



Original Research

Sociodemographic Factors Associated with Depression Among Persons with Type 2 Diabetes Mellitus in The Family Medicine Clinic of a Tertiary Hospital in Southern Nigeria.

Comfort Oritseweyimi Imarhiagbe¹, *Christian Ibe Dickson¹, Titi Precious-Ibiye Owen¹, Modupeoluwa Omotunde Soroye², Ada Nkemagu Okocha¹, Paul Owajiony Dienne¹

¹ Department of Family Medicine, College of Medical Sciences, Rivers State University, Port Harcourt, Rivers State, Nigeria. ² Department of Periodontics, School of Dentistry, University of Port Harcourt, Rivers State, Nigeria.

Abstract

Background: Diabetes Mellitus (DM) is a chronic Non-Communicable Disease (NCD) with rising prevalence worldwide. DM increases the risk for depression as the prevalence of depression has been reported to be three times more in diabetics than in non-diabetics. Though depressive symptoms are more common in diabetes, they are not usually recognized and treated. Little is known about the predictors of depression in this group of people, especially among the Nigerian population. This study explored the sociodemographic factors associated with depression in patients with type 2 DM without prior psychiatric history.

Methodology: This was a cross-sectional study conducted among two hundred and sixty-four patients using structured questionnaires. Data were analyzed using the Statistical Package for Social Sciences version 20. Chi-square tests were performed to compare associations between categorical variables. A probability (p) value less than 0.05 was taken as statistically significant.

Results: Females [176 (66%)] were three times more than males [88 (33.3%)] respectively. The prevalence of depression was 49.2%. Level of education (p= 0.008), occupation (p= 0.014), and social class (p= 0.040) were significantly associated with depression among the respondents. Depression was higher among the older age group, females, and the widowed.

Conclusions: Females and older adults were more affected by depression. The predictors of depression were level of education, occupation, and social class. Thus, there is a need to screen those who have been diagnosed with T2DM for depression, especially females and older adult patients.

Keywords: Sociodemographic, Depression, Diabetes, Family Medicine

***Correspondence:** Dr. Dickson Christian Ibe Department of Family Medicine, Faculty of Clinical Sciences, College of Medical Sciences, Rivers State University, Port Harcourt, Rivers State, Nigeria. **Email:** Dickov82@Gmail.Com

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

How to cite this article: Imarhiagbe CO, Dickson CI, Owen TP, Soroye MO, Okocha AN, Dienne PO. Sociodemographic Factors Associated with Depression Among Persons with Type 2 Diabetes Mellitus in The Family Medicine Clinic of a Tertiary Hospital in Southern Nigeria. Niger Med J 2023; 63(4):545-555. Accepted: August 24, 2023. Published: September 21, 2023.

Quick Response Code:



Introduction

Diabetes mellitus is a major threat to human health. Like many other chronic medical conditions, it is complicated by emotional and psychological disorders, yet the psychological dimension of this condition is often overlooked when caring for those affected by the disease.^[1] Furthermore, improving the quality of life for adult diabetics requires knowledge and management of psychological disorders such as depression.

Depression is a common mental disorder characterized by sadness, loss of interest or pleasure, guilt or low self-worth, disturbed sleep and appetite, tiredness, and poor concentration which could be long-lasting or recurrent.^[2] It is a mood disorder ranked by the World Health Organization (WHO) as a leading cause of disability worldwide and a major contributor to the overall global burden of disease.^[3]

Studies worldwide have reported the prevalence of depression among Type 2 diabetes mellitus (T2DM) patients ranging from 11% to 60%.^{[4],[5]} In Nigeria, the prevalence of clinical depression was reported as 30% among those who have diabetes mellitus compared to 9.5% in the apparently healthy control groups.^[5]

