Obesity among Adult Outpatients with Type 2 Diabetes Mellitus Accessing Care in Bowen University Teaching Hospital (BUTH), Ogbomoso

A. E. Idowu [a++], I. O. Amole [b#], A. O. Durodola [b#], S. A. Adesina [b#], A. O. Adegoke [b†*], A. I. Akinwumi [c], O. A. Idowu [a], O. T. Awotunde [b‡] and A. D. OlaOlorun [b‡]

[a] *Bowen University Teaching Hospital, Ogbomoso, Nigeria.*
[b] *Bowen University Iwo and Consultant Family Physician, Bowen University Teaching Hospital, Ogbomoso, Nigeria.*
[c] *Department of Family Medicine, Afe Babalola University, Ado-Ekiti, Ekiti State, Nigeria.*

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Background: Diabetes mellitus (DM) is a chronic disease afflicting people of all races, sex, economic and social status, and of all ages. Obesity is a major contributor to the type 2 diabetes epidemic. Obesity in persons with diabetes is associated with poorer control of blood glucose

_____

[++]*Consultant Family Physician;*
[#]*Senior Lecturer;*
[†]*Lecturer;*
[‡]*Associate Professor;*
Corresponding author: Email: adepeju.adegoke@bowen.edu.ng;

levels, blood pressure, and cholesterol, placing patients at higher risk for both cardiovascular and microvascular disease.

Aim: To determine the prevalence of obesity and the associated risk factors among diabetic patients in Bowen University Teaching Hospital (BUTH), Ogbomoso.

Materials and Methods: The study was a descriptive cross-sectional study. The data collection lasted 4 months between March and June 2018. A pretested questionnaire was used to collect data on socio-demographic characteristics and medical history of participants. We measured and recorded blood pressure, weight and height of each of the participants. The data collected were analyzed using SPSS for Windows version 20 statistical software package. The association between categorical variables were tested using Chi-square. Data presentation was done using tables, frequencies and percentages.

Results: Two hundred and seventy-five participants were recruited for this study. Their age ranges from 28 years to 85 years with the mean age of 59.07±11.82 years. Obesity was found in 29.8% of the study participants. Obesity was found to be associated with age group, sex, marital status, educational level, duration of diagnosis of diabetes and hypertension. The association was statistically significant.

Conclusion: The prevalence of obesity in type 2 diabetes was high in this study and was associated with age group, sex, marital status, educational level, duration of diagnosis of diabetes and level of blood pressure. There is a need to intensify effort to control obesity and achieve optimal blood pressure control among diabetic patients and prevent complications from ensuing.

1. INTRODUCTION

"Diabetes mellitus (DM) is a chronic disease afflicting people of all races, sex, economic and social status, and of all ages" [1]. "The International Diabetes Federation (IDF) estimates that over 5 million people suffer from the disease in Africa and the number is expected to increase to 15million by 2025" [2]. "A recent systematic review and meta-analysis conducted by Adeloye and collegues in 2017 to estimate the prevalence of Type 2 DM (T2DM) in Nigeria found that 5.8% of the population had diabetes mellitus, suggesting that the predictions of higher prevalence in low and middle-income countries in the future may be true" [3].

"Obesity is now regarded as a chronic, progressive disease with remissions and relapse and an important driver of the development of diabetes and many of its associated features. The deleterious effects of obesity and type 2 diabetes are seen in most, if not all, tissues in the body, with consequences resulting in significantly increased premature morbidity and mortality" [4].

"The aetiology of obesity is far more complex than simply an imbalance between energy intake and energy output. Metabolic, endocrine, and genetic factors; dietary habits; physical activity; race; age; sex; drug use; and socioeconomic status all play a role in the development of obesity" [5]. It is a major contributor to the type 2

diabetes epidemic where nearly 88% of those with T2DM are considered overweight or obese [6].

"Body mass index (BMI), is the most commonly used marker for body-weight assessment and is highly correlated with body fat" [7]. "Obesity is known to be the main risk factor for a number of non-communicable diseases like cardiovascular disease, type 2 diabetes, hypertension, coronary heart disease, or certain types of cancers. Of these diseases, type 2 diabetes is most strongly associated with obesity" [8]. "The prevalence of generalized obesity among patients with type 2 diabetes across Nigeria ranges from 5.0% in Zaria, in the Northwest to 40% in Lagos in the Southwestern part of the country" [9]. "Although more people in developing countries now die from obesity-associated diseases, including ischemic heart disease, diabetes mellitus and cancer, many people are still under the impression that overweight and obesity affects only the Western world and that lower resource countries continue to struggle with only underweight, malnutrition and infections" [8].

