

# Sexual Dysfunction and Depression in Turkish Women with Type 2 Diabetes Mellitus

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**Abstract** The aim of this study is to examine sexual dysfunction (SD) and depression in Turkish women with type 2 diabetes mellitus (DM). Forty-five women were included in the sampling. The study inclusion criteria were: literate, 18 years or older, able to speak, understand and communicate verbally in Turkish, not pregnant, having active sexual life, agreed to participate in the study. Patients had been diagnosed with DM at least 6 months before conducting the study. The instrument included questions about demographic variables. In addition, Female Sexual Function Index (FSFI) and Beck Depression Inventory were used. It was determined that the women between the ages 22 and over 50, primary school graduates, unemployed and those living in large family, those suffering from diabetes for more than 10 years were more SD and had higher level of depression than the other groups. A significant positive correlation was found between SD and depression. It was also found that as the level of depression of the patients increased, the mean subtotal and total FSFI scores decreased.

**Keywords** Sexual dysfunction · Depression · Women · Diabetes mellitus · Turkey

## Introduction

Many diseases have a negative effect on sexual health. Among the diseases, endocrine disease is one of the most leading ones because endocrine disease frequently interrupts sexual function, and consequently sexual dysfunction (SD) may signal serious endocrine disease [1],

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particularly when associated with diabetes mellitus (DM) [2]. For women, the risk of developing DM is reaching epidemic levels, and because diabetes affects multiple body systems, women with DM may suffer from medical and psychological problems, including SD [3]. In women, SD has not been associated with serum testosterone, but this may be confounded by limitations of assays at low concentrations and by the greater importance of intracellular production of testosterone in women than in men. Testosterone supplementation after menopause does improve some aspects [1] of sexual function in women, but long-term outcome data are needed. Research on the sexual effects of abnormal adrenal and thyroid function, hyperprolactinemia, and metabolic syndrome should also be prioritized [1, 4]. Although data on managing the genital consequences of low estrogen are available, Bhasin et al. [1] noted that a better understanding of the potential role of systemic estrogen supplementation from menopause onwards in sexually symptomatic women is needed.

Objective studies of the effects of DM on the sexual function of women are limited due to cultural reasons and methodological difficulties [5], and this focus has received much less attention in clinical research [2, 7]. The prevalence of SD among diabetic women is reported to range between 20 and 80 % [6]. Psychological factors are more predominant in women with diabetes, and the most common SD is decreased sexual arousal with slow and/or inadequate lubrication. Women with diabetes may, however, also experience decreased sexual desire and more pain on sexual intercourse, whereas there do not appear to be problems with orgasm [7]. Sexual dysfunction is either temporary or permanent.

The effect of diabetes on women's sexual function is complex; the most consistent finding is a correlation between SD and depression [8]. Sexual problems may be a warning sign of diabetes or a consequence that can lead to depression, lack of adherence to treatment, and strained intimate relationships [1]. The mental disorder encountered most among physical diseases is depression, and consequently patients with diabetes have a higher prevalence of depression than the general population [9]. Research suggests that co-morbid diabetes and depression is common [10, 11]. Clinically significant depression is present in 25 % of individuals with type 2 diabetes, with its risk in women being twice that of men [12].

Depression significantly impacts the quality of life of persons with diabetes [13, 14]. In the mild of expressions above, there are clear relations between SD and depression in women with DM.

Although female SD is a common health problem for women with Diabetes, there are very limited studies on that issue. As the topic of sexuality is considered a taboo subject by many, it can be overlooked by women and has been neglected by health professionals [15]. The medical community started to recognize the impact of diabetes on sexuality in the 1940s, but only as it related to men. It wasn't until 1971 that researchers conducted one of the first studies that looked at the sexual functioning of women with DM [13]. Due to the shortage of the studies in the field, there are only a few studies focusing on the related to the demographic variables prevalence of SD and depression in women with DM.

The present study aimed to examine and compare the prevalence of sexual dysfunction and depression in women with type 2 DM and then to describe related demographic variables.

