



THE EFFECT OF PHYSICAL ACTIVITY ON AVOIDANCE OF OBESITY IN SCHOOL-AGE CHILDREN

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Abstract

Purpose. Obesity is an energy metabolism defect which occurs due the accumulation of excess body fat. Obesity starts at school-ages and the main reasons of obesity are decrease in physical activity, increase in sedentary behaviors and consumption of foods with high fat and energy contents. In this study, the effect of physical activity on avoidance of obesity in school-age children was researched.

Methods. First, all the permissions were taken for the study. Then students were informed on the content of the study. The study group was formed of 390 students in total; 210 male and 180 female students. Lengths and weights of the students were measured and their body mass indexes (BMI) were calculated. Physical activity levels of the students were determined via International Physical Activity Questionnaire (IPAQ).

Results. In the measurement which was carried out on 360 students with the calculation of their body mass indexes; 15% of the students were found as obese, 40% of them were overweight, 30% of them were normal and 15% of them were slim. A significant difference ($p < 0.01$) between the levels of physical activity and obesity of primary school students were determined. It was also concluded that obesity increases in parallel with the decrease of physical activity.

Conclusion. This study shows that obesity poses an important problem for school-age children and as well as genetic predisposition, insufficient physical activity can also cause obesity.

Key words: school-age, student, obesity, physical activity.

Introduction

In recent years, prevalence of obesity has gradually increased around the world. Epidemiological studies revealed that in addition to demographic factors such as age and gender and socio-cultural factors such as educational level and marital status, biological factors and dietary habits, smoking and alcohol consumption and lifestyle factors such as deficient physical activity also account for obesity (Akbulut et al., 2007). Malnutrition and inadequate physical activity, which are the most important causes of obesity, are the second most common cause of preventable mortality due to tobacco-induced health problems (Chopra and Darntonhill, 2004).

Obesity is a serious nutrition problem affecting 25-30% of children and adolescents. Juvenile obesity has an increasing prevalence around the world, mostly in developed countries. In addition to obesity-related problems, obesity appears as an important health problem in terms of increased morbidity and mortality in adulthood in juvenile obesity; adulthood obesity in 50% of the adolescent obesity and the perception held by the families and doctors overlooking the seriousness of the disease (Gürel and İnan, 2001). Sedentary lifestyle is one of the reasons which increase the risk of juvenile obesity. Sedentary lifestyle can be a risk factor or an accompanying condition. Prevalent sedentary

lifestyle among children can be explained by social, environmental and psychological reasons. Mechanization in industry, widespread use of assistive devices at homes, transport, widespread use of cars and watching TV results in decreased activity and thus lower energy consumption (Strock., 2005).

Obesity is a chronic illness whose prevalence decreased in developed and developing countries, that effects gradually children as adults. In these days, frequency of finding obesity in every age groups has increased. This is the cause of consuming too much oils and carbonhidrates in eating habits that modern life has brought and childrens being away from physical activities, inclining towards television and computer game (Parlak and Çetinkaya, 2007). Regular physical activity has a vital role in protection of health. Previous research indicate that regular physical activity have an important role in prevention of various diseases such as cardiovascular diseases. It was reported that moderate levels physical activity only for 5 days a week reduced cardiovascular mortality risk by 30% (Leitzman et al., 2007). Therefore, technological progress decreased physical activity and the activities involving physical activity have changed. Thus, physical inactivity turned out to be a serious health problem. Physical activity is of great importance in terms of determining physical activity levels of individuals and encouraging the

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individuals who are slightly active to adopt physical activity (Karaca,2000).

Especially the tendency to obesity is at an alarming level and the annual increase in this age group is gradually rising. In the 2003 report of the International Obesity Commission, it was stated that one out of ten children aged between 5-17 worldwide was overweight or obese (Ergül and Kalkım, 2011). Today obesity is considered as one of the most common chronic diseases in primary education students. In Turkey, prevalence of obesity is reported to rise from 6-7% to 15-16% in the last 20 years. Juvenile obesity is believed to cause adulthood obesity and various chronic diseases (Parlak and Çetinkaya, 2007). Thus, this study is designed to determine the effect of physical activity levels on prevention of obesity in school age children.

