

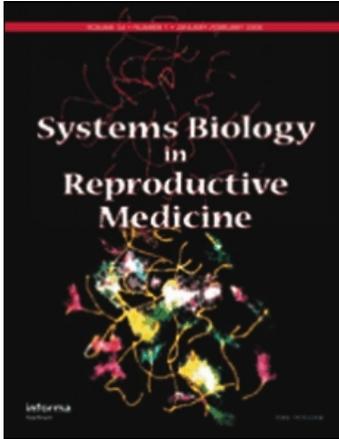
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EFFECT OF DIABETES MELLITUS ON FEMALE SEXUAL FUNCTION AND RISK FACTORS

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The study was conducted to investigate the effect of diabetes mellitus upon female sexual function, and to detect possible risk factors that might predict sexual dysfunction. The study consisted of 127 married women: 21 women with type 1 diabetes, 50 women with type 2 diabetes and 56 healthy women as a control. Female sexual functions were evaluated with a questionnaire to assess sexual desire, arousal, lubrication, orgasm, satisfaction and pain. The prevalence of sexual dysfunction was 71% in the type 1 diabetic group, 42% in the type 2 diabetic group and 37% in the control subjects. The scores for sexual desire, arousal and lubrication were significantly lower in the type 1 diabetes group than in the control subjects ($p < 0.05$). The scores of orgasm, satisfaction, dyspareunia and total sexual function were slightly lower in the type 1 diabetic group than in the other groups. No factor predicted sexual dysfunction in the diabetic women while further age, poor education, absence of occupation and menopause predicted sexual dysfunction in the control subjects. The prevalence of sexual dysfunction was significantly higher in the type 1 diabetic women than in the type 2 diabetics and control subjects. However, no risk factors that might cause sexual dysfunction could be predicted in diabetic women.

Keywords diabetes mellitus, female, prevalence, risk factors, sexual dysfunction

In diabetic patients, long-term complications include retinopathy, neuropathy, nephropathy and macrovascular disease that increases morbidity and mortality. Diabetic men are recognized to be at risk for developing impaired sexual function, and therefore, sexual research has been mainly focused on sexual problems in diabetic men [7]. Sexual research in diabetic women has been more interested in menstrual disorders, genital infections, contraception, hormone replacement therapy (HRT) and pregnancy [27].

Female sexual function includes components of desire-libido, arousal, orgasm and satisfaction. Female sexual dysfunction is a highly prevalent health problem affecting 25 to 63% of women [2, 4, 5, 9, 11, 15, 22, 25]. We have shown the prevalence of female sexual dysfunctions including sexual desire, arousal, lubrication, orgasm, satisfaction and pain problems to be 46% and the prevalence increases with older age [5]. Sexual functions may be affected by various factors such as age, education, depression, history of sexual abuse or

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sexually transmitted disease, experience of emotional or stress-related problems, and health status [3, 5, 12, 13, 15, 16, 19, 20].

Studies on sexual dysfunction in diabetic women are quite limited. Newman et al. [19] found the prevalence of sexual dysfunction to be 47% in diabetic women. Guay et al. [13] reported the prevalence of sexual dysfunction as 50% in diabetic men, while this rate was slightly lower in diabetic women.

The aim of this study was to investigate the effect of diabetes mellitus upon female sexual function, and to determine if there are differences in sexual functions between the type 1 and type 2 diabetic women. We also investigated possible risk factors that might predict sexual dysfunction in the diabetic women.

MATERIALS AND METHODS

The study consisted of 127 married women: 71 women with diabetes, including 21 women with type 1 diabetes (Group I) and 50 women with type 2 diabetes (Group II), and 56 healthy women as a control group (Group III). The control group consisted of healthy women with no diabetes and normal serum glucose level, living in households from different sociocultural areas. All diabetic women were followed by a diabetes mellitus center. The women with type 1 diabetes were on insulin treatment, and the women with type 2 diabetes were on oral antidiabetic drugs. All women with diabetes had diabetic control with normal range of serum glucose level. However, Hb A_{1C} levels of the diabetic women could not be included in the study. All women were informed about the study, and accepted to volunteer in the study. All women were sexually active and had male partners. Participants who fully administered the questionnaire were included in the study. Participants who had no sexual activity with any reason within the past month, no male partners, or male partners with erectile dysfunction were excluded from the study.