The presence of depression in patients with diabetes mellitus is of vast importance, as it is usually associated with poor disease control, adverse health outcomes, and impairment of quality of life.^[6] A chronic disease like diabetes encourages co-morbidity with mood disorders. The depression rates in primary care patients are between 5% and 10%, whereas prevalence rates of depression in patients with diabetes have been estimated to be 12% to 18%.^[7] The more serious the disease is, the more probable it will be accompanied by mood symptoms of variable severity. Thus, the co-existence of depression among people with diabetes worsens the disease outcome.^[8] In developed countries, depression and diabetes are the 4th and 8th causes of Disability Adjusted Life Years (DALYs). Different literature reviews and meta-analyses conducted worldwide showed that depression is a common co-morbid condition among patients with diabetes, with Nouwen et al in the United Kingdom and Teshoma et al in Ethiopia reporting prevalence rates of 24% and 39-75% respectively.^{[9],[10]} A recent five-year prospective study examined factors associated with major depression at a five-year follow-up in approximately three thousand patients with diabetes.^[7] Baseline minor and major depression, the number of diabetes symptoms, among others, were independent predictors of major depression in this 5-year time point.^[7] Being a chronic medical condition, diabetes mellitus necessitates several adjustments in patient aspiration, lifestyle, and even employment, and adaptation is difficult and complex. Some patients grieve about their predicament before adjusting to it while others have protracted distress which may lead to psychiatric disorders most commonly, depression and anxiety.^[11] However, little is known about the sociodemographic factors associated with depression in diabetics, especially among the primary care population without previous psychiatric illness in the Nigerian population.^{[11],[12]}

In diabetic patients, depression has been linked with multiple factors, like female sex, younger age, not having a spouse, poor social support, and low socioeconomic status.^{[7],[13],[14]} Furthermore, being underweight or overweight has been found to influence the development of depression, with high Body Mass Index, poor glycaemic control, diabetic complications, and lower educational level being risk factors for depression in diabetics.^[11] The present study assessed the magnitude of depression and its potential sociodemographic associations among type 2 diabetes mellitus patients without prior psychiatric history attending the family medicine clinic at Rivers State University Teaching Hospital. The results are expected to provide more precise measures of the prevalence of depression in Type 2 diabetics in primary family medicine settings and help identify the risk factors for depression in these patients.

Materials and Methods

This cross-sectional study was conducted at the Family Medicine Clinic of the Rivers State University Teaching Hospital, Port Harcourt. The hospital serves as a referral centre for most peripheral hospitals and health centres in the state.

Using a 19.4% prevalence of depression from a study done at a tertiary health institution in Jos, North Central Nigeria, a minimum sample size of 264 was obtained using the formula for cross-sectional studies.^[15] Two hundred and sixty-four patients who met the inclusion criteria were recruited by systematic random sampling technique, within a period of two and half months using structured questionnaires. Patients living with Type 2 DM, diagnosed using the criteria laid down by the American Diabetes Association, and attending the family medicine clinic, were evaluated for depression using the Patient Health Questionnaire 9 (PHQ- 9).^[16] Anthropometric and blood pressure measurements of participants were measured using a sphygmomanometer, weighing scale, stethoscope, and stadiometer. The sociodemographic characteristics of the participants such as age, sex, occupation, level of education, and socioeconomic class were recorded in a specially designed questionnaire. Glycaemic control was assessed in the laboratory using a standardized validated assay in the absence of factors that can affect the accuracy of the HbA1c.^[17]

Inclusion criteria

All consenting adult patients (aged above 18 years), with type 2 diabetes mellitus, who had been on treatment for diabetes for a minimum of three months.

Exclusion criteria

Patients who were seriously/critically ill or had a history of previous psychiatric history were excluded from the study.

Ethical permission

Ethical approval for this study was obtained from the Ethical Committee of Rivers State Hospital Management Board. Informed written consent was obtained from each study participant before recruitment.

Data collection procedure

On each study day, type 2 diabetic patients who met the study criteria were approached and the study procedure was explained to them. Those that gave consent for the study were enrolled in the study. For each study participant, the researcher and research assistant administered the questionnaire. The researcher collected the blood samples and carried out the anthropometric measurements. The assays for glucose levels were analysed and the results were cross-checked by a consultant pathologist in RSUTH

Statistical analysis

The results were coded and entered into an Excel worksheet and subsequently transferred into Statistical Package for the Social Sciences (SPSS) Version 20 and cleaned. Frequency tables and charts were constructed for the presentation of the results. Means and standard deviation were calculated for continuous variables and categorical variables were expressed in counts and percentages. Chi-square tests were carried out to compare the degree of association between categorical variables. Statistical significance was set at a 95% confidence interval ($p < 0.05$).