## Materials and Methods

### Study Design and Subjects

This cross-sectional and descriptive study examined 45 women with Diabetes between September 2009 and March 2010 in the Endocrinology Policlinic of Atatürk University

Hospital in Erzurum province, Turkey. The inclusion criteria for women participating in the study were: (1) literate, (2) aged 18 and older, (3) had type 2 diabetes >6 months at the time of the study and were being medically managed, (4) able to speak, understand, and communicate verbally in Turkish, (5) not pregnant, (6) had an active sexual life, and (7) agreed to participate in the study.

### Instruments

We used a questionnaire for data collection and the Beck Depression Inventory (BDI) and Female Sexual Function Index (FSFI).

#### *Questionnaire*

A semi-structured questionnaire was developed by the researchers after a review of the related literature [1, 2, 6, 7]. Demographic variables such as age, educational level, occupation, family type, diabetes duration, experiencing SD were recorded for each patient.

#### *Beck Depression Inventory*

The BDI, which reflects the most common indications of depression, was developed by Beck et al. [16], and its reliability for Turkey was studied by Hisli [17]. This inventory is a Likert-type self-evaluation consisting of 21 items, and each question is scored between 0 and 3. The lowest possible score is 0 while the highest is 63—the higher the score, the more severe the condition. Accordingly, any score of 10–17 is considered to indicate moderate depression; scores of 18–29 indicate moderate-severe depression, and scores of 30–63 indicate severe depression. The split half coefficient of the scale was 0.61 [18]. The Cronbach's alpha coefficient was 0.85 (Table 2).

#### *Female Sexual Function Index*

The FSFI was developed by Rosen et al. [19] and its reliability for Turkey was studied by Aygin and Aslan [20]. The scale evaluates sexual problems in the preceding 4 weeks. This is a multi-dimensional scale consisting of 19 items that evaluate six dimensions: desire, stimulation, lubrication, orgasm, satisfaction, and pain. Each item is scored between 0 and 5. The lowest score possible is 2, and the highest one is 36. A lower score indicates a more severe SD for desire (1.2–6), for stimulation (0–6), lubrication (0–6), orgasm (0–6), satisfaction (0–6), and pain (0–6). The Cronbach's alpha coefficients for the subscales were 0.85 for sexual desire, 0.95 for arousal, 0.95 for lubrication, 0.96 for orgasm, 0.96 for satisfaction, 0.98 for pain, and 0.98 for the total score [20]. In this study, the Cronbach's alpha coefficients for the subscales were 0.88 for sexual desire, 0.94 for arousal, 0.93 for lubrication, 0.95 for orgasm, 0.83 for satisfaction, 0.91 for pain, and 0.97 for the total score (Table 2).

### Ethical Considerations

Permission to conduct this study was obtained from the Endocrinology Policlinic of Atatürk University Hospital. Potential participants were informed about the aim of the study

by the first researcher, and patients signed written informed consent to participate. Participants were told that they could withdraw from the study at any time and that all information would be kept strictly confidential.

### Data Analysis

Analyses were performed using the Statistical Package for Social Sciences (SPSS version 16.0). In analyzing the data, descriptive statistics (including frequency, percent, arithmetical mean, standard deviation) were used to present the demographic variables. Patients' SD and depression score averages were evaluated with the Mann–Whitney *U* test according to age, educational level, occupation, and diabetes duration in independent groups with *t* tests according to family type and experiencing SD. The relation between SD and depression scores was analyzed by Pearson correlation analysis. Cronbach's alpha coefficients for the SD subscales and depression scale provided an estimate of instrument internal consistency reliability. For all the analyses, a  $p < 0.05$  was considered to be statistically significant.

