Screening for obesity and undiscovered glucose intolerance among employees of a tertiary health center in northeast Nigeria

Article · January 2019

DOI: 10.4103/jhrr.jhrr_44_19

5 authors, including:

Yakubu Lawal
Federal Medical Centre Azare Bauchi state

Original Article

Screening for Obesity and Undiscovered Glucose Intolerance among Employees of a Tertiary Health Center in Northeast Nigeria

Yakubu Lawal[1], Sanusi Muhammad[1], Umar F. Dahuwa[1], Ibrahim Bichi[1], Hayatu Ahmed[2]

Departments of [1]Internal Medicine and [2]Paediatrics, Federal Medical Centre Azare, Azare, Bauchi, Nigeria

Received : 27-07-19.
Accepted : 10-09-19.
Published : 27-11-19.

Abstract

Background: The prevalence of type 2 diabetes is increasing worldwide, and according to the International Diabetes Federation, one in every two i.e. 212 million people with diabetes is undiagnosed. This screening exercise was carried out during the World Diabetes Day celebration in line with global efforts toward early detection of persons with glucose intolerance. **Aim:** The aim of this study was to determine the prevalence of obesity and undiscovered glucose intolerance among the hospital employees and to assess the relationship among blood glucose level, some obesity indices, and blood pressure. No such study was ever carried out in this hospital and it afforded the employees the opportunity to get enlightened about the menace of obesity and diabetes. **Materials and Methods:** The screening exercise was approved by the hospital management after due ethical consideration. Consent was obtained from each participant and then some anthropometric indices and 2-h postprandial plasma glucose level were measured. Data were entered into Microsoft Excel, and then analyzed using IBM Statistical Package for the Social Sciences (SPSS) software, version 23. **Results:** The prevalence of obesity by body mass index, waist circumference, and waist-height ratio criteria was 17.4%, 33.7%, and 55.8%, respectively, and was more common among females. The prevalence of previously undiagnosed glucose intolerance was 12.7% (impaired glucose tolerance [IGT], 11.5% and diabetes mellitus, 1.2%) and the proportion among females and males was 12.5% and 11.9%, respectively. **Conclusion:** Though the prevalence of undiscovered diabetes was low, the prevalence of obesity and IGT was high, suggesting a population in transition from low prevalence to high prevalence of diabetes. In addition, obesity and glucose intolerance were more common among female compared to those among male participants.

Keywords: *Diabetes mellitus, Glucose intolerance, Obesity*

Introduction

Glucose intolerance means abnormal glucose level ranging from prediabetes (impaired fasting glucose [IFG] and/or impaired glucose tolerance [IGT]) to diabetes mellitus (DM). DM is defined as chronic hyperglycemia due to defect in insulin secretion and/or action, resulting in abnormal metabolism of carbohydrates, lipids, and protein.[1] Approximately 425 million adults (20–79 years) are living with diabetes; by 2045, this will rise to 629 million. The proportion of people with type 2 diabetes is increasing in most countries and 79% of adults with diabetes are living in low- and middle-income countries. The greatest numbers of people with diabetes are between 40 and 59 years of age.

Access this article online

Quick Response Code:

Website: www.jhrr.org

DOI: 10.4103/jhrr.jhrr_44_19

Address for correspondence: Dr. Yakubu Lawal, Department of Internal Medicine, Federal Medical Centre Azare, Azare, Bauchi, Nigeria.
E-mail: lawalyaqub2006@yahoo.com

How to cite this article: Lawal Y, Muhammad S, Dahuwa UF, Bichi I, Ahmed H. Screening for obesity and undiscovered glucose intolerance among employees of a tertiary health center in northeast Nigeria. J Health Res Rev 2019;6:107-13.

Furthermore, one in every two i.e. 212 million people with diabetes is undiagnosed.[1]

Diabetes is a leading cause of blindness, end-stage renal disease, lower limb amputation, and cardiovascular diseases worldwide. It caused four million deaths and at least US$727 billion in health expenditure in 2017, that is, 12% of total spending on adults.[1]

Ohwovoriole *et al.*[2] found that the prevalence of undiagnosed diabetes was 1.5% among males and 1.9% among females in Lagos Metropolis, Southwest Nigeria. Also, Ejike *et al.*[3] reported DM prevalence of 2.3% for males and 3.6% for females, whereas IFG prevalence was 0.6% for males and 1.6% for females in Southeast Nigeria, showing similar female preponderance.

