



## **Erectile Dysfunction and Depression in Males with Type 2 Diabetes Mellitus in a Tertiary Healthcare Facility in Uyo, South-South Nigeria**

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### **Authors' contributions**

*This work was conducted in collaboration among the authors. Author SIO designed the study and wrote the protocol. Author HEJ performed the statistical analysis and performed the literature search. Author VEI wrote the first draft of the manuscript with assistance from author AUI. All the authors read and approved the final manuscript.*

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### **ABSTRACT**

**Background:** Co-morbidity between erectile dysfunction and depression is reported high among males with type 2 diabetes mellitus and these constitute a major public health challenge due to the number of persons affected by these conditions and the negative impact on their physical and mental wellbeing.

**Aim:** This study assesses the prevalence of self-reported erectile dysfunction and depression among males with type 2 diabetes mellitus and examines factors associated with them.

**Materials and Methods:** This was a cross-sectional descriptive study of 103 male subjects with type 2 diabetes mellitus who were consecutively recruited from May 2019 to September 2019. Data were obtained with an interviewer-administered structured questionnaire. Sexual dysfunction was assessed using the international index of erectile function questionnaire (IIEF) and depressive symptoms were assessed using the Hamilton depression rating scale.

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**Results:** The mean age of the respondents was 62.78±14.1 year. Mean duration of illness and erectile dysfunction are 8.92±6.3 years and 5.64±5.7 years respectively. The prevalence of sexual dysfunction was 71.8%. About 50.2% of respondents reported severe degree of erectile dysfunction and 28.2% reported no erectile problems. Erectile dysfunction was significantly associated with depression in our sample ( $\chi^2=9.26$ ,  $P=.002$ ). The mean depression score was 24.52±8.2 and the prevalence was 68.6%. Time with diabetes mellitus and glycaemic control status were factors significantly related to the risk of developing erectile dysfunction and depression.

**Conclusion:** Erectile dysfunction and depression is highly prevalent among males with type 2 diabetes mellitus and these should be addressed in the course of treatment of these patients.

*Keywords: Diabetes mellitus; depressive symptoms; males; prevalence; sexual dysfunctions; Nigeria.*

## 1. INTRODUCTION

Diabetes mellitus (DM) is a common chronic metabolic disease that require good adherence to certain lifestyle measures and medication to achieve good glycaemic control [1]. About 285 million people are affected with diabetes mellitus (DM) worldwide. It is projected that by 2025 the largest increase in DM prevalence will occur in the developing countries [2]. Diabetes mellitus (DM) causes different medical, psychological and sexual complications throughout its course, which causes severe restriction and disability in an individual's life [3].

Both women and men with diabetes are at increased risk for sexual dysfunction. An increased prevalence of psychosexual problems has been reported in patients with diabetes mellitus compared to the general population [4]. The etiological bases for the psychosexual problems have been attributed much more to organic causes than psychological factors and these include neurological, vascular, endocrine factors and medication use or a combination of these factors [5]. In men, sexual problems manifest as erectile dysfunction which has been defined as the inability to obtain and maintain an erection sufficient for satisfactory intercourse or other sexual expressions [6]. Reported prevalence ranges from 35-75% of men with diabetes having erectile dysfunction. Apart from higher frequencies of occurrence, patients with diabetes develop erectile dysfunction 5-10 years earlier than in the general population [7-9].

Erectile dysfunction is associated with serious psychosocial and clinical consequences including depression and poor quality of life [10]. Co-morbidity between erectile dysfunction and depressive illness is reported high but the causal links is unclear. Erectile dysfunction and the psychological distress associated with it may trigger the development of depressive illness in

vulnerable individuals and depression may induce erectile dysfunction [11].

Several studies have reported significantly higher rates of depression among persons with diabetes relative to the general population. The reported prevalence of depression in the diabetic population ranges from 30% to 65% while in the general population it ranges from 5 to 10% [12-15]. The occurrence of depression in the diabetic population is strongly associated with poor glycaemic control, presence of complications, increased disability and increased cost of care [16-19].

Good compliance with medication is important to achieve and maintain good glycaemic control and reduce the risk of developing many long term complications including sexual problems and depression. This study examines the prevalence of sexual dysfunction and depression and associated factors in male patients with type two diabetes mellitus.

## 2. MATERIALS AND METHODS

### 2.1 Location of the Study

This cross-sectional study was conducted at University of Uyo Teaching Hospital located in Uyo, the capital city of Akwa Ibom State, South-South Nigeria. The hospital is a 500 bed capacity tertiary healthcare centre that offers tertiary healthcare services to the host and neighboring states.