Results

Two hundred and sixty-four respondents were involved in the study with a 100% response rate. The sociodemographic profile of diabetic patients is shown in Table 1. The mean age of respondents was 58.5 ± 11.4 . The most frequent age group was 60-69 years accounting for 34.8%. Most of the respondents

were females (66.7%). The majority (68.6%) were married. The Igbos constituted the most frequent ethnic group (20.5%), followed by the Ijaws (18.9%). Christianity constituted the commonest religion accounting for 99.6%. Just over one-third (34.5%) had secondary education, followed by primary education (21.6%), tertiary-non-university (19.3%), university (15.2%), and no formal education (9.5%). Over half (56.4%) of the respondents were in the middle socioeconomic class, with 35.6% and 8.0% in the low and high socioeconomic class respectively.

The prevalence of depression regarding age and gender is described in Table 2. The prevalence of depression was found to be 44.3% in males and 51.7% in female patients. Among those between the age group of 60–69 and ≥70 years, the prevalence of depression was found to be 52.2% and 54.3% respectively.

From the PHQ-9 tool used to evaluate for depression among the study participants, it was observed that 130 (49.2%) of them had depression as shown in Figure 1.

Table 3 describes the association of depression with the sociodemographic and economic characteristics of the respondents. Level of education ($P = 0.008$), occupation ($P = 0.014$), and social class ($p = 0.040$) were found to be associated with depression among T2DM patients. There was a trend of decreasing depression rates as the level of education increased. Depression was most prevalent among respondents with no formal education [17 (68.0%)] and least among respondents with university education [11 (27.3%)]. There was a statistically significant association between depression and level of education ($p = 0.008$). For occupation, the highest rate of depression was among the skilled artisans (55.7%), the professionals had a depression rate of 32.8% while the lowest rate was among the unemployed (30.0%). There was a statistically significant association between depression and occupation ($p = 0.014$). Also, respondents in the low social class had the highest prevalence of depression (57%) compared to those in the middle (47.0%) and high (28.6%) social class. There was a statistically significant association between social class and depression ($p = 0.040$).

Table 1: Sociodemographic/Economic Characteristics of Respondents (n=264)

Variable	Frequency (n = 264)	Percentage
Age (year)		
<40	15	5.7
40-49	41	15.5
50-59	70	26.5
60-69	92	34.9
≥70	46	17.4
Mean age	58.5 ± 11.4	
Sex		
Male	88	33.3
Female	176	66.7
Marital Status		
Single	17	6.4
Married	181	68.6
Separated/Divorced	6	2.3

Widowed	60	22.7
Ethnicity		
Ikwerre	44	16.7
Ogoni	25	9.5
Ijaw	50	18.9
Igbo	54	20.5
Others *	91	34.4
Education		
No formal education	25	9.5
Primary education	57	21.6
Secondary	91	34.5
Tertiary non-University	51	19.3
Social class **		
High (I)	21	8.0
Middle (II-III)	149	56.4
Low (IV=V)	94	35.6

*Yoruba, Edo, Ibibio. ** Olusanya`s social class classification is from I-V with I as the highest and V as the lowest

Table 2: Gender and age group distribution of depression among respondents

Variable	Depressed		Total n = 264
	Yes n = 130	No n = 134	
Age (year)			
<40	5 (33.3)	10 (66.7)	15
40-49	18 (43.9)	23 (56.1)	41
50-59	34 (48.6)	36 (51.4)	70
60-69	48 (52.2)	44 (47.8)	92
≥70	25 (54.3)	21 (45.7)	46
Sex			
Male	39 (44.3)	49 (55.7)	88
Female	91 (51.7)	85 (48.3)	176

