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RESEARCH ARTICLE

Erectile Dysfunction among Diabetic Patients in a Tertiary Hospital of Southwest Ethiopia

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Abstract:

Background:

Erectile Dysfunction (ED) is defined as the persistent inability to achieve and/or maintain penile erection sufficient for satisfactory sexual performance. Few studies have examined the prevalence of ED among men diabetic patients in Ethiopia. The aim of this study was to determine the prevalence and predictors of ED among diabetic patients in a tertiary hospital of Southwest Ethiopia.

Methods:

A hospital-based cross-sectional study was conducted on male diabetic patients on follow-up at the diabetic clinic of Jimma Medical Center (JMC), Southwest Ethiopia.

Results:

350 male diabetic patients were enrolled in the study. The mean ($\pm$SD) age of the study participants was 47.9 ($\pm$12.2) years. The majority, 212 (60.4%) of the diabetic patients had varying degrees of ED and almost all, 207 (97.6%) of the patients were not treated for ED. Independent predictors of ED were older age (AOR: 4.6; 95%CI: [2.84, 7.55]; p<0.001) and longer duration of diabetes (AOR: 3.5; 95%CI: [2.12, 5.70]; p<0.001).

Conclusion:

This study confirmed a high prevalence of ED in diabetic male patients in Jimma Medical Center (JMC). Periodic assessment and management of ED should be a routine part of the diabetic care, particularly for those aged above 40 years and living with diabetes mellitus for many years.

Keywords: Erectile dysfunction, Diabetes, Jimma, Ethiopia, Predictors, Periodic assessment, Management of ED.

1. BACKGROUND

Erectile Dysfunction (ED) is one of the most common yet underappreciated complications of Diabetes Mellitus (DM) [1]. ED is defined as the persistent inability to achieve and/or maintain penile erection sufficient for satisfactory sexual performance [2]. The prevalence estimate of ED in diabetic men varies from 35 to 90% [3]. In the Massachusetts male aging study, the probability of having ED was reported to be three times greater in patients with diabetes than patients without diabetes [4]. Poor diabetic control is associated with both microvascular and macrovascular complications in the diabetic population, making ED a major issue requiring serious attention. Furthermore, diabetic men may be afflicted by a number of comorbidities all of which are by themselves risk factors for ED, including hypertension, obesity, metabolic syndrome, dyslipidemia, cigarette smoking, and autonomic neuropathy [5 - 7].

Proper sexual functioning is one of the most important components of quality of life [8]. The presence of ED is associated with grave psychosocial and clinical consequences including poor quality of life and depression [9]. However, it should be noted that ED is the most treatable complication of diabetes; over 95% of cases can be successfully treated [10].

The sensitivity of the disorder further complicates the treatment. Owing to its embarrassing nature and the shame felt by sufferers, the subject has been a taboo. Particularly in Ethiopia, there is a culture of forbidden open discussions

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regarding sexual matters, making the diagnosis of ED more challenging.

Ethiopia is one of the low-income countries affected by the trend of sharp increases in the number of population with DM where the prevalence of diabetes was reported to be 5.2%. With the growing number of population with diabetes, it is expected to see patients suffering from diabetes-related complications including ED. Some efforts have been made to assess the prevalence of ED in the Northern part of Ethiopia, which ranges from 69.9% to 85.5% [11, 12]. However, there is a dearth of study on the prevalence and predictors of ED in the southwest region of Ethiopia. Thus, this study will provide evidence regarding the prevalence and predictors of ED in diabetic patients and contribute to efforts in improving the quality of life of diabetic patients.

2. MATERIALS AND METHODS

2.1. Study Design and Population

A hospital-based cross-sectional study was conducted on male diabetic patients on follow-up at the diabetic clinic of Jimma Medical Center (JMC), Southwest Ethiopia. All the male diabetic patients between ages 18–60 were recruited during the study period. Patients who were unconscious and mentally unstable were excluded from the study. The data were collected from April 1 to June 30, 2019 for two consecutive months. Three male nurses were involved as data collectors and each patient was interviewed alone. During data collection, confidentiality was ensured and for this reason, the name and address of the patients were not recorded in the data collection checklist.