### Results

Table 1 summarizes the patients' demographic variables and their SD and depression score averages. All the women were married, and the subjects ranged in age from 22 to 64 years, with an average age of 45.2 years (SD 9.3). Twenty-seven participants were primary school graduates who left the school after the first level of Turkish education system. Of the total sample, 27 participants had smaller family (less than 4 people) and 32 participants were unemployed. The average duration of diabetes was 6.7 years (SD 5.1, range 1–20 years); twenty-five subjects had diabetes duration of 1–5 years. Fifteen women reported experiencing SD. There was a significant difference between SD and demographic variables: (1) age ( $p < 0.05$ ), (2) education ( $p < 0.001$ ), (3) occupation ( $p < 0.001$ ), and (4) family type ( $p < 0.001$ ). There was no significant difference between SD and diabetes duration ( $p > 0.05$ ) and also experiencing SD ( $p > 0.05$ ). Results indicated that women who were older than 50, had only primary school education, were unemployed, who lived in a large family (more than 4 people), had more than 10 years duration of diabetes, and who reported experiencing SD had more SD than the other groups.

Severe depression was found in 37.8 % of the patients, a moderate degree in 20 % of the patients, and a moderate-severe degree in 11.1 %. Education ( $p < 0.05$ ), occupation ( $p < 0.01$ ), family type ( $p < 0.05$ ), diabetes duration ( $p < 0.001$ ), experiencing SD ( $p < 0.05$ ), and depression in participants showed statistically significant differences. There was no significant difference between depression and age groups ( $p > 0.05$ ). Results indicated that women who were older than 50, had only primary school education, were retired, and were living in a large family were more depressed than the other groups. The depression scores of patients with more than 10 years duration of diabetes and who reported experiencing SD were higher than the other groups (Table 1).

The mean total FSFI was 53.1, and the mean score for sexual desire, arousal, lubrication, orgasm, satisfaction, and pain were 4.7, 9.8, 11.4, 8.3, 9.7, and 9.0, respectively. The most common problem was sexual desire (4.7), while the least common one was lubrication (11.4). The mean depression score was 15.0 (Table 2), which is considered to indicate moderate depression.

**Table 1** Comparison of patients' demographic characteristics and their sexual dysfunction and depression score averages

Demographic characteristics	Sexual dysfunction Mean $\pm$ SD	Test <i>p</i>	Depression Mean $\pm$ SD	Test <i>p</i>
Age groups (45.2 $\pm$ 9.3) (22–64)				
22–35 age (n:5)	73.0 $\pm$ 14.3	U: 3.994	13.8 $\pm$ 7.5	U: 1.165
36–49 age (n:20)	56.6 $\pm$ 20.5	0.026	13.0 $\pm$ 8.1	0.322
50 age and $\uparrow$ (n:20)	44.6 $\pm$ 23.4		17.4 $\pm$ 10.8	
Education level				
Primary school (n:27)	40.7 $\pm$ 18.7	U: 17.553	17.9 $\pm$ 9.5	U: 3.650
High school (n:12)	70.4 $\pm$ 16.9	0.000	11.4 $\pm$ 8.6	0.035
University (n:6)	74.3 $\pm$ 5.7		9.3 $\pm$ 5.4	
Occupation				
Employed (civil servant + worker) (n:11)	78.0 $\pm$ 8.8	U: 18.090	7.7 $\pm$ 4.5	U: 5.589
Retired (n:2)	72.5 $\pm$ 12.0	0.000	22.0 $\pm$ 0.0	0.007
Unemployed (housewife) (n:32)	43.3 $\pm$ 19.1		17.1 $\pm$ 9.6	
Family type				
Smaller family (n:32)	60.0 $\pm$ 20.2	t: 3.585	12.8 $\pm$ 8.1	t: -2.591
Large family (n:13)	36.1 $\pm$ 20.1	0.001	20.4 $\pm$ 10.5	0.013
Diabetes duration (6.7 $\pm$ 5.1) (1–20)				
1–5 years (n:25)	59.0 $\pm$ 24.2	U: 2.216	11.4 $\pm$ 7.7	U: 9.920
6–10 years (n:11)	49.0 $\pm$ 15.7	0.122	15.0 $\pm$ 8.1	0.000
More than 10 years (n:9)	41.8 $\pm$ 22.5		25.2 $\pm$ 8.4	
Experiencing sexual dysfunction				
Yes (n:15)	45.5 $\pm$ 21.8	t: -1.608	19.4 $\pm$ 10.7	t: 2.312
No (n:30)	56.9 $\pm$ 22.6	0.115	12.8 $\pm$ 8.0	0.026

