Frequency and Determinants of Erectile Dysfunction among Type 2 Diabetes Patients in a Tertiary Health Institution in Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. Author MAO was responsible for the conception and design of the work, analysis and interpretation of data with initial manuscript drafting. Authors OAA and EYF were all involved in the reviewing the manuscript draft. All the authors approved the final version of the manuscript to be published.

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ABSTRACT

Background: Sexual dysfunction of which erectile dysfunction is one of the complications usually occurred in men with diabetes mellitus. Hence this study aimed to assess the prevalence and analyze risk factors for erectile dysfunction (ED) in patients with type 2 diabetes mellitus (DM).
Materials and Methods: This is a cross-sectional study of 147 men with type 2 DM recruited from the diabetes clinic of a tertiary health institution in Nigeria. ED was assessed using an abridged version of international index of erectile function (IIEF–5). Sociodemographic data that included age, education, occupation, marital status were assessed and medical history including diabetes duration, smoking, alcohol intake, frequency and style of sexual intercourse obtained.
Results: The mean age of the study sample was 68.22±12.15 years. The prevalence of ED was 69.5%, of which 14.3%, 14.3%, 10.5% and 29.9% had mild, mild-moderate, moderate and severe

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dysfunctions respectively. The prevalence of ED increased with age, duration of diabetes and obesity but not with glycaemic control, consumption of alcohol or smoking.

Conclusions: ED was highly prevalent among men with DM in South-West Nigeria. Hence, efforts must be made to reduce the high prevalence by managing the factors responsible for its development. Also, health care practitioners must regularly inquire about this specifically as patients may not readily volunteer this information.

Keywords: Diabetes mellitus; erectile dysfunction; Nigeria; prevalence; risk factor.

1. INTRODUCTION

Diabetes mellitus (DM) is a metabolic disorder associated with many chronic complications including sexual disorders. DM commonly causes many variants of sexual dysfunctions including erectile dysfunction (ED) and premature ejaculation (PE) mostly and reduced libido, delayed/prolonged ejaculation occasionally [1,2]. Erectile dysfunction is the most frequent sexual dysfunction associated with DM [3-5]; it is defined as inability to achieve and maintain an erection sufficient to permit satisfactory sexual intercourse [6]. It is known to be a major problem especially among patients with diabetes. A study that was done in Massachusetts, United States of America showed that diabetic men are 3 times as likely to have developed ED as non-diabetic men [7]. Many studies conducted across the world on the prevalence rates of ED among diabetic men showed results which range from 35-90%. For instance, ED rates among diabetic men were over 50% in the United States, 35-78% in Mexico, 44% in the Netherlands, and 80-90% in Saudi Arabia [3,4]. In Africa, the prevalence rates of ED ranges from 55.1% in Tanzania, 76.2% in Ethiopia and 52-72.5% in Nigeria [8-10]. Several factors predispose diabetics to ED including increased duration of diabetes which has been shown to increase both the prevalence rate and severity of ED [10]. Erectile dysfunction can occur early in the course of the disease and it can occasionally be the presenting symptom [11]. Moreover, men with diabetes may experience ED as much as 10 to 15 years earlier than men without diabetes. Talking about sexual problems by the male gender especially among diabetics is still not easily discussed which makes it difficult to properly characterize its features, hence, the problem is often under-recognized. Numerous studies revealed that men with ED find it difficult to report their conditions to doctors [12,13,14].

The proposed mechanisms of ED in diabetic patients include elevated advanced glycation end-products and increased levels of oxygen-free radicals, impaired nitric oxide (NO) synthesis, increased endothelin B receptor binding sites and ultrastructural changes, upregulated RhoA/Rho-kinase pathway, NO-dependent selective nitrergic nerve degeneration and impaired cyclic guanosine monophosphate-dependent kinase-1. Modifiable risk factors for ED include smoking, lack of physical activity, wrong diets, overweight or obesity, metabolic syndrome and excessive alcohol consumption. Therefore, the promotion of healthful lifestyles would yield great benefits in reducing the burden of ED.

The sexual dysfunction among diabetics is associated with many pathologic mechanisms including microangiopathy, hypogonadism, autonomic neuropathy, hypertension as well as psychological disorders like depression, performance anxiety and lifestyle risk factors like smoking and alcohol [15-18]. Hence this study aimed to assess the prevalence and analyze (analyse)risk factors for erectile dysfunction in patients with type 2 diabetes mellitus.

