

Sexual Dysfunction in Turkish Men and Women with Type 2 Diabetes Mellitus

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Abstract Sexual dysfunction (SD) is a common health problem for many men and women all over the world. This study was conducted to determine sexual dysfunction among Turkish men and women with type 2 diabetes mellitus (DM). Eighty men and eighty women were included in the sampling. This study inclusion criterion were: awareness of the illness, literate, married, the age range of the diabetic women 18–45, and not pregnant, the age range of the diabetic men 18–65 years, DM diagnosed at least 1 year, able to read the Turkish language, agreed to participate in the study. The data was completed using a questionnaire form, the index of female sexual function (IFSF), and the international index of erectile function (IIEF). The prevalence of male sexual dysfunction was 65.0 %; the prevalence of female sexual dysfunction was 68.8 %. The scores obtained from the subscale of the IFSF were lower for women with SD. There were also significant differences between the two groups in all domains (lubrication, sexual desire, intercourse satisfaction, clitoral sensation, overall satisfaction) except for the orgasmic function domain ($p = 0.000$). Scores obtained from the subscale of the IIEF were lower in men with SD, and between the two groups significant differences were found in the domains of erectile function ($p = 0.000$) and sexual desire ($p = 0.010$). We also found statistically significant differences between the income level ($p = 0.003$), family size ($p = 0.002$), therapy ($p = 0.017$) and SD in women. Differences for men were found between the age and SD ($p = 0.018$).

Keywords Sexual dysfunction · Female sexual dysfunction · Male sexual dysfunction · Diabetes mellitus · Turkey

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Introduction

Sexual health is an important, but often neglected, component of diabetes care [1]. Type II DM is a common chronic medical condition affecting about 90–95 % of the diabetic population. Diabetes affects sexual functioning in both men and women, and for some men sexual dysfunction (SD) may be the first sign of diabetes [2].

Sexual dysfunction as a diabetes-related symptom is common among both male and female patients [3]. The prevalence of SD and diabetes varies widely and may be due to the different definitions and the population studied. These can vary depending upon the the number and selection of participants, cultural background, socioeconomic level, quality of psychosexual relationship and income [4]. The prevalence of sexual dysfunction in diabetic men approaches 50 %, whereas in diabetic women it seems to be slightly lower [1]. In the Massachusetts Male Aging Study, the age adjusted probability of complete impotence was three times greater (28 %) in patients with treated diabetes than in those without diabetes (9.6 %). In addition to its higher frequency, erectile dysfunction (ED) also occurs at an earlier age in the diabetic population as compared with the general population [5]. Female SD is a highly prevalent health problem affecting 25–63 % of women [6]. The prevalence of SD among diabetic women is reported to range between 20 and 80 % [7]. Abu Ali et al. evaluated 613 diabetic women and 524 non-diabetic women in Jordan, and found a prevalence of female SD of 59.6 % in diabetic women 50 years of age or older as compared with 45.6 % found in the age-matched non-diabetic women [8]. 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 in their patient assessments [9].

Neuropathy, vascular impairment and psychological complaints have been implicated in the pathogenesis of decreased libido, low arousability, decreased vaginal lubrication, orgasmic dysfunction, sexual desire, clitoral sensation and intercourse satisfaction among diabetic women [1, 10]. The high rate of SD among diabetic subjects may possibly be attributed to the complications associated with diabetes. These include damage to small arteries and arterioles which could impair endothelium-dependent relaxation of the penile smooth muscle, thus preventing optimal blood flow to and from the penis, and maintenance of an erection [4]. SD among diabetic men may include disorders of libido, ejaculatory problems, and erectile dysfunction, decreased sexual desire, and intercourse satisfaction [4, 11].

Diabetes affects patients' lives in many ways. The impact of symptoms for both males and females can be profound, resulting in psychological distress, altered self-perception, and dysfunctional family dynamics [12]. Female SD can lead to loss of confidence, deterioration in relationships and emotional stress [9]. In addition, since patients with diabetes often require individualized medical nutrition, patients may need to alter their regular nutrition habits. Further adding to their stress, the stigma associated with a chronic disease such as diabetes may significantly affect patients' social lives and perhaps cause social isolation. It is well recognized that social isolation is an important risk factor for depression [3, 13].