### 2.2 Subjects

The study population consisted of one hundred and three male participants with type 2 diabetes, aged 40 years and above, who were recruited consecutively at the Diabetes and Endocrinology unit of UUTH between May 2019 to September, 2019. Type 2 diabetes mellitus was diagnosed

according to the American Diabetes Association (ADA) criteria [20]. The inclusion criteria included a diagnosis of type 2 diabetes mellitus, use of oral anti-diabetic medications for at least one year prior to study entry, adults the age of 40 years and above, and who granted informed consent. Exclusion criteria included the presence of type 1 diabetes, gestational diabetes or secondary diabetes due to other diseases.

### 2.3 Procedure

Approval for the study was obtained from the Research and Ethical Committee of the University of Uyo teaching Hospital (UUTH/AD/S/96/XX1/09). Informed consent was obtained from patients. Patients who met the inclusion criteria were consecutively recruited from the endocrinology unit of the hospital into the study for a comprehensive psychiatric evaluation and diagnosis of depression according to ICD-10 diagnostic criteria. The Mini International Neuropsychiatric Interview (MINI) English Version 5.0.0 [21] was used to confirm the diagnosis of depression in the participants.

### 2.4 Measures

**Semistructured sociodemographic questionnaire:** A socio-demographic questionnaire was used to obtain socio-demographic information including age of the patient, gender, educational status, marital status, religion, occupation, duration of illness.

**Adherence to medication:** was assessed as medication compliance during the one week preceding entry into the study. Non-adherence to medication in this study was defined as taking less than 80% of the prescribed medication one week before entry into the study [22].

**Sexual dysfunction:** was assessed using the international index of erectile function questionnaire (IIEF-5). IIEF-5 item is a 5 item questionnaire scored on a five-point likert scale with lower values representing poorer sexual function. Each question has scores of 1 to 5. Thus a score of 1 for a question was considered the least functional, while a score of 5 was considered the most functional. The possible scores for the IIEF-5 range from 1 to 25. A score above 21 was considered as normal erectile function and scores at or below this cut point was considered erectile dysfunction (ED). Based on IIEF-5 scores, subjects were categorized into mild (17-21), moderate (8-11), severe (1-7) and no ED (22-25) [23,24]. The symptoms of

depression were assessed according to the tenth edition of the International Classification of Diseases and health-related disorders (ICD -10) criteria [24].

**Hamilton Depression Rating Scale (HDRS)** [25]. This is an observer rated scale for rating the severity of depression in subjects already diagnosed with depression. In the 17-item version, eight items are defined from 0 to 2 and 9 items are defined from 0 to 4. Scores are: 0-7=no depression, 8-14=minor depression,  $\geq$  15=moderate to severe depression.

**Biochemical Measurement:** Fasting blood sugar results were classified in accordance with the American Diabetes Association classification. When the fasting blood sugar level was 90-130 mg/dl, it was considered good glycaemic control and values outside this range was considered poor glycaemic control.

### 2.5 Statistical Analysis

Continuous variables were expressed as means and standard deviation, and categorical data were expressed as frequencies for both socio-demographic and clinical characteristics of the participants. Relevant inferential statistic such as t-test and chi-square was used to determine the relationship between outcome variables (erectile dysfunction, depression) and independent variables. Significant variables related to erectile dysfunction were entered into a Binary regression analysis model to determine predictors of erectile dysfunction. Data was analyzed using SPSS software version 18. Significance was determined at  $p < 0.05$ .

## 3. RESULT S

The mean age of the participants was  $62.78 \pm 14.1$  years. The majority of the participants (62.1%) were older than 55 years. 68.0% of the subjects were married and more than half of them (63.1%) had secondary education. The mean duration of diabetes mellitus was  $8.92 \pm 6.3$  years. The mean duration of erectile dysfunction was  $5.64 \pm 5.7$  years. Medication adherence was 72.5%.

### 3.1 Sexual Dysfunction, Demographics and Related Factors

The prevalence of erectile dysfunction was 71.8%. Of these, 44.5% reported severe ED, 14.9% reported moderate ED, 12.4 reported mild

ED, and 28.2% reported no erectile problems. Respondents' characteristics according to the reported ED frequency are shown in Table 2.

Prevalence of ED in our sample was significantly associated with the length of time with diabetes ( $\chi^2=4.26, P=.01$ ) and poor glycaemic control status of study participants ( $\chi^2=5.16, P=.02$ ) and increasing age of participants ( $\chi^2=5.06, P=.02$ ). Years of education, perceived family support and presence of co-morbid hypertension were not significant factors for the development of erectile dysfunction in our sample. Also, the high cost of medication and medication adherence status were not factors related to the development of erectile dysfunction among participants. Predictors of erectile dysfunction were increasing time with diabetes (*OR* 2.34, *P*=.05), poor glycaemic control status (*OR* 3.49, *P*=.04) and increasing age of participants (*OR*=2.45, *P*=.04).

