

DIABETES-RELATED SEXUAL DYSFUNCTION AND ITS ASSOCIATION WITH MICROVASCULAR COMPLICATIONS: A STUDY FROM TERTIARY CARE CENTER IN SOUTH KERALAAJAY PAUL¹, ATHULYA G. ASOKAN²¹Department of General Medicine, Dr. Moopens Medical College, Wayanad, Kerala, India. ²Department of General Medicine, Government Medical College, Kottayam, Kerala, India.

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ABSTRACT

Objectives: (1) The objective of this study was to determine the frequency of sexual dysfunction (SD) among patients with Type 2 diabetes mellitus attending the General Medicine and Endocrinology Department at a tertiary care center in south Kerala. (2) To assess the relationship between erectile dysfunction and the microvascular consequences of Type 2 diabetes. (3) To correlate SD with glycemic status.

Methods: One hundred and twenty patients with Type 2 diabetes at a tertiary care center in south Kerala participated in the cross-sectional study. A questionnaire was employed to document demographic and glycemic status. The assessment tools utilized included the International Index of Erectile Function for male and the Female Sexual Function Index (FSFI) scoring questionnaire for females. The statistical analysis employed included unpaired t-tests for students and tests assessing the equality of proportions.

Results: About 65% of patients with diabetes mellitus had SD. About 46% of female participants and 78.6% of male participants in the study population had SD. Duration of diabetes, poor glycemic status, and microvascular complications correlated with SD.

Conclusion: SD is frequent in patients with Type 2 diabetes mellitus. Glycemic control determines the development of SD. It is advisable to screen patients with Type 2 diabetes mellitus for SD as a proactive measure for early intervention and management.

Keywords: Type 2 diabetes, Sexual dysfunction, Erectile dysfunction, Microvascular complications, Glycemic status.

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INTRODUCTION

The pandemic due to diabetes and other lifestyle diseases is on the rise in every country, attributed to our unhealthy lifestyles. A recent study estimates that, by 2035, diabetes will affect nearly 592 million people globally [1]. Diabetes leads to multisystem complications. It includes microvascular complications such as retinopathy, nephropathy, and neuropathy. It also leads to macrovascular complications such as ischemic heart disease, stroke, and peripheral vascular disease. Diabetes is a significant public health problem due to its early morbidity, mortality, reduced life expectancy, and financial burden [2]. Macrovascular disease plays a vital role in the morbidity and mortality associated with diabetes, contributing to a heightened occurrence of vascular conditions such as peripheral vascular disorders, myocardial infarction, and stroke [3]. Sexual dysfunction (SD) is often the first symptom of underlying systemic diseases. Its evaluation may reveal an underlying, progressive vascular illness that is often asymptomatic. The challenge is that individuals with erectile dysfunction are reluctant to present themselves to doctors. Chronic hyperglycemia imposes glucotoxicity on several cell types and is associated with diabetes-related complications [4].

Diabetes mellitus is associated with SD, both in males and females. Diabetes is associated with elevated rates of female SD among diabetic women compared to non-diabetic women. Similarly, diabetic men face a threefold increase in the risk of erectile dysfunction in comparison to their non-diabetic counterparts [5].

Among the contributing factors to diabetic erectile dysfunction are neuropathy, maculopathy, and endocrinopathy [6]. Erectile dysfunction may be an early indicator of vasculopathy in diabetic patients [7]. SD leads to despair, anxiety, and a decline in self-esteem. It affects the overall quality of life. As a result, inquiries about sexual function ought

to be a regular element of medical history [8,9]. Examining sexual health is a crucial but frequently ignored component of diabetes care. Assessing sexual health is an essential yet often overlooked aspect of diabetes care. Patients with Type 1 diabetes who experience SD often face a diminished quality of life, coupled with heightened psychological distress [10].

As SD is a personal issue, many are reluctant to admit and disclose it with their consultant. Early identification of SD in diabetic people aids in resolving the problem and improving the patient's quality of life [11].

Kerala, India's most southern state, has a prevalence of about 16.5% of diabetes. The incidence of prediabetes in the state is estimated to be 36.7% [12]. However, Kerala has few studies on SD in the diabetic community. In addition, there is not much research comparing microvascular issues with SD. Given the lack of research, the study assessed the frequency of SD among patients with Type 2 diabetes presenting to the tertiary care center. It determined the relationship between SD and microvascular complications of diabetes.