Turkish studies examining sexual dysfunction in men and women with type 2 diabetes mellitus are limited. Therefore the findings of this study will contribute to the literature currently available to health care professionals who provide services related to this issue.

The aim of this study was to determine the prevalence of sexual dysfunction in Turkish men and women with type 2 diabetes mellitus.

Materials and Methods

This cross-sectional and descriptive study was conducted among 160 diabetic (80 men, 80 women) between May 2, 2011 and December 31, 2011 in the Endocrinology Polyclinic of the State Hospital in Trabzon, province of Turkey. The convenience sampling method was used to obtain the names of men and women volunteers who had applied to the outpatient endocrinology polyclinic of the hospital between the specified dates. This study inclusion criteria were: (a) awareness of the illness, (b) literate, (c) married, (d) the age range of the diabetic women 18–45, and not pregnant (e) the age range of the diabetic men 18–65 years, (f) DM diagnosed at least 1 year (g) able to read the Turkish language, (h) agreed to participate in the study. The data was collected using a questionnaire form (15 questions) which included questions such as the gender, age, marital status, educational level, income level, occupation, family size, place of residence, duration of diabetes, glycosylated hemoglobin (HbA1C), body mass index (BMI), postprandial glucose (PBG), therapy, DM complications related to socio-demographics, and the characteristics of the patient's DM. The questionnaire form was developed by the researchers based on the current literature. Study participants also filled out forms for the index of female sexual function (IFSF) and the international index of erectile function (IIEF).

HbA1C

We measured HbA1C with high-performance liquid chromatography (normal range, 4.4–5.9 %); we assessed the frequency of blood and urine glucose by patients' self-monitoring and insulin-dose adjustment per week and by conducting a standardized interview and viewing the patient's log book [14]. BMI: using a portable stadiometer the researcher measured the patient's height and weight without shoes and with light indoor clothing. Their BMI was calculated as weight/height^2 (kg/m^2).

The questionnaire form was pilot-tested, and 20 men and 20 women met the required criteria. These questionnaire forms were included in the study. The questionnaire forms, the IIEF and the IFSF instrument were filled out by the men and women in separate and quiet sections of the outpatient clinic. The questionnaire form, IFSF and IIEF instruments were completed by the participants in approximately 20 min.

Index of Female Sexual Function (IFSF)

A nine item, self-administered IFSF, as previously described by Kaplan et al. [6], was used for assessment of SD, and a total of six domains as a SD symptom were analyzed. The IFSF, which has been used abroad in various studies to assess certain aspects of female sexual function, was also approved for use in Turkey by the Turkish Society of Andrology [7, 15]. The validity and internal reliability tests for the Turkish version of the IFSF were carried out by Yilmaz and Eryilmaz, and the Cronbach alpha was determined as 0.82 [16]. This result showed that the IFSF was a reliable instrument in determining SD in Turkish women. In the present study, the Cronbach alpha value was found to be 0.88. The specific domains analyzed in the IFSF included quality of sexual intercourse (questions 1 and 2), desire (questions 4 and 5), overall satisfaction with SD (questions 6 and 7), orgasm, lubrication and clitoral sensation. Specific questions analyzed the degree of lubrication (questions 2), ability to achieve orgasm (questions 8) and the degree of clitoral sensation (questions 9), with responses graded on a scale of 1 (almost never or never) to 5 (almost always or always). A score of zero indicated no attempt at intercourse and scores between one and three revealed the presence of related SD

symptom. The subscale score of the IFSF included the following: lubrication (1–5 score), orgasmic dysfunction, (1–5 score), sexual desire, (2–10 score), intercourse satisfaction (2–10 score), clitoral sensation, (1–5 score) and overall satisfaction (2–10 score). The highest total score is 45. A total score of $30 \leq$ IFSF was considered as an indication of SD.

