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Original Article

Frequency of Erectile Dysfunction in Patients with Type 2 Diabetes Mellitus Presenting with Peripheral Neuropathy at a Tertiary Care Hospital

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ABSTRACT

Background: Erectile dysfunction (ED) is notably prevalent among patients with type 2 diabetes mellitus (T2DM), especially those suffering from peripheral neuropathy. The condition significantly impacts the quality of life and is often exacerbated by diabetes-related complications.

Objective: This study aims to ascertain the frequency and severity of ED among patients with T2DM and peripheral neuropathy, and to examine the association between ED and variables such as age, duration of diabetes, and glycemic control.

Methods: A prospective cohort study was conducted at the Baqai Institute of Diabetology and Endocrinology, Karachi, from July 2021 to September 2022. We included 115 male patients aged 35-65 years with T2DM and diagnosed peripheral neuropathy. ED was assessed using the Urdu version of the International Index of Erectile Function-5 (IIEF-5) questionnaire. Demographic details, medical history, and laboratory results were collected and analyzed using SPSS version 25. Statistical tests included chi-squared and one-way ANOVA, with a significance level set at $p<0.05$.

Results: The mean age of the participants was 50.97 ± 7.21 years, and the average duration of diabetes was 9.37 ± 6.56 years. The mean IIEF-5 score was 14.33 ± 6.0, indicating moderate ED. Severe ED was observed in 20% of the participants, moderate ED in 19.1%, and mild to moderate ED in 28.7%. The study found a significant association between the duration of diabetes and ED severity ($p < 0.001$), while age and HbA1c levels did not show a significant correlation with ED status.

Conclusion: ED is highly prevalent and severe among patients with T2DM and peripheral neuropathy, with disease duration being a significant predictor of ED severity. These findings underscore the need for early screening and targeted interventions in this population.

Keywords: Erectile Dysfunction, Type 2 Diabetes Mellitus, Peripheral Neuropathy, IIEF-5, Glycemic Control, Diabetes Complications, Prospective Cohort Study.

INTRODUCTION

Erectile dysfunction (ED) is a prevalent complication among individuals with type 2 Diabetes Mellitus (DM), with reported rates considerably higher than in those without the condition. This discrepancy underscores the multifaceted interplay between diabetes and sexual dysfunction. Research indicates that the prevalence of ED in individuals with either type 1 or type 2 diabetes ranges from 35% to 90%, which is notably higher than in the general population (3). Diabetic neuropathy, a common condition in this demographic, affects approximately 30% of patients and is characterized by diminished sensation, a hallmark of large fiber peripheral polyneuropathy (4). The onset of ED in patients with diabetes tends to occur 10 to 15 years earlier than in those without the condition, with the disorder being more severe and less responsive to conventional medical treatments (5,6).

Furthermore, ED is often associated with both neurological and microvascular complications, which are prevalent in diabetes (3,4). The condition is also linked with an increased risk of cardiovascular diseases, which are significantly influenced by diabetic complications (7, 8). Several risk factors contribute to the heightened prevalence of ED among diabetic patients, including advanced

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age, prolonged duration of diabetes, poor glycemic control, obesity, and the presence of microvascular complications (3). Notably, there is a robust positive correlation between diabetic neuropathy and ED, as demonstrated by multiple studies (7-10). Additional research has illustrated a significant association between ED and diabetic symptoms in the lower extremities, such as an absent Achilles tendon reflex, further highlighting the impact of neurological impairments on sexual function (11-12).

Despite the considerable body of research linking diabetic neuropathy with ED, there is a scarcity of epidemiological data specifically from our region that explores this relationship. In response, our study aims to determine the frequency of erectile dysfunction among patients with type 2 diabetes presenting with peripheral neuropathy at a tertiary care diabetes center in Karachi. This investigation will contribute to a deeper understanding of the intersection between these two conditions and aid in the development of more effective management strategies for this patient population.

MATERIAL AND METHODS

This prospective cohort study was conducted at the Baqai Institute of Diabetology and Endocrinology (BIDE), affiliated with Baqai Medical University in Karachi, Pakistan, from July 2021 to September 2022. Ethical approval was obtained from the Institutional Review Board (IRB) of BIDE, adhering to the principles of the Declaration of Helsinki (Ref: BIDE/IRB/S.MORAI/09/15/21/268). Participants included males aged 35 to 65 years, diagnosed with type 2 diabetes and peripheral neuropathy, who provided written informed consent (13-14).

