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Identification of Factors Related to Sexual Dysfunction in Type 2 Diabetic Women

Zeinab Entezari[1], Nastaran Injinari[1], Mahmoud Vakili[2], Nasim Namiranian[1*]

[1]Diabetes Research Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.
[2]Department of Community and Preventive Medicine, Health Monitoring Research Center, School of Medicine, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.

Abstract

Objective: Type 2 diabetes mellitus (T2DM) is one of the most common metabolic diseases among women. Sexual dysfunction (SD) is a complication in patients with T2DM that has received less attention among women than men. This study aimed to assess the factors related to female SD in T2DM patients.

Materials and Methods: 120 women with T2DM who referred to the Yazd Diabetes Center in 2019-2020 were selected. Female sexual function index (FSFI) as a valid questionnaire was used. Neuropathy, nephropathy, retinopathy, hyperlipidemia, hypertension, diabetes medication, Hb1Ac, age, and duration of diabetes as factors related to SD were assessed. The T-test and chi-square tests were used to analyze the data by SPSS 22 software.

Results: The mean age of participants was 48.40 (±7.35). The SD was impaired in 85.8% of subjects and none of the participants showed a level of good function in any of the sexual domains. There was a significant relationship between SD and neuropathy (*P*= 0.005), hyperlipidemia (*P*= 0.007), hypertension (*P*= 0.015), diabetes medication (*P*= 0.005), age (*P*= 0.0001), and duration of diabetes (*P*= 0.0001). There was no significant relationship between SD and retinopathy (*P*= 0.565), nephropathy (*P*= 0.288), and Hb1Ac (*P*= 0.92).

Conclusion: The frequency of SD in females with T2DM remarkably was high and the factors including age, duration of diabetes, diabetes medication, hypertension, hyperlipidemia, and neuropathy were identified as factors related to SD.

Keywords: Type 2 diabetes mellitus, Women, Sexual dysfunction

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Corresponding Author:
Nasim Namiranian, Associate Professor, Diabetes Research Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.
Tel: (98) 353 728 0215
Email: namiranian.nasim@gmail.com
Orcid ID: 0000-0002-5133-6204

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Introduction

Type 2 diabetes mellitus (T2DM) is the most common metabolic disease and a public health problem that leads to complications and reduced quality of life (1-3). T2DM is one of the most important causes of chronic renal failure worldwide (4). It has been estimated 9.3% of people had diabetes in 2019 and it will rise to 10.9% in 2045 (5). Yazd is one of the fifth provinces in Iran in the ranking of diabetes prevalence. T2DM prevalence is 14.5% in adults of Yazd (6).

Microvascular complications such as retinopathy, nephropathy, and neuropathy as well as macrovascular complications such as peripheral artery disease, coronary artery disease, and stroke are common complications of diabetes (4,7). Besides, there is a wide range of complications such as xerostomia, candidiasis, and periodontitis in patients with T2DM than in healthy subjects (8). Depression is one of the miscellaneous complications of diabetes and it has been estimated that women with diabetes are at a higher risk for depressive symptoms (9,10). On the other hand, sexual dysfunction (SD) prevalence in T2DM women is high (11). Important factors including cardiovascular, reproductive hormones, and neurons influence sexual health (12). Based on FSFI, sexual function is defined as dyspareunia, satisfaction, arousal, lubrication, orgasm, and desire (13).

In a study in Iran, findings from 100 men and 100 women with diabetes showed the prevalence of SD is high in both genders (14). Another study by Ezeani et al. in southeast Nigeria revealed SD is very common in women with T2DM and age, body mass index (BMI), and fasting blood sugar (FBS) are predictors for SD in these patients (15). A systematic review and meta-analysis in 2019 revealed that in recent years, the rate of sexual disorders in women with T2DM significantly has increased. Moreover, this study reported the highest and lowest outbreak of SD in women with T2DM were in Iran and Italy respectively (16). In addition to female sexual disorder, diabetes influences male sexual disorder especially erectile dysfunction (17). Satisfaction with marital life and sexual function is of particular importance but has received less attention in medical studies and interventions. It is argued cultural taboos and misconceptions about women's sexual activity have led to women usually not expressing their sexual problems (12,16).

Although sexual satisfaction and its related factors have been studied in healthy people and various patients, but it is still questionable. Evaluation of sexual satisfaction in patients with diabetes due to its impact on quality of life has many values. This study aimed to assess the frequency of SD in women with T2DM and finding the most important related factors to female sexual dysfunction in these patients.

