PREVALENCE AND PREDICTORS OF DEPRESSION AMONG ADULT MALE PATIENTS WITH TYPE 2 DIABETES MELLITUSATTENDING GENERAL OUTPATIENT CLINIC IN A TERTIARY HOSPITAL IN NORTHERN NIGERIA

Abstract :

Background: Diabetes is a chronic disease that occurs when the pancreas does not produce enough insulinor when the body cannot effectively use the insulin it produces. The majority of people with diabetes have type 2 diabetes (T2DM). According to the International Diabetes Federation "diabetes is one of the largest global health emergencies of the 21st century"The World Health Organization (WHO) ranked depression as the fourth most common disease in 2019. The connection between depression and type 2 diabetes was recognized as early as in the 17th century. Today, depression and type 2 diabetes have become a great global challenge.

Objectives: To determine the prevalence of depression among adult males with type 2 DM attending GOPC.using, Hamilton Depression Rating Scale (HDRS)

Study Design/ Setting: The study design was hospital- based cross-sectional descriptive study on adult male diabetic patients on follow up at the GOPC of FMC Keffi.

Methods: Systematic random sampling method was used to select participants into the study. A total of 209 participants were recruited into this study, after obtaining informed consent from them. . Data collected from the study participants included

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socio-demographic data, , depression was assessed using the Hamilton Depression Rating Scale (HDRS, Biochemical Measurement(fasting blood sugar) was taken using The glucometer kits- (ACCU-CHEK Active.**)**

Results: : The mean age and standard deviation of the study population (N=209) was 58.04 ±8.86; 40, 75 years(as minimum and maximum age values)with majority within 50-59 years(35.5%). a total of 101 (48.3%)of the study participants were identified by the Hamilton's depression rating scale to be depressed; while 108 (51.7%) had no depression.Among the participants, the risk of developing depression was significantly found with being divorced or unmarried (p = 0.001) and unemployment,poor glycaemic control, ingestion of alcohol, cigarette smoking, increase duration of diabetes and presence of erectile dysfunction.

Conclusion: Depression is a highly prevalent health problem that is both under-diagnosed and under treated and affects the quality of life of a large number of men with type 2 diabetes mellitus. . In this study, the prevalence of depression was 48.3%. There is need to screen all diabetics for depression at any clinic visit in view of the observed high prevalence

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Introduction

Diabetes is a chronic disease that occurs when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces[1]. Insulin is a hormone that regulates blood sugar. Hyperglycaemia, or raised blood sugar, is a common effect of uncontrolled diabetes and over time leads to serious damage to many of the body's systems, especially the nerves and blood vessels.According to the

International Diabetes Federation "diabetes is one of the largest global health emergencies of the 21st century".[2] Currently, an estimated 8%–9% adults worldwide have type 2 diabetes mellitus (T2DM), and a substantial increase in prevalence over time has been observed.[3]

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.[4] In Africa, the prevalence of DM will continue to rise, thus imposing an extra burden on the health care system[5]. The mortality and morbidity in patients with DM result from both the micro and macro-vascular complications.

The World Health Organization (WHO) ranked depression as the fourth most common disease in 2019, after lower respiratory tract infections, diarrheal diseases and perinatal infections[6]. Depression is currently estimated to affect 340 million people globally.[6] Depression is also a leading cause of disability, workplace absenteeism, decreased productivity and high suicide rates.[6] The connection between depression and type 2 diabetes was recognized as early as in the 17th century.[7] Today, depression and type 2 diabetes have become a great global challenge.[8] Several studies have shown that depression is associated with type 2 diabetes; however the direction of the relationship is unclear. In addition to depression being a consequence of type 2 diabetes, depression may also be a risk factor, or a triggering factor, for the onset of type 2 diabetes.[9] Thus there appears to be a bi-directional relationship between type 2 diabetes and depression. An Ethiopian study demonstrated that depression is a common health problem in type 2 diabetic out patients with a prevalence rate of 13%.[10] In Jamaica, Wilks et al found that diabetes mellitus was more prevalent among those with symptoms of depression.[11] A

Trinidad study reported a prevalence of 17.9% among subjects with type 2 diabetes.[12] In a study done in Nigeria, the prevalence of depression among T2DM was 30%[13] while in Bangladesh, a prevalence of 34% was reported.[14] It was reported by the World Health Study, that the prevalence of depression in diabetes was 2% in adults aged 18 years and above, in 60 different countries over the period of one year.[15]Previous studies[16]have reported that depression was significantly associated with a wide range of diabetes complications with an overall prevalence of depression in diabetes varying from 8.5% to 27.3%.[17]An Indian study reported the prevalence of depression to be 49% among subjects with diabetes in Trivandrum, India.[18]

