

Comparison of the Sexual Function among Women with and without Diabetes

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ARTICLE INFO	ABSTRACT
<i>Article type:</i> Original article	Background & aim: Globally, diabetes is one of the most common chronic diseases, which is considered as the leading cause of sexual dysfunction. However, its effect on female sexual function is still inconspicuous. This study aimed to compare diabetic and non-diabetic women in terms of sexual function.
<i>Article History:</i> Received: 05 -June-2016 Accepted: 05 -Oct-2016	Methods: This cross-sectional study was conducted on 180 diabetic and non-diabetic (n=90 for each group) women referring to the health facilities of Mashhad, Iran. The subjects were married, aged between 18 to 60 years and had experienced type II diabetes for at least one year. Data were collected using clinical and demographic characteristics questionnaire and Rosen's Female Sexual Functioning Index. To analyse the data, analysis of covariance (ANCOVA), independent t-test, Mann-Whitney U test, and Chi-square test were run using SPSS, version 16.
<i>Key words:</i> Diabetes Iran Sexual function Women	Results: The mean age of diabetic and non-diabetic was respectively 52.42±9.8 and 43.58±9.39. ANCOVA reflected a significant difference between diabetic and non-diabetic women in terms of total score of sexual function (P=0.002) and the score of five domains of desire (P=0.004), arousal (0.001), lubrication (0.003), orgasm (0.001) and satisfaction (0.002). Conclusion: Diabetes is a risk factor for sexual dysfunction in women, which causes negative effects on their sexual function; therefore, it is recommended to educate patients to protect them against these adverse effects.

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Introduction

Sexual function is among the most important aspects of women's life and has a significant impact on the body, mind, social behaviors, and quality of life (1, 2). The sexual response cycle has four phases including excitement, plateau, orgasm, and resolution (3). Sexual dysfunction is a complex phenomenon, which refers to any disorder in any of the mentioned phases (4). Approximately over a third of sexually active women and up to 40% of them suffer from general and specific sexual dysfunction, respectively (5). In this regard, Masters and Johnson in 1970 demonstrated that 50% of all couples are suffering from sexual dysfunction (6). In a national survey conducted in Iran in 2005, 31.5% of Iranian women suffered from sexual dysfunction. Although this rate is lower than that of some countries, it suggests that

sexual disorders are a health concern among Iranian women (7).

There are various factors contributing to sexual dysfunction (6). Diabetes mellitus (DM) is one of the most prevalent chronic diseases worldwide and has been considered as a major cause of sexual dysfunction. Globally, the prevalence rate of DM is on a growing trend. In 2012, 371 million people were estimated to have DM throughout the world, which is expected to rise to 552 million by 2030 (8). The prevalence of diabetes varies across different parts of Iran, ranging from 5 to 8% (9, 10).

Diabetes can potentially affect sexual function in women through a variety of mechanisms including vascular changes in the urogenital system affecting genital lubrication and

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neuropathy-mediated alterations in arousal response. In addition, sexual function may be adversely affected by medications or other health interventions used to monitor or treat this chronic disease (11, 12). Additionally, the psychological stresses caused by chronic diseases such as diabetes affect family ties often in the form of conflicts beyond the regulation of diet, medication, and physical activity. In addition to the complications associated with diabetes, factors such as age, hypertension medications, high body mass index (BMI), smoking, severity and duration of diabetes, and related neuropathy and vasculopathy are associated with sexual dysfunction (13).

Despite all these findings, sexual function of diabetic women has received far less attention in research and clinical assessments (5, 14, 15). Although several studies demonstrated high prevalence of sexual dysfunction in diabetic women, the others did not confirm it (5, 14, 16). For instance, in a study conducted by Meeking on 161 patients with types I and II diabetes, it was determined that sexual impairments were more common in women with diabetes compared to controls. The identified patient problems included atrophic vaginitis (70%), lack of libido (64%), loss of genital sensation (36%), and reduced sexual pleasure (47%) (15). Regarding the results of the study by Wallner, et al. performed in Boston (2009), it was confirmed that the diabetic and non-diabetic women were similar in terms of arousal, orgasm, lubrication, dyspareunia, satisfaction, and sexual desire before and after controlling for confounding variables (5). Apparently, the reason for conflicting results in this regard are attributable to factors such as lack of a standard definition for sexual dysfunction, lack of standard tools, absence of a non-diabetic control group, and social taboos regarding women's sexual problems (12, 14).

