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Original article

Prevalence and Correlates of Depression among Persons with Type 2 Diabetes Mellitus in Uyo, South-South Nigeria

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ABSTRACT

Background: Diabetes mellitus (DM) is a chronic metabolic disease with various complications throughout its course. The presence of co-morbid depression is common among such patients and may affect their response to treatment. The objective of this study was to estimate the prevalence of depression in patients with type 2 diabetes and to determine the factors associated with the presence of depression. **Method**: A cross-sectional study conducted among outpatients who attended the diabetes clinic of the University of Uyo Teaching Hospital. A total of 106 type 2 Diabetes mellitus patients are included in this study. To diagnose Depressive Episode, the depressive module of The Mini International Neuropsychiatric Interview (MINI) English Version 5.0.0 was applied. All patients were evaluated with a semi-structured socio-demographic proforma to assess socio-demographic characteristics; Hamilton Rating Scale for Depression (HAM-D) was administered to study participants. **Result:** The point prevalence of depression among persons with type 2 diabetes was 30.8%. Among the depressed respondents, 45.3%, 21.4% and 33.3% had mild, moderate and severe depression respectively. Depression was more common among females (p=0.02), single/widowed (p=<0.001), subjects with poor social support or those with no supervision of treatment (p=<0.001) and those with poor adherence to medication (p=<0.001). Predictors of depression by multiple regression analysis were treatment non adherence (p=0.008), being single/widowed (p=<0.003) and high medication cost (p=0.004) **Conclusion:** There is a high prevalence of depression among persons with type 2 diabetes in a resource poor setting

KEYWORDS: Prevalence, Depression, Type 2 diabetes mellitus, Nigeria

INTRODUCTION

Diabetes mellitus is a chronic debilitating disease with a worldwide prevalence among adults (aged 20–79 years) estimated to be 6.4% in 2010 and projected to increase to 7.7% by 2030[1]. It is among many chronic medical conditions that are associated with co-morbid depression [2-4]. Studies have indicated that patients with diabetes are 1.5–2 times more likely to have depression compared with people without diabetes, with relative risk estimates ranging from 1.3 to 3.0 [5]. Worldwide, more than 365 million people are estimated to have type 2 diabetes mellitus, and almost 300 million people have major depression. Both these disorders are projected to be among the five leading causes of disease burden by 2030 [6].

Concerning causal relationship, the links between diabetes mellitus and depression seems to be bidirectional. The physiological abnormalities in depression, including activation of the hypothalamic-pituitary-adrenal axis, sympatho-adrenal system, and pro-inflammatory cytokines can contribute to the risk of diabetes. The elevated levels of stress hormones, such as, cortisol makes the cells resistant to insulin action resulting in insulin resistance and hyperglycaemia, while poor glycaemic control in diabetes influences the hypothalamic–pituitary adrenal (HPA) axis, activating the neurobiology of mood disorders that can result in depression [7,8].

Risk factors associated with the presence of depression in patients with diabetes include female gender, younger age, not having a spouse, poor social support, lower education, low socioeconomic status, poor adherence to diabetic medication, poor glycaemic control, presence of multiple diabetic complications, presence of medical co-morbidity, physical impairment and previous history of depression,

degree of social support. Psychological stress associated with receiving the diagnosis of diabetes [5,9-14].

Estimates of prevalence of depression vary widely, depending upon depression assessment tools (standardized interviews versus self-report questionnaires), depression classification etc. Varying prevalence of depression in diabetic patients has been reported worldwide. A study by Niraula K et al [15] in Nepal reported a 40.3 percent prevalence of depression among diabetes patients. Also, Lloyd CE et al [16] reported 28 percent of the diabetic patients having either moderate or severe levels of Depression or anxiety or both. Whittemore R et al [17] reported depressed mood in approximately 44 percent of the women patients in his study.

In Nigeria, studies of depression among diabetics have reported varying prevalence rates. A study conducted among outpatients in a secondary healthcare setting reported 31% prevalence [18]. Other studies in tertiary healthcare settings in Ibadan and Jos reported prevalence of 25.3% and 19.4% respectively [19,20].