In a study done by Jomboet al, in South-South Nigeria,45.3% of the study participants had mild depression,21.4% had moderate depression and 2.4% of the study participants had severe depression.[19]Abdisa et al. in Ethopia found out that 22% of the study participants had severe depression.[10]

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 consequently depression. As depression is a common complications of diabetes mellitus, it is important to screen for depression in patients with diabetes and associated complications because they are particularly vulnerable to further deterioration, hence the need for integrating depression with diabetic care by physicians during consultations.[19]

Some efforts have been made to assess the prevalence of Depression among type 2 diabetic patient in the southern part of Nigeria.[19] However, there is a dearth of study on the prevalence and predictors of Depression among type 2 diabetic patient in the Northern region of Nigeria.

In the Northern region of Nigeria with limited and deplorable healthcare services, the high level of poverty and ignorance in the region suggest that men with these problem may not have access to adequate care. It is hoped that the findings would increase awareness amongst men with Depression and also enhance positive attitude to care.

The objective of this study is to determine the prevalence and pattern of depression among adult males with type 2 DM attending GOPC using Hamilton Depression Rating Scale (HDRS)

As managers of resources, the findings from this study will enable Physicians not only detect and manage depression among diabetic patients, but also checkmate the heavy health care and economic costs associated with this problem

Methodology

The study design was hospital- based cross-sectional descriptive study on adult male diabetic patients on follow up at the GOPC of FMC Keffi.

3.2 Study area

The study was conducted at General out-patient Clinic, GOPC of the Federal Medical Centre Keffi. Federal Medical Centre Keffi, which is located in Keffi town, Keffi Local Government Area of Nasarawa State, North Central Nigeria.

3.3 Study population

The study population consisted of adult male participants with type 2 diabetes mellitus diagnosed in the past six months, aged 40 years and above attending the General outpatient Department of Federal Medical Centre Keffi, based on GOPD records.

3.4 Sample size

Sample size was estimated using the Cochrane's formula for cross sectional study.[20]

Sampling method All type 2 diabetic adult male patients attending the general out-patient clinic of Federal Medical Centre Keffi were approached to participate in the study.

Participant who gave informed consent and met the inclusion criteria were recruited into the study. A semi-structured, interviewer administered questionnaire was used to obtain socio-demographic information including age of the patient, gender, educational status, marital status, religion, occupation, duration of illness etc. Clinical characteristics such as weight, height and BMI were obtained with the help of two trained research assistants.

Systematic random sampling method was used to select participants into the study

Depression was assessed using the Hamilton Depression Rating Scale (HDRS [21] - Appendix 1& 2 English and Hausa versions respectively). 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, > 15=moderate to severe depression. It is a 21 items questionnaire: its scoring is based on the first 17. Nine items (items 1, 2, 3, 7, 8, 9, 10, 11, 15) are scored on a 5-point scale, ranging from 0 = not present to 4 = severe. Seven (items 4, 5, 6, 12, 13, 14, 17 are scored from 0 to 2 while the 16th item is scored from 0 to 3. The minimum score is 0 while the maximum score is 50. Score 0-7 = normal, 8-13= mild depression, 14-18 = moderate depression, 19-22 = severe depression ≥ 23= very severe depression. The participants who had severe and very severe depression were referred to the psychiatric clinic while those with mild and moderate depression were managed in GOPC. The reliability coefficient range of HDRS was 0.83-0.99[22]. Sensitivity and specificity were reported to be 86.4% and 92.2% respectively [22]. The Hamilton Depression rating scale has been validated in Nigerian populations and used in several Nigerian studies[22,23].

Statistical analysis

Data analysis was done using the statistical package for social science (SPSS) software version21.0[33] (Microsoft Chicago IL, United States). The data was expressed in frequencies, mean, standard deviation percentages, median and ranges and presented on tables and graphs as appropriate.

3.10 ETHICAL CONSIDERATIONS

Approval for the study was obtained from the ethical committee of the Federal Medical Centre, Keffi

Result

Out of the estimated 900 patients who came to GOPD within the 3 months recruitment period of the study a total of 209 study participants were recruited into the study through a systematic random sampling technique. None of the study participant was excluded from the study. Hence, all the 209 study participants had their data analysed.