2. MATERIALS AND METHODS

We conducted a cross-sectional study at the Diabetes Clinic of LAUTECH teaching Hospital (LTH), Ogbomoso, Southwest, Nigeria. A convenience sampling method was used. Men who attended the Diabetic clinic during the recruitment period (April to October 2018) were approached and recruited if met the inclusion criteria. The inclusion criteria were all men aged 20 years and above, diagnosed of type 2 diabetes and in heterosexual relationship. Those with acute infections or having major organs dysfunctions like heart, kidney or liver failures were excluded even if had type 2 diabetes. Patients with previous stroke with significant residual deficits were also excluded. The

participants were asked to complete a set of administered questionnaire in English or Yoruba language depending on their literacy level. The questionnaire consisted of questions on socio-demography lifestyle, duration of diabetes among others. Sexual history was assessed using international index of erectile function-5 (IIEF-5). The IIEF-5 questionnaire is a brief, reliable and valid self-administered questionnaire containing five domains: erectile function (questions 1 to 5 & 15), intercourse satisfaction (questions 6 to 8), orgasmic function (questions 9 & 10), sexual desire (question 11 & 12), and overall satisfaction (questions 13, 14). This instrument has been widely used in many countries, including Nigeria to assess for the presence and severity of ED [9].

Data were analyzed using SPSS 20 (IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY, USA). Continuous variables were analyzed using means and standard deviations and the results presented in tables. Categorical data were analyzed using the Chi-square test with statistical significance level set at $P < 0.05$. A multivariate logistic analysis was used to analyze the association of independent and outcome variables.

Respondents were further assured of confidentiality and anonymity. Respondents consented by signing or thumb-printing against their decision as indicated on the questionnaire.

2.1 Operational Definitions

The following operational definitions were used for the presence and severity of ED based on the scores using IIEF.

- Severe ED----scores of 1-7 out of 25 points.
- Moderate ED----scores of 8-11 out of 25 points.
- Mild to moderate ED-----scores of 12-16 out of 25 points.
- Mild ED-----scores of 17-21 out of 25 points.
- No ED----scores of 18-25 points.

3. RESULTS

A total of 184 men were approached to participate in the study, of which 160 men fulfilled the inclusion criteria but only 147 men consented, this represent a response rate of 79.9%. The mean age of the participants was 68.2±12.2 years, (Table 1). The majority of the patients were of Yoruba extraction, married and sexually active. There were 109 (74.2%) patients who were less than 65 years.

Clinical characteristics of the study participants indicated that the mean fasting blood glucose (FBG) level of study participants was 178.6 mg/dL (9.9 mmol/L), and approximately one-third (32.6%) of the participants had good glycaemic control defined as FBG ≤ 126 mg/dl (7.0 mmol/L). Additionally, the mean BMI of respondents was 26.9±3.9 kg/m^2. Results indicated that 56.4% of study participants were either overweight (defined as BMI of 25.0-29.9 kg/m^2) or obese defined as BMI of ≥30.0 kg/m^2. The majority of participants (63.7%) of the participants had history of hypertension out of which (42.6%) had good blood pressure control defined as ≤140/90 mmHg.

Based on IIEF-5, the prevalence of ED was found to be, (remove)102 (69.4%), of which 21 (14.3%) each had mild and mild-moderate dysfunctions, 16 (10.5%) had moderate dysfunction and 44 (29.9%) severe dysfunction (Table 2).

The prevalence of dysfunctions in other domains of sexual functions were 128 (87.1%), 122 (83.0%), 134 (91.2%) and 121 (82.2%) for sexual desire, orgasmic function, intercourse satisfaction and overall satisfaction respectively (Table 2). The average frequency of sexual intercourse was 7.0±5.5 times/month and this frequency decrease significantly with age (p=0.004). The more commonly adopted position for sexual activity in this study was man-on-top, and both frequency of sexual activity and sexual position were not related to the incidence rate of ED.

To determine for the variables that were significantly and independently associated with the presence of ED in our patients, we performed a multivariate logistic analysis (Tables 3, 4). The only variables found to be significantly and independently associated with ED among diabetic men in our study were; increase in age (OR-15.78, 95%CI: 11.47-20.11), duration of diabetes (OR-3.205, 95%CI: 1.423-4.452) and being overweight/obese (OR-1.673, 95%CI: 1.250-4.452).