International Index of Erectile Function (IIEF)

The IIEF was developed by Rosen and colleagues [11] and approved by the Turkish Society of Andrology for use in our country after its translation into Turkish. The IIEF is a 15-item self-administered assessment which measures different areas of sexual functioning in men. A principal component analyses five factors: erectile function, orgasmic function, sexual desire, intercourse satisfaction, and overall satisfaction. Psychometric studies have supported the reliability and discriminate validity of these measurements. Studies with clinical samples demonstrated its sensitivity and specificity for detecting treatment related changes. The measure allows the calculation of specific indexes for each dimension as well as sexual function total index (calculated through the sum of the specific dimensional indexes). Higher scores indicate greater levels of sexual functioning (sexual desire: 2–10; erectile function: 1–30; orgasmic function: 0–10; intercourse satisfaction: 0–15; overall satisfaction: 2–10; total: 5–75). The maximum score is 30 for the erectile function domain. The severity of erectile dysfunction is evaluated as severe (6–10 score), moderate (11–16 score), mild (17–25 score) and without dysfunction (26–30). In the present study, the Cronbach alpha value was found as 0.91.

Ethical Considerations

This study was approved by the institutional review board of the hospital. All participants were informed in detail about the aims and procedures of the study, and their signed consent forms were obtained. The researchers guaranteed participants that their identities and answers would be kept confidential. The study conformed to the principles of the declaration of Helsinki.

Analysis of the Data

In analyzing the data descriptive statistics (including frequency, percent, arithmetical mean, standard deviation) were used to present the sociodemographic variables, DM-related variables. Based on their IFSF and IIEF score, the men and women were divided into two groups of either “with sexual dysfunction” or “without sexual dysfunction.” Mean and standard deviations were used for the IFSF and IIEF. Continuous variables between men/women with and without SD were compared using the *t* test. The Chi-square test was used for comparing categorical variables. The results were analyzed with a 95 % confidence interval, and the accepted level of significance for all analyses was $p < 0.05$.

Results

Sample Characteristics

In all, 160 cases (80 men and 80 women) were studied. The mean age of patients was 39.0 (SD = 12.3). The mean age of men was 47.2 while it was 30.7 for women. All patients had

type 2 diabetes mellitus. It was observed that 68.9 % of men had graduated high school and 57.4 % of women had finished primary and secondary school; 58.9 % of men perceived income at a middle level; 79.4 % of women perceived income low; 85.7 % of men were retired, and 73.5 % of women were housewives. It was found that 53.4 % of men had small families and 59.5 % of women had large families; 52.2 % of men lived in districts and counties, and 52.9 % of women lived in villages.

When the DM-related characteristics were investigated, it was found that 60.6 % of the women had been coping with diabetes for 16 or more years, 69.0 % of the men had lived 6–10 years with diabetes; 45.5 % of women and 54.5 % of men were >7 % HbA1C; 92.7 % of women were obese, 63.9 % of men were overweight; 44.9 % of women and 55.1 % of men had PBG >180 mg/dl. Study results also found that 56.6 % of men and 43.4 % of women were treated with insulin + diet, and 54.5 % of men and 45.5 % of women had DM complications (Table 1).

Income level ($p = 0.003$), family size ($p = 0.002$), therapy ($p = 0.017$) and SD in women showed statistically significant differences, but for the men statistically significant differences were found only between age and SD ($p = 0.018$). No significant associations were found between clinical characteristics in both genders including diabetes duration, HbA1c levels, BMI, PBG levels, DM complications with SD. In addition, education, occupation, and place of residence did not show a significant association with SD in both genders (data not shown).

Upon examination of the subscale IFSF scores of women for SD and non SD, it was found that these were lower for women with SD, and between the two groups, except for the orgasmic function domain, significant differences ($p = 0.000$) existed in all domains (lubrication, sexual desire, intercourse satisfaction, clitoral sensation, overall satisfaction) (Table 2).

Scores for the men on the subscale of the IIEF with SD and without SD determined these scores to be lower in men with SD. There were significant differences between the two groups in the domains of erectile function ($p = 0.000$) and sexual desire ($p = 0.010$) (Table 3). With data not shown, it was also found that 36.5 % of men had severe SD, 40.4 % had moderate SD, and 23.1 % had mild SD.