2.2. Sample Size Determination

The sample size was calculated using the single population proportion formula. Assuming the proportion of erectile dysfunction as 50%, the confidence interval was 95% and the marginal error was 5%. The final sample size was determined to be 350 by adding a 10% non-response rate.

2.3. Study Instruments and Measurements

Assessment of Erectile Function: the ED was assessed using the abridged version of the International Index of Erectile Function (IIEF-5). This multidimensional tool evaluates five aspects of sexual function such as erectile function, orgasm, desire for sex, satisfaction after intercourse and overall satisfaction. Each aspect was assessed by a five-point likert scale and the scores ranged from 0 to 25. Individuals who scored more than 21 were considered as having a normal erectile function. Those who scored 1–7, 8–11 and 12–21 out of 25 points were classified as severe ED, moderate ED and mild ED, respectively [13].

A structured questionnaire was used to collect relevant socio-demographic and clinical information such as age, marital status, occupational status, monthly income, educational status, Body Mass Index (BMI), smoking status, type of DM, the status of glycemic control, comorbidity, and duration of DM. Body mass index (BMI) was calculated as weight (in kilograms) divided by the standing height (in meters squared). Individuals who smoked at least 100 cigarettes were considered smokers. Fasting blood sugar reading of 80 to 130 mg/dL was considered as controlled blood sugar.

2.4. Ethical Consideration

The principal investigator or data collectors briefed the aim of the study to the patients and signed informed consent was taken from all the participants prior to the data collection. During the data collection, confidentiality was ensured and for this reason, the name and the address of the patients were not recorded in the data collection checklist.

2.5. Statistical Analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 21.0. Descriptive analysis was performed and the result was presented by text and tables. Chi-square test was performed to check the adequacy of cells before performing logistic regression. To examine independent predictors of ED, variables with p-values <0.25 on a bivariate binary logistic regression model were entered into a multivariate logistic regression model and variables with p-value <0.05 were considered statistically significant.

2.6. Operational Definitions

Co-morbidity: any medical condition concomitantly occurring with diabetes mellitus. Example, hypertension [14].

Alcohol consumption: individuals who drink any level of alcohol are labeled as "Drinker".

3. RESULTS

3.1. Socio-demographic and Clinical Characteristics of the Study Participants

A total of 350 eligible male diabetic patients were enrolled in the study. The mean ($\pm$SD) age of the study participants was 47.9 ($\pm$12.2) years. More than half, 197 (56.3%) of the patients had a monthly income of less than 2500 ETB (86 USD) and 153 (43.7%) of them attended primary education. Out of the total respondents, 58 (16.6%) and 132 (37.7%) were smokers and alcohol consumers, respectively.

The majority, 216 (61.7%) of the participants had type 2 diabetes and 203 (58%) patients were diagnosed before 5 years. More than half, 193 (55.1%) of the patients had an uncontrolled glycaemic goal and two-third, 236 (67.4%) of the patients had a BMI greater than 25kg/m2 (Table **1**).

3.2. Prevalence of Erectile Dysfunction among the Study Participants

Among the study participants, 212 (60.4%) had varying degrees of erectile dysfunction. Almost all, 207 (97.6%) of the patients were not treated for ED. The erectile function scores of the subjects are presented in Table **2**.

3.3. Independent Predictors of Erectile Dysfunction

Binary logistic regression was done to identify the association between socio-demographic, clinical character-istics, and ED. Accordingly, age, alcohol consumption, smoking habit, BMI (kg/m2), smoking status, type of DM, duration of diabetes and co-morbidity had a P-value of <0.25.

Further multivariate logistic regression was conducted to identify independent predictors of ED. After including variables significant in bivariate analysis into multivariate analysis; age older than 40 years (AOR: 4.6; 95%CI: [2.84,

7.55]; p<0.001) and diabetes duration of greater than 5 years (AOR: 3.5; 95%CI: [2.12, 5.70]; p<0.001) were found to be independent predictors of ED (Table **3**).

