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Original Article

Evaluation of the Relationship Between Glycaemic Control and Body Mass Index with Psychiatric Disorders at the University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria.

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Abstract

Background: Type 2 Diabetics are prone to several co-morbidities, including psychiatric disorders. However, maintenance of good glycaemic controls will likely culminate in better mental state status of majority of patents. **Aim**: To assess the relationship between glycaemic control and body mass index with psychiatric disorders at the University of Port Harcourt Teaching Hospital, Port Harcourt Nigeria. **Methodology**: A cross sectional hospital based study to evaluate the relationship between glycaemic control and body mass index at the University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria. By simple random sampling technique,328 respondents were selected for the study. They were subjected to oral interview using the General Health Questionnaire version 28(GHQ-28). Their body mass index (B.M.I) was calculated using the Hanson's weighing scale and a stadiometer. Blood glucose was analysed using venous blood sample. Collated data was analysed using the Statistical Package for Social Sciences (SPSS) version 17, IBM U.S.A. Chi-square test was employed for comparing differences in proportions. Results were presented in Frequency tables. **Results**: Majority of the respondents 36 (80%) with normal weight did not have psychiatric co-morbidity, however most of the obese respondents 93 (33%) had psychiatric disorder. CONCLUSION: There is significant association between mental disorders with glycaemic control and body mass index

Key Words: Evaluation, Relationship, Glycaemic control, Body Mass Index, Psychiatric disorders, Port Harcourt.

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Introduction

There is a rising prevalence of psychiatric comorbidities among types 2 diabetics, with well documented association between mental problems and poor glycaemic control, as well as raised body mass index[1,2] · Optimizing glycaemic control as well as maintenance of proper body mass index can slow down the development of psychiatric disorders in diabetics[3]. Gale et al[3], has observed a 60% reduction in developing diabetic complications over 9 years when the glycosylated haemoglobin is kept around 7% in type 1 diabetes mellitus. A systematic review and meta-analysis has shown that, overall, psychological interventions are effective in improving glycaemic control in type 2 diabetics.[4,5]

The aim of the research was basically to align glycaemic controls and body mass index with the development of psychiatric illnesses, especially depression, with the overall objective of educating care givers, especially family and primary health care physicians on the need to be on red alert, when managing patients with diabetes mellitus.

Methodology

Study Area: It was conducted at the diabetic clinic of University of Port Harcourt Teaching Hospital, Port Harcourt, South-South Nigeria. Port-Harcourt, originally known as "**Igwe Ocha"** is the capital of Rivers State. It was founded in 1912 by the British and was named after Lewis Viscount Harcourt, who was the then Secretary of State for the colonies[6].

Study Population: It comprised of type 2 diabetic patients who attended the diabetic clinic of the University of Port Harcourt Teaching Hospital over a three –months study period.

Study design: It was a cross-sectional hospital based study.

Sampling method: Simple random sampling method was used. The recruitment and patients selection were done carefully to avoid double interviewing of respondent through an identification mark and number on the patients case folders and questionnaires.

Sample size determination

It was determined using the Cochrane formula[7]

$$n = \frac{z^2pq}{d^2}$$

Where n = sample size

Z = Standard normal deviation put at 1.96

d = Degree of desired accuracy which is 0.05

P = proportion of target population expected to have psychiatric disorder.

q = 1-p

Using 31% prevalence of psychiatric co-morbidity for diabetics as reported by Coker et al[8],

$n = 1.96^2 \times 0.31 \times 0.69 / 0.05^2$

$= 328$

Thus, the minimum sample size of 328 was used for the study with no loss to attrition.

Inclusion criteria

Patients aged 18years and above, with type 2 diabetes mellitus for more than one year and who had been on treatment for the past six consecutive months.

Exclusion criteria

Patients who were critically ill to respond to the interview and female patients who were pregnant. Patients with primary metabolic co-morbidities such as hypertension, cardiovascular diseases, and thyrotoxicosis and patients who declined consent for the study.

