Original Article

Sexual dysfunction among patients with type-2 diabetes mellitus attending diabetes clinics in primary healthcare centers in Bahrain—A cross-sectional study

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Abstract

Introduction: Sexual dysfunction (SD) is a common problem among males with type-2 diabetes mellitus (T2DM) but often goes underdiagnosed and underreported. This study aimed to measure the prevalence and risk factors of SD among males with T2DM attending diabetes clinics in Bahrain. **Methods:** A cross-sectional study was conducted in ten primary health centers in Bahrain using a self-administered questionnaire. The questionnaire consisted of three parts: sociodemographic characteristics and the Sexual Assessment and Dysfunction in Diabetic Men (SAD-M) questionnaire. Descriptive and inferential analyses, including logistic regression, were performed. **Results:** A total of 313 patients with an average age of 54.3 ± 10.0 years were included. More than half of the patients had dyslipidemia (n = 220, 70.3%) and hypertension (n = 178, 56.9%). Approximately half of the participants had no morning erections (n = 161, 51.4%), and about a third had less than three sexual intercourse attempts in the last six months (n = 90, 28.8%). Of the participants, 32.6% had moderate SD, 42.5% had mild SD, and 25% had no SD. Univariate analysis showed that male patients with SD were older ($P < 0.001$) and had a higher body mass index ($P = 0.036$) compared to those without SD. In addition, unemployed patients ($P < 0.001$), Bahraini ($P < 0.001$), had diabetes for 10 years or more ($P < 0.001$) and had prostate and spinal diseases ($P = 0.004$ and $P = 0.010$, respectively) had higher rates of SD. Logistic regression analysis showed that older patients ($P = 0.007$) and patients with a diabetes duration of more than 10 years were more likely to have SD than their counterparts (OR = 14.908, $P < 0.001$). **Conclusion:** SD is a common problem among males with T2DM in Bahrain, especially among older patients and those with a prolonged history of diabetes. Therefore, primary care providers should consider screening for SD in male patients with T2DM.

Keywords: Diabetes mellitus, erectile dysfunction, psychological, sexual assessment, sexual dysfunction

Introduction

Sexual dysfunction (SD) is a group of disorders characterized by disturbances in the ability to achieve sexual pleasure. In general, SD is classified into several types including desire-related disorders (e.g., hypoactive sexual desire disorder),

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arousal disorders (e.g., erectile dysfunction (ED)), orgasm disorders (e.g., premature ejaculation, retro-ejaculation, delayed ejaculation), and pain disorders (e.g., pain during intercourse).[1] Despite the increasing prevalence, SD is often underreported and underdiagnosed due to associated stigma.[2]

SD is a complex and multifactorial disorder with multiple risk factors involved. Patients with diabetes mellitus (DM), essential hypertension, neurological diseases (e.g., stroke, multiple sclerosis), and psychiatric disorders (e.g., depression, anxiety) are at a higher risk of having SD. Besides, certain medications induced SD (e.g., antihypertensive, antidepressants, α-blockers, and anti-androgens).[3-5]

Considering chronic hyperglycemia, atherosclerosis, obesity, neuropathy, and metabolic syndrome, patients with DM have a high chance of developing SD. Studies showed that type-2 DM (T2DM) is associated with a threefold increased risk of ED among men with DM as compared to the control group.[6]

SD can severely impair the quality of life (QoL) in patients with DM, resulting in worsening metabolic control and poor therapeutic compliance. Therefore, early identification and treatment of SD in males can enhance QoL modifications and glycol-metabolic management.[7]

Several validated tools assess SD among males, including the Arabic Index of Premature Ejaculation (AIPE), the Sexual Health Inventory for Men (SHIM), the Arizona Sexual Experiences Scale (ASEX), the Canadian Male Sexual Health Council survey, and the Sexual Assessment of Dysfunction in Diabetic Men (SAD-M) questionnaire.[8-13] The SAD-M is most effective and reliable when evaluating sexual functioning among individuals with DM across various languages and different ethnicities.[13,14]