Considering the importance of optimal sexual function and satisfaction, as well as controversies regarding sexual dysfunction in diabetic women compared to the general population, we aimed to compare sexual function between diabetic and non-diabetic women.

Materials and Methods

This cross-sectional study was conducted on

180 women referred to health facilities in Mashhad, Iran, 2015. Subjects of this descriptive study were selected using multistage method. For the purpose of this study, 11 health centers were selected from five main public health centers of Mashhad using lottery method and based on the population under their coverage. Convenience sampling was employed to recruit all the eligible married women referred to Mashhad health facilities during the study period. The sample size was calculated at 90 women in each group based on the study by Taghavi (17). Considering of 10% sample attrition, each group included 100 participants; however, after removing the questionnaires containing missing data, 90 participants remained.

The inclusion criteria included being married and aged 18 to 60 years, having passed at least six months from marriage, having a normal marital relationship, and suffering from type II diabetes for at least one year according to the physicians' confirmation and based on the results of laboratory tests.

The exclusion criteria consisted of drug addiction or alcohol abuse in the subjects themselves or their husbands, limb amputation, diseases affecting sexual activity such as sexually transmitted diseases, previous history of breast or pelvic surgery, consumption of medications disturbing sexual activity by the patient or her husband like contraceptive pills, menopause, pregnancy, parturition, lactation, history of sexual abuse, husband's betrayal, experience of a major psychological crisis, and fatigue over the past month.

After explaining the objectives of the study and obtaining written informed consent, the participants were asked to fill out Female Sexual Function Index (FSFI) and a demographic form.

The demographic characteristics form included items on age, occupation, educational level of the subjects and their spouses, socioeconomic status, age of marriage, gravidity, route of delivery, contraceptive method, and duration of diabetes. In addition, clinical measurements included BMI and blood glucose level.

The subjects' sexual function was evaluated using Rosen's FSFI, a famous standard tool for assessing sexual function in women by evaluating six domains of desire,

arousal, lubrication, orgasm, satisfaction, and pain during sexual intercourse. Higher scores of FSFI indicate better sexual function. According to Wiegel study in 1999, sexual dysfunction is determined by a cutoff score of 26.55 on the FSFI (18). Validity and reliability of the English and Persian versions of the instrument were confirmed by Rozen et al. in 2000 and Mohammed et al. in 2008, respectively (19, 7).

In this study, the content validity of this instrument was confirmed, and its reliability was established by a Cronbach's alpha coefficient of 0.95. Data analysis was performed using ANCOVA, independent t-test, Mann-Whitney U test, and Chi-squared test, in SPSS version 16. Normal distribution of the quantitative variables was tested by Kolmogorov-Smirnov and Shapiro-Wilk tests. P-value less than 0.05 was considered statistically significant.

Before data collection, ethical approval was obtained from the Ethics Committee of Mashhad University of Medical Sciences, Mashhad, Iran. A written informed consent was obtained from the subjects after explaining the aim of the study, and those who refused to participate were excluded.

Results

A total of 180 women, including 90 diabetic and 90 non-diabetic subjects, were enrolled. The mean ages of the diabetic and non-diabetic subjects were 52.42 ± 9.8 and 43.58 ± 9.39 years, respectively. Independent t-test demonstrated no significant difference in the mean age between the two groups ($P=0.582$). The level of education of the majority of the subjects in the diabetic (75.6%) and non-diabetic (78.9%) groups was lower than diploma ($P=0.516$).

