yr) ($p>0.05$) while were different in average height

(159.9±7.5 vs. 162.7 ± 6.6 cm) ($p<0.05$) . Further analysis showed post-BMI as well as body weight did not altered in comparison with pre -exercise programme ($p>0.05$) in both exercise and control groups (Table 1). Subsequently all post - lipids variables included FBS, LDL, HDL, triglycerides and total cholesterol were elevated in experimental group compared with pre- intervention exercise programme and in comparison to the control groups ($p<0.05$) (Table 1).

Table1. Changes in variables in slim subjects pre and post assessments (X ± SD)

Variables	Exercise		Control	
	pre	post	pre	post
Age (years)	21.1±1.7		21.9 ± 1.2	
Height (cm)	159.9±7.5		162.7 ± 6.6	
Weight (kg)	46.9± 5.3	46.4±5.2	46.5 ±5.7	46.3 ± 5.2
BMI (kg/m^2)	17.8±1.2	17.8± 0.0	17.5±1.1	17.6±0.1
FBS (mg/dl)	84.9±0.1	90.5±0.00 *	86.4±0.2	88.4±0.1
LDL (mg/dl)	93.3±0.0	102.7±0.3 *	101.1± 0.2	99.4±0.5
HDL (mg/dl)	56.0±0.0	57.6±0.04 *	58.9±0.0	60.1±0.0
Cholesterol Total (mg/dl)	165.5±0 .2	177.9±0.0 1*	174.3±0 .3	173.8±0 .1
Triglycerides (mg/dl)	81.4±0.0	87.3±0.03 *	73.1±0.1	71.0±0.0

Significantly different from the respective 'Pre' value $p < 0.05$*

DISCUSSION

Exercise increases fat profiles and the metabolic rate increases exercise group while they still had normal range of all lipid serums variables in which blood suture (desirable<200 mg/dl), LDL (desirable<130 mg/dl), HDL(35-60 mg/dl), triglycerides (up to 200 mg/dl) and total cholesterol (desirable < 240 mg/dl) in conventional terms that can be because of stimulated appetite in exercised subjects to use more calories in daily to daily routine after any exercise session [8]. Moreover, the body weight and body mass index (BMI) did not change in experimental group after exercise programme in spite of increased lipids profile that might be due to limited duration of the study period. Nonetheless, slim individual rarely gain any extra weight because of multiple reasons such as not having enough appetite and a simple exercise such as walking can be a good strategy in this line [9]. This means an exercise programme such as walking in a well-designed schedule can easily corporate in all population way of lives including underweight people who may continuously in doubt to engage in any exercise programmes because of losing weight [10]. For this reason American college of sports medicine (ACSM) from long time ago every single year update the famous recommendation that stated to promulgate public health all adults aged 18 to 65 years need engage at cardiorespiratory activity for a minimum of 30 min on five days at each week [11,12] .This is because more activity requires more arm and leg works thereby it can improve the quality of life toward optimal health and ideal weight [13]. Another interesting point can be referred to the control group who did not perform exercise but were acquired to the terms of health promotion with taking part in this study. As even gaining knowledge can be a life-style modification intervention itself. For instance, they did not lose weight which is a risk factor for many illness such as osteoporosis as well as bone loss [14] and they showed elevation in their HDL-C level as a good cholesterol components resulting in optimal health and well-being [15] .Hence, lack of knowledge is a one of major risk factors for many disease and more educational strategy could be a beneficial tool in different population namely in underweight individual. In conclusion this study is done to observe the walking training outcome on lipid serums, although it additionally has educational health benefit consequences for control group. Finally , current study outlined that walking programme can be a stimuli toward ideal weight in slim individual because an increased lipids profile as indicators of an increased body mass in underwent individual who are at risk of diseases such as anorexia nervosa shows this notion. However, more investigation with longer duration is needed to justify this conclusion.

CONCLUSIONS

This study outlined that walking programme can be a stimuli toward ideal weight in slim individual because an increased lipids profile as indicators of an increased body mass in underwent individual who are at risk of diseases such as anorexia nervosa shows this notion. However, more investigation with longer duration is needed to justify this conclusion.

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Only review articles from experts in the field will be considered for publication. Review articles can be submitted either upon specific invitation or editorial acceptance of an author's proposal. To submit a proposal, authors should send a title to the Editorial Office and justify their expertise in the target area, and also both the scientific relevance and lack of recent reviews on the topic.

Review articles are an attempt by one or more authors to sum up the current state of research on a particular topic. Ideally, the author searches for everything relevant to the topic, and then sorts it all out into a coherent view of the current state.