In Bahrain, many studies assessed the prevalence and characteristics of ED among Bahraini males with DM found prevalence rates between 74.4% and 81.9%, with strong associations with premature ejaculation and inhibited sexual desire. However, a comprehensive analysis of SD among males with T2DM was not done in Bahrain.[7,15-20]

Given the high prevalence of DM in the adult population (9%) and its significant impact on patient's QoL, there is a pressing need to address SD among T2DM patients.[7,21] SD may serve as an early indicator of future coronary heart disease (CVD) and glycemic control, in T2DM.[22]

This study enhances practitioners' ability to screen and manage SD in male T2DM patients, improving holistic care and early detection of cardiovascular risks, while empowering patients to seek treatment, reduce stigma, and improve their overall QoL and diabetes management.[23]

Despite advancements in understanding SD and effective treatments, there remains a gap in comprehensive assessment among diabetic patients in Bahrain.[24-27] The study aimed to investigate the prevalence of SD and identify associated risk factors among male patients with T2DM attending primary care in Bahrain.

Materials and Methods

A cross-sectional study was conducted in the period from March 2023 to January 2024 at ten primary health centers throughout Bahrain. These centers were selected from a total of 28 primary healthcare centers spread across five health regions in Bahrain, with two centers chosen from each region.

Eligible participants were adult patients with T2DM, excluding those with intellectual disabilities, emergency conditions, and non-Arabic or non-English speakers.

To achieve statistical significance, a sample size of 300 participants was targeted, considering previous studies indicating an 82% prevalence of ED, a 95% confidence interval, and a 5% margin of error.[28]

The researchers distributed a self-administered questionnaire to patients attending diabetic clinics at the selected centers. The research tool consisted of three main components. The first part assessed the sociodemographic and baseline characteristics, including age, weight, height, marital status, education, nationality, working status, and diabetes-related outcomes such as glycated hemoglobin and low-density lipoprotein levels. The second section assessed the risk factors associated with SD, including smoking habits, alcohol consumption, and comorbidities such as hypertension, hyperlipidemia, prostate issues, spinal conditions, endocrine disorders, and neurological diseases. The third part consisted of the (SAD-M) questionnaire distributed over 26 items designed to assess sexual disorders and function. It included thirteen questions about the history of sexual disorders and thirteen questions focusing on the evaluation of sexual function. The questionnaire specifically addresses sexual performance with nine items and sexual desire with four items. Scoring is categorized into four SD levels: Severe (≤18), Moderate (19–42), Mild (43–55), and None (56 and above). The Arabic version of the SAD-M underwent meticulous translation and validation procedures to ensure linguistic accuracy and cultural appropriateness.[13,14,29-31]

Participants in the study provided informed consent before completing the self-administered questionnaire, and all collected data were anonymized to protect confidentiality. Ethical approval for the study was obtained from the primary care ethical committee on October 13, 2022.

Statistical analysis was conducted using SPSS version 26, with a significance level set at 0.05. Categorical variables were presented as frequencies and percentages, while continuous variables were reported as means with standard deviations. Univariate analysis utilized Chi-square and T-tests, followed by binary logistic regression to explore associations between variables.

Results

This study encompassed a cohort of 313 patients diagnosed with T2DM, yielding a participation rate of 70%. The non-participation was due to the sensitivity of the questionnaire, cultural stigmas, lack of awareness about SD in DM, fears of judgment, and competing priorities during primary care visits.

The demographic analysis indicated that the mean age of the participants was 54.3 ± 10.0 years. Employment status showed that approximately two-thirds of the patients were employed (n = 201, 64.2%), and more than half were Bahraini nationals (n = 177, 56.5%). Additionally, 17.3% of the participants were smokers, and 10.9% consumed alcohol. The primary comorbid conditions identified in this cohort were dyslipidemia (n = 220, 70.3%), essential hypertension (n = 178, 56.9%), and prostate diseases (n = 41, 13.1%). Table 1 presents the sociodemographic and baseline characteristics of the participants.