Method And Instrument Of Data Collection

Information about the socio-demographic background of the patients was obtained in the following areas: age, sex, marital status, religion, education, occupation, leisure activities, use of medications/tobacco/drugs, access to medical care and average family monthly income in Naira. Added information obtained included duration and family history of diabetes mellitus, any recent deaths, divorces or separation in the family, and any current illness, marital difficulties or sexual dysfunction as well as coping mechanisms. The family history of diabetes was coded yes or no. General Health Questionnaires (GHQ-28) in English and translated in pidgin (for those unable to understand English) were administered to subjects by interviewers and used to measure their psychological distress. Physical examination was carried out on all participants. Venous blood was drawn and sent to the laboratory for estimation of glycosylated haemoglobin. Thereafter, the Patients were given health education and counselled. For reliability testing, a 28-item General Health Questionnaire (GHQ-28) in single-use was pretested among 10% (32) of patients meeting the study criteria who attend the same diabetic clinics by investigator and trained research assistants to detect individuals who have mental disorders. Thereafter, the GHQ-28 was administered to the study subjects by the investigator and the trained research assistants. This tool has been validated in Nigeria with a cut-off of 4 and is capable of screening for psychiatric disorders in the following 7 item-each of four sub-classes: somatic symptoms, anxiety/insomnia, social dysfunction and severe depression.[9]A score of less than 4 was interpreted as normal while a score of 4 and above was interpreted as suggesting mental ill health (psychiatric disorder). At the completion of the interviews, the heights of the patients were measured using a stadiometer accurate to 0.25cm, and weights of patients were measured using a Hanson weighing scale accurate to 0.5kg. The measurements of the heights and weights were done without shoes, hats or ties. Then 2 ml of venous blood was collected in an EDTA bottle using sterile single-use 5 ml syringe with needle in aseptic conditions while observing universal precautions of safety and sent to the laboratory for estimation of glycosylated haemoglobin (HbA1C) by a chemical pathologist to ascertain the average glycaemic control over the previous 2-3 months[10]. Based on the American Academy of Family Physicians, American College of Physicians, Canadian Diabetic Association and other professional associations' recommendations, this study regarded HbA_1C level of 7% or less as evidence of good glycaemic control, while, values above 7.0% were regarded as evidence of poor control.[11] Finally, the patients were given health education.

Method Of Data Analysis

The data was analyzed by computer using the Statistical Package for Social Sciences software(SPSS) version 17. (SPSS Inc. Headquarters, Chicago, Illinois, United States of America) after coding responses to questionnaire. The mean, frequencies and percentages were determined. Chi-square(X^2) test was employed for comparing differences in proportions. Associations were tested using cross tabulations and correlations while two independent sample tests were used for GHQ-28 score and gender. The level of statistical significance was taken as $p < 0.05$. Tables and graphical illustrations were constructed where applicable for the presentation of results.

Ethical consideration

The approval of the Ethical Committee of the University of Port Harcourt Teaching Hospital was obtained. Detailed explanation of the importance of the research was given to each patient eligible for the study and their approval and written consent were obtained before inclusion into the study

Limitations

Financial constraints as all costs for the project was borne by the researchers.

Results

Table 1: Sociodemographic characteristics of respondents.

	Categories	Frequency	Percent (%)	Mean ± Std deviation
Age (in years)	18-20 21-30 31-40 41-50 51-60 61-70 71-80 Above80 Total	1 8 29 129 105 43 12 1 328	0.3 2.4 8.8 39.3 32.0 13.1 3.7 0.3 100.0	51.47±9.89
Gender	Female Male Total	199 129 328	60.7 39.3 100.0	
Marital status	Married Single Widowed Total	277 8 3 328	84.5 2.4 13.1 100.0	
Educational level	No formal Primary Secondary Tertiary Total	14 116 75 123 328	4.3 35.4 22.9 37.5 100.0	
Economic status	**≥ 100,000 50,001-100,000 20,001-50,000 0-20,000Total**	**76 52 77 123 328**	**23.2 15.8 23.5 37.5 100.0**	