Review articles should be divided into the **following sections**:

- Title page
- Abstract (with Keywords)
- Introduction
- Review
- Conclusions
- Acknowledgements
- Conflicts of Interest
- Financial Disclosure/Funding
- References

TITLE PAGE
The title page should contain the following information:

- Title,
- Shortened running title,
- Full names of authors and their affiliations,
- Corresponding author contact information (address, telephone, fax, e-mail).

ABSTRACT
Abstract, of no more than **250 words** should be provided on a separate page and contain the main ideas and important conclusions.

The abstract should include **Keywords**. Keywords (3-6) or short phrases should be added to the bottom of the abstract page. Use terms from the Medical Subject Headings list from Index Medicus.

ACKNOWLEDGMENTS
Acknowledgments of the contributions of colleagues can be stated in this section.

CONFLICTS OF INTEREST
Authors must disclose any commercial, financial, or other associations that could pose a conflict of interest in connection with their submitted article and these must be disclosed in this section.

FINANCIAL DISCLOSURE/FUNDING
Authors should list all funding sources related to the study and to the article preparation in this section.

AUTHORS' CONTRIBUTIONS
Authors must indicate their specific contributions to the published work. Please provide the contribution each author made to the manuscript - eg, literature search, figures, study design, data collection, statistical analysis, data interpretation, and writing the paper.

TABLES
Tables should be typed on a separate sheet of paper and a title for each one should be provided. Tables should be numbered in Arabic numerals in the order in which they are cited in the text. Vertical rules should be used. The position of each table should be indicated in the manuscript. Tables must be sent in Microsoft Word format and have no links to the main document or other archives.

FIGURES
Figures should be numbered in Arabic numerals in the order of appearance in the text, where they are referred to as Fig. 1, Fig. 2, etc. Figures that include more than one image should be labeled as a, b, c, etc. (small letters).
Figure legends with descriptive titles should be provided on separate pages. If needed, a short description is also accepted. Footnotes can be included below the figure.

- **Photographs** must be in **JPG or TIFF** format, preferred **resolution 300 dpi**.
- **Drawings** must be in **JPG, GIF or EPS** format
- **Graphs** must be in **JPG, EPS or PDF** format

The total number of (Tables, Figures and Photographs) must not exceed 6. Authors are required to confirm the source of the figures and photographs by filling out authorship form and send it to the editor. The template is available for download from the journal website (Statement).

REFERENCES Should be numbered in the order they appear within the manuscript and listed in the 'References' section see References details.
The total number of references should not exceed 50.

SHORT COMUNNICATIONS ARTICLE

Should present original research and address a clearly stated specific hypothesis or question. The total number of pages (including Tables, Figures, Photographs and References) should not exceed 8. Papers should provide novel approaches and new insights into the problem addressed.

Short comunnications article should be divided into the **following sections**:

- Title page
- Abstract (with Keywords)
- Introduction
- Materials and Methods
- Results
- Discussion
- Conclusions
- Acknowledgements
- Conflicts of Interest
- Financial Disclosure/Funding
- References

TITLE PAGE
The title page should contain the following information:

- Title,
- Shortened running title
- Full names of authors and their affiliations,
- Corresponding author contact information (address, telephone, fax, e-mail).

ABSTRACT
Abstract, of no more than 250 words should be provided on a separate page, organized in structural form, and should consist of four paragraphs:

- Purpose
- Materials/Methods,
- Results,
- Conclusions.

The abstract should include Keywords. Keywords (3-6) or short phrases should be added to the bottom of the abstract page. Use terms from the Medical Subject Headings list from Index Medicus (www.nlm.nih.gov/mesh/MBrowser.html)

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- **Photographs** must be in **JPG or TIFF** format, preferred **resolution 300 dpi**.
- **Drawings** must be in **JPG, GIF or EPS** format
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The total number of references should not exceed 10.

LETTERS

Letters to the editor typically offer comments on material published in *Progress in Health Sciences* during the past few months or introduce brief ideas or commentary. Letters should not exceed 500 words and 5 references. Letters may include one table or one photo.

REFERENCES DETAILS

References should be numbered **in the order they appear** within the manuscript and listed in the 'References' section **In the text,** they should be referred to by **numbers in square brackets. In the 'References' section,** items should be l**isted numerically in the order they are cited in the text**, not alphabetically. **All authors** of the cited items should be included, regardless of the number. Journals titles should be abbreviated as shown in Index Medicus.

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