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Frequency, severity, and risk factors related to sexual dysfunction in Chinese women with T2D

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ORIGINAL ARTICLE

Frequency, severity, and risk factors related to sexual dysfunction in Chinese women with T2D

Highlights
- In China, female sexual dysfunction is more severe in women with diabetes than the non-diabetics.
- Being older, taking oral antidiabetic medications and having diabetic neuropathy are predictors of female sexual dysfunction.

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Abstract

Background: The aim of the present study was to assess the frequency and severity of female sexual dysfunction (FSD) in those with T2D (T2D) compared with non-diabetic controls. In addition, risk factors for FSD were analyzed.
Methods: Sexual dysfunction, measured using the Female Sexual Function Index (FSFI), was evaluated using a questionnaire in 184 women with T2D and 146 non-diabetic controls at three study sites in China. In the T2D group, FSD was examined by education level, correlations between FSD and other variables were analyzed, and risk factors were studied.
Results: The frequency of FSD in the T2D group was 75.0%, much higher than in the control group (56.2%; $P = 0.001$). The severity of FSD in the T2D group was 17.84 ± 8.47 (mean ± SD), significantly lower than in the control group (21.14 ± 8.08; $P = 0.001$). In patients with T2D, being older ($P = 0.001$), taking oral antidiabetic medications ($P = 0.013$), and having diabetic neuropathy ($P = 0.036$) were risk factors for FSD.
Conclusions: The rate of FSD is high in China and, as seen in the literature, more severe in diabetics than non-diabetics. Being older, taking oral antidiabetic medications, and diabetic neuropathy are risk factors for FSD.

Keywords: China, diabetes mellitus, female sexual dysfunction.

Significant findings of the study: Being older, taking oral antidiabetic medications, and diabetic neuropathy are risk factors for FSD in patients with T2D.
What this study adds: The frequency of sexual dysfunction in Chinese women with T2D and non-diabetic controls was 75.0% and 56.2%, respectively.

Introduction

Diabetes is recognized as a major public health problem in China. The prevalence of diabetes is 9.7%, which means 92.4 million adults live with diabetes, including 50.2 million men and 42.2 million women.[1] Female sexual dysfunction (FSD) is a serious complication of diabetes and has a high reported prevalence of 26.6% worldwide.[2] In Asia, more women (>30%) complain of at least one symptom of sexual dysfunction than men (>20%).[3] Many studies have shown that women with diabetes are clearly at higher risk of developing FSD than their non-diabetic counterparts.[4–7] Sex is seen as a private issue in China, strongly rooted in Chinese traditional culture and folk

concepts. Although FSD is present in Chinese patients with diabetes,[8] they are reluctant to seek help for their condition from experts.[9] The lack of studies of diabetes-related FSD in China means that there is little information to guide treatment. Compared with studies focusing on FSD in Chinese women in general,[10,11] studies on FSD in Chinese women with diabetes are rare. Indeed, only one study has examined FSD in Chinese women with T2D (T2D).[8] However, the small sample size of that study limits its generalizability. Moreover, that study excluded patients with severe acute or other chronic complications of diabetes, which are typically highly correlated with the sexual dysfunction reported in other studies.[12–15] Therefore, we undertook the present multicenter study of Chinese women to characterize diabetes-related FSD in China. The purpose of the study was to assess the frequency and severity of sexual dysfunction in patients with T2D compared with a control group of subjects who did not have diabetes. In addition, in the T2D group, the frequency and severity of sexual dysfunction was examined according to education level, and risk factors for sexual dysfunction were identified.

Methods

The protocol and procedures used in the present study were approved by the Ethics Committee of Jiangsu Province Hospital on Integration of Chinese and Western Medicine. All subjects provided written informed consent before participation. The present questionnaire-based multicenter observational cohort study was conducted in three large hospitals in Nanjing, Hangzhou, and Jinan cities from 1 to 31 December 2011.