The sociodemographic characteristics of the study population is shown in table 1.The mean age and standard deviation of the study population (N=209) was 58.04 ±8.86; 40, 75 years(as minimum and maximum age values)with majority within 50-59 years(35.5%).Majority (36.0%) of the study participants had tertiary education. Majority of the participants were married (95.2%), 2.9% were single and 1.9% divorced. Data on the occupational status of the study participants revealed that 90.9% of them were employed.

Table 1:Socio-demographic characteristics of the study participants

Variables	Frequency	Percentage (%)
Age		
40 – 49	40	19.1
50 – 59	70	33.5
60 – 69	67	32.1
70+	32	15.3
Mean ±SD; Min, Max	58.04 ±8.86; 40, 75	
Educational status		
No formal education	27	12.9
Primary	42	20.0
Secondary	65	31.1
Tertiary	75	36.0
Marital status		
Single	6	2.9
Divorced	4	1.9
Married	199	95.2
Occupation		
Employed	190	90.9
Unemployed	17	8.1
Retiree	2	1.0
Income (#)		
<20,000	12	5.7
20,000 – 49,000	33	15.8
50,000 – 99,000	77	36.9
100,000 & above	87	41.6
Religion		
Christianity	109	52.2
Islam	100	47.9

The clinical characteristics and social habits of the study participants are shown in table2 Out of the 209 study participants,90 of them (43.1 %) had good glycaemic control and 119 (56.9%) of the study participants had poor glycaemic control. Good glycaemic control is FBG of ≤ 7.0 mmol/L and poor glycaemic control is FBG of ≥7.0 mmol/L. The mean FBG of the study participants was 8.05 mmol/L ± 3,68.

A total of 6 (2.9%) of the participants were underweight (BMI < 18.5kg/m^2),while 50 (23.9%) had normal weight (BMI 18.5 – 24.9kg/m^2). Majority of the participants 99

(47.4%) were overweight (BMI 25 – 29.9kg/m^2), and54 (25.8%)had different forms of obesity (obesity class 1 – 2 and morbid obesity).

Fifty-two (24.9%) of the participants responded 'Yes' to the history of hypertension while 157 (75.1%) of the study participants responded 'No' to the history of hypertension. However, the mean systolic blood pressure of the study participants was 134 ±21 mmHg while the mean diastolic blood pressure was 88 ± 11mmHg among the study participants.

A total of 79 (37.8%) of the study participants reported taking alcohol and 139 (62.2%) reported not taking alcohol. The mean unit of alcohol ingestion was 8.9 ± 2. 2 units per day among the study participants who took alcohol.

A total of 161 (77.0%) of the study participants responded 'No' to history of cigarette smoking while 48 (23.0%) of study participants responded 'Yes' to the history of cigarette smoking. The mean sticks of cigarette smoked per day was 22.4 ± 9.2

Table 2: Clinical Characteristics and social habits of the study Participants

Characteristics	Frequency	Percentage (%)
Glycaemic control		
Good	90	43.1
Poor	119	56.9
	Mean (SD); Median, Max, Min	
Fasting Blood Sugar (mmol/l)	8.05 (3.68); 6.70,	20.30, 4.50.
BMI		
Underweight	6	2.9
Normal weight	50	23.9

Overweight	99	47.4
Obese	54	25.8
History of hypertension		
Yes	52	24.9
No	157	75.1
Alcohol use		
Yes	79	37.8
No	130	62.2
Smoking		
Yes	48	23.0
No	161	77.0
Perceived social support		
Yes	119	56.9
No	90	43.1

PATTERN OF DEPRESSION. the prevalence of depression in this study was 48.3%. Of these, 19.1% had mild depression, 15.3% had moderate depression and 13.9% of the study participants had severe depression. Majority of the participants who reported depression 67 (66.4%) had duration of depression between 6 – 10 years. None of the participants with depression had consulted with professionals or received mental health attention as at the time of the study.