Female sexual functions were evaluated with a detailed 19-item questionnaire (the female sexual function index, FSFI) [21]. The questionnaire assessed sexual functioning or problem during the past 4 weeks. Sexual function domains included sexual desire, arousal, lubrication, orgasm, satisfaction and pain during sexual intercourse. Total score was obtained by adding the six domain scores and was calculated multiplying the sum by the domain. Factors were 0.6 for desire, 0.3 for arousal and lubrication, 0.4 for orgasm, satisfaction and pain. Therefore, total score range was 2 to 36. Total score >22.7 was considered as normal female sexual function, and total score ≤22.7 was considered as sexual dysfunction [5]. Based on total score, the prevalence of sexual dysfunction was calculated. The prevalence of sexual dysfunction was also calculated for each domain and compared among the groups. Score of < median value was considered sexual dysfunction for each domain.

Demographic characteristics including age, educational attainment level (primary-high school or university graduated), marriage age and occupational status (the presence or absence of occupation) were assessed in all women. Risk factors, associated with health and lifestyle, including smoking, chronic disease (hypertension controlled with medical therapy), cardiovascular diseases (coronary artery disease, heart failure, peripheral vascular disease) and neurological diseases (multiple sclerosis, epilepsy, cerebral stroke, etc.), previous pelvic surgeries (gynecologic, urologic or colorectal surgeries), menopausal status, previous pregnancies and contraception methods were assessed in all women

Table 1. Demographic characteristics of the women

	Diabetic group (n: 71) n (%)	Control subjects (n: 56) n (%)
Menopause	22 (31%)	13 (23.2%)
Chronic disease (+)	28 (39.4%)	12 (21.4%)
Absence of occupation	51 (71.8%)	30 (53.6%)
Smoking	22 (31%)	30 (53.6%)
Poor education	60 (84.5%)	37 (66.1%)
Pelvic surgery (+)	16 (22.5%)	13 (23.2%)
Contraception (+)	40 (56.3%)	33 (58.9%)
Previous pregnancy (+)	60 (84.5%)	42 (75%)

(Table 1). In addition, the type of diabetes and duration of diabetes were also assessed in all diabetic women.

Statistical Analysis

Parametric sexual function scores were compared using the one way Anova with post hoc tests and independent t test because of the unequal groups; however, their variances were homogeneous. The chi-square test was used to compare proportions. Univariate analysis with logistic regression was used to investigate possible risk factors that might cause sexual dysfunction. Odds ratio (OR) and confidential interval (CI) were also calculated. Probability values of <0.05 were considered significant. The values are given as the mean \pm standard deviation (SD).

RESULTS

The mean age of the women was 41 ± 9.5 years (range 21 to 60) in Group I, 43 ± 7.8 years (range 22 to 60) in Group 2 and 39 ± 10.9 years in Group 3 (range 25 to 64), revealing no statistical significance among the three groups ($p > 0.05$). The mean duration of diabetes was 7.00 ± 7.13 (1–23) years in the type 1 diabetics and 4.6 ± 4.17 (0.3–16) years in the type 2 diabetics, revealing a significant difference ($p < 0.05$). Based on total sexual function score, the prevalence of female sexual dysfunction was 71% in Group 1, 42% in Group 2 and 37.5% in Group 3, revealing statistical significant difference among the three groups ($p < 0.05$) (Table 2). Total scores were 18 ± 8 in the type 1 diabetic group, 21 ± 8 in the type 2 diabetic group and 23 ± 8 in the control subjects ($p > 0.05$), and the mean scores of sexual desire, arousal and lubrication were meaningful lower in Group I than in the control subjects. No risk factors predicted sexual dysfunction in the women with diabetes mellitus; however further age ($p = 0.035$), poor education ($p = 0.050$), absence of occupation ($p = 0.034$), and menopause ($p = 0.035$) predicted sexual dysfunction in the women with control subjects.

DISCUSSION

Neuropathy, vascular insufficiency and psychological problems have been implicated in decreased vaginal lubrication, orgasmic dysfunction and decreased libido in women [28].