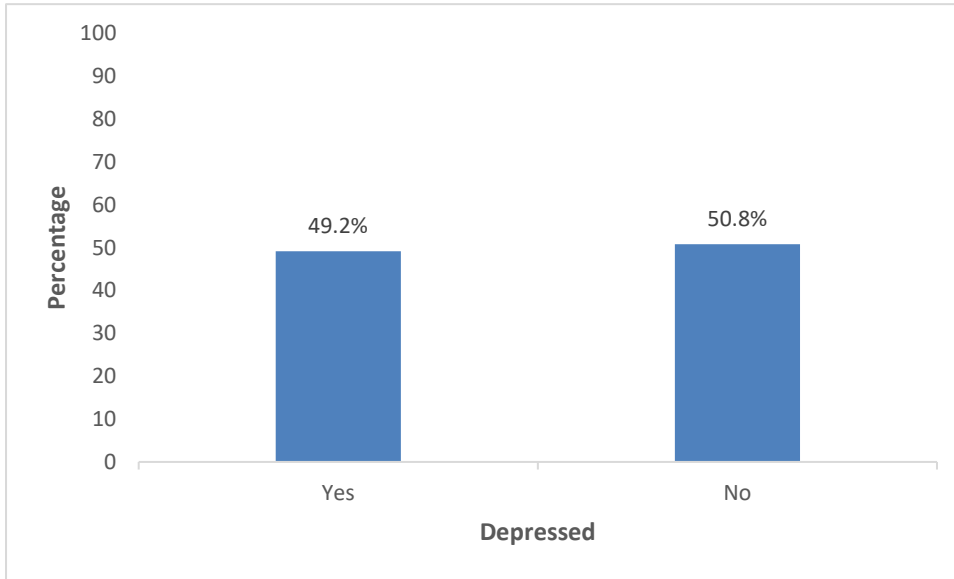


Figure 1: Prevalence of depression according to PHQ-9 among the respondents

Table 3: Associations Between Sociodemographic/Economic Characteristics and Depression

Variable	Depressed			χ^2	Df	p-value
	Yes n = 130	No n = 134	Total n = 264			
Age (years)						
<40	5 (33.3)	10 (66.7)	15	2.795	4	0.593
40-49	18 (43.9)	23 (56.1)	41			
50-59	34 (48.6)	36 (51.4)	70			
60-69	48 (52.2)	44 (47.8)	92			
≥70	25 (54.3)	21 (45.7)	46			
Sex						
Male	39 (44.3)	49 (55.7)	88	1.281	1	0.258
Female	91 (51.7)	85 (48.3)	176			
Marital status						
Single	6 (35.3)	11 (64.7)	17	2.349	3	0.503
Married	90 (49.7)	91 (50.3)	181			
Separated/Divorced	2 (33.3)	4 (66.7)	6			
Widowed	32 (53.3)	28 (46.7)	60			
Ethnicity						
Ikwerre	20 (45.5)	24 (54.5)	44	0.836	4	0.934
Ogoni	12 (48.0)	13 (52.0)	25			
Ijaw	23 (46.0)	27 (54.0)	50			
Igbo	28 (51.9)	26 (48.1)	54			
Others	47 (51.6)	44 (48.4)	91			
Religion						
Christianity	130 (49.4)	133 (50.6)	263	0.974	1	0.324
Islam	0 (0)	1 (100)	1			

Education						
No formal	17 (68.0)	8 (32.0)	25	13.763	4	0.008*
Primary	33 (57.9)	24 (42.1)	57			
Secondary	47 (51.6)	44 (48.4)	91			
Tertiary (non-university)	22 (43.1)	29 (56.9)	51			
University	11 (27.5)	29 (72.5)	40			
Occupation						
Unemployed	3 (30.0)	7 (70.0)	10	10.569	3	0.014*
Retired	25 (53.2)	22 (46.8)	47			
Skilled artisans	83 (55.7)	66 (44.3)	149			
Professional	19 (32.8)	39 (67.2)	58			
Social class						
High	6 (28.6)	15 (71.4)	21	6.427	2	0.040*
Middle	70 (47.0)	79 (53.0)	149			
Low	54 (57.4)	40 (42.6)	94			