Religion	Christianity Islam Others Total	312 8 8 328	95.1 2.4 2.2 100.0	
occupation	Business Civil servant Retired Skilled Student Unemployed Total	116 118 44 40 2 8 328	35.4 36.0 13.4 12.2 0.6 2.4 100.0	
Family history of diabetes	No Yes Total	229 99 328	69.8 30.2 100.0	

Table 1 shows that majority (84.5%) of the patients were currently married and that most of the subjects (37.5%) had tertiary education. The majority belonged to the Christian faith (95.1%) and only 2.4% were unemployed. More than a third of the patients (37.5%) had monthly family income of twenty thousand naira and below.

Table 2:Factors affecting psychiatric disorder among respondents

	Non-psychiatric patient (n =45)	psychiatric patient (n=283)	significance
Ages groups (years) < 41 years 41 yrs and above	 4 41	 34 249	χ^2 0.370 P = 0.543
Gender Female Male	25 20	174 109	χ^2 = 0.572 P = 0.450
Religion Christianity Islam Others	 41 4 0	 271 4 8	χ^2 = 10.256 P = 0.006
Level of education No formal Primary Secondary Tertiary	 0 8 5 32	 14 108 70 91	χ^2 = 25.652 P = 0.006
Occupation Business Civil servant Retired Skilled Student Unemployed	 12 30 1 0 0 0	 104 88 43 40 2 8	χ^2 25.652 P = 0.000

Marital status Married Single Widowed	 41 0 4	 236 8 39	$\chi^2 = 2.255$ P = 0.324
Glycaemic control Good Bad	 28 17	 97 186	$\chi^2 = 12.857$ P = 0.000
Family history of DM No Yes	 25 20	 204 79	$\chi^2 = 5.034$ P = 0.025
Access to medical care **Difficult** **Easy**	 12 33	 88 195	$\chi^2 = 0.359$ P = 0.549
Economic status **High income** **Middle income** **Low income** **Not available**	 24 8 0 13	 74 56 67 86	$\chi^2 = 20.367$ P = 0.000
Current family hx **Illness** **Marital difficulties** **Sexual dysfunction** **None**	 17 0 0 28	 99 12 32 140	$\chi^2 = 8.315$ P = 0.040
Any recent family hx **Death** **Divorce** **None**	 4 4 37	 40 8 235	$\chi^2 = 4.699$ P = 0.95

Table 2 shows that psychiatric disorder was significantly more common among patients who are of Christian faith. It was also more common among patients with low level of education, students and the unemployed. Mental illness was significantly more common among those patients with poor glycaemic control, low income, current family history of marital difficulties and sexual dysfunction as well as those without family history of diabetes mellitus. On the other hand, gender, marital status, access to medical care, recent family history of death and divorce did not show any statistical significance.

Table 3: Prevalence of psychiatric disorders among the respondents

	Frequency	Percent (%)
Normal	45	13.7
Psychiatric disorder	283	86.3
Total	**328**	**100.0**

Table 3 shows that majority of the patients 283 (86.3%) had psychiatric disorders

Table 4: Relationship between BMI and psychiatric disorders

	Non-psychiatric patientsn = 45	Psychiatric patientn = 283
Under weight (BMI < 18.5kg/m^2)	0	1 (0.4%)
Normal weight (BMI = 18.5-24.9kg/m^2)	36(80%)	131 (46.3%)
Overweight (BMI = 25-29.9kg/m^2)	4 (8.9%)	58 (20.5%)
Obesity (BMI ≥30 kg/m^2)	5 (11.1%)	93 (32.9%)

F = 36.173 T= 4.277 P= 0.000

Table 4 showed that a large proportion 36 (80%) of the patients with normal weight did not have psychiatric comorbidity compared with patients who had the condition. Greater proportion of the overweight patient 58(21%) had psychiatric illnesses, in comparison to those who did not have the disorder. Also, greater proportion of the obese 93(33%) had psychiatric disorders compared with the group that did not have mental illness.