Discussion

Health professionals throughout the world are becoming increasingly aware that sexual health is important for overall good health and well-being. However, sexuality is a complex concept that includes organic, hormonal, emotional, social and cultural inputs [17], and patients coping with a diagnosis of DM may find that they also face multiple medical, psychological, and sexual dysfunctions [4].

This study examined SD among 160 diabetic men and women. When assessed with the IFSF, the prevalence of female SD was high (68.8 %) in this study. It was also similar to that previously reported using a comparable tool in other Hispanic [18, 19] and non-Hispanic populations with varying cultural and social backgrounds [17, 20, 21]. However, the incidence of SD among women was higher than men in this study. Overall high rates of SD in female patients with diabetes have been reported in different studies. Erol et al. [15] found that the prevalence of SD was 51.3 % in women, and he also revealed that the SD can be regarded as a silent complication of DM. A study from Iran showed that diabetes significantly impairs the sexual performance of women with diabetes [1]. A study by Doruk [6] demonstrated that female SD affected women with diabetes in all SD items, and

Table 1 Socio-demographic and diabetes mellitus related characteristics of the patients (n = 160)

Socio-demographic and diabetes mellitus related characteristics	Total (n = 160) n (%)	Women (n = 80) n (%)	Men (n = 80) n (%)
Age groups			
18–31	53 (100.0)	44 (83.0)	9 (17.0)
32–45	56 (100.0)	36 (64.3)	20 (35.7)
46 and ↑	51 (100.0)	0.00	51 (100.0)
Mean (SD)	39.0 (12.3)	30.7 (7.47)	47.2 (10.7)
Education status			
Primary and secondary school	115 (100.0)	66 (57.4)	49 (42.6)
High school	45 (100.0)	14 (31.1)	31 (68.9)
Income level			
Low	34 (100.0)	27 (79.4)	7 (20.6)
Middle	112 (100.0)	46 (41.1)	66 (58.9)
High	14 (100.0)	7 (50.0)	7 (50.0)
Occupation			
Civil servant	66 (100.0)	16 (24.2)	50 (75.8)
Retired	35 (100.0)	5 (14.3)	30 (85.7)
Housewife	59 (100.0)	59 (100.0)	0.00
Family size			
Small family	79 (100.0)	55 (46.6)	63 (53.4)
Large family	81 (100.0)	25 (59.5)	17 (40.5)
Place of residence			
Village	79 (100.0)	36 (52.9)	32 (47.1)
District and county	92 (100.0)	44 (47.8)	48 (52.2)
Duration of diabetes (years)			
1–5	8 (100.0)	3 (37.5)	5 (62.5)
6–10	42 (100.0)	13 (31.0)	29 (69.0)
11–15	77 (100.0)	44 (57.1)	33 (42.9)
16 and ↑	33 (100.0)	20 (60.6)	13 (39.4)
HbA1C			
>%7	134 (100.0)	61 (45.5)	73 (54.5)
<%7	26 (100.0)	19 (73.1)	7 (26.9)
BMI			
≤20	11 (100.0)	3 (27.3)	8 (72.7)
21–25	108 (100.0)	39 (36.1)	69 (63.9)
26 ≥	41 (100.0)	38 (92.7)	3 (7.3)
PBG			
>180 mg/dl	138 (100.0)	62 (44.9)	76 (55.1)
<180 mg/dl	22 (100.0)	18 (81.8)	4 (18.2)
Therapy			
Diet + oral antidiabetics	24 (100.0)	21 (87.5)	3 (12.0)
Insulin + diet	136 (100.0)	59 (43.4)	77 (56.6)
DM complications			
Yes	110 (100.0)	50 (45.5)	60 (54.5)
No	50 (100.0)	30 (60.0)	20 (40.0)

Table 2 The index of female sexual function (IFSF) subscale score of women with SD and without SD (n = 80)