During this 1-month period, 547 women were approached in the outpatient clinic and invited to participate in the study; 385 women agreed to take part. Women with T2D were eligible for inclusion in the study if they were ≥18 years of age, married to spouses with normal sexual function, had no other diseases affecting sexual performance (e.g. hyperthyroidism or hypothyroidism), did not have critical conditions, such as diabetic ketoacidosis or heart failure, and did not have severe mental disorders. Age-matched women who did not have diabetes (n = 189) and who had visited the outpatient gynecology clinics for routine screening were also invited to participate in the study. Women were eligible for inclusion in the non-diabetic control group if they were ≥18 years of age, apparently healthy, married to spouses with normal sexual function, had no diseases affecting sexual performance (e.g. hyperthyroidism or hypothyroidism), and did not have severe mental disorders.

The Female Sexual Function Index (FSFI) is a 19-itemquestionnaire related to female sexual function.[16] In addition to a total score, individual scores are given to each of six dimensions: desire, subjective arousal, lubrication, orgasm, satisfaction, and pain during intercourse. The reliability of the Chinese version of the FSFI has been established previously (Cronbach's $\alpha > 0.84$).[17] Lower scores of the FSFI indicate greater sexual dysfunction.[16,17] The authors of the Chinese version of the FSFI (CVFSFI) have established a total cut-off score of ≤23.45 to indicate FSD in Chinese women.[10]

Six well-trained nurse researchers from three hospitals collected data for the present study and were monitored by advanced practice nurses during the data collection interviews. The nurse researchers explained the purpose of the study and reviewed the patients' answers regarding exclusion criteria before informed consent was obtained. A nurse researcher interviewed the patients in a quiet private room over a period of 40 min. The nurse researchers reviewed all the finished questionnaires for completeness and consistency. After the questionnaires had been reviewed, they were stored in sealed files and could not be accessed by the nurse researchers. The women in the study did not receive payment for their participation.

Descriptive statistics were used to analyze demographic and clinical variables. The Wilcoxon rank non-parametric test was used for variables that were not normally distributed. Two-sided tests were used. The cut-off value for the total score on the CVFSFI and the Chi-squared test were used to determine the frequency of sexual dysfunction in women with and without T2D. The total score on the CVFSFI and *t*-tests were used to determine the severity of sexual dysfunction in the T2D and control groups. In the T2D group, the Chi-squared test and analysis of variance (ANOVA) were used to determine the frequency and severity of sexual dysfunction according to education level (primary school or lower, middle school, high school, and college or above). Spearman correlation and Chi-squared tests were used to identify factors significantly related to having sexual dysfunction. These correlated factors were used in multiple logistic regression analysis to determine factors affecting sexual dysfunction. Two-sided $P < 0.05$ was considered significant. All data were analyzed using SPSS version 16.0 (SPSS Inc., Chicago, IL, USA).

Results

In all, 385 women were interviewed. Of these, 330 (85.7%) completed the questionnaire properly. There was no significant difference in mean age between the T2D and control groups. Comparisons of demographic and clinical variables in women with and without T2D are given in Table 1. Baseline differences between the two groups were seen for income ($P = 0.001$) and waist circumference ($P = 0.001$). Systolic blood pressure (SBP), diastolic blood

Table 1 Comparison of characteristics between women with and without type 2 diabetes