Report show that 80% of people with type 2 diabetes reside in low and middle income countries (LMICs) [21]. Scanty literature exists on depression among diabetes in Nigeria. Most of the research on the subjects comes from the advanced industrialized nations. It is not known what factors may be more related to depression among diabetics in a resource poor setting like ours. This study was conducted to determine the prevalence of depression and associated factors among subjects with type 2 diabetes mellitus in a developing country setting.

MATERIALS AND METHODS

Location of the study

This study was conducted at University of Uyo Teaching Hospital from February to May, 2017 The hospital is located in Uyo, the capital city of Akwa Ibom State, Southern Nigeria. The hospital is a 500 bed capacity tertiary healthcare centre that offers tertiary healthcare. It receives referral from primary and secondary healthcare facilities in the state as well as from the neighboring states.

Participants

The study population consisted of one hundred and six patients with type 2 diabetes, aged 30 to 65 years, and was assessed consecutively at the Diabetes and Endocrinology unit of UUTH. Type 2 diabetes mellitus was diagnosed according to the American Diabetes Association (ADA) criteria [22]. All patients in the study had clinical and psychiatric evaluation. A subject is enrolled if he/she met the following inclusion criteria: a diagnosis of diabetes mellitus and had been on medications for at least one year prior to study entry, adults above the age of 30years, and who granted consent. Exclusion criteria included the presence of type 1 diabetes, gestational diabetes or secondary diabetes due to another disease.

Procedure

Approval for the study was obtained from the Research and Ethical Committee of the University of Uyo teaching Hospital. Informed consent was obtained from patients and their accompanying family members. The diagnosis of depression was made according to the tenth edition of the International Classification of Diseases and health-related disorders (ICD -10) criteria [23].

The Mini International Neuropsychiatric Interview (MINI) English Version 5.0.0 was further used to confirm the diagnosis of depression in the participants. The MINI was designed as a brief structured interview for the major Axis 1 diagnosis in the Diagnostic and Statistical Manual (DSM-IV) and ICD-10 [24].

A socio-demographic questionnaire designed by the authors was used to obtain information. Measures evaluated includes socio-demographic details (age of the patient, gender, educational status, marital status, religion, monthly cost of medication, place of residence, occupation, duration of illness and medication related variables like number of tablets taken per day, monthly cost of medication etc. Information on supervision of treatment by relatives was obtained as a proxy measure of the quality of social support.

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. This instrument has been used in a previous Nigerian study [26].

Adherence to medication in the one week prior to study entry was assessed. Non-adherence to medication in this study was defined as taking less than 80% of the prescribed medication [27]. They were asked to recall medication compliance on day by day bases over a period of one week. A review of patient's medical records yielded information on the doses actually prescribed.

This information yielded recent percentage of medication adherence. All the above questionnaires used in this study were translated into Ibibio language separately by two bilingual translators. The two versions were combined and revised and then back translated into English by another bilingual translator.

Statistical Analysis

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

RESULTS

The mean age of the participants was 60.58±12.2 years and more than half of them were females (51.0%). The majority of the participants (87.5%) were older than 40 years. 76% of the subjects were married and more than half of them 73(70.2%) had secondary education. The mean duration with diabetes mellitus was 8.92±6.3 years. 60.6% of participants lived in an urban setting.

All the study participants lived with someone in the same house/ home environment while those who had some form of active supervision during medication intake/treatment constituted 67.0% of the subjects. 57.7% of them were taking 5 tablets or less per day. About 75.0% of participants were adherence to medication (table 1).