Table 1: Sociodemographic and baseline characteristics of male patients with T2DM attending primary care

Baseline Chrematistics		*n* (%)
Age in years, mean±SD.		54.3±10.0
Nationality	Bahraini	177 (56.5)
	Non-Bahraini	136 (43.5)
Education	No education	2 (0.6)
	Primary level	46 (14.7)
	Intermediate education	4 (1.3)
	Secondary education	132 (42.2)
	University/College	113 (36.1)
	Higher education	16 (5.1)
Working status	Employed	201 (64.2)
	Unemployed/Retired	112 (35.8)
Marital Status	Married	296 (94.6)
	Single	6 (1.9)
	Divorced	8 (2.6)
	Widowed	3 (1.0)
Smoking status	Smoker	54 (17.3)
	Ex-smoker	63 (20.1)
	Nonsmoker	196 (62.6)
Alcohol intake	Current drinker	34 (10.9)
	Past drinker	29 (9.3)
	Nondrinker	250 (79.9)
DM duration	< 10 years	189 (60.4)
	≥ 10 years	124 (39.6)
Comorbidities	Dyslipidemia	220 (70.3)
	Essential hypertension	178 (56.9)
	Prostate disease	41 (13.1)
	Spinal problems	28 (8.9)
	Anxiety disorders	26 (8.3)
	Coronary artery diseases	7 (2.2)
	Cerebrovascular accidents	5 (1.6)
	Urinary tract diseases	5 (1.6)
	Depression disorders	5 (1.6)
	Peripheral artery diseases	4 (1.3)
DM and other related outcomes	Glycated hemoglobin	59.87±15.40
	Body mass index	33.76±29.96
	Low-density lipoprotein	2.52 1.83

As shown in Table 2, nearly 30% of the participants reported early ejaculation (n = 92, 29.4%) and had less than three sexual intercourse attempts in the last 6 months (n = 90, 28.8%). More than half of the participants had no morning erections (n = 161, 51.4%) and up to 40% of them reported that erection needs more stimulation (n = 122, 39%).

Approximately one-third of the patients reported that they always enjoy their sexual intercourse (n = 100, 31.9%), ejaculate during any sexual (n = 95, 30.4%), and feel orgasm or climax when they had any sexual activity (n = 114, 36.4%). More than 25% of the participants were always satisfied with their sexual life (27.2%) and confident in achieving and maintaining an erection (n = 80, 25.6%), while 9.3% reported challenges in maintaining an erection at all times. Half of the cohort reported no difficulties at all in entering their partner during sexual intercourse (n = 158, 50.5%). Additionally, nearly 20% only of the cohort reported a daily urge for sex and thinking about sex (22.4% and 23, respectively), and more than 15% disagreed that they had a strong sex drive (n = 63, 20.1%), Table 3.

While 25% of the participants had no SD (24.9%, n = 78), 42.5% had mild SD and 32.6% had moderate SD. Figure 1

Male patients with SD were older ($P < 0.001$) and had a higher body mass index ($P = 0.036$) compared to those without SD. In addition, patients who were unemployed (P=<0.001), Bahraini ($P < 0.001$), and suffered from diabetes for 10 years or more (<0.001) had higher rates of SD. In addition, the prevalence of SD was higher among patients with prostate and spinal disease ($P = 0.004$ and $P = 0.010$, respectively). Table 4

As illustrated in Table 5, the logistic regression analysis showed that older patients ($P = 0.007$) and patients with more than

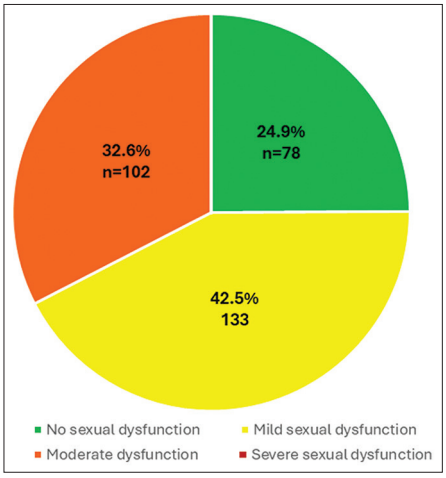

Figure 1: Severity of sexual dysfunction among male patients with T2DM attending primary care in Bahrain