Materials and Methods

In this analytical cross-sectional study, we enrolled 120 women with T2DM who referred to the Yazd Diabetes Center in 2019-2020. The systematic random sampling method was done. The aims of the research and the study steps were explained by female general practitioners. The inclusion criteria for the group of participants were: T2DM diagnosis at least during the past two years, age 35-60 years, married and cohabitation, no alcohol addiction, and satisfaction with participation in the study. The following patients were excluded from the study: having neurological diseases, history of performing surgeries on genitals, the existence of severe physical disabilities or disabilities of oneself or partner, consumption of known drugs that affect sexual function (increasing or decreasing), and the existence of known chronic diseases affecting sexual function such as cardiovascular disease and cancer, pregnancy, breastfeeding, menopause, and the existence of another sexual partner for husband. The data collection

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method using a valid questionnaire with a specified validity and reliability was obtained. The questionnaire was provided in two parts. The first part of the questionnaire was a checklist of patient's profile such as age, marital status, employment status, education status, diabetes complications, HbA1c level, hyperlipidemia, hypertension, drug addiction, and duration of diabetes. Blood pressure> 80/135 as hypertension and triglycerides> 250 as hyperlipidemia were regarded.

In the second part of the questionnaire, FSFI as a self-report instrument was assessed in 19 items within six domains: dyspareunia, satisfaction, arousal, lubrication, orgasm, and desire (13). The total score was regarded from 15 to 75 and based on the sexual function the patients were categorized into dysfunction (15-25), moderate function (25-50), and good function (>50). The Kolmogorov-Smirnov test was used to assess the normality of distribution. The chi-square test was used for qualitative variables and the T-test was used for quantitative data. All statistical analysis was performed using SPSS, version 22 software, and *P* less than 0.05 (*P*< 0.05) was considered significant.

Ethical considerations

This manuscript has been based on a thesis (Thesis code: 5904) and approved by the ethics committee of Shahid Sadoughi University of Medical Sciences, Yazd, Iran (IR.SSU.MEDICINE.REC. 1398.021).

Results

In this study, 120 women with T2DM and married according to the inclusion criteria were included. Information on demographics and clinical features is given in Table 1. The mean age of participants was 48.40 (±7.35) and the mean HbA1c value was 7.66 (±1.04). Occupationally, most patients were unemployed (78.3%). Moreover, 55% of patients had neuropathy, 41.7% retinopathy, 15% nephropathy, 41.7% hyperlipidemia, and 38.3% hypertension. Also, none of the patients had a drug addiction. As shown in Table 2, based on the total FSFI score, none of the subjects were in a good function, and 85.8 percentage subjects were in a state of SD. The correlation of studied variables with six sexual domains to the etiology of SD in women with T2DM is shown in Tables 3-5. There was a significant relationship between the total FSFI score and neuropathy (*P*= 0.005), hyperlipidemia (*P*= 0.007), hypertension (*P*= 0.015), type of treatment (*P*= 0.005), age (*P*= 0.0001), and duration of diabetes (*P*= 0.0001). On the contrary, there was no significant relationship between the total FSFI score and retinopathy, nephropathy, and Hb1Ac (*P*> 0.05).

Discussion

In the cross-sectional study, we evaluated female SD based on FSFI in 120 women with T2DM. The frequency of sexual dysfunction and moderate function was 85.8% and 14.2% respectively. None of the participants showed

Table 1. Demographic and clinical characteristics of the participants

Variables		Frequency (%)
Employment Status	Government employee	2 (1.7%)
	Private employee	12 (10%)
	unemployed	94 (78.3%)
	Retired	12 (10%)
Education	Relatively appropriate	70 (58.3%)
	Quite appropriate	18 (15%)
	Illiterate	20 (16.7%)
	Primary	20 (16.7%)
	Middle school	20 (16.7%)
	High school	16 (13.3%)
	Diploma	30 (25%)
	Bachelor and higher	4 (3.3%)
Diabetes treatment	Non-insulin	86 (71.7%)
	Insulin	34 (28.3%)

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Table 2. Female sexual function index in patients

Domain	Sexual function	Frequency (%)
Overall sexual function	Dysfunction	103 (85.8%)
	Moderate function	17 (14.2%)
	Good function	-
Sexual desire	Dysfunction	48 (40%)
	Moderate function	72 (60%)
	Good function	-
Dyspareunia	Dysfunction	75 (62.5%)
	Moderate function	%45 (37.5)
	Good function	-
Sexual satisfaction	Dysfunction	89 (74.2%)
	Moderate function	31 (25.8%)
	Good function	-
Arousal	Dysfunction	78 (65%)
	Moderate function	42 (35%)
	Good function	-
Lubrication	Dysfunction	75 (62.5%)
	Moderate function	45 (37.5%)
	Good function	-
Orgasm	Dysfunction	73 (60.8%)
	Moderate function	47 (39.2%)
	Good function	-