Rasaki *et al.*[4] also reported a DM prevalence of 4.6% and prediabetes prevalence of 6.0% with a similar female preponderance. Furthermore, a systematic review and meta-analysis by Adeloye *et al.*[5] showed that the prevalence of DM in Nigeria had steadily increased from 2.0% in 1990 to 5.7% in 2015. The study also showed a pooled prevalence rate of IGT and IFG to be 10% and 5.8%, respectively. A similar systematic review and meta-analysis by Uloko *et al.*[6] showed a pooled prevalence rate of DM to be 5.77% in Nigeria and 5.9% in Northeast Nigeria.

One of the major risk factors for diabetes is obesity. In 2016, the World Health Organization (WHO) estimated the prevalence of overweight as 39% and that of obesity as 13% and had expressed concern about the epidemic global trend of obesity.[7] Reilly *et al.*,[8] however, reported that around half of all adults with excess body fat are defined as nonobese by the BMI criterion. This means that the WHO report of obesity prevalence was even highly underestimated. There is, therefore, the need to consider other methods of assessing obesity such as waist circumference (WC), waist-hip ratio, and waist-height ratio (WHtR).

This screening exercise was carried out during the World Diabetes Day celebration in line with global efforts toward early detection of persons with glucose intolerance. The aim of the study was to determine the prevalence of obesity and undiscovered glucose intolerance among the hospital employees and to assess the relationship between blood glucose level, some obesity indices, and blood pressure.

No such study was ever carried out in the Federal Medical Centre Azare, and the screening exercise afforded some hospital employees the opportunity to get enlightened about the menace of diabetes and obesity as a major risk factor. Though most screening exercises are usually carried out using casual or fasting blood glucose level, we measured blood glucose level 2 h after breakfast (2-h postprandial). This was for convenience sake, to ensure compliance by subjects, and also in line with one of the American Diabetes Association methods of determining glucose intolerance.[9] Those found to have glucose intolerance or at risk were educated on therapeutic lifestyle measures and referred to diabetes clinic for regular visits. It is important that health-care givers be healthy enough to give the best to their clients.

Materials and Methods

This was a cross-sectional observational study of the employees of Federal Medical Centre Azare, a tertiary hospital in Bauchi State, Northeast Nigeria. The workforce of the hospital consisted mainly of nurses, doctors, administrative staff, and others that include pharmacists, physiotherapists, laboratory workers, health attendants, and artisans.

Following ethical approval (FMCA/COM/36/vol.iii) by the Research and Ethics Committee of Federal Medical Centre Azare, a total of 172 participants (all available employees) were consecutively enrolled after explanation of the procedures involved and due consent obtained from them.

Inclusion criteria included subjects who were not previously known to have diabetes, whereas exclusion criteria included subjects known to have DM; subjects on medications that affect glucose metabolism such as steroids, thiazides, beta blockers, or human immunodeficiency virus protease inhibitors; and subjects who declined consent.

Trained assistants helped in data collection, which included biodata and medical history. Subsequently, anthropometric indices were measured by male and female trained assistants on male and female participants, respectively. Standing height was measured using a stadiometer (seca 213 portable stadiometer, seca Birmingham, Alabama, United States). Each participant's head was positioned in the Frankfort horizontal plane (i.e., when the horizontal line from the ear canal to the lower border of the orbit is parallel to the floor and perpendicular to the vertical backboard), then the height was measured to the nearest 0.1 cm.