4. DISCUSSION

This study examined the magnitude and predictors of erectile dysfunction among adult diabetic patients in a tertiary hospital in Southwest Ethiopia. A high prevalence of ED was observed in the study population and almost all of them were not treated for ED. Older age and diabetes duration of greater than five years were independent predictors of ED.

Table 1. Socio-demographic and clinical characteristics of the study participants (n=350)

Variable		Frequency (%)
Age (years)	18-40	143 (40.9)
	>40	207 (59.1)
	Mean ± SD	47.9 $\pm$12.2
Body Mass Index (BMI) (Kg/m2)	<25	106 (30.3)
	$\geq$25	244 (69.7)
Occupational status	Employed	262 (74.9)
	Unemployed	88 (25.1)
Education level	Illiterate	24 (6.9)
	Primary	153 (43.7)
	Secondary	115 (32.9)
	Tertiary	58 (16.6)
Monthly income (Birr)	$\leq$2500 ETB (86 USD)	197 (56.3)
	>2500 ETB (86 USD)	153 (43.7)
Alcohol consumption	Drinker	132 (37.7)
	Non- drinker	218 (62.3)
Smoking habit	Smoker	58 (16.6)
	Non-/ex-smokers	292 (83.4)
Type of DM	Type 1	134 (38.3)
	Type 2	216 (61.7)
Co-morbidity	Yes	203 (58)
	No	147 (42)
Duration of diabetes	$\leq$5	147 (42)
	>5	203 (58)
Status of glycemic control	Controlled	157 (44.9)
	Uncontrolled	193 (55.1)

Table 2. Erectile function scores of the study population.

-	-	Frequency (%)
Erectile function status	Normal erectile function (IIEF-5 score > 21)	138 (39.4)
	Mild ED (IIEF-5 score 17–21)	34 (9.7)
	Mild-to-moderate ED (IIEF-5 score 12–16)	58 (16.6)
	Moderate ED (IIEF-5 score 8–11)	42 (12)
	Severe ED (IIEF-5 score < 8)	78 (22.3)
	Total	350 (100)
Treatment for ED	Yes	5 (2.4)
	No	207 (97.6)

Table 3. Independent predictors of erectile dysfunction.

Variables		Erectile Dysfunction		*COR [95%CI]	P-value	*AOR[95%CI]	P-value
		Yes	No				
Age	18-40	53	90	1	1	1	1
	>40	159	48	5.6 [3.52,8.98]	<0.001	4.6 [2.84, 7.55]	<0.001*
Alcohol consumption	Yes	91	41	1.7 [1.13,2.81]	0.013	1.5 [0.91, 2.56]	0.103
	No	121	97	1	1	1	1
Smoking habit	Smoker	40	18	1.5 [0.84,2.83]	0.15	1.4 [0.69, 2.79]	0.34
	Non-smoker	172	120	1	1	1	1
BMI (kg/m2)	<25	58	48	1.4 [0.89,2.25]	0.14	1.6 [0.93, 2.67]	0.09
	≥25	154	90	1	1	1	1
Type of DM	Type 1	68	66	1	1	1	1
	Type 2	144	72	1.9 [1.25,3.02]	0.003	1.3 [0.80, 2.01]	0.26
Duration of diabetes (Years)	≤5	61	86	1	1	1	1
	>5	151	52	4.1 [2.59,6.45]	<0.001	3.5 [2.12, 5.70]	<0.001*
Co-morbidity	Yes	135	68	1.8 [1.17, 2.79	0.008	1.5 [0.89, 2.43]	0.13
	No	77	70	1	1	1	1

COR: Crude Odds Ratio, AOR: Adjusted Odds Ratio, DM = Diabetes Mellitus, BMI: Body Mass Index, *= significant p-value <0.05.

Nearly two-third (60.4%) of the study participants had some degree of ED, of which 22% had severe ED. Almost a similar percentage was noted in the study conducted in Egypt (63.6%) [15] and Jordan (62%) [16]. However, lower and higher proportions were reported in the study conducted in Nigeria (36%) [17] and Pakistan (88%) [15], respectively. The difference might be attributed to differences in the study population and methodology.