Table 1. The comparison of personal and clinical variables between diabetic and non-diabetic groups

Variable	Non-diabetic	Diabetic	P-value
	Mean \pm SD*	Mean \pm SD	
Age	52.42 \pm 9.8	43.58 \pm 9.39	0.582
Age of marriage	20.43 \pm 8.33	23.73 \pm 10.85	0.032
Parity	3.20 \pm 1.21	3.50 \pm 1.99	0.635
	Number (Percent)	Number (Percent)	
Occupation			
Housekeeper	80(88.9%)	85(94.4%)	0.140
Employed	10(11.1%)	5(5.6%)	
Education			
Less than high school	71(78.9%)	68(75.6%)	0.516
Diploma	14(15.6%)	19(21.1%)	
Academic	5(6.5%)	3(3.3%)	
Economic situation			
Below average	39(43.3%)	39(43.3%)	0.560
Moderate	51(56.7)	51(56.7)	
Body mass index			
18.5-24.9	48(53.33%)	17(18.89%)	0.002
25 \pm 29.9	26(28.89%)	43(47.78%)	
30 \leq	16(17.78%)	30(33.33%)	
Previous delivery methods			
Natural	39(43.33%)	45(50%)	0.376
Caesarean section	25(27.78%)	21(23.33%)	
Both of them	14(15.5%)	22(24.44%)	
missing	12(13.33%)	2(2.23%)	
Condition of the disease			
Controlled	-----	74(82.2%)	-----
Uncontrolled	-----	16(17.8%)	

* Standard deviation

The mean duration of diabetes was 5.58 ± 4.14 years and 82.2% of the patients were suffering

from controlled type II diabetes. The last measured mean blood glucose level was within

the normal limit in the diabetic patients (179.62±64.32 mg/dL). Additionally, most of the subjects in diabetic (53.33%) and non-diabetic (47.77%) groups were obese and their mean BMI was 25 and 29.9, respectively (P=0.002).

Other demographic and clinical characteristics of the subjects are illustrated in Table 1.

Based on the considered cut-off point, 74.4% of diabetic and 48.9% of non-diabetic women had sexual dysfunction (Table 2).

Table 2. The comparison of sexual function and its dimensions between diabetic and non-diabetic women

Variable	Groups		Test result					
	Diabetic	Non-diabetic	Type III sum of squares	F	P	Partial eta squared	df*	R squared
Desire	3.04±0.95	3.60±0.93	7.34	8.46	0.004	0.074	1	0.111
Arousal	3.08±1.35	4.06±1.24	24.33	14.47	0.001	0.120	1	0.109
Orgasm	3.60±1.64	4.57±1.29	24.32	11.47	0.001	0.098	1	0.099
Lubrication	3.92±1.53	4.57±1.23	17.67	9.45	0.003	0.082	1	0.089
Satisfaction	3.91±1.48	4.71±1.07	16.44	10.28	0.002	0.088	1	0.089
Pain	4.12±1.64	4.27±1.29	0.570	0.271	0.604	0.003	1	0.003
Total sexual function	21.70±7.46	25.99±6.00	466.11	10.54	0.002	0.090	1	0.096

* Degree of freedom

Table 3. The relationship between sexual dysfunction and clinical variables in women with diabetes

Variable	Diabetic		P-value
	Women without sexual dysfunction	Women with sexual dysfunction	
	Mean±SD	Mean±SD	
Age	42.52±9.98	43.95±9.24	0.531
Age of marriage	22.13±12.39	24.28±10.31	0.492
Duration of diabetes	3.91±3.80	6.16±4.12	0.010
Parity	3.39±1.90	3.53±2.03	0.771
Last measured blood sugar level	162.00±67.22	185.67±62.67	0.141
	No.(%)	No.(%)	
Education			
Less than diploma	17(73.9%)	56(83.6%)	0.233
Diploma and upper	6(26.1%)	11(16.4%)	
Occupation			
Housekeeper	2(8.7%)	3(4.5%)	0.379
Employed	21(91.3%)	64(95.5%)	
Economic situation			
Below average	8(34.8%)	31(46.3%)	0.238
Moderate	15(65.2%)	36(53.7%)	
Previous delivery methods			
Natural	12(52.2%)	33(49.3%)	0.524
Caesarean section	7(30.4%)	14(20.9%)	
Both of them	4(17.4%)	18(26.9%)	
Body mass index			
18.5-24.9	2(8.7%)	6(9.0%)	0.756
25±29.9	8(34.8%)	12(17.9%)	
30≤	5(21.7%)	9(13.4%)	
Condition of the disease			
Controlled	20(87.0%)	54(80.6%)	0.367
Uncontrolled	3(13.0%)	13(19.4%)	
Mann-Whitney U test	Chi-squared test		