Table 3: Pattern of Depression among the Participants

Variables	Frequency	Percentage (%)
Depression (101)		

Mild	40	19.1
Moderate	32	15.3
Severe	29	13.9
No depression	108	51.7
Duration of depression (yrs)		
≤ 5	18	17.8
6 - 10	67	66.4
≥ 10	16	15.8

ASSOCIATION BETWEEN DEPRESSION AND TYPE 2 DIABETES AMONG STUDY SUBJECTS

Among participants with type 2 diabetes, the risk of developing depression was significantly found with being divorced or unmarried (p = 0.001) and unemployment (p = 0.002).However, increasing age or perceived social support were not associated with developing depression among study participants (see table 4 for details)

Table 4: Association between socio-demographics variables and depression among study participants

Variables	Depression Yes (%)	Depression No (%)	Statistics (χ^2)	OR (95% CI)	P Value
Age (years)					
≤ 55	49 (48.5)	55 (50.9)	0.4	0.9 (0.53 –	0.73
>55	52 (51.5)	53 (49.1)		1.57)	
Marital status					
Married	36 (35.6)	74 (68.5)	22.6	0.3 (0.14 –	**0.001**
Unmarried/widowed	65 (64.4)	34 (31.5)		0.45)	
Religion					
Christian	52 (51.5)	57 (52.8)	0.04	0.9 (0.55 –	0.85
Islam	49 (48.5)	51 (47.2)		1.64)	
Educational status					
≤ 12 years	64 (63.4)	70 (64.8)	0.05	0.9 (0.53 –	0.83
> 12 years	37 (36.6)	38 (35.2)		1.66)	
Occupation					
Employed	83 (82.2)	107 (99.1)	18.0	0.02 (0.02 –	**0.002**[#]
Unemployed/retired	18 (17.8)	1 (0.9)		0.25)	
Monthly income					
≤ ₦50,000	29 (28.7)	29 (26.9)	0.1	1.1 (0.60 –	0.76
>₦50,000	72 (71.3)	79 (73.1)		2.02)	
Perceived social support					
Yes	64 53.8()	55 (63.1)	3.3	1.7 (0.96 –	0.07
No	37 (46.2)	53 (35.9)		2.91)	

4.9.1 Association between clinical characteristics and social habits with depression among study participants

Among the clinical parameters and social habits, it was found that poor glycaemic control, ingestion of alcohol, cigarette smoking, increase duration of diabetes and presence of erectile dysfunction were significantly associated with depression among the study participants (see table 5 below)

Table 5: Association between depression and type 2 diabetes among study participants

Clinical characteristics	Depression Yes (%)	Depression No (%)	Statistics (χ^2)	OR (95% CI)	P Value
BMI					
Obese	71 (70.3)	82 (75.9)	0.8	0.5 (0.40 –	0.36
Not obese	30 (29.7)	26 (24.1)		1.39)	
Glucose status					
Good control	23 (22.8)	67 (62.0)	32.8	0.2 (0.11 –	≤
Poor control	78 (77.2)	41 (38.0)		0.40)	**0.001**
Hypertension					
Yes	29 (28.7)	23 (21.3)	1.5	1.5 (0.79 –	0.22
No	72 (71.3)	85 (78.7)		2.82)	
Alcohol use					
Yes	47 (46.5)	32 (29.6)	2.1	1.0 (1.17 –	**0.01**
No	54 (53.5)	76 (70.4)		6.67)	
Cigarette smoking					
Yes	41 (40.6)	7 (6.5)	34.3	9.7 (4.26 –	≤
No	60 (59.4)	101 (93.5)		24.87)	**0.001**
Duration of diabetes	10 (9.9)	59 (50.9)	47.2	0.1 (0.04 –	<
≤ 5 years	91 (90.1)	49 (49.1)		1.19)	**0001**
> 5 years					
Cost of medications	43 (42.6)	28 (25.9)	3.4	1.7 (1.00 –	0.05
≤ $1 per day	58 (57.4)	80 (74.1)		3.07)	
> $1 per day					
Level of adherence					
Good adherence	69 (69.3)	79 (73.1)	0.6	0.8 (0.43 –	0.44
Poor adherence	32 (31.7)	29 (26.9)		1.44)	
Erectile dysfunction	87 (86.1)	58 (53,7)	25.8	5.3 (2.73 –	<
Yes	14 (13,9)	50 (46.3)		10.78)	**0.003**
No					

Discussion

A total of 101 study participants had depression giving a prevalence of(48.3%).Jombo et al found a prevalence of 68.6% among their study participants in South-South Nigeria[10]while Salinero-Fort et al in a Spanish study reported a prevalence of 20.03%.[3] Mohamed et al in Ethopia found a prevalence of 48.9%.[24]

A possible explanation for the differences in prevalence of these studies could be attributed to the different measurement or screening tools used to determine the presence of depression as well as the population where the studies were conducted, also this discrepancy might be due to the variation in socio-economic characteristics of the study subjects.