Results showed that as the level of depression increased, the mean scores for sexual desire ( $r = -0.364$ ,  $p < 0.05$ ), arousal ( $r = -0.359$ ,  $p < 0.05$ ), lubrication ( $r = -0.320$ ,  $p < 0.05$ ), orgasm ( $r = -0.307$ ,  $p < 0.05$ ), pain ( $r = -0.402$ ,  $p < 0.01$ ), and total FSFI ( $r = -0.387$ ,  $p < 0.01$ ) decreased, indicating a statistically significant difference between SD and depression levels. The subdimension of satisfaction and depression was not statistically correlated ( $r = -0.276$ ,  $p > 0.05$ ) (Table 3).

## Discussion

The association between SD score and demographic variables (age, education level, occupation, family type, diabetes period and experiencing sexual dysfunction) found in our study was comparable to results of previous studies [8, 21–27]. We found increasing age to be associated with increased SD, as reported by others [21–25, 27]. However, Enzlin et al. [7] found no association between SD and age in patients with type 1 diabetes.

Women of low educational status were more sexually dysfunctional than the other groups in this study. Aslan et al. [25] and Çayan et al. [27] found that low education status was related to SD. The reason for this might be that women of low educational status are less capable of coping with SD.

**Table 2** Reliability co-efficient and score averages patients received from FSFI and BDI

Scales	Reliability co-efficient	Mean $\pm$ SD	Min–Max values
Sexual desire	0.88	4.7 $\pm$ 2.4	2–10
Arousal	0.94	9.8 $\pm$ 5.4	0–20
Lubrication	0.93	11.4 $\pm$ 5.6	0–20
Orgasm	0.95	8.3 $\pm$ 4.2	0–15
Satisfaction	0.83	9.7 $\pm$ 3.5	2–15
Pain	0.91	9.0 $\pm$ 4.7	0–15
Total FSFI score	0.97	53.1 $\pm$ 22.8	4–91
Total BDI score	0.85	15.0 $\pm$ 9.4	0–37

**Table 3** The relationship between Female Sexual Function Index and Beck Depression Index

	Beck Depression Inventory	
	r	p
Female Sexual Function Index		
Sexual desire	–0.364	<0.05
Arousal	–0.359	<0.05
Lubrication	–0.320	<0.05
Orgasm	–0.307	<0.05
Satisfaction	–0.276	>0.05
Pain	–0.402	<0.01
Total FSFI score	–0.387	<0.01

In our study, occupation and SD in participants showed statistically significant difference. Similarly, in another study, unemployed participants were reported as higher SD [26]. However, another study indicated there were no significant differences between occupation and SD in Turkish women [15]; a possible explanation might be that the study [15] did not take into consideration women with DM and included patients from a maternity and gynecology outpatient clinic.

Our study showed that SD in women was significantly higher for those women with a large family compared to women with a smaller family. This finding of our study was also supported with the results of the studies conducted by Hindistan and Çilingir [21], Özerdoğan et al. [26], and Çayan et al. [27].

We found no significant difference between diabetes duration and SD. Likewise, Enzlin et al. [2, 7] and Hindistan and Çilingir [21] revealed that there weren't any significant difference between diabetes duration and SD.

In our study, women with experiencing SD were more sexually dysfunctional than the other groups, but we found no significant association between SD score mean and experiencing SD. The reason why might be that the number of participants ( $n = 15$ ) explaining that they experienced SD was low in our study. We must also note that discussing the topic was deemed “taboo”.