* Statistically significant

† Fisher exact p

Discussion

The present study was conducted to ascertain the prevalence of depression among type 2 diabetes mellitus patients without prior psychiatric history and to identify the sociodemographic factors associated with it. In this study, the prevalence of depression was 49.2% among the respondents. This finding was similar to the report of El-Mahalli et al in a cross-sectional study done in Saudi Arabia, using the Centre for Epidemiological Studies Depression Scale (CES-S).^[18] They reported a depression prevalence of 49.6% among diabetics.^[18] The similarity of their finding with the 49.2% prevalence of depression in the index study could be due to the fact that both studies had similar populations, study sites, and study design (cross-sectional study design). In some other studies, a higher prevalence has been reported.^{[10], [19], [20]} For instance, Teshome, in a systematic review and meta-analysis in Ethiopia found a pooled prevalence of depression among diabetics to be 52.9%,^[10] while Ofori et al in Port Harcourt South-South Nigeria found a 54.9% prevalence of depression for patients with diabetes and/or hypertension.^[19] This similarity could be due to the fact that their study had a similar chronic disease and the use of the same PHQ-9 tool for assessing depression and prevailing environmental factors with the index study.^[19] Also, Hall et al in Cameroon found a higher prevalence of depression (60%) among diabetic patients and concluded that a large percentage of the diabetic population may be experiencing depressive symptoms for which they are currently not receiving treatment or support.^[20] These studies indicate the huge burden of depression among diabetic patients.

Conversely, the depression prevalence found in the index study was much higher than the findings by James et al in a comparative hospital-based study in a tertiary institution in Benin City, Southern Nigeria.^[5] They reported a 30% prevalence of depression among diabetic patients and a significantly lower 9.5% ($p < 0.001$) in the control group. In that study, they used the depression module, Schedule for Clinical Assessment in Neuropsychiatry (SCAN) to diagnose depression, and the Beck Depression Inventory (BDI) to measure depression and its severity. On the BDI score, 39.5% of the diabetic patients met the depression criteria compared with 13.5% among the control group.^[5] Their findings although as the index study, supported the fact that depression rates were higher among diabetic patients than in the general population, they however found a prevalence lower than the index study. The lower prevalence could be due to the difference in assessment tools used as well as the difference in study designs. Similarly, Agbir et al in a cross-sectional descriptive study among patients in a tertiary hospital in Northern Nigeria reported a prevalence of 19.4%.^[12] In that study, the depressive module used was the Structured Clinical Interview for DSM and Axis Disorder (SCID). Subsequently, Hamilton Depression Rating Scale (HDRS) was used to determine the severity of symptoms among respondents diagnosed

with depression according to the DSM IV criteria. Agbir et al concluded that depression was common among diabetes mellitus subjects in their environment.^[12] The prevalence of 19.4% compared to other studies could be due to the fact that SCID is used for the diagnosis of major depression and cases of mild and moderate depression were not accounted for. Other international studies also reported a lower prevalence of depression among diabetics.^{[21],[22]} Wang et al reported a depression prevalence range of between 15-17% among diabetics in different out-patient specialties in Turkey.^[21] Meanwhile, in a systematic review by Rezia et al in South East Asia, a depression prevalence range of 14 – 41% was found among diabetics.^[22]

These findings have been irrespective of the urban or rural location as Dienne et al in a rural clinic-based study in Nigeria reported a higher prevalence of depression (61.54%) among participants with co-morbid physical illness than a 15.38% prevalence in those without physical illness while Adiari et al in a study in cosmopolitan Lagos found a 14.4% prevalence of depression among patients with a chronic illness as compared to 5.5% in the general population. ^{[23], [24], [25]}

The variations in prevalent figures of these studies and the index study could thus be attributed to demographic, biological, and socioeconomic heterogeneity as well as the difference in instruments used to assess depression in diabetic patients.^{[5],[12],[19]} The disparity in the prevalence rate of depression among diabetic patients could be due to different geographic locations, composition of the study population, presence/absence of co-morbidities as well as methodological differences.