Obesity combined with insulin deficiency leads to the development of T2D [10].

"An unhealthy diet consisting mainly of high-fat, energy-dense food contributes to the development of obesity and DM" [11]. "Obesity in persons with diabetes is associated with poorer

control of blood glucose levels, blood pressure, and cholesterol, placing patients at higher risk for both cardiovascular and microvascular disease" [12]. "It has also become an enormous public health problem and a bigger health crisis than hunger and the leading cause of death and disabilities around the world with the burden expected to increase through time" [13].

This study aims to determine the prevalence of obesity and its associated risk factors among diabetic patients in BUTH, Ogbomoso.

2. MATERIALS AND METHODS

The study was a descriptive cross-sectional study. We recruited 275 patients with Type 2 diabetic accessing care at BUTH Ogbomoso. The data collection lasted 4 months between March and June 2018. Patients aged 18 years and above with diabetes mellitus who had been on treatment for at least 6 months and gave consent for the study were recruited while pregnant and cognitively impaired patients were excluded from the study. A pretested questionnaire was used to collect data on socio-demographic characteristics and medical history of participants.

We measured and recorded weight and height of each of the participants. This was used to calculate the body mass index expressed in kg/m^2. Participants with BMI <18.5 were classified as underweight, BMI of 18.5–24.9 as normal weight, while 25.0–29.9 and ≥30.0 were classified as overweight and obese respectively [14].

Blood pressure measurement was used to classify participants into hypertensive or normotensive. Participants with blood pressure ≥ 140/90mmHg or with history of antihypertensive drug use were considered hypertensive while participants with blood pressure < 140/90mmHg were considered normotensive.

The Standard Occupational Classification System designed by Office of Population Census and Surveys, London (OPCS 1991) and modified for Nigeria was used to classify participants into socioeconomic classes 1-3 as follows:

Class 1 = skilled worker e.g., professionals and managerial officers and retirees of this cadre
Class 2 = unskilled workers e.g., Artisans and traders

Class 3 = dependents e.g. retirees of class 2, those not on pension, house wives of class 2 cadre, students [15].

The data collected were analyzed using SPSS for Windows version 20 statistical software package. Data presentation was done using tables, frequencies, percentages and prose.

The associations between sociodemographic factors, medical history and body mass index were tested using chi-square. P-value was set at 0.05 and P-value less than or equal to 0.05 was regarded as statistically significant.

3. RESULTS

Two hundred and seventy-five participants were recruited for this study. Age group above 60 had the highest proportion (41.8%) of study participants. Majority (61.5%) of the study participants were female. Highest proportion (90.5%) of them were married. About three quarter (75.6%). were Christians. One third of the study participants were not educated and 68.4% of them belong to social class 2. Majority (94.5%) belong to Yoruba ethnic group (Table 1). More than two third of the participants are Urban dwellers.

About two third (65.5%) of the participants had duration of diabetes less than 5years. Almost two third (61.5%) of the participants were on oral medication alone while more than two third (69.1%) had hypertension. Only 29.8% of the participants were obese.

Obese participants were found in about one third (38.5%) of the females, age group 51-60 had the highest proportion (35.7%), about one half (50.0%) of the separated, about one third (33.3%) of participants, with no level of education, social class 1 with 30.4%, Yoruba ethnicity with 30.8%, Urban dwellers with 32.0%. A statistically significant association was found between age group, sex, marital status, religion, educational level and ethnicity.

Proportion of obese participants was highest among the participants who had been diabetic for 6-10 years (35.4%), and those without hypertension (36.5%).

A significant association was found between duration of diagnosis of diabetes and hypertension.

Table 1. Sociodemographic characteristics of study participants

		Frequency	Percentage
Sex	Female	169	61.5
	Male	106	38.5
Age group	≤30	4	1.5
	31-40	14	5.1
	41-50	58	21.1
	51-60	84	30.5
	>60	115	41.8
Mean=59.07			
SD=11.82			
Marital status	Single	3	1.1
	Married	249	90.5
	Separated	4	1.5
	Widow	19	6.9
Religion	Christianity	208	75.6
	Islam	66	24.0
	Others	1	0.4
Level of education	Uneducated	84	30.5
	Primary	81	29.5
	Secondary	50	18.2
	Tertiary	60	21.8
Social class	1	69	25.1
	2	188	68.4
	3	18	6.5
Ethnicity	Yoruba	260	94.5
	Hausa	3	1.1
	Igbo	18	4.4
Location	Rural	77	28.0
	Urban	197	71.6
	Others	1	0.4