Table 3. Association between diabetes complications and sexual domains

Sexual domains	Sexual function	Neuropathy	*P*	Retinopathy	*P*	Nephropathy	*P*
Total score	Dysfunction	62 (51.7%)	0.005*	44 (36.6%)	0.565	14 (11.7%)	0.288
	Moderate function	4 (3.3%)		6 (5%)		4 (3.3%)	
Dyspareunia	Dysfunction	49 (40.8%)	0.003*	31 (25.8%)	0.924	12 (10%)	0.692
	Moderate function	17 (14.2%)		19 (15.8%)		6 (5%)	
Sexual satisfaction	Dysfunction	56 (46.7%)	0.003*	38 (31.7%)	0.698	14 (11.7%)	0.704
	Moderate function	10 (8.3%)		12 (10%)		4 (3.3%)	
Arousal	Dysfunction	55 (45.8%)	0.0001*	39 (32.5%)	0.012*	13 (10.8%)	0.486
	Moderate function	11 (9.2%)		11 (9.2%)		5 (4.2%)	
Lubrication	Dysfunction	50 (41.7%)	0.001*	36 (30%)	0.069	11 (9.2%)	0.895
	Moderate function	16 (13.3%)		14 (11.7%)		7 (5.8%)	
Orgasm	Dysfunction	49 (40.8%)	0.001*	37 (30.8%)	0.013*	13 (10.8%)	0.283
	Moderate function	17 (14.2%)		13 (10.8%)		5 (4.2%)	
Sexual desire	Dysfunction	54 (45%)	0.0001*	36 (30%)	0.023*	11 (9.2%)	0.917
	Moderate function	12 (10%)		14 (11.7%)		7 (5.8%)	

The chi-square test was used to analyze the data.* Significant

Table 4. Association between hyperlipidemia, hypertension, and insulin with sexual domains

Sexual domains	Sexual function	Hyperlipidemia	*P*	Hypertension	*P*	Insulin treatment	*P*
Total score	Dysfunction	48 (40%)	0.007*	44 (36.7%)	0.015*	34(28.3%)	0.005*
	Moderate function	2 (1.7%)		2 (1.7%)		-	
Dyspareunia	Dysfunction	38 (31.7%)	0.01*	36 (30%)	0.005*	23 (19.2%)	0.46
	Moderate function	12 (10%)		10 (8.3%)		11 (9.2%)	
Sexual satisfaction	Dysfunction	46 (38.3%)	0.0001*	42 (35%)	0.001*	30 (25)	0.027*
	Moderate function	4 (3.3%)		4 (3.3%)		4 (3.3%)	
Arousal	Dysfunction	39 (32.5%)	0.012*	36 (30%)	0.016*	30 (25%)	0.001*
	Moderate function	11 (9.2%)		10 (8.3%)		4 (3.3%)	
Lubrication	Dysfunction	41 (34.2%)	0.0001*	38 (31.7%)	0.0001*	29 (24.2%)	0.001*
	Moderate function	9 (7.5%)		8 (6.7%)		5 (4.2%)	
Orgasm	Dysfunction	39 (32.5%)	0.001*	36 (30%)	0.002*	28 (23.3%)	0.002*
	Moderate function	11 (9.2%)		10 (8.3%)		6 (5%)	
Sexual desire	Dysfunction	39 (32.5%)	0.001*	38 (31.7%)	0.0001*	30 (25%)	0.0001*
	Moderate function	11 (9.2%)		8 (6.7%)		4 (3.3%)	

The chi-square test was used to analyze the data.* Significant

a level of good function.

Among sexual domains, the frequency of dysfunction was high than moderate function except in the sexual desire domain which 60%

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Table 5. Relationship between sexual function and HbA1c, age, and duration of diabetes