Regarding the results of Mann-Whitney test, a significant difference was observed between the two groups in terms of the mean score of sexual Function ($P=0.001$). Besides, there were significant diversities between diabetic and non-diabetic subjects in the domains of desire ($P=0.001$), arousal ($P=0.001$), lubrication ($P=0.001$), orgasm ($P=0.001$), and sexual satisfaction ($P=0.001$). Nevertheless, there was no significant difference between the two groups with respect to pain score during sexual intercourse ($P=0.936$). Given the significant

differences between the groups in terms of BMI, ANCOVA was applied to control the effect of this variable. Therefore, the results indicated significant differences in mean score of sexual function ($F=10.54$, $P=0.002$, $\eta^2=0.090$) and five subscales of desire ($F=8.46$, $P=0.004$, $\eta^2=0.074$), arousal ($F=14.47$, $P=0.001$, $\eta^2=0.120$), lubrication ($F=9.45$, $P=0.003$, $\eta^2=0.082$), orgasm ($F=11.47$, $P=0.001$, $\eta^2=0.098$), and sexual satisfaction ($F=10.28$, $P=0.002$, $\eta^2=0.088$) in diabetic and non-diabetic women (Table 2).

Table 4. The relationship between sexual dysfunction and clinical variables in non-diabetic women

Variable	Non-diabetic		P-value
	Women without sexual dysfunction	Women with sexual dysfunction	
	Mean±SD	Mean±SD	
Age	41.43±8.16	44.23±7.89	0.742
Age of Marriage	19.27±8.29	21.54±8.31	0.106
Parity	3.28±1.04	3.11±1.38	0.106
	No.(%)	No.(%)	
Education			0.544
Lower than diploma	36(78.3%)	35(79.5%)	
Diploma	10(21.7%)	9(20.5%)	
Occupation			0.140
Housekeeper	43(93.5%)	37(84.1%)	
Employed	3 (6.5%)	7(15.9%)	
Economic status			0.427
Below average	19(41.3%)	20(45.5%)	
Moderate	27(58.7%)	24(54.5%)	
Previous delivery methods			0.050
Natural	23(52.2%)	16(49.3%)	
Caesarean section	11(30.4%)	14(20.9%)	
Both of them	3(17.4%)	11(26.9%)	
Body mass index			0.039
18.5-24.9	15(32.6%)	18(40.9%)	
25±29.9	12(26.1%)	6(13.6%)	
30≤	2(4.3%)	9(20.5%)	

Mann-Whitney U tests

Chi-squared test

Furthermore, based on the results of Mann-Whitney U test, mean duration of DM in diabetic women with sexual dysfunction was significantly higher than those without this disorder ($P=0.010$; Table 3). As well, the results of Chi-square test showed a relationship between BMI and sexual dysfunction only in the non-diabetic group ($P=0.039$; Table 4). There was no significant correlation between other demographic and clinical characteristics and sexual dysfunction in neither groups ($P>0.05$; tables 3 and 4).

Discussion

The overall prevalence of sexual dysfunction was 74.4% among type II diabetic patients and 48.9% in non-diabetics. Previous studies reported various prevalence rates; Omidvar in 2013 reported the prevalence of 32.3% and Ziaei-Rad in 2010 reported its prevalence to be about 88% in two regions of Iran (9, 20). This difference could be explained by the difference in study populations (type I or II diabetes), applied instruments, and cut-off points (score less than 17). In a study conducted by Doruk in 2005 in Turkey, the

prevalence of sexual dysfunction was reported 42% in type II diabetic patients and 37% in the control group (21).

Conversely, the current study revealed that score obtained from FSFI in domains of desire, arousal, lubrication, orgasm, and sexual satisfaction were lower in women with diabetes compared to the control group. However, there was no significance disparity between the groups in terms of dyspareunia.