	T2D (n = 184)	Non-diabetic controls (n = 146)	*F*	*t*	*t'*	*P*-value
Age (year)	51 ± 9	50 ± 7	2.48	0.198	–	0.843
Height (cm)	159 ± 5	159 ± 4	4.72	–	–0.575	0.566
Weight (kg)	61 ± 10	60 ± 9	1.09	1.457	–	0.146
BMI (kg/m^2)	24.3 ± 3.5	23.6 ± 3.2	1.18	1.67	–	0.097
Waist (cm)	79 ± 9	75 ± 10	0.01	3.55	–	0.001
Annual income (×10^5 RMB)	2.93 ± 1.99	4.69 ± 4.50	1.81	–4.75	–	0.001
Menopausal age (years)	49 ± 4	48 ± 3	26.35	–	1.53	0.129
No. pregnancies	1.56 ± 0.88	1.60 ± 0.92	0.08	–0.40	–	0.687
No. deliveries	1.24 ± 0.53	1.16 ± 0.44	12.91	1.40	–	0.163
SBP (mmHg)	130 ± 16	120 ± 18	1.21	5.68	–	0.001
DBP (mmHg)	78 ± 10	75 ± 10	0.001	2.75	–	0.006
HDL (mmol/L)	1.41 ± 0.62	1.59 ± 0.58	7.72	–	–2.64	0.009
LDL (mmol/L)	2.82 ± 1.33	2.46 ± 0.57	61.67	–	3.32	0.001
TG (mmol/L)	1.69 ± 1.39	1.41 ± 0.57	14.48	–	2.51	0.013

Data are the mean ± SD.
T2D, type 2 diabetes; BMI, body mass index; SBP, systolic blood pressure; DBP, diastolic blood pressure; HDL, high-density lipoprotein; LDL, low-density lipoprotein; TG, triglyceride.

pressure (DBP), low-density lipoprotein (LDL), and triglyceride (TG) levels were significantly higher in women with T2D than in the non-diabetic controls. In contras, high-density lipoprotein (HDL) levels were significantly lower in women with T2D than in the non-diabetic controls. Of the women with T2D, 50.5% had microvascular disease (22.8% had diabetic retinopathy, 9.2% had diabetic nephropathy, 38.6% had diabetic neuropathy, and 2.7% had diabetes related foot problems). Based on the CVFSFI cut-off point of 23.45,[10] 75.0% (138/184) of women with T2D and 56.2% (82/146) of non-diabetic women reported FSD ($P = 0.001$).

In addition, the mean total score for FSD severity was significantly lower in the T2D group than in the control group (Table 2). Mean scores for all sexual dysfunction dimensions, except for satisfaction, were significantly lower in T2D subjects than in non-diabetic controls (Table 2).

Education level was missing from three questionnaires, so the total number of subjects analyzed was 181. Sixty-four (35.4%) women had attained a primary school or lower education, 52 (28.7%) women had attained a middle school education, 39 (21.5%) had attained a high school education, and 26 (14.4%) had attained a college or above education. Based on the CVFSFI cut-off point of 23.45, the frequency of FSD in women with T2D according to education level was as follows: 87.5% (56/64) for women with primary school or lower education; 71.2% (37/52) for women with middle school education; 71.8% (28/39) for women with high school education; and 57.7% (15/26) for women with a college or higher education ($P = 0.017$). When comparing the frequency of FSD in women with T2D between two education levels, the level of significance test was reset ($\alpha = 0.0125$). The mean frequency of FSD in women with T2D increased significantly only for the primary school or lower category (87.5%) versus the college or higher category (57.7%; $P = 0.002$).

The mean (± SD) total score for FSD severity in women with T2D was 15.61 ± 8.12 for those with a primary school or lower education, 18.65 ± 8.45 for women with middle school education, 17.92 ± 8.21 for

Table 2 Comparison of scores for each dimension and the total score on the Female Sexual Function Index[17] between women with and without type 2 diabetes

	T2D (n = 184)	Non-diabetic controls (n = 146)	*F*	*t*	*t'*	*P*-value
Sexual function dimension						
Desire	2.38 ± 1.06	2.82 ± 1.17	3.38	–3.50	–	0.001
Arousal	2.47 ± 1.53	3.07 ± 1.42	1.75	–3.64	–	0.001
Lubrication	3.14 ± 1.86	3.88 ± 1.68	4.01	–	–3.82	0.001
Orgasm	2.78 ± 1.78	3.48 ± 1.60	5.16	–	–3.76	0.001
Satisfaction	3.47 ± 1.41	3.78 ± 1.50	1.46	–1.94	–	0.053
Pain	3.65 ± 1.94	4.14 ± 1.77	1.34	–2.38	–	0.018
Total score	17.84 ± 8.47	21.14 ± 8.08	0.93	–3.59	–	0.001

Data are the mean ± SD.
T2D, type 2 diabetes.