Table 2: Sexual disorders among male patients with T2DM in Bahrain

Statements		*n* (%)
Have you been diagnosed with a penis foreskin problem that causes pain? (Tightness, inflammation)	Yes	7 (2.2)
	No	306 (97.8)
Do you ejaculate too early for the satisfaction of you and your partner/s?	Yes	92 (29.4)
	No	221 (70.6)
Do you have no semen when you have an ejaculation or find semen in the urine?	Yes	27 (8.6)
	No	286 (91.4)
Unable to attain orgasm, unable to ejaculate, or must wait for a long time to achieve orgasm or ejaculate	Yes	21 (6.7)
	No	292 (93.3)
How many times have you attempted sexual intercourse? (In the last six months)?	0-2 times/6 months	90 (28.8)
	3-6 times/6 months	62 (19.8)
	>6 times/6 months	161 (51.4)
Have you been on any medications that made cause erection more difficult?	Yes	20 (6.4)
	No	293 (93.6)
Have you noticed that an erection requires more stimulation (caressing, foreplay) than before to achieve an erection?	Yes	122 (39)
	No	191 (61)
Have you been able to have your morning erections?	Yes	152 (48.6)
	No	161 (51.4)

Table 3: SD among male patients with T2DM attending primary care in Bahrain

Statements	Not at all	Minimally	Moderately	Good/Usually	Very Good/Always
How much do you enjoy your sexual intercourse?	20 (6.4)	33 (10.5)	67 (21.4)	93 (29.7)	100 (31.9)
Are you satisfied with your sexual life?	37 (11.8)	35 (11.2)	63 (20.1)	93 (29.7)	85 (27.2)
During sexual intercourse, did you find entering your partner difficult?	158 (50.5)	39 (12.5)	74 (23.6)	30 (9.6)	12 (3.8)
During sexual intercourse, was it challenging to maintain your erection to completion of intercourse?	123 (39.3)	45 (14.4)	76 (24.3)	40 (12.8)	29 (9.3)
Is your confidence level high in achieving and maintaining an erection?	31 (9.9)	44 (14.1)	77 (24.6)	81 (25.9)	80 (25.6)
Are you satisfied with the outcome after you have attempted intercourse?	26 (8.3)	33 (10.5)	81 (25.9)	94 (30)	79 (25.2)
How often can one get an erection during sexual activity (intercourse, foreplay, or masturbation)?	16 (5.1)	55 (17.6)	86 (27.5)	78 (24.9)	78 (24.9)
How often did you ejaculate during any sexual activity (intercourse, foreplay, or masturbation)?	12 (3.8)	34 (10.9)	73 (23.3)	99 (31.6)	95 (30.4)
How often do you feel orgasm or climax when you have any sexual activity (intercourse, foreplay, or masturbation)?	11 (3.5)	27 (8.6)	70 (22.4)	91 (29.1)	114 (36.4)
	None	**Once/month**	**Once/week**	**Twice/week**	**Everyday**
How often is there an urge for sex?	14 (4.5)	45 (14.4)	67 (21.4)	117 (37.4)	70 (22.4)
How frequently do you think about having sex?	11 (3.5)	38 (12.1)	63 (20.1)	129 (41.2)	72 (23)
	Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
It does not take much for me to get easily sexually excited	28 (8.9)	31 (9.9)	87 (27.8)	102 (32.6)	65 (20.8)
I have a strong sex drive	17 (5.4)	32 (10.2)	78 (24.9)	123 (39.3)	63 (20.1)

10 years duration of diabetes were more likely to have SD than their counterparts (OR = 14.908, $P < 0.001$).

Discussion

This study aimed to evaluate the prevalence of SD and its associated risk factors among males with T2DM attending diabetic clinics in Bahrain. Previous research in this context has primarily focused on ED in Bahraini diabetic populations. Our study uniquely highlights the high prevalence and diverse risk factors of SD among Bahraini males with T2DM, particularly among older patients and those with a longer duration of diabetes offering specific regional insights and emphasizing the need to integrate sexual health into diabetes management.