Table 2. The comparison of the prevalence of sexual dysfunction among the groups

FSFI domains	Groups (% sexual dysfunction)			p		
	Group I	Group II	Group III	I vs. III	I vs. II	II vs. III
Desire	85	82	66	NS	NS	NS
Arousal	76	68	41	<0.05	NS	<0.05
Lubrication	57	38	28	<0.05	NS	NS
Orgasm	66	38	39	<0.05	<0.05	NS
Satisfaction	52	50	37	NS	NS	NS
Dyspareunia	61	46	39	NS	NS	NS
Total score	71	42	37	<0.05	<0.05	NS

Diabetes can deteriorate smooth muscle in rat vagina via adrenergic, cholinergic and non-adrenergic non-cholinergic neurotransmitter mechanism [10]. Previous prevalence studies assessed one of following dysfunctions: desire disorders, arousal disorder, orgasmic disorder and sexual pain disorders. However, such studies lacked assessing lubrication problems and satisfaction. Therefore, we used FSFI [21] to assess female sexual function including desire, arousal, lubrication, orgasm, satisfaction and pain. The FSFI is a self-report measurement of female sexual function. The questionnaire scores determine status of sexual functioning; however, it does not have criteria to determine sexual dysfunction. We used a cut-off score to investigate the prevalence of female sexual dysfunction for each parameter of sexual functioning. We previously used the same questionnaire as we used to assess sexual dysfunction in diabetic women [5]. Erol and colleagues [8] compared sexual dysfunction between women with type 2 diabetes and control subjects using a similar questionnaire; however they did not use the factors and cut-off score to assess sexual dysfunction in the women.

In the present study, total sexual function score in the type 1 diabetics was lower than those in the type 2 diabetics and the control subjects. The prevalence of female sexual dysfunction was higher in the type 1 diabetics (71%) than in the type 2 diabetics (42%) and the control subjects (37%). Total sexual functioning score and the prevalence of female sexual dysfunction were not significantly different between the type 2 diabetic group and the control subjects. Sexual arousal and lubrication problems were significantly higher in the type 1 diabetic women than in the control subjects. Orgasm problems were significantly higher in the type 1 diabetic women than the other two groups.

In a study by Newman and colleagues [19], 47% of type 1 diabetic women were diagnosed with sexual dysfunction. The more frequently reported sexual problems were sexual excitement, inhibited sexual desire, and dyspareunia. Enzlin and colleagues [6] reported the prevalence of sexual dysfunction in type 1 diabetic women as 27%, and lubrication was significantly lower in complicated diabetic women than in the control group. However, sexual function was assessed with a form (UKU) used to assess side effects of the psychiatric drugs such as increased libido, decreased libido, erectile dysfunction/dry vagina, and ejaculatory dysfunction/orgasmic dysfunction Tyrer and colleagues [26] compared sexual functions in 82 women with type 1 diabetes and 47 healthy women. Although vaginal lubrication was lower in diabetic women, there were no significant differences in

positive and negative feelings sexual intercourse, vaginal lubrication, non-genital arousal during sexual intercourse and frequency of orgasm during sexual activity between the two groups. Schreiner-Engel and colleagues [24] compared sexual response, activity, dysfunction and satisfaction between 35 women with type 1 diabetes and 42 healthy married women. Type 1 diabetics were less affected or had no effect. On the other hand, Schiel and colleagues [23] found the prevalence of sexual disorders to be 18% in type 1 diabetics, and Erol and colleagues [8] reported that the mean sexual function score in 72 type 2 diabetics was lower than 60 healthy women. Schiel and colleagues [23] reported the prevalence of sexual disorders in type 2 diabetics as 42%.

Çayan and colleagues [5] reported that the presence of older age, lower educational level, unemployment status, chronic disease, multiparity and menopause status predicted sexual dysfunction in the prevalent study including 179 women. Mooradian and Greiff [17] reported that some of the age-related changes in physiological indicators of sexual function, such as vaginal blood flow, are the result of estrogen deficiency. Kadri and colleagues [14] found positive association between hypoactive sexual desire disorder and age, financial dependency, number of children, and sexual harassment. Menopause was related to lower sexual desire, but not all, aspects of sexual functioning [1]. Nappi and colleagues [18] found that pain during sexual intercourse and low libido/lack of arousal were significantly more frequent with age and years since menopause.

In conclusion, our study suggests that the prevalence of sexual dysfunction was significantly higher in the type 1 diabetic women than in the type 2 diabetics and control subjects. However, no risk factors that might cause sexual dysfunction could be predicted in diabetic women. The limitation of our study is that diabetic complications such as retinopathy, neuropathy and nephropathy were not recorded. Therefore, the findings were not compared between diabetic women with and without complication. However, we determined severe sexual dysfunction in women with type 1 diabetes. Further studies with more diabetic women are needed to clarify these findings.

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