Table 3 Comparison of mean (± SD) scores for each dimension and the total score on the Female Sexual Function Index[17] in women T2D according to education level (n = 181[A])

	Education level					
	Primary school or lower	Middle school	High school	College or above	*P*-value	Total score
No. subjects	64	52	39	26		181
Sexual function dimension						
Desire	2.17 ± 0.95	2.49 ± 1.01	2.40 ± 1.09	2.63 ± 1.26	0.198	2.38 ± 1.05
Arousal	2.10 ± 1.50	2.67 ± 1.57	2.54 ± 1.46	2.90 ± 1.54	0.081	2.47 ± 1.54
Lubrication	2.66 ± 1.82	3.28 ± 1.94	3.19 ± 1.80	3.89 ± 1.65	0.031	3.13 ± 1.86
Orgasm	2.31 ± 1.62	2.80 ± 1.82	2.99 ± 1.84	3.48 ± 1.81	0.030	2.77 ± 1.78
Satisfaction	3.12 ± 1.22	3.73 ± 1.42	3.35 ± 1.40	3.99 ± 1.59	0.020	3.47 ± 1.40
Pain	3.25 ± 2.03	3.79 ± 2.00	3.57 ± 1.64	4.37 ± 1.88	0.085	3.64 ± 1.94
Total score	15.61 ± 8.12	18.65 ± 8.45	17.92 ± 8.21	21.25 ± 8.67	0.026	17.79 ± 8.46

[A]Education level was missing on three questionnaires.

women with high school education, and 21.25 ± 8.67 for women with a college or higher education. However, the mean total score increased significantly only for the comparison of the primary school or lower category with the college or higher category (P = 0.004). Similarly, significant differences were found between women with college or higher levels of education and those with primary school or lower education for the sexual dysfunction dimensions of arousal (P = 0.025), lubrication (P = 0.004), orgasm (P = 0.005), satisfaction (P = 0.007), and pain (P = 0.013), but not for desire (P = 0.059; Table 3).

Tables 4 and 5 show the correlations between having FSD and variables in women with T2D. Demographic and clinical variables were analyzed for 184 subjects, except for education level, which was analyzed for 181 women. Variables positively correlated with having FSD were: age, menopause, number of pregnancies, number of deliveries, taking oral antidiabetic drugs, having diabetic cerebrovascular disease, having diabetic cardiovascular disease, and having diabetic neuropathy. However, a significant negative correlation was found between education level and having FSD.

The variables significantly correlated with having FSD were analyzed by multiple logistic regression, and age (odds ratio [OR] = 1.132; P = 0.001), taking oral antidiabetic drugs (OR = 5.750; P = 0.013), and having diabetic neuropathy (OR = 2.585; P = 0.036) were found to be risk factors for FSD in women with T2D (Table 6).

Age, body mass index (BMI), waist circumference, annual income, education level, menopause, eumenorrhea, number of pregnancies, number of deliveries, SBP, DBP, HDL, LDL, TGs, and having diabetes were analyzed by multiple logistic regression across all participants. Age (OR = 1.079; P = 0.009) and having diabetes (OR = 4.138; P = 0.001) were significant predictors of FSD in all women (Table 7).

Table 4 Correlations between quantitative variables and having female sexual dysfunction among women with type 2 diabetes as determined by Spearman correlation (n = 184)

Variable	*r*	*P*-value
Age	0.437	0.001
Body mass index	0.050	0.501
Annual income (×10^5 RMB)	–0.057	0.442
No. pregnancies	0.154	0.036
No. deliveries	0.149	0.044
Duration of diabetes	0.117	0.115
HbA1c	–0.005	0.948