Table 1: Socio-demographic and clinical characteristics of respondents

Characteristics	Participants n(%)
Mean Age	60.58±12.2
Age in Years	
≤40 years	13(12.5)
>40 years	91(87.5)
Sex	
Male	51(49.0)
Female	53(51.0)
Marital status	
Single/widowed	25(24.0)
Married	79(76.0)
Educational status	
Primary	39(37.5)
Secondary	34(32.7)
Tertiary	31(29.8)
Residence	
Urban	63(60.6)
Rural	41(39.4)
Treatment cost borne by	
Self	54(51.9)
Assisted by others	50(48.1)
Living arrangement	
With someone	104(100)
Treatment supervision	
Supervised	81(65.9)
Not supervised	23(34.1)
Duration of illness	
≤10 years	75(72.1)
>10 years	29(27.9)
Tablets taken per day	
≤5 tablets per day	60(57.7)
>5 tablets per day	44(42.3)
Cost of medication	
≤$1 per day	55(51.9)
>$1 per day	51(48.1)
Depression	
Yes	32(30.8)
No	72(69.2)
Adherence to treatment	
Adherent	78(75.5)
Non adherent	26(25.0)

Prevalence of depression

The point prevalence of depression among the study participants was 30.8%. Of these, 45.3%, 21.4% and 33.3% has mild, moderate and severe depression respectively. Out of 30.8% who had depression, none were aware about depression as a co-morbid illness and none had consulted or received mental health attention.

Factors associated with depression

The characteristics of individuals with diabetes by depression status are compared. Among individuals with diabetes those with major depression were more likely to be women (x^2=5.23, p-value=0.02), unmarried (x^2=29.77, p-value=<0.001), less likely to have active treatment supervision (x^2=17.30, p=value=<0.001). They were also less likely to be adherent to medication (x^2=17.30, p=value=<0.001) and they were more likely to be having greater financial constraints in terms of medication affordability (x^2=9.67,p-value 0.002) (table 2).

Table 2: Association between socio-demographic, clinical variables and depression

Variables	Positive(n%)	Negative(n%)	Statistics(x^2)	p-value
Age				
≤40years	5(33.3)	10(66.7)	1.56	0.21
>40 years	17(19.1)	72(80.9)		
Sex				
Male	5(10.9)	41(89.1)	5.23	**0.02**
Female	17(29.3)	41(70.7		
Marital status				
Married	7(8.9)	72(91.1)	29.77	**<0.001**
Unmarried/widowed	15(60.0)	10(40.0)		
Education level				
≤12years	17(23.3)	56(91.1)	0.67	0.41
>12 year	5(16.1)	26(83.9)		
Residential Area				
Urban	13(20.6)	50(79.4)	0.03	0.87
Rural	9(22.0)	32(78.0)		
Duration of illness				
≤10years	15(20.0)	60(80.0)	0.21	0.64
>10years	7(24.1)	22(75.9)		
Cost of Medication				
≤$1 per day	13(23.6)	42(76.4)	9.67	**0.002**
>$1 per day	27(52.9)	24(47.1)		
Treatment adherence				
Adherent	9(41.5)	69(88.5)	17.30	**<0.001**
Non Adherent	13(50.0)	13(50.0)		
Treatment supervision/ Social support				
Good	6(9.0)	61(91.0)	16.80	**<0.001**
Poor	16(43.2)	21(56.8)		
Treatment cost borne by	9(16.7)	45(83.3)	1.36	0.24
Self	13(26.0)	37(74.0)		
Others				
Co-morbid Hypertension	16(21.1)	56(78.9)	0.01	0.09
Yes	7(21.2)	26(78.8)		
No				

Our study did not find a relationship between depression and age, rural urban residency, level of education, presence of co-morbid hypertension and duration of illness. Multivariate analysis results indicated that depression was independently predicted by being unmarried, absence of active continuing supervision of treatment, poor treatment compliance and high cost of medication. (table 3).