Regrettably, only five diabetes men had sought medical advice in order to be treated for ED. Remaining 207 (97.6%) were not treated or unaware of ED treatment modalities. This failure to seek advice might be due to social stigma, or not considering ED as a treatable condition. As a result, ED is a common distressful complication of diabetes which is often under-appreciated. This could further adversely affect the quality of life of the affected men [18].

In the present study, older age was found as independent predictor of ED. Diabetic patients who were older than 40 years were four times more likely to experience erectile dysfunction as compared to those younger than 40 years (AOR: 4.6; 95%CI: [2.84, 7.55]; p<0.001). Advancing age has been consistently shown to increase the risk of ED [19 - 21]. Increasing age has been linked to a decline in organ function and male sex hormones. Several well-recognized risk factors of ED such as neuropathy, hypertension, hypogonadism, and atherosclerotic diseases are also common with advancing age which further increase the risk of developing ED. However, some recent studies have failed to show increasing age as an independent risk factor for ED in diabetes [18].

In the current study, diabetes duration was found to be an independent risk factor for ED in our study population. We observed that those who were living with diabetes for greater than five years were three times more likely to experience erectile dysfunction as compared with those who were living with it for less than 5 years (AOR: 3.5; 95%CI: [2.12, 5.70]; p<0.001). This finding was consistent with several other studies [18, 22 - 24]. With longer duration of diabetes, the risk of micro and macrovascular complications increases, giving rise to diabetes-related ED that is mostly neurogenic and vasculogenic in etiology. Furthermore, other risk factors for ED such as hypogonadism and poor glycemic control have also been shown to worsen with increasing duration of DM [25, 26].

Cigarette smoking is one of the well-recognized risk factors of ED in diabetic patients by accelerating atherosclerosis which is the main pathophysiologic pathway for vasculogenic ED (2 [22]. However, our study failed to show such an association with smoking (P=0.34). This might be related to the relatively small number of participants who had ever smoked cigarette actively (16.6%) in our study population. This lower proportion of smokers might be due to a significant reduction in the number of smokers owing to continual campaign against smoking as part of lifestyle modification education programs in the diabetic clinics. Moreover, the use of questionnaires to assess smoking status may have a social desirability issue diminishing response rate. Similar findings were reported in studies conducted in Nigeria and the United States [4, 18].

CONCLUSION

This study confirmed a high prevalence of ED in the study population and almost all of them were not treated for ED. Older age and diabetes duration of greater than five years were independent predictors of ED. Periodic screening and management of ED should be a routine part of diabetes care, particularly for those aged above 40 years and living with DM for more than 5 years.

LIMITATIONS OF THE STUDY

The results of our study should be interpreted in the

context of several possible limitations. First, the cross-sectional nature of the study does not allow to make inferences about the causal relationship. Further longitudinal studies to clarify a causal relation between ED and those predictors will be needed. Second, the study was conducted in a tertiary care hospital, where complex medical conditions are treated, and therefore the study population might be different from those attending other clinics. Selection and social desirability biases may also play a role.

LIST OF ABBREVIATIONS

AOR	=	Adjusted Odds Ratio
COR	=	Crude Odds Ratio
CI	=	Confidence Interval
JMC	=	Jimma Medical Center
ED	=	Erectile Dysfunction
DM	=	Diabetes Mellitus

AUTHORS' CONTRIBUTIONS

Abdisa Dinku:

Conceived the study, collected and analysed the data, and drafted the manuscript.

Getandale Zeleke:

Conceived the study, analysed the data and reviewed the manuscript. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

HUMAN AND ANIMAL RIGHTS

Not applicable.

CONSENT FOR PUBLICATION

Informed verbal consent was obtained from all the participants prior to publication.

AVAILABILITY OF DATA AND MATERIAL

The data supporting the findings of the article is available from the corresponding author [G.Z.N.] on reasonable request.

CONFLICT OF INTEREST

The author declares no conflict of interest, financial or otherwise.

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