Sexual domains	Sexual function	HbA1c Mean (± SD)	*P*	Age Mean (± SD)	*P*	Duration of diabetes Mean (± SD)	*P*
Total score	Dysfunction	7.66 (±1.01)	0.92	49.89 (±6.70)	0.0001*	8.27 (±3.83)	0.0001*
	Moderate function	7.64 (±1.29)		39.41 (±3.89)		4.06 (±0.89)	
Dyspareunia	Dysfunction	7.61 (±1.004)	0.53	51.62 (±5.20)	0.0001*	8.93 (±3.93)	0.0001*
	Moderate function	7.74 (±1.12)		43.04 (±7.20)		5.58 (±2.65)	
Sexual satisfaction	Dysfunction	7.64 (±1.002)	0.705	51.04 (±5.60)	0.0001*	8.76 (±3.85)	0.0001*
	Moderate function	7.72 (±1.18)		40.83 (±6.40)		4.55 (±1.38)	
Arousal	Dysfunction	7.58 (±0.91)	0.26	51 (±6.45)	0.0001*	8.92 (±4.05)	0.0001*
	Moderate function	7.80 (±1.26)		43.59 (±6.49)		5.36 (±1.94)	
Lubrication	Dysfunction	7.62 (±1.02)	0.60	52.04 (±5.11)	0.0001*	9.21 (±3.98)	0.0001*
	Moderate function	7.72 (±1.09)		42.35 (±6.49)		5.11 (±1.66)	
Orgasm	Dysfunction	7.65 (±1.02)	0.86	51.82 (±5.38)	0.0001*	9.41 (±3.88)	0.0001*
	Moderate function	7.68 (±1.10)		43.10 (±6.86)		4.98 (±1.62)	
Sexual desire	Dysfunction	7.61 (±0.94)	0.54	52.09 (±5.60)	0.0001*	9.25 (±4.04)	0.0001*
	Moderate function	7.73 (±1.19)		42.87 (±6.10)		5.31 (±1.84)	

SD: Standard deviation; HbA1c: glycated hemoglobin,. The T-test was used to analyze the data., * Significant

of subjects had a moderate function. A study in Zarand, Kerman, Iran that was conducted on 120 diabetic women, indicated SD in dyspareunia, satisfaction, arousal, lubrication, and orgasm domains were lower in patients compared to healthy women; but in the sexual desire domain, differences were not significant between the diabetic group and the control group (18). A study conducted in southeast Nigeria reported that based on the FSFI score, only desire, lubrication, and orgasm domains significantly were fewer in women with T2DM compared to healthy individuals (15).

Nitric oxide is an invisible molecule that plays a key role in a wide range of physiological processes in the body, including vasodilation, a neurotransmitter in the brain, regulation of gonadotropin hormones and sexual behavior, erection, and ejaculation (19). It is argued that in people with T2DM, the level of nitric oxide decreases in the body and leads to reduced libido, lubrication, arousal, and orgasm in women with T2DM (16,20). Besides, diabetic depression indirectly affects the sexual desire of women with diabetes (21). Therefore, it is suggested the level of nitric oxide and depression be measured in diabetic patients in future studies. Given that SD is related to the patient's mental health and fertility, it should be recognized as an important issue among physicians in follow-up sessions.

Comparing diabetic patients and the presence or absence of symptoms of neuropathy, retinopathy, and nephropathy, it was found that there was a significant relationship between all sexual domains and neuropathy, and patients with neuropathy symptoms obtained a lower score compared to patients with no neuropathy symptom. Moreover, patients with retinopathy remarkably have a lower score in arousal, orgasm, and sexual desire, but based on a total score, there was no significant correlation between retinopathy and SD. Also, there was no significant association between SD and nephropathy. Contrary to our study, a study by Yenice et al. on 149 diabetic women showed diabetic women who more suffer from retinopathy as well as nephropathy significantly had SD (22). This may be due to differences in sociodemographics between our studied group and Yenice's study.

There is strong evidence that hypertension, as well as hyperlipidemia, negatively influence SD (23,24). Our study was consistent with these studies and a significant relationship was observed between hypertension and hyperlipidemia with SD in the participants. A study by Elyasi et al. on one hundred and fifty women with T2DM reported depression and SD are common in participants and parameters such as hypertension, HbA1c, and duration of diabetes with SD had no significant relationship (25). In this study, age and duration of diabetes were related factors to SD, but HbA1c were not associated with SD. Yı ldı z et al. indicated SD is high in Turkish

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women with T2DM, and SD increases with age and menopause (26). According to a study on diabetic women, concentrations of HbA1c, triglycerides, glucose, and insulin were remarkably higher in diabetic women with SD compared to diabetic women without SD (22).

Tuncel et al. reported there is an association between insulin therapy and female sexual dysfunction (27). It is argued that the insulin hormone can regulate the activities of the steroidogenesis enzyme. On the other hand, insulin can increase the proliferation of vaginal epithelium (28). The results of our study showed in diabetic women, SD in subjects with oral treatment significantly was high compared with insulin treatment.

Conclusions

Based on the total score of FSFI, we demonstrated 85.8% of women with T2DM had SD, and the factors including age, duration of diabetes, type of treatment, hypertension, hyperlipidemia, and neuropathy were identified as related factors to SD. This study was established as a background for interventional and therapeutic actions. As a consequence, it is recommended that similar descriptive and longitudinal studies with a larger population be performed in future research to better manage the disease by identifying important factors in sexual disorders and intervening with these factors.

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Conflict of Interest

The authors declare no conflict of interest.

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