This study found a slightly higher prevalence of SD among Bahraini T2DM patients, reaching 70%, which is consistent with both local and global trends. Similar regional studies in Jordan, Saudi Arabia, and Oman also reported high SD prevalence among diabetic men, confirming that SD is a widespread issue in the Middle East.[32,33]

The prevalence of mild and moderate SD in Bahraini T2DM, reaching 70%, aligns with both local and global patterns

Table 4: Association between sociodemographic and baseline characteristics of males with T2DM and SD

Baseline Characteristics		No sexual dysfunction T=78	Sexual dysfunction T=235	*P*
Age (Years)		47.4+9.8	56.9+8.8	<0.001
Nationality	Bahraini	22 (12.4)	155 (87.6)	<0.001
	Non-Bahraini	56 (41.2)	80 (58.8)	
Education	Primary/Intermediate Education	6 (11.5)	46 (88.5)	0.081
	Secondary education	35 (26.5)	97 (73.5)	
	University/College	37 (28.7)	92 (71.3)	
Working	Employed	64 (31.8)	137 (68.2)	<0.001
	Unemployed/Retired	14 (12.5)	98 (87.5)	
Marital Status	Married	75 (25.3)	221 (74.7)	0.856
	Unmarried	3 (17.6)	14 (82.4)	
Smoking status	Non-smoker	48 (24.5)	148 (75.5)	0.410
	Smoker	17 (31.5)	37 (68.5)	
	Ex-smoker	13 (20.6)	50 (79.4)	
Alcohol intake	Non-drinker	51 (20.4)	199 (79.6)	0.001
	Current drinker	14 (41.2)	20 (58.8)	
	Past drinker	13 (44.8)	16 (55.2)	
DM duration	<10 years	65 (34.4)	124 (65.6)	<0.001
	10 years and above	13 (10.5)	111 (89.5)	
Comorbidities	Essential hypertension	40 (22.5)	138 (77.5)	0.389
	Dyslipidemia	54 (24.5)	166 (75.5)	0.066
	Prostate disease	4 (9.8)	37 (90.2)	0.004
	Presence of spinal problems	1 (3.6)	27 (96.4)	0.010
	Anxiety	2 (7.7)	24 (92.3)	0.082
	Coronary artery diseases	1 (14.3)	6 (85.7)	0.096
	Cerebrovascular accidents	2 (40)	3 (60)	0.729
	Peripheral arterial diseases	1 (25)	3 (75)	0.822
Glycated hemoglobin		62.0+16.8	59.1+14.8	0.161
Low-density lipoprotein		2.5+0.9	2.5+2.1	0.975
Body mass index		28.8+5.9	34.7+32.6	0.036

Table 5: Risk factors of SD among male patients with T2DM attending primary care in Bahrain

Risk Factors	Odds ratio (95% Confidence Interval)	*P*
Age (Years)	1.073 (1.019-1.130)	0.007
Nationality	1.581 (0.435-5.744)	0.487
Working status	2.415 (0.682-8.555)	0.172
Alcohol intake (1)	1.960 (0.520-7.393)	0.320
Alcohol intake (2)	4.099 (0.588-28.555)	0.154
Diabetes mellitus duration	14.908 (3.288-67.594)	<0.001
Prostate diseases	0.696 (0.153-3.176)	0.640
Presence of spinal problems	3.845 (0.426-34.669)	0.230
Body mass index	1.029 (0.954-1.109)	0.460

reported in the literature. For instance, a systematic review of 15 studies involving more than 60,000 patients reported an SD prevalence of 61% among patients with diabetes.[34-36] The high SD prevalence in Bahrain can be attributed to several factors, including the high rates of comorbidities such as dyslipidemia (70%), hypertension (57%), and obesity (34%) among the participants.[37-39] Additionally, T2DM has a significant impact on neurological and vascular functions, which are critical for sexual health.[40] These findings are consistent with other regional studies, such as those conducted in Jordan, Saudi Arabia, and Oman which also report high SD prevalence among diabetic men.[41-44] Integrating sexual health assessments and targeted interventions within diabetes care protocols is essential to mitigate the adverse impact of SD on patients' QoL.[7,45]