4. DISCUSSION

The prevalence of obesity in this study was 29.8%. this was close to 27.4% found by Gezawa et al. [9] in Northern Nigeria. An higher prevalence of 40.1%, 49.5%,55.5%, 57.7% and 58.6% were found in other studies [2,6,7,16,17]. A prevalence which was half (14.8%) of our finding was found by Obirikorang et al. [12] while a slightly more than half of our prevalence (18.8%) was found by Bizuayehu et al. [13] This study agreed with other studies reviewed that prevalence of obesity was higher in females than male counterpart [12,13,16,18]. This may be due to childbearing, hormonal status, high female illiteracy rate and cultural practices that limit physical exertion by females (Table 2).

Age group above 60 years had highest number of participants (41.8%). This may be because of improvement in standard of living seen over the past few years in Nigeria which resulted in aging of its populace [9]. This finding agrees with Gezawa et al. [14] who observed increasing prevalence of diabetes mellitus with age. However, Obirikorang et al. [12] in Ghana found a higher proportion among age group slightly lower than what was found in our study. A statistically significant association was found between age group of the patient and body mass index. This was in agreement with finding by Kasimu et al. [2] in North- West Nigeria.

Female sex was more than half of the study participants. This may be because famales seek hospital care better than males. This agrees with findings in other studies [2,9,19] but in contrast to the findings in Jeddah, [20] Markurdi [18] and Maiduguri [14]. A significant association was found between the sex of the patient and their body mass index. This was supported by other researchers [2,12,13,16]. The married constituted more than three quarter of the study participants and this agrees with Murad et al. [20] A significant association was found between marital status and BMI in this study.

Table 2. Medical history of study participants

		Frequency	Percentage
Duration of diabetes in years	<5	180	65.5
	6-10	47	17.1
	>10	48	17.4
Medication	Oral	169	61.5
	Insulin	11	4.0
	Both	95	34.5
Hypertension	Present	190	69.1
	Absent	85	30.9
BMI category	Underweight	13	4.7
	Normal	70	25.5
	Overweight	110	40.5
	Obese	82	29.8

Table 3. Association between sociodemographic factors, medical history and body mass index

		Normal weight	Overweight	Obese	Underweight	P-value
Sex	Female	35(20.7%)	56(33.1%)	65(38.5%)	13(7.7%)	
	Male	35(33.0%)	54(50.9%)	17(16.0%)	0(0.0%)	0.000
	Total	70(25.5%)	110(40%)	82(29.8%)	13(4.7%)	
Age Group	<30	4(100.0%)	0(0.0%)	0(0.0%)	0(0.0%)	
	31-40	3(21.4%)	7(50.0%)	3(21.4%)	1(7.1%)	
	41-50	11(19.0%)	28(48.3%)	19(32.8%)	0(0.0%)	0.003
	51-60	21(25.0)	24(28.6%)	30(35.7%)	9(10.7)	
	>60	31(27.0%)	51(44.0%)	30(26.1%0	3(2.6%)	
	Total	70(25.5%)	110(40.0%)	82(29.8%)	13(4.7%)	
Marital Status	Single	3(100.0%)	0(0.0%)	0(0.0%)	0(0.0%)	
	Married	61(24.5%)	105(42.2%)	73(29.3%)	10(4.0%)	
	Separated	2(50.0%)	0(0.0%)	2(50.0%)	0(0.0%)	0.025
	Widow	4(21.2%)	5(26.3%)	7(36.8%)	3(15.8%)	
	Total	70(25.5%)	110(40.0%)	82(29.8%)	13(4.7%)	
Religion	Christianity	55(26.4%)	91(43.8%)	49(23.6%)	13(6.3%)	
	Islam	15(22.7%)	19(28.8%)	32(48.5%)	0(0.0%)	0.003
	Others	0(0.0%)	0(0.0%)	1(100%)	0(0.0%)	
Educational level	Uneducated	22(26.2%)	26(31.0%)	28(33.3%)	8(9.5%)	
	Primary	29(35.8%)	22(27.2%)	25(30.9%)	5(6.2%)	
	Secondary	10(20.0%)	25(50.0%)	15(30.0%)	0(0.0%)	0.000
	Tertiary	9(15.0%)	37(61.7%)	14(23.3%)	0(0.0%)	
	Total	70(25.5%0	110(40.0%)	82(29.8%)	13(4.7%)	
Social Class	1	14(20.3%)	33(47.8%)	21(30.4%)	1(1.4%)	
	2	52(27.7%)	68(36.2%)	56(29.8%)	12(6.4%)	0.331
	3	4(22.2%)	9(50.0%)	5(27.8%)	0(0.0%)	
	Total	70(25.5%)	110(40.0%)	82(29.8%)	13(4.7%)	
Ethnicity	Yoruba	59(22.7%)	108(41.5%)	80(30.8%)	13(5.0%)	
	Hausa	3(100%)	0(0.0%)	0(0.0%)	0(0.0%)	
	Igbo	8(66.7%)	2(16.7%)	2(16.7%)	0(0.0%)	0.002
	Total	70(25.5%)	110(40.0%)	82(29.8%)	13(4.7%)	
Location	Rural	19(24.7%)	33(42.9%)	19(24.7%)	6(7.8%)	
	Urban	51(25.9%)	76(38.6%)	63(32.0%)	7(3.6%)	0.559
	Others	0(0.0%)	1(100%)	0(0.0%)	0(0.0%)	
	Total	70(25.5%)	110(40.0%)	82(29.8%)	13(4.7%)	