Peripheral neuropathy was defined by one of two criteria: (A) the presence of at least two of the following three symptoms: neuropathic symptoms (numbness, pain, burning sensation, paresthesia, or decreased sensation in the tips of the toes and bottoms of the feet), decreased or absent bilateral Achilles tendon reflex, and decreased vibration at the medial malleoli (14); or (B) a vibration perception threshold exceeding 15 (15). Erectile dysfunction was assessed using the International Index of Erectile Function-5 (IIEF-5) questionnaire, translated into Urdu. This tool includes five questions focusing on erectile function, orgasmic function, sexual desire, intercourse satisfaction, and overall satisfaction, rated on a 1–5 Likert-type scale. Scores ranged from a minimum of 5–7, indicating severe erectile dysfunction, to a maximum of 22–25, indicating no erectile dysfunction.

Data collection involved detailed demographic information, medical history including the duration of diabetes, smoking habits, ischemic heart diseases, and chronic kidney disease. A thorough physical examination was conducted, and body mass index (BMI) was calculated. Laboratory investigations were carried out, and the results, along with ED scores, were recorded in a pre-designed questionnaire, ensuring confidentiality (16).

Statistical analysis was performed using SPSS version 25. Continuous variables were presented as means ± standard deviation, and categorical variables were expressed as frequencies (percentages). The chi-squared test and one-way ANOVA were utilized to explore associations between groups. A p-value of less than 0.05 was considered statistically significant. All procedures and data handling were conducted in accordance with ethical standards to maintain participant privacy and data integrity.

RESULTS

In the study of 115 male participants with type 2 diabetes, the mean age was found to be approximately 51 years, with a standard deviation of 7.21. The participants exhibited a range of body metrics, with a mean height of about 170 cm and a mean weight of 79.12 kg, which resulted in a mean Body Mass Index (BMI) of 27.57 kg/m². The mean duration of diabetes among the cohort was noted to be slightly over 9 years, and the average hemoglobin A1c (HbA1c) level was recorded at 8.79%, indicating less than optimal blood glucose control (Table 1).

Regarding lipid profiles, the mean low-density lipoprotein (LDL) cholesterol level was observed at 95.69 mg/dL. Kidney function, as indicated by the mean creatinine level, was 1.17 mg/dL. The sample group showed a higher prevalence of hypertension with more than half of the participants (51.3%) being hypertensive. In terms of cardiovascular complications, only a small fraction (2.6%) had coronary artery disease, and similarly, renal disease was present in 7.8% of the subjects. Stroke prevalence was minimal, with only one reported case (0.9%). Smoking habits were recorded, with 20% of the participants being smokers. Regarding treatment for erectile dysfunction, the majority (89.5%) had not taken sildenafil, while a minimal number (7%) had used the medication (Table 1).

Table 1: Baseline Characteristics of Study Participants (n=115)

Parameter	Value
Age (years)	50.97 ± 7.21
Height (cm)	169.58 ± 12.1
Weight (kg)	79.12 ± 14.3

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Parameter	Value
BMI (kg/m²)	27.57 ± 5.38
Duration of DM (years)	9.37 ± 6.56
HbA1c (%)	8.79 ± 1.94
Creatinine (mg/dL)	1.17 ± 0.6
LDL (mg/dL)	95.69 ± 35.2
Hypertension	No: 56 (48.7%)
	Yes: 59 (51.3%)
Stroke	No: 114 (99.1%)
	Yes: 1 (0.9%)
Coronary Artery Disease	No: 112 (97.4%)
	Yes: 3 (2.6%)
Renal Disease	No: 106 (92.2%)
	Yes: 9 (7.8%)
Smoking	No: 92 (80%)
	Yes: 23 (20%)
Treatment for ED	Advised to Visit ED Clinic: 3 (2.6%)
	Device Advised, Not Used: 1 (0.9%)
	Not Taken Sildenafil: 103 (89.5%)
	Took Sildenafil: 8 (7%)
IIEF-5 Score	14.33 ± 6.0

Table 2: Classification of Erectile Dysfunction among Participants (n=115)

ED Classification	n (Percentage)
Severe ED	23 (20%)
Moderate ED	22 (19.1%)
Moderate to Mild ED	33 (28.7%)
Mild ED	19 (16.5%)
No ED	18 (15.7%)

Table 3: Association of Erectile Dysfunction Status with Age, HbA1c, and Duration of DM