IFSF subscale	Sexual dysfunction		
	With (n = 55) X ± SD	Without (n = 25) X ± SD	p
Lubrication	2.92 ± 0.99	3.92 ± 0.95	0.000
Orgasmic function	3.78 ± 1.04	4.08 ± 0.81	0.212
Sexual desire	4.63 ± 1.53	6.28 ± 1.69	0.000
Intercourse satisfaction	3.96 ± 1.13	7.36 ± 1.75	0.000
Clitoral sensation	3.10 ± 0.93	4.36 ± 1.07	0.000
Overall satisfaction	3.89 ± 1.10	7.64 ± 1.46	0.000

Table 3 The international index of erectile function (IIEF) subscale score of men with SD and without SD (n = 80)

IIEF subscale	Sexual dysfunction		
	With (n = 55) X ± SD	Without (n = 25) X ± SD	p
Erectile function	12.78 ± 4.81	27.96 ± 1.42	0.000
Orgasmic function	3.51 ± 1.52	3.03 ± 0.96	0.133
Sexual desire	3.03 ± 2.40	4.67 ± 3.04	0.010
Intercourse satisfaction	4.76 ± 2.50	5.96 ± 3.04	0.063
Overall satisfaction	3.40 ± 1.93	3.00 ± 2.49	0.424

the rate of involvement was higher among type 1 diabetic cases. Social and cultural issues may also be contributing factors to female SD. Some cultures teach women that sex is only for procreation, should not be enjoyed, or that the most important issue in a sexual encounter is pleasing the male partner, at her own expense. These issues are relevant in male-centric cultures.

As assessed with the IIEF, the prevalence of male SD was high (65.0 %) in this study. Other studies on men with diabetes have also indicated a high occurrence of SD in the patients [3, 15, 22]. In agreement with our results, a rate of 63.6 % SD among Chinese diabetic men has previously been reported [4]. However we also agree with the 20 to 85 % incidence rate for diabetic subjects reported in other studies [23, 24].

SD in females with diabetes affects lubrication, orgasmic dysfunction, sexual desire, intercourse satisfaction, clitoral sensation, and women's overall satisfaction. Diabetic males' sexual lives may be adversely affected in the areas of erectile function, orgasmic function, sexual desire, intercourse satisfaction, and overall satisfaction. With the exception of the orgasmic function domain, our study found significant differences in other all domains (lubrication, sexual desire, intercourse satisfaction, clitoral sensation, overall satisfaction) in diabetic women. For the diabetic men in our study, there were statistically significant SD results in the erectile dysfunction and sexual desire domains.

DM is also a well-identified risk factor for ED [22] which is frequently observed in diabetic patients [3, 23] and is classified as severe, moderate, and mild [11]. The men in our study were afflicted with SD and ED at rates of 23.1 % mild, 40.0 % moderate, and 36.5 % severe. In addition, the ED mean in men was found to be 12.78 ± 4.81 in our study. A study by Zdravko [25] supported the hypothesis that in the complex pathogenesis of diabetic ED, diabetic neuropathy is the major pathogenic factor. Diabetes causes damage to nerves throughout the body including the penis and the development of ED is a common

diabetes complication. Although a number of men with autonomic neuropathy can experience normal erectile function and orgasm, urine analyses have verified that they do not ejaculate normally [3].

A study by Giuliano et al. [22] indicated that the men with diabetes type 1 and type 2, have a significantly greater prevalence of ED than the general population, and the prevalence increases with age, duration and severity of disease. In a recent report of nationwide outcomes in a research program of 1,460 type 2 diabetes patients, 34 % reported frequent erectile problems and 24 % reported occasional problems [22]. In diabetic men, ED severity increases with age and diabetes duration, poor glycemic control, presence of microvascular complications and cardiovascular disease [23]. In our study, 42.9 % of men had been coping for 11–15 years with diabetes, 54.5 % of men had HbA1c >7 %, 55.1 % of men had PBG >180 mg/dl and 54.5 % of men had DM complications. Reduced sexual function is a well-documented complication of diabetes [4]. Research indicates that although ED is widespread among men with diabetes, the condition often remains undiagnosed and demands appropriate assessment and initiation of proper treatment [3, 26]. Other research findings are indicative that the etiology of ED is a multifactor disorder and in the management of diabetic ED, a holistic approach should be applied [27].