4. DISCUSSION

Sexual dysfunction usually develops insidiously over months or years in the natural history of diabetes [4], it may even precede its diagnosis. The study shows that the prevalence of ED among patients with type 2 DM is high (69.4%), of which 29.9% had severe ED. The prevalence of ED among diabetics in this study of 69.4% is slightly lower than 74% reported by Olarinoye et al. [19] in Ilorin but higher than 51% earlier reported by Modebe et al. [19] in Enugu, Southeast, Nigeria. Few studies have also reported a lower prevalence of ED in men with DM. For example, Ogbera et al. [20] reported a prevalence of 34% among 96 men with diabetes in Lagos and a multicentre study among 9,756 diabetic men in Italy reported a prevalence of 47% [21]. The wide variation in the reported prevalence of ED among diabetics may be related to but not limited to population sizes, demographic characteristics, duration and severity of diabetes and presence of other confounding comorbiditiies.

The relatively high prevalence of ED in our study may be due to older patients recruited for the study (mean age was 68.2±12.2years). Also, patients who had ED were significantly older, confirming increasing prevalence of ED with increasing age; this has consistently been shown to be a significant risk factor for ED both in the general population and among diabetic cohorts [4,17]. Increased age, especially older age, is associated with a decline in several organ functions including erectile function. Also, several of the well known risk factors for ED such as hypertension, obesity, atherosclerosis, hypogonadism are commoner with increasing age. Also the age-related physiological changes in the testicles and decline in male sex hormones especially testosterone may also be responsible to (for)the increasing incidence of ED in older men.

Most patients who had problem with erection also had problems with other domains of sexual functions including intercourse satisfaction (91.2%) and overall satisfaction (82.2%). These findings were not unexpected since good erection is critical to overall satisfaction of sexual intercourse in men.

This study further confirms that longer duration of diabetes and being overweight or obese are the independent predictors for ED but in contrast, this study reveals glycaemic control was not associated with ED. Most studies have similar results demonstrating duration of diabetes and increasing BMI to be significantly associated with ED [10,17].

Table 1. Some clinical characteristics of the participants

Parameters	Mean (SD)
Age (years)	68.2±12.2
Weight (kg)	68.2±10.6
Height (m)	1.59±0.07
BMI (kg/m2)	26.92±3.99
WC (cm)	81.42 ± 17.49
HC (cm)	91.01 ± 18.97

BMI: Body mass index; WC: Waist circumference; HC: Hip circumference

Table 2. Level of dysfunction by type of sexual function domains among male patients

Level of dysfunction	Type of sexual function domain				
	Erectile Function	Sexual Desire	Orgasmic Function	Intercourse Satisfaction	Overall Satisfaction
None	45 (30.6)	19 (12.9)	25 (17.0)	13 (8.8)	26 (17.7)
Mild	21 (14.3)	37 (25.2)	33 (22.4)	38 (25.9)	37 (25.2)
Mild – Moderate	21 (14.3)	27 (18.4)	14 (9.5)	18 (12.2)	16 (10.9)
Moderate	16 (10.9)	26 (17.7)	18 (12.2)	25 (17.0)	20 (13.6)
Severe	44 (29.9)	38 (25.9)	57 (38.8)	53 (36.1)	48 (32.7)
Overall Dysfunction	102 (69.4)	128 (87.1)	122 (83.0)	134 (91.2)	121 (82.3)

Table 3. Univariate analysis of sociodemographic and clinical factors associated with ED among male diabetic patients

Variable	Number (n=147)	Frequency of ED (%)	*p* – value
Age class			0.003
≤ 25	2	1 (50.0)	
26 – 35	3	2 (66.7)	
36 – 45	10	7 (70.0)	
46 – 55	26	21 (76.9)	
56 – 65	54	41 (75.9)	
66 – 75	52	41 (76.9)	
Educational status			0.425
None	2	1 (50.0)	
Primary	20	16 (80.0)	
Secondary	28	20 (71.4)	
Tertiary	93	61 (65.6)	
Postgraduate	4	4 (100.0)	
Occupational status			0.008
Student	6	0 (0)	
Artisan	10	8 (80.0)	
Petty trader	14	12 (85.7)	
Civil servant	73	49 (67.1)	
Business	8	7 (87.5)	
Private sector	32	23 (71.9)	
Retiree	4	3 (75.0)	
Monthly income			0.113
0 – 20,000	42	24 (57.1)	
20,001 – 50,000	48	36 (75.0)	
50,001 – 100,000	32	27 (84.4)	
100,001 – 150,000	13	7 (53.8)	
150,001 – 200,000	10	7 (70.0)	
> 200,000	2	1 (50.0)	
Smoking history			0.027
Yes	28	23 (82.1)	
No	119	79 (66.4)	