Participants were then weighed in kilograms using a weighing scale (seca 700 series, seca North America). They were asked to wear only light clothing, stand in the center of the scale platform with hands at the sides, looking straight ahead, and weight evenly distributed.[9] The weight was then recorded in kilograms to the nearest 0.5 kg. Body mass index (BMI) was calculated by dividing weight by the square of height (kg/m^2). BMI values were classified as normal (18.5–24.9 kg/m^2), overweight (25.0–29.9 kg/m^2), and obese (≥30.0 kg/m^2).[7]

WC was measured using a non-stretchable tape (NON171330 [72"], Medline Industries, Illinois, United States). Each subject was instructed to cross the arms and place the hands on opposite shoulders. The WC was measured to the nearest 0.1 cm midway between the iliac crest and the costal margin along the midaxillary line.[10] According to the International Diabetes Federation, WC values >94 cm for male subjects and >80 cm for female subjects were used to define central obesity.[1] WHtR was also calculated by dividing WC (cm) by height (cm). WHtR values of ≥0.5 cm were considered as indicative of obesity irrespective of sex.[11]

Mercury sphygmomanometer was used to measure blood pressure in sitting position after the patient was relaxed for at least 5 min. Systolic blood pressure (SBP) and diastolic blood pressure (DBP) were recorded to the nearest 2 mm Hg. Subsequently, blood glucose level was measured using Accu-Chek Active glucometer (GC Model, M_version02_Rev0 70127672; Roche Diagnostics, Mannheim, Germany). This device measures blood glucose by reflectance photometry and the results displayed correspond to those in plasma. Fresh capillary blood was obtained from each subject, 2 h after breakfast, into the glucometer strips, and values displayed were recorded accordingly. The WHO criteria were used in the diagnosis of IGT (2-h postprandial glucose [2HrPP] ≥ 7.8 mmol/L) and DM (2HrPP ≥ 11.1 mmol/L).[7]

Statistical analysis: Data were entered into Microsoft Excel and then analyzed using International Business Machines' (IBM) Statistical Package for Social Sciences (SPSS) software (IBM SPSS version 23, IBM SPSS company, New York, United States) released on March 4, 2015, by IBM SPSS. Results were expressed as mean values ± standard deviation at 95% confidence interval. Spearman rank correlation coefficient was used to test for association among BMI, WC, WHtR, blood pressures, and blood glucose level. *P*-value was taken as significant when less than or equal to 0.05.

Results

The total number of participants screened was 172 and was made up of the following: administrative staff (50, 29.1%), medical doctors (30, 17.4%), nurses (50, 29.1%), and others (42, 24.4%). There were 134 males and 38 females with a male/female ratio of 3.5:1.

The mean age, BMI, WC, and WHtR of subjects were 36.1 ± 7.9 years, 24.9 ± 4.5 kg/m^2, 85.0 ± 12.3 cm, and 0.51 ± 0.07, respectively. Similarly, the mean SBP, DBP, mean arterial pressure (MAP), and 2HrPP level were 120.9 ± 15.9 mm Hg, 83.0 ± 13.7 mm Hg, 95.7 ± 13.5 mm Hg, and 6.4 ± 2.0 mmol/L. Female participants had significantly higher BMI compared to males, whereas males had significantly higher DBP and MAP. The mean age, WC, WHtR, SBP, and 2HrPP level did not significantly differ between the male and female participants [Table 1].

The prevalence of obesity by BMI, WC, and WHtR criteria was 17.4%, 33.7%, and 55.8%, respectively. Sex subanalysis showed that the proportion of obesity (BMI criterion) was higher among the female subjects compared to that among the male subjects (21.1% vs. 16.4%, $P = 0.041$). In addition, the proportion of obesity by WC and WHtR criteria was significantly higher among the females than that among the males (57.9% vs. 26.9%, $P < 0.001$ and 63.2% vs. 53.7%, $P = 0.032$, respectively) [Table 2].