Parameters	Severe ED	Moderate ED	Moderate to Mild ED	Mild ED	No ED	P-value	Overall
n	23	22	33	19	18		115
Age (Years)	53.65 ± 7.44	51.91 ± 7.44	48.85 ± 7.56	52.32 ± 6.3	48.83 ± 5.71	0.067	50.97 ± 7.21
HbA1c (%)	9.27 ± 2.23	8.3 ± 1.28	8.5 ± 1.79	8.71 ± 2.1	9.4 ± 2.22	0.235	8.79 ± 1.94
Duration of DM (years)	13.87 ± 7.91	10.32 ± 5.61	8.79 ± 5.54	7.32 ± 5.96	5.67 ± 4.95	<0.001	9.37 ± 6.56

The distribution of erectile dysfunction severity revealed that 20% of participants suffered from severe ED, 19.1% from moderate ED, and 28.7% from moderate to mild ED. A smaller segment, 16.5%, experienced mild ED, and 15.7% had no ED, demonstrating the varied impact of diabetes on erectile function within the cohort (Table 2).

Further analysis revealed a notable correlation between erectile dysfunction severity and both the duration of diabetes and age. The average age and duration of diabetes increased with the severity of ED. Those with severe ED had an average age of 53.65 years and had been living with diabetes for approximately 13.87 years. This was in contrast to those with no ED, who were younger on average (approximately 48.83 years) and had a shorter diabetes duration (roughly 5.67 years). These findings underscore the significant impact of prolonged diabetes duration and older age on the risk of developing severe ED. The statistical analysis showed a significant association ($p < 0.001$) between the duration of diabetes and ED severity, although the association between ED and age or HbA1c levels did not reach statistical significance (p-values 0.067 and 0.235, respectively) (Table 3).

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These results underline the complex interplay between diabetes management, patient age, and the risk of erectile dysfunction, emphasizing the need for targeted interventions to manage and possibly mitigate these issues in this patient population.

DISCUSSION

In this study, the mean International Index of Erectile Function-5 (IIEF-5) score was 14.33 ± 6.0, indicating a notable presence of erectile dysfunction (ED) among the participants. Notably, 20% of the participants experienced severe ED, while 19.1% faced moderate ED and 28.7% moderate to mild ED. This distribution suggests a significant burden of ED among patients with type 2 diabetes mellitus who also exhibit peripheral neuropathy. Moreover, ED severity displayed a significant association with the duration of diabetes but not with age or HbA1c levels (17).

The mean age of participants in this cohort was 50.97 ± 7.21 years, which is somewhat younger than that reported in other studies, such as one with a mean age of 54.0 ± 8.9 years, and a meta-analysis of 145 studies encompassing 88,577 men with a mean age of 55.8 ± 7.9 years (1, 4). However, these results align closely with another study, which reported a mean age of 49.38 ± 9.52 years (7), indicating that the age of onset for ED in diabetic patients can vary widely. Regarding diabetes duration, our findings (mean 9.37 ± 6.56 years) are comparable to those in other studies, such as the DOGO study's mean duration of 8.3 ± 7.2 years (2), suggesting a general consistency in the duration of diabetes among patients before the onset of ED symptoms (18).

The average HbA1c level in this study was 8.79 ± 1.94%, similar to findings from other studies where mean HbA1c levels were 8.4 ± 2.1%. In contrast, another study reported a lower mean HbA1c of 7.94 ± 2.31%, with a third of their participants achieving well-controlled glycemic status (HbA1c < 7%) (1, 7). This variation underscores the role of glycemic control in the development and severity of ED, although our study did not find a statistically significant association between HbA1c levels and ED severity.

Interestingly, while age and HbA1c did not show a significant association with ED status in our study, other research indicates a strong correlation between these factors and the IIEF-5 score, particularly highlighting more severe dysfunction among patients with poor glycemic control and longer diabetes duration (3, 18-19). This discrepancy might suggest the influence of other mediating factors or the need for larger-scale studies to further explore these associations (19).

The study's single-center design and the relatively small sample size may limit the generalizability of the findings. Moreover, the homogeneity of the sample in terms of demographic and clinical characteristics might not accurately reflect the broader population of patients with type 2 diabetes and peripheral neuropathy. Therefore, community-based studies with larger and more diverse populations are recommended to confirm these findings and to better understand the complex interactions between diabetes duration, glycemic control, and the development of ED (20).

CONCLUSION

In conclusion, the high frequency of erectile dysfunction among patients with type 2 diabetes presenting with peripheral neuropathy emphasizes the need for targeted screening and intervention strategies. Future research should focus on longitudinal studies to track the progression of ED and to evaluate the effectiveness of various treatment modalities. Aggregated data from this study may be made available upon reasonable request to the corresponding author, subject to the approval of all collaborators and a signed data access agreement.

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