Alcohol history			0.189
Yes	75	55 (73.3)	
No	72	47 (65.3)	
Coffee history			0.115
Yes	30	24 (80.0)	
No	117	78 (66.7)	
Cola nut history			0.081
Yes	20	17 (85.0)	
No	127	85 (66.9)	
Frequency of SI			0.013
< 3 times	47	35 (74.5)	
4 – 8 times	55	38 (69.1)	
9 – 12 times	23	15 (65.2)	
> 12 times	22	14 (63.6)	
Sexual Activity Position			0.72
Man on top	97	66 (68.0)	
Woman on top	6	5 (83.3)	
Both	44	31 (70.5)	
FBG			0.125
<126mg/dl	48	30 (62.5%)	
>126mg/dl	99	72 (72.7%)	
BMI			0.042
Normal	72	46 (63.9)	
Overweight	63	44 (69.8)	
Obese	12	12 (100.0)	

Table 4. Multivariate analysis of factors associated with ED among male diabetic patients

Variable	Adjusted OR	95% CI	*p* – value
Age class			
≤ 25	1		
26 – 35	14.465	10.981-17.950	< 0.001
36 – 45	15.316	11.793-18.840	< 0.001
46 – 55	16.682	13.159-20.205	< 0.001
56 – 65	15.787	11.465-20.108	< 0.001
> 65	31.855	6.638-67.019	< 0.001
Duration of diabetes			
<5 years	1	-	-
5-10 years	1.125	0.632-1.907	0.352
>10 years	3.205	1.423-6.567	0.023
Normal weight	1	-	-
Overweight/Obese	1.673	1.250-4.452	0.034
Smoking history			
Yes	1.946	0.400-9.455	0.409
No	1		
Alcohol history			
Yes	0.461	0.173-1.226	0.121
No	1		
Coffee history intake			
Yes	1.548	0.508-4.722	0.442
No	1		
Colanut intake history			
Yes	1.425	0.191-10.638	0.73
No	1		
Frequency of sexual intercourse			
< 3 times			
4 – 8 times	1		
9 – 12 times	1.074	0.265-4.346	0.921
> 12 times	0.84	0.193-3.658	0.816
	1.477	0.341-6.395	0.602
Sexual Activity Position			
Man-on-top	0.82	0.319-2.108	0.681
Woman-on-top	1.051	0.060-18.541	0.973
Both	1		

In our study, consumption of alcohol was not found to predispose to ED. This is contrary to findings from other studies. Alcohol consumption in large quantity has been shown to cause central sedation, reduced libido and transient ED, however chronic alcoholism may result in ED through hypogonadism and polyneuropathy, which can impair penile nerve function [22]. The reason why alcohol intake had no significant relationship with ED in this study is unclear but may be related to the facts that only few numbers of our participants takes alcohol. It may also be due to the fact that we did not quantify the amount of alcohol consumed by participants. Moreover, cigarette smoking is a known risk factor for ED in diabetics possibly through acceleration of atherosclerosis predisposing to vasculopathy with subsequent reduced perfusion to penile structure. However smoking was not associated with ED in our study. Although the reason is not clear, it might be related to relatively small sample number of participants who currently smoked or ever smoked cigarette in our study.

One of the strengths of this study was that the determination of ED was by self-reporting by patients using a self-administered questionnaire. The questionnaire was also translated to Yoruba language for easy understanding of those who were not proficient in English language. This eliminated a feeling of embarrassment which some of the patients could have if the questionnaire was filled for them by health care

personnel. However the questionnaires were checked for completion also(delete) to be sure (they)were properly filled. However, the study was limited in its cross-sectional nature which does not permit inference on cause and effect; also there was no control group to compare the findings with.

5. CONCLUSIONS

The prevalence of ED is high among Nigerian of Southwestern origin with type 2 DM and the prevalence and severity increases with age. Sexual disorders are still considered a personal and private matter that most people including diabetics will not readily volunteered the information until(unless) asked. Based on these findings, we recommend that regular assessment of erectile functions should form part of routine medical evaluation both at diagnosis of diabetes and routinely at diabetes clinic visits using symptoms of ED.

ETHICAL APPROVAL AND CONSENT

Ethical approval was obtained from the Ethics Committee of the LAUTECH teaching hospital, Ogbomoso. Informed consent was obtained from each respondent by explaining the objectives (in the local language if need be) of the study before inclusion.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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