Erectile dysfunction had significant links to depression as there was statistically significant difference in the prevalence of depression

between those with and those without ED ( $\chi^2=9.26, P=.002$ ).

### 3.2 Depression and Associated Factors

The point prevalence of depression among the study participants was 50.2%. Of these, 45.3%, 21.4% and 33.3% has mild, moderate and severe depression respectively. The mean score of depression was 24.52±8.2. None of the participants with depression had consulted with professionals or received mental health attention.

Participants with depression were more likely to be non-adherent to medication ( $t=4.08, p<0.001$ ) and were also more likely to have poor glycaemic control ( $t=-6.13, p<.001$ ). Also, participants with depression had longer duration of illness ( $t=4.08, p=.001$ ) and they were also more likely to have sexual difficulties compared to those without depression ( $t=-6.95, p<.001$ ). age ( $P=.5$ ), years of education ( $p=.6$ ) were not factors related to development of depression among study participants (Table 3).

**Table 1. Socio-demographic and clinical characteristics of respondents**

<b>Characteristics</b>	<b>Participants n(%)</b>
Mean Age	62.78±14.1
<b>Age in Years</b>	
≤55 years	64(62.1)
>55 years	39(37.9)
<b>Marital status</b>	
Single/widowed	33(21.2)
Married	70(68.0)
<b>Educational status</b>	
Primary	33(32.0)
Secondary	41(39.8)
Tertiary	29(28.2)
<b>Duration of illness</b>	
≤8 years	74(71.8)
>8 years	29(28.2)
<b>Perception of social support</b>	
Good	62(60.0)
Poor	41(40.0)
<b>Erectile dysfunction</b>	
Yes	74(71.8)
No	29(28.2)
<b>Mean duration with Erectile dysfunction</b>	5.64±5.7
<b>Adherence to treatment</b>	
Adherent	75(72.5)
Non adherent	28(27.5)
<b>Cost of medication</b>	
≤\$1 per day	59(57.3)
>\$1 per day	44(42.7)
<b>Depression</b>	
Yes	71(68.6)
No	32(31.4)

**Table 2. Association between socio-demographic, clinical variables and erectile dysfunction**

<b>Variables</b>	<b>With sexual dysfunction (n%)</b>	<b>Without sexual dysfunction (n%)</b>	<b>Statistics (x<sup>2</sup>)</b>	<b>P-value</b>
<b>Age</b>				
≤55years	41(64.1)	33(84.6)	5.06	<b>.02</b>
>55years	23(35.9)	6(15.4)		
<b>Marital status</b>				
Married	48(68.6)	26(78.8)	1.16	.28
Unmarried/widowed	22(31.4)	7(21.2)		
<b>Education level</b>				
≤12years	46(70.8)	28(73.7)	0.10	.75
>12 year	19(29.2)	10(26.3)		
<b>Glyceamic status</b>				
Good	20(23.5)	9(50.0)	5.16	.02
Poor	65(76.5)	9(50.0)		
<b>Duration of illness</b>				
≤8years	52(66.7)	22(88.0)	4.26	.04
>8years	26(33.3)	3(12.0)		
<b>Cost of Medication</b>				
≤\$1 per day	38(65.5)	36(80.0)	2.6	.11
>\$1 per day	20(34.5)	9(20.0)		
<b>Treatment adherence</b>				
Adherent	41(69.5)	33(75.0)	0.39	.54
Non Adherent	18(30.5)	11(25.0)		
<b>Treatment supervision/Perceived Social support</b>				
Good	55(71.4)	19(73.1)	0.26	.87
Poor	22(28.6)	7(26.9)		
<b>Depression</b>				
Yes	37(60.7)	37(88.1)	9.26	.002
No	24(39.3)	5(11.9)		
<b>Co-morbid Hypertension</b>				
Yes	37(74.0)	37(69.8)	0.2	.64
No	13(26.0)	16(30.2)		

**Table 3. Participants' characteristics and average depression score**

<b>Characteristics</b>	<b>Mean(SD)</b>	<b>Statistics</b>	<b>p-value</b>
<b>Age</b>			
≤55 years	24.27±3.7	t=0.65	.5
>55 years	23.67±4.7		
<b>Education</b>			
≤12 years	21.09±7.5	t=-1.74	.08
>12 years	18.18±9.5		
<b>Duration of illness</b>			
≤8 years	18.06±7.79	t=-4.08	.001
>8 years	24.24±6.02		
<b>Erectile dysfunction</b>			
Yes	24.08±4.5	t=-6.95	<.001
No	18.28±3.9		
<b>Treatment adherence</b>			
Good	18.28±3.9	t=-5.92	.001
Poor	16.96±6.67		
	22.89±4.25		

#### 4. DISCUSSION

Erectile dysfunction has been described as an important public health issue by the National Institutes of Health (NIH) Consensus Panel [26] because of the number of persons and their families affected by the disorder and which has highlighted the need for more studies concerning the prevalence, causal factors, and consequences of this disorder. Erectile dysfunction is a highly prevalent health problem that is both under-diagnosed and undertreated that affects the quality of life of a large number of men suffering from type 2 diabetes mellitus.