Table 4. Association between medical history and BMI

Medical History		Normal weight	Overweight	Obese	Underweight	P-value
Duration of diagnosis in years	<5	56(31.1%)	66(36.7%)	54(30.0%)	4(2.2%)	
	6-10	5(10.4%)	26(54.2%)	17(35.4%)	0(0.0%)	0.000
	>10	9(19.1%)	18(38.3%)	11(23.4%)	9(19.1%)	
	Total	70(25.5%)	110(40.0%)	82(29.8%)	13(4.7%)	
Hypertension	Absent	16(18.8%)	38(44.7%)	31(36.5%)	0(0.0%)	
	Present	54(28.4%)	72(37.9%)	51(26.8%)	13(6.8%)	0.015
	Total	70(25.5%)	110(40.0%)	82(29.8%)	13(4.7%)	

Most of the study participants had no or only primary level of education and belong to social class 2 (Table 3 above). This may be because majority of the people in the study area were artisan and farmers.

Gezawa et al. [14] found highest prevalence of diabetes among participants in low socioeconomic class. However, only the educational level had a significant association with BMI in this study. This was found to be contrary by Damian et al. [16] in Northern Tanzania. About two third of the participants dwell in the urban area. This may lead to nutrition transition and increasing sedentary lifestyle but there was no significant association found in this study as also confirmed by Damian et al. [16] Majority had duration of treatment less than 5 years and a significant association was observed with the BMI. This agrees with Vasanthakumar et al. [6] in Belagavi.

Majority of study participants had hypertension. This may be because hypertension and obesity are significant risk factors for Type 2 diabetes. There was a significant association between this and BMI. This was corroborated by Bizuayehu et al. [13] in an institutional based cross sectional study of 314 patients in Southern Ethiopia who found that BMI was strongly associated with systolic blood pressure and Vasanthakumar et al. [6] in Urban area of Belagavi studied 380 patients and found an association with hypertension.

5. CONCLUSION

The prevalence of obesity among adult outpatients with Type 2 diabetes found in this study was high and was associated with age group, sex, marital status, educational level, duration of diagnosis of diabetes and level of blood pressure. Therefore, effort should be intensified to control obesity and achieve optimal blood pressure control among diabetic patients to prevent complications from ensuing.

CONSENT AND ETHICAL APPROVAL

All participants provided written informed consent and the study was conducted in accordance with the Declaration of Helsinki. The ethics committee of Bowen University Teaching Hospital Ogbomoso approved the study.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Adeleke OR, Ayenigbara GO. "Preventing diabetes mellitus in Nigeria : Effect of physical exercise, appropriate diet and lifestyle modification." Int J Diabetes Metab. 2019;25:113–117.
   DOI: 10.1159/000502006
2. Kasimu S, Rahman MBA. "Prevalence of obesity among type 2 diabetic patients attending diabetes clinics in Sokoto Northwestern Nigeria." Saudi J. Pathol. Microbiol. 2019;4(10):767–771.
   DOI: 10.36348/SJPM.2019.v04i10.013
3. Osunkwo DA, et al. "Prevalence of obesity and associated factors in Benue State, Nigeria: A population-based study." Ann. Afr. Med. 2021;20(1):1–7.
   DOI: 10.4103/aam.aam
4. Pillon NJ, Loos RJF, Marshall SM, Zierath JR. Metabolic consequences of obesity and type 2 diabetes: Balancing genes and environment for personalized care. Science Direct. 2021;184(6).
5. Alzaman N, Ali A. "Obesity and diabetes mellitus in the Arab world." J. Taibah Univ. Med. Sci. 2016;11(4):301–309.
   DOI: 10.1016/j.jtumed.2016.03.009