Material and Method

The study consisted of primary students in Kars province of Turkey. Participation to the study was voluntary. Necessary permissions were taken for the study and all students were informed about the content of the study. The students having health problems which will affect physical activity levels were excluded from the study. A total of 390 students (210 male, 180 female) were included in the study. BMI values of the participants were calculated using [Body Weight (kg) / Height (m)²] formula. BMI results were classified according to WHO 2007 5-19 age reference values (WHO, 2007b) and intersection values suggested by WHO. The students were evaluated in 4 groups

according to BMI values. The students with a BMI value of -3 SD - -2SD were grouped as “underweight”; -2 SD - +2 SD were grouped as “normal”; +1 SD - +2 SD were grouped as “overweight” and +2 SD and over were grouped as “obese” (Who., 2007). Physical activity levels were determined by International Physical Activity Questionnaire (UFAA) (Craig, 2003). Validity and reliability study of the questionnaire in Turkey was carried out by Öztürk (Öztürk, 2005). In this study, short-form of the questionnaire involving the last seven days was used to evaluate physical activity levels of primary education students. Performance of each activity for at least 10 minutes at each time was taken as evaluation criteria for all activities. A score of MET-minute/week is obtained by multiplying minute, day and MET values (multiples of resting oxygen consumption). Walking time (minute) was multiplied by 3.3 MET to calculate walking score. 4 MET values were taken for moderate level activity and 8 MET value was taken for intensive activity. Physical activity levels were categorized as follows: physically inactive (<600 MET- min/week), low physical activity level (600-3000 MET-min/week) and adequate physical activity level (beneficial for health) (>3000 MET- min/week) (Öztürk, 2005).

Statistical analysis: SPSS 17.0 statistics program was used for data analysis. One-Way Anova and t test were used to evaluate data. The results were presented as mean ± standard deviation. p<0.05 level was considered as statistically significant.

Findings

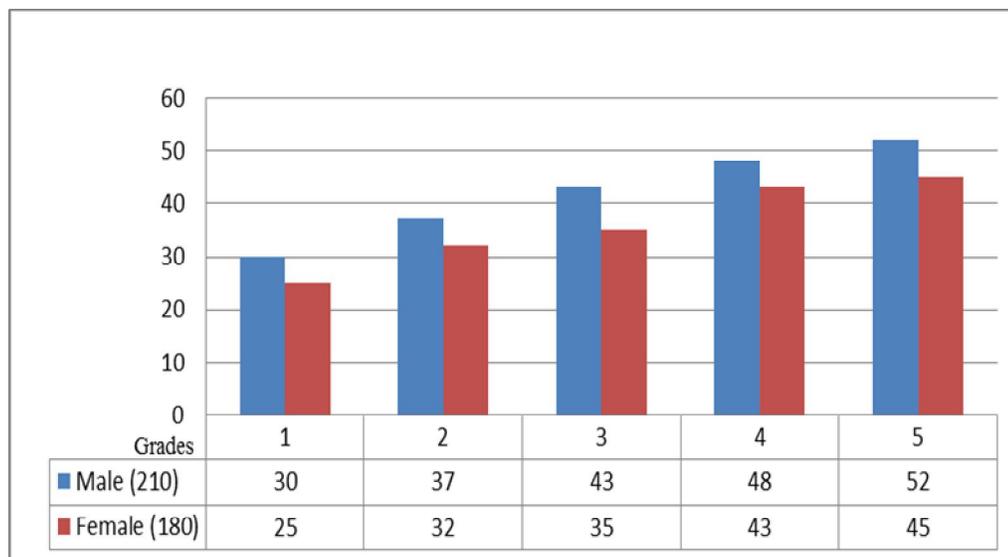


Figure 1: Distribution of School Age Children According to Gender

Distribution of school age children according to grade levels and gender are presented in figure 1. It was found that 14.3% of male students were 1.grade students; 17.6% were second grade students; 20.4% were third grade students; 22.9% were fourth grade students and 24.8% were fifth grade students. It was found that 13.9% of female students were 1.grade students; 17.8% were second grade students; 19.4% were third grade students; 23.9% were fourth grade students and 25.0% were fifth grade students.