The prevalence of obesity (BMI criterion) among all participants was 17.4%. However, the proportion of obesity within each professional group included

Table 1: Mean values of obesity indices and blood glucose level by sex

Variable	F	M	Total	*t*-test
	Mean (SD)	Mean (SD)		
Age (years)	34.63 (7.69)	36.51 (7.98)	36.09 (7.94)	0.913
BMI (kg/m^2)	26.29 (4.21)	24.53 (4.52)	24.92 (4.5)	0.028
WC (cm)	82.23 (10.42)	85.78 (12.65)	84.99 (12.25)	0.083
WHtR	0.518 (0.065)	0.503 (0.070)	0.506 (0.069)	0.213
SBP (mm Hg)	116.84 (15.44)	122.09 (15.94)	120.93 (15.94)	0.071
DBP (mm Hg)	77.37 (13.49)	84.63 (13.36)	83.02 (13.69)	0.005
MAP (mm Hg)	90.53 (12.98)	97.11 (13.34)	95.66 (13.51)	0.008
2HrPP (mmol/L)	6.13 (1.12)	6.54 (2.16)	6.45 (1.98)	0.117

F = females, M = males, SD = standard deviation, BMI = body mass index, WC = waist circumference, WHtR = waist-height ratio, SBP = systolic blood pressure, DBP = diastolic blood pressure, MAP = mean arterial pressure, 2HrPP = 2-h postprandial glucose, *t* = Student's *t*-test admin, 16.0%; doctors, 20.0%; nurses, 20.0%; and others, 14.3%. The prevalence of overweight among all participants was 32.6% and the proportion of overweight within each occupational group was admin, 32.0%; doctors, 33.3%; nurses, 48.0%; and others, 14.3% [Table 3]. The prevalence of obesity (WC criterion) among all participants was 33.7%, whereas the proportion of obesity within each professional group included admin, 32.0%; doctors, 20.0%; nurses, 48.0%; and others, 28.6% [Table 4].

The prevalence of obesity (WHtR criterion) among all participants was 55.8%, whereas the proportion of obesity within each professional group included admin, 56.0%; doctors, 53.3%; nurses, 64.0%; and others, 47.6% [Table 5]. The prevalence of previously undiagnosed glucose intolerance was 12.7% (IGT [11.5%] and DM [1.2%]) and the proportion among females and males was 12.5% and 11.9%, respectively [Table 6].

Subanalysis within professional groups showed that the proportion of administrative staff, doctors, nurses, and others with glucose intolerance was 20.0%, 6.7%, 12.0%, and 4.8%, respectively [Table 7]. Spearman rank correlation coefficient showed that 2HrPP level correlated significantly with BMI ($r = 0.131$, $P = 0.048$), WC ($r = 0.29$, $P = 0.004$), WHtR ($r = 0.190$, $P = 0.013$), and SBP ($r = 0.139$, $P = 0.040$) [Table 8].

Discussion

The main aim of this study was to determine the prevalence of obesity and undiscovered glucose intolerance and to determine whether glucose intolerance correlates with obesity and blood pressure indices among the employees of a tertiary medical center.

The prevalence of obesity and overweight (BMI criterion) was 17.4% and 32.6%, respectively, which was in keeping with the estimate by the WHO, where

Table 2: Distribution of obesity by sex among the subjects

Obesity class		BMI			WC			WHtR		
		F	M	Total	F	M	Total	F	M	Total
Normal	Count	12	64	76	16	98	114	14	62	76
	% within sex	31.6%	47.8%	44.2%	42.1%	73.1%	66.3%	36.8%	46.3%	44.2%
Obese	Count	8	22	30	22	36	58	24	72	96
	% within sex	21.1%	16.4%	17.4%	57.9%	26.9%	33.7%	63.2%	53.7%	55.8%
Overweight	Count	18	38	56						
	% within sex	47.4%	28.4%	32.6%						

F = females, M = males, BMI = body mass index, WC = waist circumference, WHtR = waist-height ratio

Table 3: Distribution of obesity (body mass index criterion) among professional groups in the hospital

BMI class			Professional groups				Total
			Admin	Doctors	Nurses	Others	
BMI criterion	Normal	Count	22	12	14	28	76
		% within profession	44.0%	40.0%	28.0%	66.7%	44.2%
	Obese	Count	8	6	10	6	30
		% within profession	16.0%	20.0%	20.0%	14.3%	17.4%
	Overweight	Count	16	10	24	6	56
		% within profession	32.0%	33.3%	48.0%	14.3%	32.6%
		Total % within profession	100.0%	100.0%	100.0%	100.0%	100.0%