In diabetic patients, vasculopathies, neuropathies, and psychiatric problems were the leading risk factors for lack of libido, atrophic vaginitis, frigidity, orgasm, and dyspareunia (17). This finding was consistent with those of a study performed by Copeland in 2012, which concluded that women with insulin-dependent diabetes had more problems in the domains of orgasm and lubrication as compared to non-diabetic group. They also showed lower levels of sexual satisfaction in diabetic women in comparison with non-diabetics (12). In contrast, no significant association was found between diabetes and other types of sexual dysfunction such as frigidity or dyspareunia.

Similarly, the results of the studies conducted by Soltan Ahmadi in 2014 and Fatemi in 2009 in Iran, Kolodny in 1971 in New England, Abu Ali in 2008 in Jordan, and Yencilek in 2010 in Turkey determined that diabetic women had a lower sexual function than non-diabetic subjects (22-26). These findings contradict those of Wallner, which proposed that diabetic and non-diabetic women had similar overall sexual function scores after adjustment for demographic variables (5). Furthermore, Jensen in 1985 found no significant difference in the incidence of sexual dysfunction between the diabetic and control groups (16). According to the study by Enzlin, depression was associated with the sexual function in diabetic women (14).

Discrepancies in results of different studies could be associated with probable confounding variables such as heterogeneous patient population, marital status, age of marriage, partner characteristics, and different cultural factors.

In contrast, there was no significant correlation between demographic and clinical

characteristics and sexual dysfunction in diabetic women except for duration of diabetes. Given the results of Yencilek in 2010 and Doruk in 2005, no significant association was observed between sexual function and age, BMI, socioeconomic status, and age of marriage (21, 26). However, these results contradict those of studies performed by Morales, Olarinoye, and Fatemi (23, 27, 28).

Moreover, a study executed by Bitzer showed that maintaining blood glucose level as close to the normal range as possible is the basis for improving sexual activity in people suffering from diabetes. This might be attributed to the fact that in the present study, unlike Bitzer study, clinical assessment was limited to measuring blood sugar level instead of HbA_{1c}, which was not an accurate indicator (29).

Inconsistent with the findings of the current study, a meta-analysis by Pontiroli in 2013 demonstrated a significant relationship between BMI and sexual dysfunction in diabetic women (30). Although the relationship between BMI and sexual dysfunction was not significant in the diabetic women, a significant association was observed in non-diabetic ones. This difference can be due to pathologic mechanisms associated with weight gain in diabetic women that affect their sexual function more commonly than non-diabetic subjects. Therefore, the effects of BMI should be determined and controlled in future studies.

In contrast with the present study, Ziaei-Rad found a significant relationship between duration of diabetes and sexual dysfunction (20). This could be explained by the short duration of diabetes in the subjects of the present study. Overall, results of different studies indicated lack of agreement on factors affecting sexual function in diabetic women. This may be attributed to the lack of studies assessing these factors and sample size, which was determined in accordance with objective. Therefore, in the most mentioned studies these relationships were evaluated as an ancillary finding.

Limitations of this study included lack of control of end organ damages, diabetic neuropathy, or renal injury, used medication, psychological factors, and lack of vaginal and urinary tract examination to identify the

symptoms of infection and prolapse. In addition, since this was a cross-sectional study, the causal relationship between sexual function and diabetes in women could not be investigated.

Generally, the obtained results suggest that diabetes plays a major role in the growing prevalence of sexual dysfunction and most of its domains. Nonetheless, the present study did not indicate a significant effect for diabetes on dyspareunia. Therefore, sexual problems of diabetic patients should be examined in the diabetes and health facilities, and then the selected cases should be referred for sex therapy. In this regard, providing comprehensive care and implementing educational and behavioral interventions for sexual problems along with other measures for the management of this complication are recommended. Ultimately, further studies are recommended to be performed in diverse populations.

Conclusion

Diabetes is a risk factor for sexual dysfunction in female population, which can cause negative effects on their health-related quality of life; therefore, it is recommended to educate patients to protect them against these adverse effects.

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Conflicts of Interest

Authors declared no conflicts of interest.

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