BMI, weight and height values of female of male students in the study were compared and summarized in Table 1. It was observed that there was a significant difference between BMI, weight and height values of the students ($p < 0.01$). However, comparison of BMI, weight and height values of male and female students showed a statistically significant difference ($p < 0.01$). Comparison of BMI, weight and height values according to grade levels showed that these values gradually increased in both genders as the grade levels increased.

Table 1: Distribution of BMI, weight and height of School Age Children. Data was presented as mean \pm standard deviation.

Variables	Male (n=210)		Female (180)			*p
	<u>X\pmSD</u>		<u>X\pmSD</u>			
value	1. Grade	2. Grade	3. Grade	4. Grade	5. Grade	
Male						
Height (m)	118.10 \pm 4.18	121.08 \pm 5.28	130.16 \pm 6.05	138.87 \pm 5.65	141.32 \pm 5.12	p<0.01**
Weight (kg)	20.43 \pm 1.99	24.62 \pm 2.33	29.95 \pm 3.42	37.06 \pm 3.73	40.90 \pm 3.53	p<0.01**
BMI (kg/m ²)	16.95 \pm 1.56	16.82 \pm 1.60	17.30 \pm 3.56	19.37 \pm 2.95	20.55 \pm 2.12	p<0.01**
Female						
Height (m)	109.12 \pm 2.97	119.12 \pm 4.43	124.51 \pm 4.18	131.23 \pm 4.67	140.17 \pm 5.84	p<0.01**
Weight (kg)	19.20 \pm 1.55	22.21 \pm 1.86	25.28 \pm 1.99	33.69 \pm 2.94	37.93 \pm 2.78	p<0.01**
BMI (kg/m ²)	16.17 \pm 1.66	16.66 \pm 1.76	16.36 \pm 1.74	19.59 \pm 1.78	18.99 \pm 3.56	p<0.01**

BKI, body mass index; X, average; SD, standard deviation; n, number of subjects

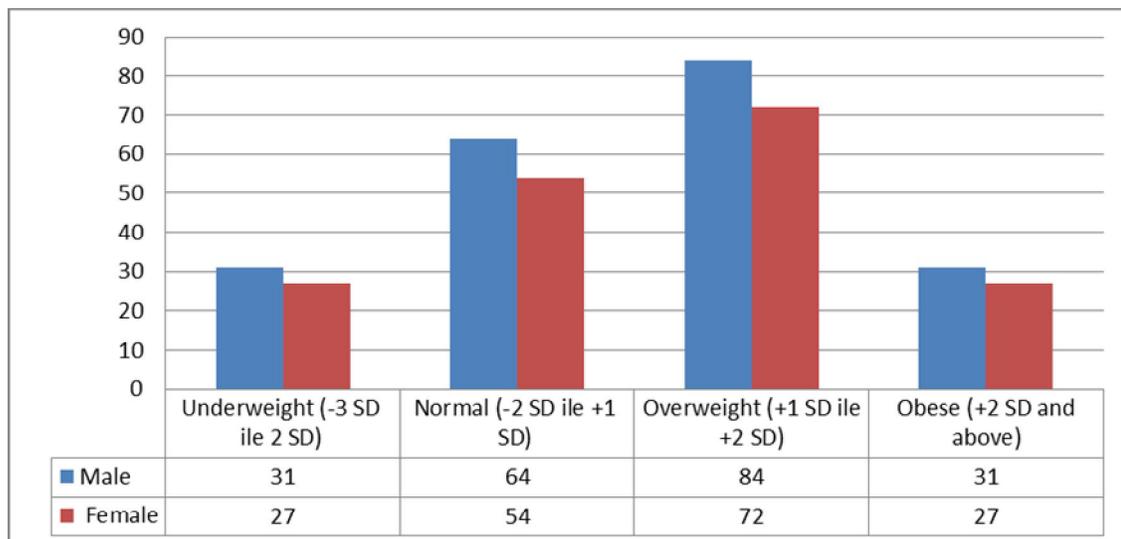


Figure 2: Distribution of Body Mass Index (BMI) Z score of Male and Female School Age Children

Body mass index (BMI) values were evaluated according to WHO, 2007 reference values for 5-19 age group children. It was found that 15.0% of female and

male students were underweight; 30.0% were normal (-2 SD -+1 SD); 40.0% were overweight and 15.0% were obese.