In the present study, older age (OR = 1.073, $P = 0.007$) and prolonged T2DM duration (OR = 14.908, $P < 0.001$) were significantly correlated with higher odds of SD, corroborating previous findings on these risk factors. The literature consistently indicates that a longer duration of T2DM is associated with a higher risk of SD, highlighting the cumulative neurovascular impact of T2DM on sexual health. A systematic review of 58 studies established a link between T2DM duration and increased SD risk.[46] Therefore, prolonged T2DM duration and advanced age are critical predictors of SD.

Employment status and nationality were identified as predictors of SD in univariate analysis, but not in logistic regression. Higher SD rates among unemployed and retired individuals can be attributed to secondary factors such as older age, increased comorbid conditions, psychosocial stressors (financial concerns, and reduced self-esteem), and negative lifestyle changes (decreased physical activity, and increased alcohol consumption). These findings align with previous research, which suggests that unemployment and retirement contribute to higher SD prevalence due to these interconnected factors.[47,48]

Moreover, studies have shown that nationality affects SD rates. The predominance of Bahraini nationals among participants suggests regional differences in the prevalence and management of SD in DM populations.[47-49]

While prostate and spinal diseases were identified as predictors of SD in univariate analysis, they did not remain significant in logistic regression. This suggests that other factors have a stronger association with SD when multiple variables are considered simultaneously. This finding contrasts with other studies that found persistent links between these conditions and SD even in multivariate analysis, indicating potential differences in study design, population characteristics, and regional health profiles.[50-52]

This study found no link between glycemic control, obesity, and SD, unlike many others that have. Literature generally shows a strong association between these factors and SD. The absence of a significant connection here suggests a need for further research with varied methods or larger, more diverse samples. This could clarify the impact of glycemic control and obesity on SD in type-2 diabetes mellitus (T2DM).[52-55]

Recent studies have consistently highlighted the adverse effects of smoking and alcohol consumption on SD and health outcomes in individuals with T2DM. According to our research, alcohol drinkers exhibited higher rates of SD in the univariate analysis compared to non-drinkers, while smoking did not emerge as a significant predictor of SD.[56,57]

Additionally, the study found that 29.4% of participants experienced premature ejaculation, and 8.6% experienced retrograde ejaculation during sexual activity. These findings are consistent with existing research on how common these conditions are and their impact on sexual health.[58-61]

Moreover, the study revealed that 39% of participants reported ED and 51.4% reported not having morning erections. Additionally, 6.4% experienced medication-related ED. These findings underscore the significant pharmacological impacts on erectile function in individuals with T2DM, aligning with recent literature on the subject.[62-72]

Recent studies highlight persistent challenges in addressing sexual health issues in males with type-2 diabetes, due to cultural barriers, poor patient-provider communication, and differing perspectives on the importance and initiation of these discussions.[73]

This study offers comprehensive insights into sexual function and dysfunction in men with T2DM, despite limitations such as reliance on self-reported data and a cross-sectional study design. Future longitudinal studies using standardized criteria are crucial to bolster the evidence base. Further research is needed to explore psychological factors, lifestyle influences, and the effects of medications on SD management in T2DM, enhancing clinical strategies and patient outcomes.

Conclusion

This study underscores the notable prevalence of SD among males with T2DM in Bahrain, emphasizing age and T2DM duration as critical predictors. Integrating sexual health into DM management frameworks is essential to enhance overall well-being and QoL for affected individuals. Routine sexual health assessments and targeted interventions within DM care protocols are pivotal in mitigating the adverse impacts of SD on physical, emotional, and relational aspects. Future research should explore the temporal relationships between DM and SD and the psychological influences on QoL.

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Conflicts of interest

There are no conflicts of interest.

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