When it comes to the association between depression score and demographic variables (age, education level, occupation, family type, diabetes period and experiencing SD), it can be claimed that there are strong association between depression and demographic

variables. The close relationship between depression and diabetes has been recognized since 1675. However, it was not until the late 20th century that epidemiological studies started to discover the complexities of the interrelationship between these two conditions [11]. In our study, the prevalence of depression was found to be 68.9 % and the subcategories of depression as moderate (37.8 %), moderate-severe (20.0 %), severe (11.1 %). Küçük et al. [8] reported that 34 % of patients suffered from moderate depression, while 8 % suffered from severe depression. Téllez-Zenteno and Cardiel [28] found that depression occurs among patients with type 2 diabetes at a rate of 39 %, and other researchers have reported similar findings [7, 13, 29]. These findings are consistent with other studies showing that patients with diabetes suffer from mental as well as physical problems. In studies of type 2 diabetic patients, Yang et al. [30] found that 39.2 % had depression and Xu et al. [31] reported 23.0 % had depression. Rates of depression in our study were much higher than prior studies [30, 31]. This difference may be due to differences in patient number, culture, and different scales. Nevertheless, results indicate that people with diabetes have an increased risk of developing depressive symptoms and people with depression also have an increased risk of developing diabetes [32].

In this study, no significant association was found between depression level and age which was surprising. However, we found that women older than 50 showed more depressive symptoms than the other age groups. It was understood that by aging, there occurred a rapid increase in the occurrence of several medical disorders and a decrease in psychological function. Because aging also often involves loss of important people from changes social roles and goals [30] and people with type 2 diabetes over age 50 have been linked to depression [28, 33]. Our results were similar to those of Küçük et al. [8] who found no significant difference between depression and patients' age.

We found a significant difference between educational level and depression. Patients with a low level of education had higher average depression scores. This finding is consistent with prior research studies [8, 30, 34].

Our study also revealed that unemployed and retired patients had higher level of depression scores. In the field the results of different studies were consistent with our study results: Küçük et al. [8] reported unemployed patients had higher average depression scores.

Their findings suggest that if people are unemployed or retired, they are more likely to present depressive symptoms than those who are employed [30]. Working at any job is considered a factor that can prevent depression by contributing to feelings of self-sufficiency and self-realization. Those individuals who are unemployed or retired may have strong feelings of powerlessness, inferiority, and personal unworthiness that could worsen their mental health [35].

In contrast to the expectations that women with a smaller family have higher level of depression scores [30, 36], we found that women who lived in large families were more depressed than those who lived in a smaller family. One explanation for this is that a woman who is responsible for more children might be overwhelmed; more depressed, and have less time/energy for a sexual relationship with her husband.

We found a significant difference between depression and duration of diabetes. The depression scores of patients who had had diabetes for more than 10 years were higher than the other groups. Similarly, studies by Yang et al. [30] and Xu et al. [31] showed that depression was positively correlated with duration of diabetes. People with diabetes typically require a long-term controlled diet and medical care. Consequently, they suffer increased psychological stress as the diabetic duration increases [37]. However, in another

study no significant difference was found between depression scores and duration of diabetes [8].

Our study also revealed that experiencing SD was related to depression. Experiencing SD has been associated with more depressive symptoms [7]. Depression may have an effect on sexual function, and reports indicate that depression is three times more common among individuals with diabetes than the general population [3].

Another important point we focused in our study was the SD problems which the woman with diabetes had frequently. The average SD scores were high in our study. And in various studies, overall high rates of SD in female patients with diabetes have also been reported [21, 38–40]. In our study it was found out that the most common problem related to SD was sexual desire, while the least common problem was lubrication in women with diabetes. In another study carried out to indicate the problems of diabetic women, it has also been reported that they experienced problems with sexual desire, orgasm, and dyspareunia more frequently [7]. Rutherford and Collier focused on the impact of hormonal alterations in diabetic woman as they related to sexual drive and speculated that vasocongestion may be compromised by a decrease in nitric oxide levels. They reported that a possible complication of diabetes decreased levels of nitric oxide due to vascular disease [41]. LeMone reported that other problems affecting women's sexuality were fatigue, changes in premenstrual blood, glucose control, vaginitis, decreased sexual desire, decreased vaginal lubrication, and an increased time to reach orgasm [42]. In another qualitative study, Sarkadi and Rosenqvist [43] identified guilt and embarrassment regarding their diabetes, vaginal dryness, pain during intercourse, and decreased desire as affecting sexual functioning. Studies have confirmed that diabetes decreases vaginal lubrication, decreases sexual desire and orgasm, and increases dyspareunia. Additionally, it has been found that psychological factors, such as depression and fatigue are predominant issues in diabetic women [3]. The other study results consistent with our study results showed us that the woman with diabetes had such SD problems as pain, orgasm and vaginal dryness frequently.