Discussion

The frequency of FSD in Chinese women with T2D was 75.0%, much higher than in the control group. Shi et al.[8] reported that the frequency of FSD in Chinese women with T2D was 79.2%, which is higher than the frequency in the present study. This may be due to the fact that Shi et al.[8] used a higher cut-off score (<25) based on the Korean version of the FSFI.[18] The frequency of FSD in women with diabetes varies in different countries and has been reported to be 27% in Belgian women with type 1 diabetes (T1D),[19] 41% in Italian women with T2D,[20] 59.6% in Jordanian women with diabetes,[21] 94.4% in Iranian women with T2D,[22] 71% and 42% in Turkish women with T1D and T2D, respectively,[23] 75% in Polish women with diabetes,[4] and 88% in Nigerian women with diabetes.[5] Therefore, the frequency in the present study (75.0% in women with T2D) is relatively high. We speculate that this variation may reflect cultural and racial differences in reporting or differences in sexual education and folk concepts towards sexual activities, but investigating variations in the frequency of FSD among countries was not a focus of the present study.

The mean total CVFSFI score was much lower in women with T2D than in the non-diabetic control group. Vascular and neurogenic pathologies are responsible for sexual dysfunction in women with diabetes.[24] Women with diabetes

Table 5 Correlations between categorical variables and having female sexual dysfunction among women with type 2 diabetes as determined by the Chi-squared test (n = 184)

Variable	Total FSFI score (mean ± SD)	Chi-squared	*r*	*P*-value
Education level[A] (n = 181)		10.147	–0.223	0.003
Primary school or lower (n = 64)	15.61 ± 8.12			
Middle school (n = 52)	18.65 ± 8.45			
High school (n = 39)	17.92 ± 8.21			
College or above (n = 26)	21.25 ± 8.67			
Taking aspirin		2.044	0.105	0.153
Yes (n = 64)	16.33 ± 8.68			
No (n = 120)	18.64 ± 8.28			
On antihypertensive therapy		1.760	0.097	0.185
Yes (n = 67)	15.83 ± 8.77			
No (n = 117)	18.99 ± 8.10			
On lipid-lowering therapy		2.926	0.125	0.087
Yes (n = 26)	15.67 ± 8.19			
No (n = 158)	18.19 ± 8.49			
Taking insulin		0.070	0.019	0.792
Yes (n = 115)	17.86 ± 8.54			
No (n = 69)	17.80 ± 8.42			
Taking OADs		7.974	0.227	0.005
Yes (n = 171)	17.36 ± 8.51			
No (n = 13)	24.12 ± 4.56			
Diabetic cerebrovascular disease		4.472	0.175	0.034
Yes (n = 16)	12.22 ± 7.44			
No (n = 168)	18.37 ± 8.39			
Diabetic cardiovascular disease		4.089	0.170	0.043
Yes (n = 15)	11.61 ± 7.49			
No (n = 169)	18.39 ± 8.35			
Diabetic foot		0.069	0.058	0.793
Yes (n = 5)	20.86 ± 5.76			
No (n = 179)	17.75 ± 8.53			
Diabetic neuropathy		5.573	0.171	0.018
Yes (n = 71)	16.42 ± 8.87			
No (n = 113)	18.73 ± 8.12			
Diabetic nephropathy		0.194	0.054	0.659
Yes (n = 17)	17.39 ± 8.57			
No (n = 167)	17.88 ± 8.48			
Diabetic retinopathy		0.041	0.015	0.839
Yes (n = 42)	14.60 ± 9.37			
No (n = 142)	18.79 ± 7.97			
Chronic diabetes complications		2.904	0.125	0.088
Yes (n = 96)	16.82 ± 8.75			
No (n = 88)	18.95 ± 8.05			
Eumenorrhea		0.412	0.071	0.521
Yes (n = 170)	17.50 ± 8.62			
No (n = 14)	21.89 ± 4.92			
Menopause		22.048	0.327	0.001
Yes (n = 99)	13.63 ± 8.11			
No (n = 85)	22.74 ± 5.87			

[A]Education level was missing on three questionnaires.
FSFI, Female Sexual Function Index; OADs, oral antidiabetic drugs.