Objectives

The objectives of the study are as follows:

1. To determine the frequency of SD among patients with Type 2 diabetes mellitus attending the General Medicine and Endocrinology Department at a tertiary care center in south Kerala
2. To assess the relationship between erectile dysfunction and microvascular consequences of Type 2 diabetes
3. To correlate SD with glycemic status.

METHODS

Having received ethical approval from the institutional ethics board, the tertiary care facility in south Kerala conducted a cross-sectional

study from November 2019 to May 2021. Marzieh *et al.*'s recent study guided the determination of the sample size, assuming that 82.5% of diabetes patients experienced SD [13]. By employing the formula $n = Z^2(1-\alpha/2)^2 P^*(1-P)/d^2$, the calculated minimum sample size needed for a 95% confidence interval and a 10% absolute error was 60.

The trial involved the participation of 120 patients in total. Patients with diabetes meeting inclusion and exclusion criteria participated after giving informed consent.

Inclusion criteria

The following criteria were included in the study:

1. Both genders were diagnosed with Type 2 diabetes mellitus
2. Age group: more than 18 years and < 60 years.

Exclusion criteria

The following criteria were excluded from the study:

- a. Patients previously diagnosed with neurogenic disorders such as spinal cord compression, Alzheimer's disease, Parkinsonism, multiple sclerosis, temporal lobe epilepsy, and stroke
- b. Patients with ovarian dysfunction or a history of oophorectomy, prostatic, bladder, or penile surgery, or pelvic irradiation
- c. Patients diagnosed with primary hypogonadism or psychogenic disorders such as anxiety, depression, chronic liver disease, alcohol dependence, chronic kidney disease Stage 3, or more
- d. Patients on any of the following drugs: Alpha-adrenergic blockers, beta-blockers, chemotherapeutic agents, CNS depressants and stimulants, SSRIs, tricyclic anti-depressants, spironolactone, thiazide diuretics, and synthetic hormones.

The study utilized a questionnaire to document the demographic and glycemic conditions of the subjects. Assessment of sexual function involves using the International Index of Erectile Function (IIEF-5) for males and the Female Sexual Function Index Scoring (FSFI) for females [14,15].

A 15-item questionnaire called the IIEF is used as a self-administered measure to rate sexual function. The questionnaire, which measures erectile function, orgasmic function, sexual desire, intercourse pleasure, and overall satisfaction, is simple to use and of high psychometric quality. A result of 22 or less implies SD [14].

An evaluation tool that can address the nature of SD is the FSFI. Desire, lubrication, orgasm, contentment, and pain are five indicators of SD. A score of <26.55 on the tool's 19-item assessment denotes SD [15].

Based on the scores, patients with SD were identified and investigated for microvascular complications. Dilated funduscopic examination assessed diabetic ophthalmopathy while urine microalbumin levels/urine protein creatinine ratio evaluated diabetic nephropathy. The assessment of diabetic neuropathy involved conducting a monofilament test and evaluation of clinical symptoms.

Statistical analysis

SPSS version 2.0 was the statistical tool used to analyze the data. The study population's baseline characteristics were analyzed using descriptive statistics.

Expression of the frequency of SD was as a percentage with a 95% confidence interval. The evaluation of the relationship between SD and microvascular complications utilized the Chi-square/Fisher's exact test. Glycemic status and SD were correlated using Spearman's rank correlation coefficient. The link between SD and the duration of diabetes was analyzed using the Mann-Whitney U-test.

RESULTS

Participant characteristics

The study involved 120 cases of diabetes in total. The patients' ages varied from 19 to 59. The median age was 45.59±9.8 years. Table 1 shows

Table 1: Demographic and clinical profile of participants

Characteristics	Frequency	Percent
Age in years		
21-30	13	9.23
31-40	29	24.2
41-50	31	25.8
51-59	47	39.2
Gender Distribution		
Males	70	58.3
Females	50	41.7
Comorbidities		
Hypertension	51	42.5
Dyslipidemia	39	32.5
Hypothyroidism	9	7.5
Coronary artery disease	22	18.33
Obesity	61	50.8
BMI(kg/m ²) <18.5: Underweight, 18.5-24.9: Normal, 25-29.9: Overweight, >30: Obese		
<18.5	10	8.3
18.5-24.9	49	40.8
25-29.9	41	34.2
>30	20	16.7
HbA1c %		
<6.5	9	7.5
6.5-7.9	46	38.3
>8	65	54.2
Duration of diabetes		
<2 years	30	25
2-5 years	50	41.6
>5 years	40	33.3