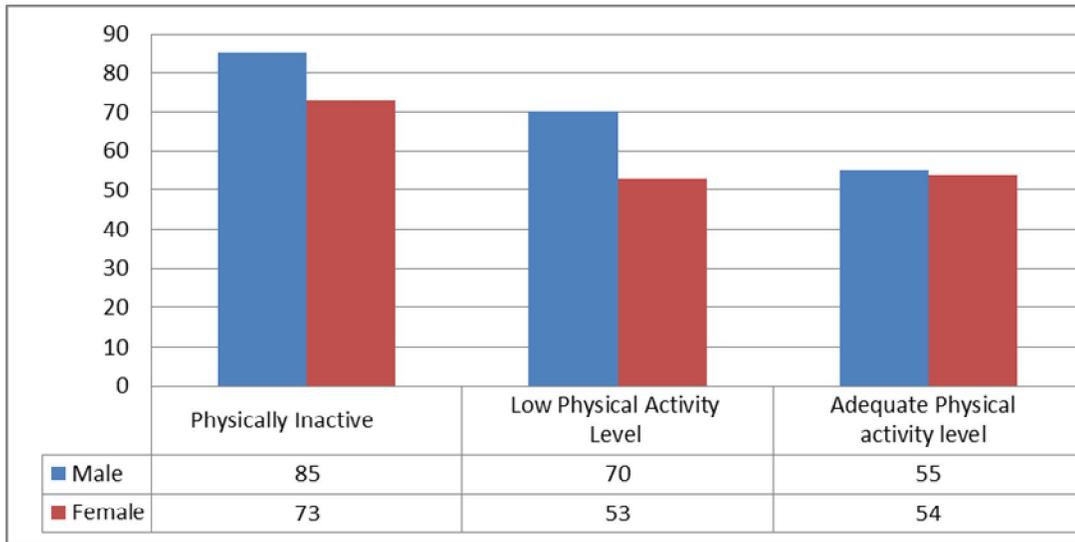


Figure 3: Physical Activity Levels of Male and Female School Age Children

Analysis of physical activity levels of school age children revealed that 40.5% (n=158) of male and females were physically inactive; 33.3% of males and

29.5% of females had low physical activity levels; 26.2% of males and 30.0% of females had adequate physical activity levels.

Table 2: The Relationship between Physical Activity MET-min/week Levels and BMI of Male and Female School Age Children. Data was presented as mean \pm standard deviation.

Physical Activity	UFAA Values <u>X\pmSD</u>	Body Mass Index <u>X\pmSD</u>	<u>*p value</u>
Male			
Inactive (MET-min/week)	173.23 \pm 127.47	19.60 \pm 2.17	p>0.05
Low activity level (MET-min/week)	161.25 \pm 65.75	17.24 \pm 1.72	p<0.05
Adequate activity level (MET-min/week)	44.11 \pm 63.80	15.92 \pm 1.14	p<0.01
Female			
Inactive (MET-min/week)	148.81 \pm 109.5	18.57 \pm 2.04	p>0.05
Low activity level (MET-min/week)	122.08 \pm 49.78	17.08 \pm 2.02	p<0.05
Adequate activity level (MET-min/week)	43.30 \pm 62.64	16.12 \pm 1.17	p<0.01

X, average; SD, standard deviation

Physical activity levels of school age children were determined by Physical Activity Questionnaire. Analysis of MET-min/week values of physical activity levels showed that there was no significant difference between BMI values of physically inactive male and female children (p>0.05); however, BMI values were found to decrease as the physical activity levels between the groups with low and adequate physical activity increased. It was observed that the decrease in BMI of male and female students particularly having adequate physical activity was higher and thus there was a correlation between physical activity and BMI (p<0.05, p<0.01).