had worse scores in different sexual dysfunction categories. This may due to women with diabetes having an increased prevalence of vaginal infection and decreased vaginal lubrication,[4] which may contribute to more severe dysfunction in the pain category. Hemodynamic changes in genital tract blood flow result in reduced vaginal lubrication.[24] Moreover, the higher severity of dysfunction in desire, arousal, and orgasm may be attributed to increased prevalence of depression in women with diabetes.[25]

Some studies found that lower education levels were associated with lower FSFI scores.[22,26,27] Laumann et al.[28] also reported that higher education attainment was negatively associated with experience of sexual problems for both men and women. We also analyzed

Table 6 Correlates of female sexual dysfunction among women with type 2 diabetes as determined by multiple logistic regression (n = 184)

Variable	β	SE	*P*-value	OR	95% CI for Exp(β)
Age	0.124	0.025	0.001	1.132	1.078–1.188
Taking oral antidiabetic medicine	1.749	0.702	0.013	5.750	1.453–22.750
Having diabetic neuropathy	0.950	0.452	0.036	2.585	1.065–6.275

OR, odds ratio; CI, confidence interval.

the relationship between education level and FSFI score. In the present study, there was increased frequency and severity of FSD in women with T2D with lower educational attainment. This result is in agreement with Nowosielski et al.,[4] who reported that lower education level is a risk factor for sexual function disorders in women with diabetes. A possible explanation is that Chinese women with lower educational attainment may receive more limited sexual education and have negative beliefs with regard to sexual dysfunction. They are reluctant to seek help from sex therapy experts compared with women with higher education attainment. According to the recent literature, female sexual function is correlated with age, BMI, education level, number of deliveries, course of diabetes, HbA1c, having diabetic retinopathy and menopause.[20,22,26,27,29–31] These variables were also tested for correlations with FSD in the present study. Financial difficulties,[32] employment status,[32] hypertension,[33] use of medication (including oral antidiabetic drugs and insulin),[30] and the presence of diabetic complications[30] have been reported to be predictors of FSD; however, in the present study, some of these variables were not collected at baseline. So, alternative variables (annual income, taking antihypertensive therapy, insulin, or oral antidiabetic drugs, as well as having diabetes-related cerebrovascular disease or cardiovascular disease, diabetic foot problems, diabetic neuropathy, diabetic nephropathy, and chronic complications of diabetes) were chosen for analysis. In addition to these variables, we were also interested as to whether the number of pregnancies, eumenorrhea and taking aspirin or lipid-lowering drugs were correlated with having FSD. We found that age, menopause, number of pregnancies, number of deliveries and taking oral antidiabetic drugs in addition to having diabetes-related cerebrovascular disease and cardiovascular disease, as well as diabetes-related neuropathy were positively correlated with having FSD. However, only age, taking oral antidiabetic drugs, and having diabetic neuropathy were identified as risk factors for FSD among women with T2D.

Table 7 Correlates of female sexual dysfunction among all participants as determined by multiple logistic regression (n = 330)

Variable	β	SE	*P*-value	OR	95% CI for Exp(β)
Age	0.076	0.029	0.009	1.079	1.019–1.142
Having diabetes	1.420	0.369	0.001	4.138	2.008–8.529

OR, odds ratio; CI, confidence interval.

Age plays an important role in FSD among women with T2D (the older the women, the more frequent and more severe the sexual dysfunction). This is consistent with other studies that have reported that sexual dysfunction increases with age.[20,21,23,34] It has been established that age-related physiological changes in the genitalia and sex steroids are associated with deterioration in sexual activity.[35] For example, the reduced vaginal size, thinning of the vaginal walls, and poor lubrication will result in dyspareunia.[35]

Taking oral antidiabetic drugs was a predictor of FSD in the present study. This finding differs to that of studies performed in Turkey and Nigeria. In Turkey, it was reported that FSD was seen less among women who use antidiabetic drugs, including insulin.[30] The Nigerian study reported that type of antidiabetic therapy used did not affect sexual function, because no significant differences were found for mean total scores of the FSFI among women on dietary therapy, those taking oral antidiabetic drugs or those on insulin therapy.[6] This point remains unsettled. More studies need to be performed to determine whether taking oral antidiabetic drugs is a risk factor for FSD. Changes in FSFI before and after antidiabetic treatment need to be compared and the pharmacological mechanism underlying the actions of the oral antidiabetic drug being taken in relation to FSD needs to be studied further.