In this study, the prevalence of erectile dysfunction was 71.8%. This prevalence implies that three in four male patients with diabetes in our sample have developed varying degrees of erectile dysfunction in the course of the illness. This prevalence rate is in agreement with previous studies [27-29] which have reported similar prevalence rates of erectile difficulties among male diabetics and in disagreement with studies which have reported much lower prevalence in males with type 2 diabetes [30,31]. These variations in the reported rates of erectile dysfunction in these studies may be due to differences in the sample size and methodology used in estimating prevalence, and peculiar characteristics of the study populations.

In this study, plausible reasons for the high prevalence of erectile problems in our sample may be related to the fact that being a tertiary reference centre, a high number of serious cases of type 2 diabetes are treated here compared to several peripheral primary and secondary treatment centres. Also, a higher proportion of participants are of the older age group in our sample and also poor glycaemic control, and the impact of long duration of time with diabetes may be contributing factors [27].

It was observed that in spite of the high prevalence of erectile problems and its associated psychological distress, a high proportion of respondents have not sought nor received any form of intervention, medical or otherwise for the erectile problems. Previous studies have reported that the reluctance of men with erectile dysfunction to seek medical attention may probably be related to ignorance, misinformation, and embarrassment [32]. This finding highlights the need for physicians and care givers to inquire regularly about sexual difficulties in male type 2 diabetics and to

address it through a multidisciplinary treatment approach during the course of giving care to these patients.

The links between various demographic variables and the risk of developing erectile dysfunction have been reported to be inconsistent in several previous studies. In this study, several demographic variables were not significant factors promoting the development of erectile dysfunction in male patients with type 2 diabetes mellitus. Increasing age of patients has often been cited as a more consistent demographic determinant of erectile dysfunction in male diabetics [29,33]. In our sample, age of participants was a statistical predictor of the risk of erectile dysfunction and therefore in agreement with studies which have reported such association [27,34].

The role of good glycaemic control in the prevention of long term complications of diabetes has been reported in several studies. In our sample, poor glycaemic control was significantly related to the risk of developing erectile dysfunction. This is in agreement with studies which have reported similar association [29,35,36]. Poor glycaemic control has been cited as the reason for many physical and mental complications experienced by persons with diabetes mellitus [37]. In the care persons with type 2 diabetes, it is important for care-givers to give attention to psychological problems that can markedly affect an individual's quality of life, functionality and compliance with treatment specifications.

The impact of time with diabetes in the development of erectile dysfunction is highlighted in this study. We found a significant association between duration of diabetes and the risk of developing erectile dysfunction. This is consistent with studies which have reported similar findings [27,34]. There is the need for good glycaemic control during the course of the illness to minimize the risk of both erectile dysfunction and depression in the long term [38].

Co-morbidity between erectile dysfunction and depression is reported high. Previous studies had reported that depression can occur secondary to sexual problems, and sexual problems can lead to depression [39,40]. The high prevalence of depressive symptoms in our sample was significantly related to the erectile difficulties experienced by participants and this is consistent with the study results of Kim GM, et al [10]. The

severity of depression can affect the effectiveness of diabetes control and poor glycaemic control can significantly increase the risk of developing sexual dysfunction, setting up a vicious circle that has the potential to worsen both mental and physical complications of diabetes. Other factors that promoted depression in our sample were poor glycaemic control and the length of time with diabetes [28].

## 5. CONCLUSION

This study showed the high prevalence of erectile dysfunction in male diabetics, especially among those with depression. Health care professionals dealing with male diabetic patients should explore possibility of erectile dysfunction in all male diabetic patients.

Findings suggest that depression and sexually related problems should be addressed when providing care for people diagnosed with type 2 diabetes.

## 6. LIMITATIONS

This study has some limitations. The cross-sectional nature of our study cannot confirm causality or a temporal relationship between different independent factors and outcome variables. Also, reliance on patient self report to estimate prevalence of erectile dysfunction without objective clinical confirmation is a weakness of the study.

## CONSENT AND ETHICAL APPROVAL

Approval for the study was obtained from the Research and Ethical Committee of the University of Uyo teaching Hospital (UUTH/AD/S/96/XX1/098). Informed consent was obtained from patients.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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