the sample's age-specific percentage distribution. In the study, women accounted for 41.7% of the population, while men accounted for 58.3%. About 54.2% of the patients had no comorbidities, whereas 45.8% had related comorbidities. The study showed that 32.5% of people had hypertension, 12.5% had dyslipidemia, 7.5% had hypothyroidism, 8.3% had coronary artery disease (CAD), 2.5% had obesity, and 0.8% had chronic renal disease. Most individuals in the research population had a B.M.I. within the 18.5-24.9 kg/m² range, and the mean B.M.I. was 25.66±5.7 kg/m². The study population's average HbA1c value was 8.321.61%. About 54.2% of people had HbA1c levels higher than 8%. The study population's average age at diagnosis of diabetes was 4.2 years. Fig. 1 depicts the percentage of sexual dysfunction among study sample. The correlation of gender, diabetes status, diabetes duration, and microvascular complications on SD is shown in Table 2.

DISCUSSION

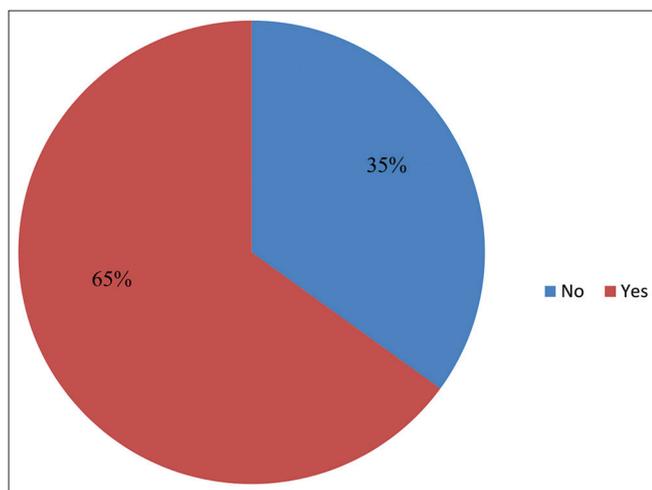
One hundred and twenty individuals with Type 2 diabetes who were under 60 years old participated in the study, which examined sexual function. The research predominantly recruited participants aged 50 to 59, mirroring the increasing occurrence of diabetes with advancing age. Male participants outnumbered females in the study population, and they demonstrated greater willingness to address their sexual health concerns compared to their female counterparts. Comorbidities were present in 58% of the subjects. Obesity, hypertension, and dyslipidemia were the most prevalent. The results emphasize the need for screening diabetes patients for co-morbidities. Participants in the study had varying BMIs. The BMIs of 40% were within normal ranges, while those of 50% were higher than 24.9 kg/m². In Indian patients, the data emphasize that waist-hip ratio and waist circumference may be more reliable indicators of Type 2 diabetes risk than BMI [16].

With an HbA1c score of more than 8%, more than 50% of patients had insufficient glycemic control. The pandemic-driven circumstances, in which many patients skipped usual checkups and follow-up care, may have contributed to these findings. A tremendous health catastrophe might occur shortly due to poor follow-up, which could further heighten

Table 2: Correlation of gender, diabetes status, diabetes duration, and microvascular complications on SD

Characteristics	Without sexual dysfunction	With sexual dysfunction	Statistical significance
Gender			
Male	15	55	(78.6%)
Female	27	23	46%
Mean duration (in years)	3.04±1.8	8.16±4.76	p<0.001
Glycosylated hemoglobin			
<6.5%	6	3	Pearson
6.5–7.9%	26	20	Chi-square: 24.326
>8%	10	55	p<0.001
Distal peripheral neuropathy			
No	37	36	Pearson
Yes	5	42	Chi-square: 20.155
			p<0.001
Diabetic nephropathy			
No	42	63	Pearson
Yes	0	15	Chi-square: 5.943
			p=0.002
Diabetic retinopathy			
No	40	60	Pearson
			Chi-square: 9.231
			p=0.015

SD: Sexual dysfunction

**Fig. 1: Percentage of sexual dysfunction among the study sample**

long-term issues. There were disparities in this regard; however, most of the patients in the study had diabetes for <5 years following diagnosis.