In the current study, the depression rate was higher among the older age group (54.4%) and lowest among those with ages below 40 years. This is consistent with the report by Ofori et al in a cross-sectional study design done in Port Harcourt Nigeria, who found that ages younger than 60 years were associated with lesser depression.^[19] In the same vein, Onya et al in the same city also found a high prevalence of depression among older adult diabetics.^[27] Obadeji et al in South Western Nigeria and Salihu et al in North Western Nigeria also found a significant association between depression with increasing age.^{[25],[28]} They reported depression to be more in respondents aged 45 years and above with statistical significance of ($P = 0.005$, $X^2 = 7.95\%$) and ($P = 0.001$, $X^2 = 11.46$) respectively.^{[25],[28]}

This observation in the current study is also consistent with the report of Ganasageran et al in Malaysia, who worked among type two diabetics and reported that patients aged 50 years and older were more depressed when compared to those aged less than 50 years.^[26] A possible explanation for this could be that the older a person gets, the greater the likelihood of suffering from more age-related co-morbid conditions like diabetes, and disabilities which are associated with increased prevalence and morbidity of depressive illness.^[27] However, Agbir et al in Jos, North Central Nigeria using SCID for the diagnosis of depression and HDRS to determine the severity of the symptoms found no significant association between age and depression. In that study, the majority of the respondents were between 40 and 50 years and the association was not statistically significant ($P = 0.46$).^[12] Similarly, Berg et al in a study among diabetics comparing middle-aged (40- 47 years) and older adults (70-72 years) found that persons in their seventies with diabetes had little increased prevalence of depression while those in their forties with diabetes had a twice as high prevalence of depression relative to persons without diabetes in the respective age groups.^[29] These findings were in contrast to the observation in the current study.

More female respondents in the current study were depressed (51.7%) compared to male respondents (44.3%). This is similar to what was found in various studies.^{[18],[30]} In the study by Agbir et al depression was found to be significantly correlated with sex, with a female-to-male ratio of 3:1, and was also significantly associated with unmarried patients and those who had a poor relationship with their partners.^[12] This higher prevalence in women could have been influenced by the sociocultural role of women in our environment, including responsibilities at home and child care as well as physiologic cyclical hormonal changes in women and their social vulnerability.^[27] In contrast, Ganasegeran in

Malaysia found a higher prevalence of depression in males than females reporting 58.6% in males and 41.4% in females.^[26] The higher male prevalence in their study could be due to the sociocultural practice in that geographic area.

Respondents who were widows had a higher prevalence of depression. This could be because the study population was mainly in the aged stage of the family developmental cycle and one of the issues of this stage is spousal loss.

In this study, the highest prevalence of depression was found among respondents with no formal education. Similar findings have been reported by various studies.^{[1],[5]} Igwe et al reported in a similar study that no formal education was associated with depression.^[1] The study by James et al in Benin, Southern Nigeria also reported an association between a low level of education and depression.^[5] These findings could be because less educated people are more likely to have low socioeconomic status as they may earn less as they are likely to get poorly paid jobs. With low earning power, patients face the burden of maintaining lifestyle changes that could sustain the cost of medication adherence. Also, lack of education is a strong impediment to understanding the dynamics of chronic medical conditions and the complexities involved in good glycemic control for subjects with diabetes mellitus.^[1] Furthermore, these patients may not be able to source information for their health, thus ignorance and poor health-seeking behaviour could predispose them to depressive illness. Local studies report poor educational background as a strong risk for depression.^{[5],[27]}

With regards to occupation and social class in the index study, the highest rate of depression was among the skilled artisans (55.7%) and respondents with a low social class had the highest prevalence of depression (57%). There was a statistically significant association between depression and occupation ($p=0.014$), and depression and social class ($p=0.040$). This is similar to reports from various studies.^{[18],[30]} The high rate of depression among skilled artisans could be due to the current general economic downturn as skilled artisans depend on patronage from others to earn a living.^[31] Many had come to the metropolitan city believing there were business opportunities but the economic downturn has negatively affected this. In the index study, respondents in the low social class had the highest prevalence of depression (57%). This is consistent with the report by Leone et al who in a systematic mapping of evidence reported the occurrence of depression among diabetic patients to be associated with lower social class.^[32] This could be because diabetics in the low social class do not only have to contend with the burden of the physiologic chronic disease condition but also the financial and psychological stress of unavailable means to manage the condition. Additionally, it was also found in a study that patients with diabetes and depression have a higher frequency of cardiovascular risk factors.^[7]

The current study's findings indicate the importance of screening T2DM patients for depression, (predominantly female, older adult patients, and those of lower socioeconomic class) to prevent further complications and improve their quality of life.