In the study by Jumbo et al, 45.3% of the study participants had mild depression,21.4% had moderate depression and 2.4% of the study participants had severe depression.[10]The slight difference in the findings might be attributed to differences in the study population and methodology. High figures could be attributed to failure to seek medical advice in order to treatDepression due to the social stigma or not considering Depression as a treatable condition.[10]

This study showed a statistically significant relationship between depression and marital status of respondents ($\chi 2 = 22.6$, $p = 0.001$). This is in agreement with studies carried out by Vas et. al. who found a significant relationship between depression and being unmarried revealing that being married is protective against depression by providing emotional stability as well as shared burden in coping with challenges.[2,]Being unmarried or divorce may lead to lack of family support, loneliness and stress of raising children alone. These factors could infact predispose

the individual to depression and in similar vein, being unmarried deprives the individual of emotional stability thereby making them prone to depression.

The high number of employment rate in this study did not militate against developing depression. This may be due to the fact that being employed may not relate to high economic status and prevent the development of type 2 DM. This finding is in congruence with the findings of Petrck et.[6]

In this study poor glucose control had a statistically significant relationship with depression, (χ^2 = 32.8, p< 0.001). Participants with high/uncontrolled blood glucose had more depression. Similarly, the relationship between depression and blood glucose level could be due to the effect of depression on diabetic subjects resulting in physical inactivity, obesity and non-compliance with medication that all contribute to insulin resistance leading to hyperglycemia.[2]

This study showed statistically significant association between depression and duration of illness ($\chi 2 = 47.2$; $p < 0.001$). Similarly, studies concur with our findings found that depression was associated with duration of illness from the date of diagnosis.[25] The increase in the duration of diabetes leads to increased risk of developing diabetic complications,which might increase the patient's health care expenditure for health care services. Both diabetes complications and cost might contribute to the development of depression in such patients. Karl et al, reported individuals with type 2 DM has poor, inadequate or inefficient coping skills of managing diabetes by the respondents

Interestingly, the risk of depression was linked with smoking cigarettes and ingesting alcohol. Our study found a significant relationship between alcohol and smoking. Similar findings have been reported by other studies.[25]

Conclusion:

The results of this study indicate that depression is a common conditions among men with type 2 diabetes in the primary care clinic setting in this environment. The prevalence increases with age as seen in this study.This studyaimed to determine the predictors of Depression among adult males with type 2 diabetes mellitus attending GOPC, FMC,and Keffi with the need to detecting and ameliorating their effects, including screening for depression in the usual care among these patients.

.The overall prevalence of erectile dysfunction in this study was 69.4% while the prevalence of depression was 48.3% .

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Limitations of the study:

The study was cross-sectional in nature and this limits the interpretation of the findings with regards to causality between some of the identified variables and the diagnosis of depression.

Recommendation

In view of the high prevalence of depressionin this study, mental health preventive and promotion programmes should be targeted at patients with type 2 diabetes mellitus.

It is hoped that findings from this study should make a case for screening for depression in diabetes patients during consultation using the screening tools in this study and integrating depression treatment with diabetes care in order to make the treatment more wholistic.

REFERENCES

1 Kim NH. Diabetes mellitus,still major threat to mortality from variour causes. DMJ 1 2o19 1:43(3):273

2 Vas A, Devi ES. Quality of Life of People with Type 2 Diabetes. IJPHRD. 2019 1;10(11).

3 Salinero-Fort MA, Gómez-Campelo P, el al . Prevalence of depression in patients with type 2 diabetes mellitus in Spain (the DIADEMA Study): results from the MADIABETES cohort. BMJ open. 2021;8(9):e020768.

4 Shaw JE, Sicree RA, et al. Global estimates of the prevalence of diabetes for 2010 and 2030. Diabetes Res Clin Pract. 2010;87:4–14. ed studies with 4·4 million participants. The Lancet 2021-12-19;387:1513–3

5 Choukem SP, Dimala CA, Mbanya JC et al. Diabetes Management in Africa 18. The Diabetes Textbook: Clinical Principles, Patient Management and Public Health Issues. 2021-12-19:273.

6 Petrak F, Röhrig B. Treatment of depression in type 2 diabetes. Depression and Type 2 Diabetes. 2018 ; 22.

7 Owens-Gary MD, Zhang X, Jawanda S, Bullard KM, Allweiss P, Smith BD. The importance of addressing depression and diabetes distress in adults with type 2 diabetes. J. Gen. Int. Med,. 2019 , 15;34(2):320-4.