Table 3: The predictors of depression by multiple regression analysis

Variables	Odds ratio	95% C.I Lower upper	p-value
Gender	1.62	0.71 3.72	0.25
Marital status	3.78	1.57 9.08	**0.003**
Supervised treatment/ Social support	1.87	0.39 9.02	0.44
Treatment Adherence	3.71	1.41 9.71	**0.008**
Medication cost	4.63	1.64 13.07	**0.004**

DISCUSSION

This study has highlighted a common psychological complication in patient with diabetes mellitus, often unrecognized but which may have profound implication for treatment outcomes. The point prevalence of depression among participants in this study was 30%. This figure is higher than the 25.3% prevalence of depression among diabetics at the University College Hospital, Ibadan [19], and the 19.4% 1-year prevalence reported by Agbir et al in Jos Nigeria [20]. Worldwide, the prevalence rate of depression in the present study is in agreement with several studies [12,14,27] which have reported similar prevalence. The wide variations in reported prevalence rates may be a reflection of differences in study design and methods of detecting depression either by patient's self report or by diagnostic interview [5].

The high prevalence rate of depression in the present study may also be due in part to the fact that the out-patient departments of this tertiary healthcare centre cater for referred cases of severe diabetes. Also, a good proportion of the sample, 27.9 % of the subjects in the present study has more than 10 years duration of diabetes, representing long duration of illness which has been reported as an independent risk factor for depression [28]. Furthermore, the criteria used for diagnosis of depression in this study captured the mild, moderate and severe cases of the disease. The implication of this high prevalence rate of co-mobid depression is the compelling imperative for routine assessment of all diabetic patients for depression as recommended by the American diabetic association [29].

The role of psychosocial factors in the etiology of depression in individuals with diabetes has long been recognized. In the present study, we found a significant association between the gender of the subjects and the tendency for depression. The female subjects were three times more likely to be depressed than the male subjects. This is in agreement with previous studies [9,28,30] which reported similar finding and at variance with other studies that did not find such association [10,14]. Plausible explanation for this may in part be attributed to gender-specific conditions like menstrual cycle changes, pregnancy, miscarriage, postpartum, premenopausal, and menopausal changes [20].

The role of a supportive marital union in reducing the risk of developing depression in diabetes was supported in this study. We observed a significant association between being unmarried or single and the risk of depression in diabetes. This is in agreement with previous studies [14,30] which had reported similar findings and at variance with others [10,31] which did not report such association. The link of marital status to the risk of depression may be related to the fact that major part of the care for this disease is done at home and inside the family [32]. In this study, all the participants reported that they reside with members of their family. According to the study by Fleeson-Kreig, the more the support received from spouse and other family members, the more serious the patient would be in terms of adherence to medication and self-care activities [33].

We found a significant statistical association between treatment supervision and the risk of developing depression. This observation may be due to the fact that a high level of social support afforded by family members, friends and other caregivers may lead to a therapeutic chain of events that reinforce medication usage and reduction in the risk of depression. Poor glycemic control has indeed been associated with development of diabetic complications and these complications are probably a more direct cause of depressive mood in patients [34-36]. Depression in the diabetics may lead to fatigue and poor compliance with treatment prescriptions resulting in poor glyceamic control and a worsening of treatment outcomes.

Regarding socioeconomic factors, there was significant association found between variables relating to financial constraints and the risk of developing depression. In terms of the cost of the medications, the higher the cost of the medication per day, the higher the rate of depression. Subjects whose medications cost more than $1 per day were significantly more likely to be depressed than those whose medication cost less than $1 per day. Previous studies [37,38] have reported similar association. This may in part be related to the fact that financial constraints might lead to poor treatment adherence and poor glycaemic control which is a known risk factors for depression.

Also, a large proportion of the participants in this study (80.5%) are from a low socioeconomic background comprising retired workers, farmers and the unemployed. This economic placement implies that limited financial resources are available to fund Medicare. In Nigeria, the setting in which this study was conducted has one of the highest poverty rates in the world with over 70% of the inhabitants living below the $1 per day benchmark (National Bureau of Statistics, 2013 [39]. United Nations Development Programme, 2013 [40]. Previous studies [33,41] had reported the negative impact of low socioeconomic status and treatment adherence and outcome among subjects with diabetes.

CONCLUSION

This study has shown that depression is common among out-patients with type 2 diabetes in a resource poor setting. There is the need to incorporate depression screening and treatment in the protocol for management of patients with type 2 diabetes.

Competing interest: The authors declare that they have no competing interests.

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