Strength and limitations

It was a cross-sectional and hospital-based study limiting the ability to make causal inferences and extrapolate to the general community. As little is known about the predictors of depression in the Nigerian diabetic population, this study contributes essential data to depression as an emergent need of diabetic patients as well as serves as a reference for the need for larger population-based research on depression and its predictors in diabetic patients.

Conclusions

Findings revealed a high prevalence of depression among T2DM patients, and among these, females and older adult patients were more affected by depression. This study also concluded that patients' level of education, occupation, and socioeconomic status were also significantly associated with depression. Further large-scale research is required to explore the predictors of depression among type 2 DM patients. It is needed to screen patients of type 2 DM, especially females, older adults, and less educated patients, for depression, at regular intervals as per clinical demand. The occupation and socioeconomic status of these patients should also be considered as predictors for depression.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Igwe MN, Uwakwe P, Ahanoto CA, Onyeama GM, Bakare MO, Ndukuba AC. Factors associated with depression and suicide among patients with diabetes mellitus and hypertension in a Nigerian tertiary hospital. *Afr Health Sci.* 2013; **13**(1): 68 – 77.
2. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 5th Edition. Washington, DC: American Psychiatric Association; 2013.
3. World Health Organization. Depression-fact sheet. 2018. Available at:
4. <https://www.who.int/news-room/fact-sheets/detail/depression>. Accessed April 2018
5. Hussain S, Habib A, Singh A, Akhtar M, Najmi AK. Prevalence of depression among type 2 diabetes mellitus patients in India: A meta-analysis. *Psychiatry research.* 2018; **270**: 264-273.
6. James BO, Omoaregba JO, Eze G, Morakinyo O. Depression among patients with diabetes mellitus in Nigeria tertiary hospital. *S.Afr J Psychiatr.* 2010; **16** (2): 61 – 64.
7. Andreoulakis E, Hyphantis T, Kandylis D, Lakovides A. Depression in diabetes mellitus: a comprehensive review. *Hippocrates.* 2012; **16** (3) 205-214.
8. Katon WJ, Lin EH, Russo J, Von Korff M, Ciechanowski P, Simon G, et al. Cardiac risk factors in patients with diabetes mellitus and major depression. *J Gen Intern Med.* 2004; **19**: 1192–1199.
9. International Diabetes Federation. IDF Diabetes Atlas, 10th edition. Brussels, Belgium: 2021. Available at: <https://www.diabetesatlas.org>. Accessed April 2022
10. Nouwen A, Winkley K and Twist J. Type 2 diabetes mellitus as a risk factor for the onset of depression: a systematic review and meta-analysis. *Diabetologia* 2010; **53**(12): 2480-2486.
11. Teshome HM, Ayalew GD, Shiferaw FW, Leshargie CL and Boneya DJ. The prevalence of Depression among Diabetic patients in Ethiopia; A Systemic Review and Meta-Analysis 2018 *Depress Res Treat.* 2018; 2018. Available at <https://doi.org/10.1155/2018/6135460> Accessed June 2018
12. Naskar S, Victor R, Nath K. Depression in diabetes mellitus – A comprehensive systematic review of literature from an Indian perspective. *Asian J Psychiatr.* 2017; **27**: 85–100.
13. Agbir TM, Adebowale TO, Audu MD, Goar SG. Clinical correlates of depression among diabetics in Jos, Nigeria. *J Med Trop.* 2010; **12**: 37-41
14. Tol A, Baghbanian A, Mohebbi B, Shojaeizadeh D, Azam K, Shahmirzadi SE, et al. Empowerment assessment and influential factors among patients with type 2 diabetes. *J Diabetes MetabDisord.* 2013; **12**: 6.