Discussions

Excessive weight is a serious health problem in childhood period. Childhood obesity in industrial regions has increased over the last decade. Considering that excessive weight in childhood has the risk of causing obesity in adolescence, the strategies to prevent adolescence obesity should be designed in childhood period (Gnavi. et al., 2000). Excessive weight and obesity prevalence in children and adolescents have shown a global increase. It was reported that the prevalence of excessive body weight at 6-17 age group gradually increased in the United States (Troiano et. al., 1995). Research conducted in Turkey showed that prevalence of obesity in children



varied between 1.9% and 30.7% (Esmailzadeh, 1994, Karakaş et. al., 2002, Özçırpıcı et. al., 2004). Obesity in childhood and adolescence is a serious health problem as it affects the whole life of an individual. Obesity is a multi-factorial condition, which results from the imbalance between calorie intake and calorie utilization. Thus, as the grade level increase, number of overweight students increase. While prevalence of being underweight is higher in females; the prevalence of obesity is higher in males (Aksoydan and Çakır, 2011). Previous research in Turkey analyzed the prevalence of obesity in various regions. In a study carried out in Ankara on a total of 6462 students in 9-16 age group found that prevalence of obesity was 2.3% based on BMI. In another study, obesity incidence in 1647 children according to BMI was reported as 3.6% (Hood and et. al., 2000). In this study we obtained similar results. This study aimed to determine the effect of physical activity levels in school age children to prevent obesity and found that there was a significant difference between the BMI, body weight and height values of students ($p < 0.01$). However, comparison of BMI, body weight and heights of male and female students showed a statistically significant increase ($p < 0.01$). Comparisons of BMI, body weight and height values according to grade levels showed a gradual increase in both males and females as the grade level increased.

BMI is a beneficial technique to categorize individuals according to body fat. In developed countries, obesity levels were found to be 31% in adults; 15.3% in children and 15.5% in adolescents. In a study carried out in Kayseri on a total of 3703 children (1032 in 6-10 age group, 2671 in 11-17 age group), it was found that 10.6% of children were overweight (BMI 85 - <95. percentage) and that 1.6% were obese (BMI 95) (Krassas et. al., 2004). In a study carried out in Kastamonu Body Mass Index of 480 students was estimated, and 46.5 % of them were found to be underweight while 10.4 % were overweight and 1.3 % were obese. Similarly, in a study carried out on 1044 adolescents in 12-13 age group in İstanbul, Ankara and İzmir provinces of Turkey found that 12% of children were underweight; 12% were overweight and 2% were obese (Sur et. al., 2005). The findings of this study are consistent with the literature. We found that 15.0% of female and male children were underweight; 30.0% were normal (-2 SD - +1 SD); 40.0% were overweight and 15.0% were obese. On the other hand, another study carried out in Ankara to determine growth and obesity status in school age children evaluated physical activity habits and activity levels of children and found that of the 469 (211 males, 258 females) children in 7-14 age group, 76% walked to school while 23.5% went to school using means of transport. It was reported that 22% of children didn't do sport regularly; 43% played outdoor games and used computer for 1.28 hours a day.

Physical activity levels of children were found to be inactive (1.39), slightly active (1.40-1.59), active (1.60-1.89) and highly active (1.90) according to PAL (Physical Activity Level) values. It was suggested that 73% of children had an inactive lifestyle in weekdays and 61% of children had an inactive lifestyle at weekends (Yabancı, 2004). In a cross-sectional study carried out by Janssen et al. (2005) in 34 countries, it was reported that in the majority of countries, overweight children had lower physical activity levels and longer television watching durations than normal children. Similarly, in this study physical activity levels of school age children showed that 40.5% ($n=158$) of male and female students were physically inactive; 33.3% of males and 29.5% of females had low physical activity levels; 26.2% of males and 30.0% of females had adequate physical activity levels. Physical activity levels of school age children were determined by International Physical Activity Questionnaire. Analysis of MET-min/week values of physical activity levels showed that there was no significant difference between BMI values of physically inactive male and female children ($p > 0.05$) and that as physical activity levels increased, BMI values decreased in the groups with low and adequate physical activity. It was observed that BMIs of male and female children who had adequate physical activity were particularly higher and thus there was a significant relationship between physical activity and BMI ($p < 0.05$, $p < 0.01$).

In conclusion, the fact that the reasons for obesity are multifactorial indicates that fight against obesity should adopt a multidisciplinary approach. Since lifestyles, dietary habits and physical activity levels of school age children are changeable factors affecting obesity, transition to adulthood with positive health habits should be given priority. Thus, the study showed that obesity is a serious problem in school children and that in addition to genetic tendency, dietary habits and lack of physical activity might be an important factor in obesity. Therefore, school age children are recommended to be physically active on daily basis and to do physical activity as a part of their lives.

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