8 Lee HJ, Jang J, Lee SA, Oh SS, Park EC. Association between the Type of Diabetes Treatment and Depressive Symptoms among Patients with Diabetes: A Cross-Sectional Study of Korea Community Health Surveys Data, 2011–2016. Int. J.Environ. Res. Public Health 2019;16(22):4441.

9 Compayo A. ZARADEMP Project. Depressive disorder and incident diabetes mellitus. The effect of characteristics of derepssion. Am J Pyschiatry. 2010;167:580-8.

10 Engidaw NA, Wubetu AD, Basha EA. Prevalence of depression and its associated factors among patients with diabetes mellitus at Tirunesh-Beijing general hospital, Addis Ababa, Ethiopia. BMC Public Health. 2020 ;20(1):1-7.

11 Morrissey-Ross M. *Living with Diabetes: Experiences from Jamaican Diabetes Clinics in Kingston and Morant Bay* (Doctoral dissertation, Walden University).

12 Sutherland ME. Palliative Care: Theory, Research, and Treatment in the English-speaking Caribbean Region. West Indian Med J. 2017 Jan 1;66(6):715.

13 James B, Morakinyo O, Eze G, et al. Depression and subjective quality of life among outpatients with diabetes mellitus at a teaching hospital in NIgeria. Ment Heal Fam Med 2019; 7:179–83.

14 Šabanović A, Maksimović N, Stojanović-Tasić M, Bakić M, Grgurević A. Factors associated with depression in the patients with diabetes mellitus type 2. Vojnosanitetski pregled. 2019;76(11):1178-83.

15 Petersen I, Rathod S, Kathree T, Selohilwe O, Bhana A. Risk correlates for physical-mental multimorbidities in South Africa: a cross-sectional study. Epid. psychiatric sci. 2019 ;28(4):418-26.

16 Wu CS, Hsu LY, Wang SH. Association of depression and diabetes complications and mortality: a population-based cohort study. Epid. Psychiatric Sci. 2020;29.

17 Wang H, Chen H, Gao Y, Wang S, Wang X, Tang X, Fang W, Shi X, Yao J, Chen Q. The effect of wuling capsule on depression in Type 2 diabetic patients. Bioscience Reports. 2020 28;40(2).

18 Bettegowda S, Kalegowda MB, Mallam SG, Ramalingaiah VH. Depression in type 2 diabetes mellitus patients: a cross sectional study from rural tertiary care hospital of South Karnataka, Ind. Intn J. Res, in Med. Sci. 2019 l;7(7):2599.

19 Jombo HE, Onung SI, Idung AU, Iyanam VE. Erectile Dysfunction and Depression in Males with Type 2 Diabetes Mellitus in a Tertiary Healthcare Facility in Uyo, South-South Nigeria. Asian J. Med. Princ. Clic. Prac. 2020 1:9-17.

20 Daniel WW, Cross CL. Biostatistics: a foundation for analysis in the health sciences. Wiley; 2018.

21 Kiernan MC. Jewels in the crown: a century of achievement for the Journal of Neurology, Neurosurgery & Psychiatry. Journal of Neurology, Neurosurgery & Psychiatry. 2020 1;91(1):1-2.

22 Ezema CI, Akusoba PC, Nweke MC, Uchewoke CU, Agono J, Usoro G. Influence of Post-Stroke Depression on Functional Independence in Activities of Daily Living. Ethp. J. health sciences. 2019;29(1

23 Tungchama FP, Obindo JT, Armiya'u AY, Maigari YT, Davou FJ, Goar SG, Piwuna CG, Umar MU, Sadiq SA, Agbir MT, Uwakwe R. Prevalence and sociodemographic correlates of postpartum depression among women attending Postnatal and/or Children's Welfare Clinics in a Tertiary Hospital, Jos, Nigeria. Sahel Med. J. 2018 1;21(1):23.

24 Ebrahim M, Tamiru D, Hawulte B, Misgana T. Prevalence and associated factors of depression among diabetic outpatients attending diabetic clinic at

public hospitals in Eastern Ethiopia: A cross-sectional study. SAGE open medicine. 2021 Dec;9:20503121211066244

25 Ochigbo EE, Puepet FH et al. Undiagnosed depression among adults with diabetes mellitus in Jos. Nigerian Journal of Clinical Practice. 2020 Oct 1;23(10):1431