BMI = body mass index, admin = administrative staff, profession = professional group

Table 4: Distribution of obesity (waist circumference criterion) by professional groups among the participants

WC class			Professional groups				
			Admin	Doctors	Nurses	Others	Total
WC criterion	Normal	Count	34	24	26	30	114
		% within profession	68.0%	80.0%	52.0%	71.4%	66.3%
	Obese	Count	16	6	24	12	58
		% within profession	32.0%	20.0%	48.0%	28.6%	33.7%
	Total	Count	50	30	50	42	172
		% within profession	100.0%	100.0%	100.0%	100.0%	100.0%

WC = waist circumference, admin = administrative staff, profession = professional group

Table 5: Distribution of obesity (waist-height ratio criterion) by professional groups among the participants

WHtR class			Professional groups				Total
			Admin	Doctors	Nurses	Others	
WHtR criterion	Normal	Count	22	14	18	22	76
		% within profession	44.0%	46.7%	36.0%	52.4%	44.2%
	Obese	Count	28	16	32	20	96
		% within profession	56.0%	53.3%	64.0%	47.6%	55.8%
	Total	Count	50	30	50	42	172
		% within profession	100.0%	100.0%	100.0%	100.0%	100.0%

WHtR = waist-height ratio, admin = administrative staff, profession = professional group

Table 6: Distribution of glucose intolerance by sex among the participants

Glucose Intolerance class		Sex		Total
		F	M	
DM	Count	0	2	2
	% within sex	0.0%	1.5%	1.2%
Normal	Count	34	118	152
	% within sex	89.5%	88.1%	88.4%
IGT	Count	4	14	18
	% within sex	12.5%	10.4%	11.5%
Total	Count	38	134	172
	% within sex	100.0%	100.0%	100.0%

DM = diabetes mellitus, IGT = impaired glucose tolerance, F = females, M = males

Table 7: Distribution of glucose intolerance by professional groups among the participants

Glucose Intolerance class		Professional groups				Total
		Admin	Doctors	Nurses	Others	
DM	Count	0	0	0	2	2
	% within profession	0.0%	0.0%	0.0%	4.8%	1.2%
Normal	Count	40	28	44	40	152
	% within profession	80.0%	93.3%	88.0%	95.2%	88.4%
IGT	Count	10	2	6	0	18
	% within profession	20.0%	6.7%	12.0%	0.0%	12.5%
Total	Count	50	30	50	42	172
	% within profession	100.0%	100.0%	100.0%	100.0%	100.0%

DM = diabetes mellitus, admin = administrative staff, profession = professional group

Table 8: Spearman rank correlation coefficient of clinical variables and plasma glucose among participants

Variables			BMI	WC	WHtR	2HrPP	SBP	DBP	MAP
Spearman's rho	BMI	*r*	1.000	0.867	0.912	0.131	0.445	0.284	0.352
		P		0.000	0.000	0.048	0.000	0.000	0.000
	WC	*r*	0.867	1.000	0.934	0.219	0.516	0.351	0.436
		P	0.000		0.000	0.004	0.000	0.000	0.000
	WHtR	*r*	0.912	0.934	1.000	0.190	0.458	0.305	0.368
		P	0.000	0.000		0.013	0.000	0.000	0.000
	2HrPP	*r*	0.131	0.219	0.190	1.000	0.139	−0.019	0.033
		P	0.048	0.004	0.013		0.040	0.803	0.669
	SBP	*r*	0.445	0.516	0.458	0.139	1.000	0.642	0.809
		P	0.000	0.000	0.000	0.040		0.000	0.000
	DBP	*r*	0.284	0.351	0.305	−0.019	0.642	1.000	0.963
		P	0.000	0.000	0.000	0.803	0.000		0.000
	MAP	*r*	0.352	0.436	0.368	0.033	0.809	0.963	1.000
		P	0.000	0.000	0.000	0.669	0.000	0.000	

r = correlation coefficient, *P* = level of significance, BMI = body mass index, WC = waist circumference, WHtR = waist-height ratio, SBP = systolic blood pressure, DBP = diastolic blood pressure, MAP = mean arterial pressure, 2HrPP = 2-h postprandial glucose the prevalence of obesity and overweight worldwide was put at 13% and 39%, respectively, and said to be in epidemic proportion and on the increase.[7] Our figures for the prevalence of obesity and overweight also fell within the range (8.1%–22.2% and 20.3%–35.1%, respectively) as reported by Chukwuonye *et al.*[12] in a systematic review of studies in Nigeria.