6. Vasanthakumar J, Kambar S. Prevalence of obesity among type 2 diabetes mellitus patients in urban areas of Belagavi. Indian J. Heal. Sci. Biomed. Res. 2020;13: 21–27.
    DOI: 10.4103/kleuhsj.kleuhsj

7. Babandina MM, Abdullahi IN, Emeribe AU, Ali Shuwa H, Olayemi L, Musa PO. "Short communication inter-relationship between type-2 diabetes mellitus, obesity and hypertension in Nigeria." Borno Med. J. 2019;16(1):1–5.

8. Leitner DR, Yumuk V, Micic D, Woodward E, Toplak H, Schindler K. "Obesity and type 2 diabetes : Two diseases with a need for combined treatment strategies – EASO can lead the way." Eur. J. Obes. 2017;10:483–492.
    DOI: 10.1159/000480525

9. Gezawa ID, Uloko AE, Gwaram BA, Ibrahim DA, Ugwu ET, Mohammed IY. "Pattern of obesity among patients with type 2 diabetes at a tertiary healthcare center in." Dove Press J. Diabetes, Metab. Syndr. Obes. Targets Ther. Ibrahim. 2019;12:2785–2790.

10. Chobot A, Górowska-Kowolik K, Sokołowska M, Jarosz-Chobot P. "Obesity and diabetes—Not only a simple link between two epidemics." Diabetes Metab. Res. Rev. 2018;34:1–9.
    DOI: 10.1002/dmrr.3042

11. Uloko AE, Musa BM, Ramalan MA. "Prevalence and risk factors for diabetes Mellitus in Nigeria : A systematic review and meta-analysis." Diabetes Ther. 2018;9(3):1307–1316.
    DOI: 10.1007/s13300-018-0441-1

12. Obirikorang Y, et al. "Knowledge and lifestyle-associated prevalence of obesity among newly diagnosed type II diabetes mellitus patients attending diabetic clinic at Komfo Anokye Teaching Hospital, Kumasi, Ghana: A hospital-based cross-sectional study. J. Diabetes Res. Patients. 2016; 2016.

13. Bizuayehu T, Menjetta T, Mohammed M. "Obesity among type 2 diabetes mellitus at Sidama region." PLoS One. 2022;17(4):1–7.

14. Gezawa I, et al. "Socio-demographic and anthropometric risk factors for type 2 diabetes in Maiduguri, North-Eastern Nigeria." Sahel Med J. 2015;18:1–9.
    DOI: 10.4103/1118-8561.149495

15. O. LO Adesina SA, Amole IO, Durodola AO, Awotunde OT, Olaolorun DA, Adeniran A. "Family functioning of people living with HIV / AIDS." Asian J. Fam. Med. 2019:1–9.
    DOI: 10.9734/ajmah/2019/v16i230138

16. Damian DJ, Kimaro K, Mselle G, Kaaya R, Lyaruu I. "Prevalence of overweight and obesity among type 2 diabetic patients attending diabetes clinics in Northern Tanzania." BMC Res. Notes. 2017:1–6.
    DOI: 10.1186/s13104-017-2861-9

17. Bawady N, Aldafrawy O, Elzobair EM, Suliman W, Alzaabi A, Ahmed SH. "Prevalence of overweight and obesity in type 2 diabetic patients visiting PHC in the Dubai health authority." Dubai Diabetes Endocrinol J. 2022:20–24.
    DOI: 10.1159/000519444

18. Eru E, et al. "Relationship between body mass index and type 2 diabetes mellitus among adult Nigerians in Makurdi, Nigeria." J. Pharm. Biol. Sci. 2018;13 (5):31–37.
    DOI: 10.9790/3008-1305023137

19. Hassan MR, et al. "Determinants of glycaemic control among type 2 diabetes mellitus patients in Northern State of Kedah, Malaysia: A cross-sectional analysis of 5 years national diabetes registry 2014-2018." Pan African Med. J. 2021;39(206):1–10.

20. Murad MA, Abdulmageed SS, Iftikhar R. Sagga BK. "Assessment of the common risk factors associated with type 2 diabetes mellitus in jeddah." Int J Endocrinol. 2014:1–15.
    DOI: 10.1155/2014/616145

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/94254