Table 5: Relationship between glycaemic control and psychiatric disorders among respondents.

	Psychiatric disorderPresent (%)	absent (%)	Total (%)	HbA C level 1 (mean ±Std Dev.)
Glycaemic control				
Good Glycaemic control	97(34.3)	28 (62.2)	125 (38.1)	8.26 ± 2.50
Poor Glycaemic control	186 (65.7)	17 (37.8)	203 (61.9)	
Total	283 (100)	45 (100)	328 (100.0)	

Table 5 shows that majority 28(62.2%) of the patients who had good glycaemic control did not have psychiatric illness in comparison to the group that had poor control. Conversely, the majority 186 (65.7%) of the patients who had poor glycaemic control had psychiatric disorders compared with those who did not have the problem. The level of glycaemic control was 38.1% with a mean HBA1C of 8.26 ± 2.50

Discussion

The mean age of 51.5years seen in this study was similar to the findings of other researchers in Nigeria, Ghana and Kenya, indicating that type 2 diabetes mellitus is a disease common among the middle age population, affecting the agile and production phase of human life[12,13,14,15]. This age group should therefore form the target for health interventional measures against type 2 diabetes. However, age, was not significantly associated with the development of psychiatric disorders in this study. This agreed with the World Health report by Black et al[5], which indicated that age was not a risk factor for onset of mental disorders.

Majority of the respondents were females, as was also reported by Adebisi et al[1], and Titty et al[2], respectively in their studies. The higher preponderance of female respondents in this study, though not significant, however could be behavioural, since females have been found to exhibit better health seeking behavior in our society than males, as also reported by Unadike et al[5], in Benin city, in the same South South geopolitical zone of Nigeria with Port-Harcourt our study area.

Majority of the respondents had normal weight, while others mostly belonged to pre-obese, obese classes 1,2 and 3. Their mean body mass index (B.M.I) was 26.6, with a standard deviation of 5.3. This was similar to the finding of 26.2 in Benin City Nigeria by Unadike etal[4], 26.1 in Kenya by Otieno et al [3], and 29.2 in South Africa by Klisiewiz et al[6]. Other studies have also shown that BMI was a factor affecting psychiatric co-morbidity[7,8]. Anderson et al[16], in a meta-analysis also confirmed an increased prevalence of comorbid depression in adults with diabetes mellitus and obesity. The high level of obesity found in this study was reflective of inappropriate diet among patients with an erroneous cultural belief that obesity is a sign of good health, while being thin implies ill health. The mean

glycosylated haemoglobin in this study was 8.26% with a standard deviation of 2.5. One hundred and twenty five patients(38%) had good glycaemic control (HbA_1C of ≤ 7%), while 203 (62%) had poor glycaemic control of ≥ 7%. The glycaemic control of 38.1% found in this study was similar to the findings of 37% in Calabar by John et al[17], and 33% in Bangkok[18]. However, it was lower than the 54% and 44% reported in Nigeria and 58% in Saudi Arabia[19,20,21]. In Sagamu, South West Nigeria,Ebesunun et al[22] however reported a far lower value of 16.7% in their work. The overall prevalence of psychiatric disorder among the respondents was 86.3%. The study found a significant association between psychiatric disorders and glycaemic control as well as elevated body mass index and a positive correlation between them. This agreed with earlier reports of high glycaemia and obesity in association with psychiatric co-morbidity by Anderson et al[16], and Lloyd et al[23], in their various researches among patients with type 2 diabetes.

Conclusion

There is significant association between mental disorders with glycaemic control and body mass index.

Recommendation

Physicians, especially primary care doctors should create awareness of psychiatric association in diabetes management and screen all adult diabetics, especially obese ones for psychiatric co-morbidity. Everybody should embrace lifestyle medicine to reduce diabetes scourge.

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