In the present study, having diabetic neuropathy is a risk factor for FSD; this could be explained by the fact that degenerative changes and fiber loss in unmyelinated nerve fibers and small myelinated nerve fibers occur earlier and more severely in diabetic neuropathy.[36] Large myelinated sensory fibers are responsible for vibration sensation. During intercourse, the sensation of the penis vibrating in the vagina is of crucial importance; therefore, a deficiency in vibration sensation attributed to diabetic neuropathy may contribute to sexual dysfunction in women with diabetes.[24] Moreover, diabetic neuropathy can result in impaired temperature, touch, and pain sensation, which are significant for sexual dysfunction.

It remains contentious whether HbA1c is a risk factor for FSD. Some have reported that HbA1c is a risk

factor,[26] whereas others have reported that it is not. [20] In the present study we found that HbA1c was not a risk factor for FSD. Cultural and/or psychosocial factors may play a larger role in female sexuality[37] and, compared with men, sexual response in women with diabetes is more likely to be affected by psychosocial aspects than by metabolic control.[38] The present study did not find that a longer duration of diabetes was correlated with a higher frequency of FSD, as reported previously.[19,20,39] However, Abu Ali et al.[21] and Olarinoye et al.[6] reported a negative correlation between that the duration of diabetes and sexual function in women. In addition, we did not find that a higher BMI was a risk factor for FSD, even though this has been reported in other studies.[20,21] This may be attributed to the fact that most of the participants in the present study had normal weight, with only 12 (6.5%) women with T2D being obese based on a BMI >30 kg/m^2.[40] Therefore, the sample size of obese women in the present study was too small to enable us to reach any conclusions.

A major strength of the present study is that the new cut-off score of the CVFSFI (total score = 23.45)[10] was used to define FSD, whereas the cut-off score of the Korean version of the FSFI was used in former studies examining FSD in women with diabetes. Although the sample size of the present cross-sectional study was larger than that of the former study,[8] it was still relatively small and this is a limitation of the study. The relatively small sample size should be kept in mind when generalizing the findings of the present study. Depression has been reported to be a predictor of FSD[20,31] or to be negatively correlated with FSD.[22,30] However, in the present study this variable was not investigated. In further studies, depression needs to be evaluated. In addition to this, sex hormone levels that may result in FSD[29] were not assessed. Detailed investigations using larger samples should be performed in future studies. Currently, researches tend to choose the FSFI as the only tool to evaluate FSD[8,9,26,27] because of limitations of specific diagnostic approaches. To be more innovative, like the studies carried out in Iran[22] and Greece,[41] it may be a good idea to combine the FSFI with other scales and questionnaires, such as the Female Sexual Distress Scale (FSDS)[41] and Partner Relationship Questionnaire (PRQ),[22] in future studies.

In conclusion, FSD has a high prevalence in China and is more severe in women with diabetes than in women without diabetes. This condition warrants further investigation, especially as it relates to women with diabetes who are $\geq$60 years of age. Being of older age, taking oral antidiabetic drugs, and diabetic neuropathy are risk factors for FSD among women with T2D. Furthermore, across all participants, being of older age and having diabetes were predictors of FSD. Nowadays, Chinese women are more open to discussing sexual dysfunction; however, they are still reluctant to talk with doctors. Diabetes educators, most of whom are female, need to help patients with diabetes prevent FSD. Healthcare professionals need to be willing to seek information about FSD, and evaluate it as an important, and sometimes hidden, complication of diabetes in China.

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Disclosure

None declared.

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