According to the study, SD affected 65% of the respondents. The findings show that SD is widespread among people with diabetes. About 46% of women and 78.6% of men in the research sample reported having SD. The results were similar to those of past studies conducted in India and other countries [17,18]. Numerous studies have discovered that diabetic people have a high overall rate of SD. Iranian research found that women with diabetes are more likely to experience SD [19]. According to research by Doruk, diabetic women were more likely than non-diabetic women to develop female SDs across all SD categories [20]. Studies on diabetic males have also shown that the individuals had a high risk of SD [21].

According to Selvin *et al.*, more than 50% of males experience erectile dysfunction [22]. The prevalence of erectile dysfunction among Type 2

diabetes patients was 41.3%, according to Dutch studies [23]. This study discovered a greater frequency of SD among men and women with diabetes compared to a few earlier studies. The previous research has linked erectile dysfunction to vasculopathy, neuropathy, insulin resistance, visceral obesity, and hypogonadism [24,25].

SD correlated positively with the duration of diabetes and with glycosylated hemoglobin. According to the study, the higher frequency of SD in diabetic patients, both boys and girls, is linked to poor glycemic control, a longer duration of diabetes, and chronic diabetic comorbidities, including hypertension [20,26-30]. In the Lu *et al.* study, severe ED was positively correlated with HBA1c, diabetes duration, and hypertension in individuals under the age of 60 years. Age was the only significant independent risk factor in individuals above the age of 60 years [31].

According to studies, hyperglycemia-induced chronic damage results in endothelial dysfunction. It, in turn, promotes macrovascular diseases, erectile dysfunction, and vasculopathy [32]. In addition, penile arterial insufficiency results from cardiovascular risk factors linked to diabetes. Endothelial dysfunction reduces nitric oxide availability, leading to less relaxation of the smooth muscles in the corpus cavernosa, as indicated by studies. SD may also indicate the onset of macrovascular disease in people who have no symptoms related to cardiovascular disease [19]. Therefore, the observation of ED in asymptomatic diabetic males might be seen as an unexpected result that warrants more research into CAD.

Hyperglycemia in females can cause the vaginal mucous membranes to lose moisture, which results in decreased lubrication and painful intercourse. Diabetes makes people uncomfortable and raises their risk of vaginal infections. Vasculopathy and neuropathy can affect the blood supply to the genitalia, which reduces their arousal. Psychosocial factors, such as depression and the severity of a chronic illness, may impact sexual function [24].

There is a significant connection between ED and body mass index, as per some studies that examined the topic. According to research by Maiorino *et al.*, there is a link between ED and depression, the waist-hip ratio, and metabolic syndrome [33]. However, this study did not investigate the relationship between waist-to-hip ratio and SD.

When compared, there was a significant correlation between diabetic microvascular problems and SD. Patients with peripheral neuropathy, nephropathy, and diabetic retinopathy had higher rates of erectile dysfunction. In research examining the relationship between erectile dysfunction and macrovascular and microvascular endothelial dysfunction, the former was more likely to have a role in erectile dysfunction than the latter [34]. The study's conclusions were consistent with other studies evaluating the link between peripheral neuropathy and ED [17,32]. This might be attributed to autonomic neuropathy, microvascular ischemia of the distal circulation, impaired relaxation of the smooth muscle of the corpus cavernosum, and microvascular ischemia of the distal circulation [34,35].

The conclusions highlight the significance of careful glycemic management in patients with diabetes and recommend early screening for SD for early identification and further prevention.

CONCLUSION

SD is more likely to occur in diabetic patients. To recognize and treat the problem and to enhance the quality of life, patients should be evaluated for SD early on. Among the various factors, glycemic control is a significant factor that determines the development of SD. SD among patients is also more prevalent when microvascular problems such as peripheral neuropathy, nephropathy, and retinopathy are present.

RECOMMENDATIONS

The study emphasizes the need for routine screening for SD among diabetic patients for an early diagnosis. Patients should be screened

for SD while screening for other microvascular complications such as neuropathy, retinopathy, and neuropathy. Guidelines on diabetes should also endorse the need for early screening for SD. Strict glycaemic control is necessary for the prevention of chronic complications.

AUTHORS CONTRIBUTION

Author 1: The process of conceptualization, data gathering, analysis, and paper writing. Author 2: The process of conceptualization, data gathering, analysis, paper writing, and editing

CONFLICTS OF INTEREST

None.

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