15. Chowdhury SH, Karim MN, Selim S, Ahmed F, Azad AK, Maksud SA, et al. Risk of depression among Bangladeshi type 2 diabetic patients. *Diabetes MetabSyndr.*2017;**11**(2):1009–1012.
16. Araoye MO. Sample size calculation. Research methodology with statistics for health and social sciences. Ilorin: *Nathadex Publishers*; 2004:**115**-121.
17. Miller CD, Phillips LS, Tate MK, Porwoll JM, Rossman SD, Cronmiller N et al. Meeting American Diabetes Association guidelines in endocrinologist practice. *Diabetes Care.* 2000;**23**(4):444-448.
18. Gupta S, Jain U, Chauhan N. Laboratory diagnosis of HbA1c: a review. *J Nanomed Res.* 2017;**5**(4):00120.
19. El-Mahalli AA. Prevalence and predictors of depression among type 2 diabetes mellitus outpatients in Eastern Province, Saudi Arabia. *International Journal of Health Sciences*, 2015; **9**(2): 119-126
20. Ofori SN, Adiukwu FN. Screening for depressive symptoms among patients attending Specialist Medical Outpatient in a Tertiary Hospital in South Nigeria. *Psychiatry J.* 2018; 2016: **1**-6
21. Hall KK, Tambekou J, Penn L, Camara A, Balde MM, Sobngwi E. Association between depression, glycaemic control and the prevention diabetic retinopathy in a diabetic population in Cameroon. *S Afri J Psychiat.* 2017; **23**:1-7
22. Wang J, Wu X, Lai W, Long E, Zhang Y, Li W et al. Prevalence of depression and depressive symptoms among outpatients: a systematic review and meta-analysis. *BMJ Open.* 2017; **7**(8): e 017173. Doi: 10.1136/bmjopen.2017-017173
23. Rezia R, Islam A, Islam SMS, Depressive symptoms among participants with type 2 diabetes in South east Asia. A systematic review. *J Diabetol* 2018; **9**(1): 19-24
24. Dienye PO, Gbeneol PK, Akani AB. Association Between Giant Hydrocele and Depression in a Rural Clinic in Nigeria. *Am J Men Health.* 2011; **5** (5): 438-443
25. Adiari O, Cambell PC. Prevalence and severity of Depression among people living with HIV/AIDS in a Tertiary Hospital. *Nigeria Hospital Practice.* 2014; **14**(1-2):3-15
26. Obadeji A, Olowoin LO, Dada MU, Ajiboye AS, Kumolalo BF, Solomon OA. Assessment of depression in a primary care setting in Nigeria using the PHQ-9. *Family Practice.* 2015;**4**(1):10-34
27. Genasageren K, Renganathan P, Manf RA, Al-Dubai SAR. Factors associated with anxiety and depression among type 2 diabetes out patients in Malaysia; a descriptive cross sectional single centre study, *BMJ Open journal of Clinical Pathology.* 2014; **4**: 1-7
28. Onya ON, Stanley PC. Risk Factor for depressive illness among elderly GOPD Attendees at UPTH. *Int Res. J Medical Sci.* 2013; **1**(6): 1-9
29. Salihu AS, Udofia O. Prevalence and Associated Factors of Depression among general outpatients in a tertiary Institution in Kano North Western Nigeria. *O J Psych.* 2016;**6**(3): 228-236.
30. Berg LL, Ruse T, Knudsen KA. Depression in persons with by age and antidiabetic treatment; a cross sectional analysis with Data from Hondaland Health Survey. *PloS one* 2015
31. Ichibuzo FMUO. Influence of social support, age and religious commitment on depressive symptoms among cancer patients 2013. Available from [www.Unn.edu.ng>Rpositiry](http://www.Unn.edu.ng/Rpositiry) Accessed June 2017
32. Adofu I, Al Hassan A. Insecurity and economic development in Nigeria. *Journal of Economic and Sustainable Development.* 2018; **9**(18): 101-111
33. Leone T, Coast E, Narayanan S, Aikins A. Diabetes and Depression comorbidity and socio-economic status in low- and middle-income countries (LMICs): a mapping of evidence. *Global Health.* 2012; **8**:39