The mean BDI score of  $15.0 \pm 9.4$  in our study differed from the findings of Yang et al. [30] and Xu et al. [31] in China. Their studies applied the Zung Self-Rating Depression Scale and obtained a mean index score of 46 and 42, respectively [30, 31]. While the average score obtained from BDI ( $15.0 \pm 9.4$ ) indicated the mild level of depression, the average score obtained from Zung Self-Rating Depression scale (46–42) indicated moderate level of depression. Such a difference between their scores and ours may be due to the use of a different scale, thus limiting comparability of findings. Despite the differences, these findings all indicate that type 2 diabetes has a strong link to depression.

We found a significant positive correlation between SD and depression, which corresponds to results obtained by Dennerstein et al. [44]. These findings suggest that more SD is associated with higher levels of depression. With the exception of satisfaction, our study found an association between all other domains (sexual desire, arousal, lubrication, orgasm, pain, and total FSFI) and depression.

## Conclusion

Our study demonstrated that women with DM have significant problems of SD and depression. While sexual dysfunction was associated with women's age, education, and family type, depression was associated with women's education, occupation, family type, diabetes duration, and experiencing SD. Sexual dysfunction and depression have some



common demographic variables as women's education and their family types. However, they have some hallmarks like women's occupation, depression, diabetes duration and experiencing SD. In addition, our study showed that SD was strongly associated with an increasing level of depression. With the exception of the satisfaction domain, the scores obtained from the FSFI showed a significant difference between all domains (sexual desire, arousal, lubrication, orgasm, pain) and depression. We therefore demonstrated that depression in women with DM is an important risk factor for the development of SD, which emphasizes the need for a psychological evaluation of these patients.

Health care professionals must incorporate screening of sexual functionality in women with diabetes, along with thorough physical and nursing examinations, to identify and treat SD effectively. Nurses are the most frequent contact for the patient with diabetes in the health care system. Nurses' knowledge about sexuality in relation to diabetes should improve patient education and counselling as well as the identification of symptoms that could signal undiagnosed disease or a high risk for disease. In addition, researchers need to continue to explore this subject as the study of the sexual problems of and depression in women with diabetes deserves more attention in clinical research and practice. Patients should be treated holistically, and psychiatric support should be provided for those considered at risk.

### Limitations

In the interpretation of the results of this study, some limitations are noteworthy. First of all, our lack of knowledge about the body mass index, glycosylated hemoglobin, post-prandial glucose, therapy, DM complication, and quality of participants' partnered relationship is one such limitation. These variables are known to have an effect on sexual function and depression. Second, since self-report questionnaires were used and orally administered, an assumption was made that the subjects provided the truth. While collecting the raw data via the questionnaire, only one interview was made between the researcher and the participants. In future studies, more than one interview may be made, which enables the researcher have much more consistent data.

Another limitation of the study is that the women who participated in the research were not asked if they had reached menopause, and if they had, whether it happened naturally or whether a surgical operation was involved and whether they had been using hormone replacement therapy (HRT). If these data were available, some of the findings of this study could be further clarified since postmenopausal women not receiving HRT might naturally experience some of the reported SD symptoms (e.g., decreased lubrication, increased pain). To overcome such a limitation, women's menopause status may be examined before accepting them as participants or the women may be categorized based on their menopause status. Finally, due to the use of a cross-sectional design, it was not possible to clearly draw inferences regarding causal relations. For that reason, similar studies may be conducted via different research designs.

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