In all reported studies conducted thus far, the rate of SD increased with age. In this study we found significant differences between age and SD in men. Our male patients mean age was 47.2 ± 10.7 . Previous reports have shown that diabetic men are at increased risk for SD at an earlier age with an incidence ranging from 20 to 85 % [4]. In a study of Giugliano et al. [28] the ED rate showed increases with age for the male patients with type 2 diabetes. In the Massachusetts Male Aging Study cohort, the annual age-adjusted incidence rate of ED increased with diabetes [22]. Guay's study [29] reported a nearly 36 % moderate to severe ED rate, ranging from 4.6 % in young men to 45.5 % in older men. The results of the present study confirmed the relationship between increasing age and increasing prevalence of SD.

It has been reported that income levels are inversely correlated to SD rates [17]. Results of this study also found that there is a significant association between income level, family size, therapy and SD in women. A low income level was determined for 79.4 % of female participants in our study. We also determined that low-income series was the most important determinant of female SD [17]. We think that regional differences in culture, customs, and socioeconomic status may affect attitudes towards SD.

We found that SD in women was significantly higher for those women with a large family than for women with a smaller family. Ozerdogan et al. [30] also reported findings similar to this study with a higher SD rate for women with larger rather than smaller families.

Contrary to male SD, which in most cases is organically related, female SD is often caused by psychogenic factors including depression/anxiety, stress, and recommended by the physician drugs. Female stress-related factors and drug use can induce SD. Indeed antidepressants, antihypertensive, anticholinergics and other commonly prescribed drugs have been associated with female SD [17]. It has also been reported that drugs used in the treatment of diabetes may lead to SD [17, 31, 32]. El-Rufaie et al. [2] also showed that SD was associated with the use of medications. Our results were also consistent with these results.

No significant associations were found between clinical characteristics in both genders including diabetes duration, HbA1c levels, BMI, PBG levels, and DM complications with SD. Similarly, another study from Turkey indicated that no risk factors predicted SD in diabetic women [6]. Enzlin [33], from Belgium, has reported also that SD in type 1 diabetic

women did not correlate with BMI, duration of diabetes, glycemic control, and complications.

In addition, education, occupation, and place of residence did not show a significant association with SD in both genders. The Erbil study [9] yielded results similar to ours and showed no significant differences between education, occupation, place of residence and SD in women. Furthermore, this study [9] reported no significant differences between education and SD in both genders.

Considering the high prevalence of SD among patients with diabetes, it seems the management of these disorders should be acknowledged more precisely in the health care setting. In general, patients with diabetes may benefit from educational interventions in order to reduce the SD impact on their personal life. Furthermore, cognitive behaviour therapy, problem solving skills and improving family communications might help to minimize the unfavorable outcomes of SD among patients. Indeed, effective interactions with diabetic patients who suffer from sexual problems should become a high priority for those working in the health care field [3].

Conclusion

The findings of this study showed that the prevalence of SD was high in diabetic patients of both genders. The scores obtained from subscale of IFSF were lower for women with SD, and except for the orgasmic function domain, there were significant differences in all domains between the two groups (lubrication, sexual desire, intercourse satisfaction, clitoral sensation, overall satisfaction). Furthermore, the scores obtained from the subscale of the IIEF were lower in men with SD, and between the two groups significant differences were found in the domains of erectile function and sexual desire. In addition, this study also revealed that SD was associated with women's income status, family type, and therapy; for men SD was associated with age. SD needs to be considered in the assessment of both male and female diabetic patients. As indicated earlier, it is highly recommended that SD and its implications for diabetic patients should be given much more attention by Turkish medical professionals.

Limitations

Several limitations of this research should be noted. The sample group for this research was obtained using the convenience method of selection. The sampling was restricted to married men and women only who had sought medical assistance for various ailments and were not reporting sexual complaints. An additional limitation of this study is our lack of knowledge about the quality of participants' partnered relationship. The quality of a partnered relationship is known to have an effect on sexual satisfaction. Consideration was given to the possibility that the men and women's complaints could also have an impact on their sexual lives. For these reasons, the results of this study apply only to this study.

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Conflict of interest The authors report no conflict of interest.

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