However, our study showed that the prevalence of obesity by WC criterion (33.7%) and WHtR criterion (55.8%) was far higher than the prevalence by BMI criterion (17.4%). The central obesity prevalence (WHtR criterion) of 55.8% was closely in agreement with the central obesity prevalence of 49.7% reported in a study by Iwuala *et al.*[13] among some Nigerian health-care givers. Generally, our study revealed that WHtR was most sensitive in diagnosing obesity when compared to WC and BMI. This makes WHtR the earliest warning of abnormality in body fat composition and distribution. The low sensitivity of BMI in diagnosing obesity was also reported by Reilly *et al.*,[8] where he revealed that around half of all adults with excess body fat were defined as nonobese by the BMI criterion.

Sex subgroup analysis showed that the prevalence of obesity was higher among the females compared to that among the males. This may be explained by the fact that the males were involved in more physical activities after working hours and during weekends, whereas the females mostly stayed at home after working hours. Such physical activities the men engaged in include farming and sports. Iwuala *et al.*[13] also reported that obesity was more prevalent among female compared to that among male health-care providers in Nigeria.

However, professional subgroup analysis showed that the prevalence of obesity was higher among the nurses and administrative staff compared to that among the doctors and the "others" group. This may be explained by the fact that doctors were involved in more physical activities in the course of routine duties. Such duties include ward rounds, conducting physical examinations during clinics, call duties, and interdepartmental reviews where doctors may walk the length and breadth of the hospital several times in a day. The "others" group (physiotherapists, health attendants, and artisans) also involved in physically demanding jobs as they move around several wards and offices in the course of their routine duties in a day.

The prevalence of glucose intolerance was 11.7% (IGT 10.5% and DM 1.2%). This undiscovered DM prevalence of 1.2% was lower than the 3.4% reported by Ohwovoriole *et al.*[2] in Lagos, Southwest Nigeria. The lower prevalence of undiscovered diabetes in the index study may be explained by the lower level of Westernization in the index area of study compared to Lagos, Southwest Nigeria. High Westernization level is associated with unhealthy lifestyles, namely consumption of high fat, high-calorie diet, smoking, alcohol, and sedentary lifestyles, which are risk factors for developing diabetes.

The IGT prevalence of 10.5% in the index study was similar to the IGT pooled prevalence of 10% reported in a meta-analysis of studies in Nigeria by Adeloye *et al.*[5] Though the prevalence of undiscovered diabetes was low in this study, the IGT prevalence was high, which signified a population in transition from low prevalence to high prevalence of diabetes. This population will, therefore, benefit immensely from intervention programs including adoption of therapeutic lifestyle measures and diabetes education.

Sex subgroup analysis showed that the prevalence of glucose intolerance was higher among the female than the male subjects. This can be explained by the higher prevalence of obesity among the females compared to that among the males. In addition, the higher level of physical activities the males were involved in may reduce the prevalence of glucose intolerance in them. This female preponderance in the prevalence of glucose intolerance is in keeping with reports by Ejike *et al.*[3] and Rasaki *et al.*[4] in Southeast Nigeria and Southwest Nigeria, respectively.

Professional subgroup analysis showed that the prevalence of glucose intolerance was higher among administrative staff and nurses compared to that among doctors and the "others." This can also be explained by the lower prevalence of obesity among the doctors and the "others" group compared to that among the administrative staff and nurses. The higher level of physical activities among the doctors and the "others" group may also contribute to their lower prevalence of glucose intolerance. Vimalananda *et al.*[14] also reported a higher prevalence of glucose intolerance among nurses compared to that among doctors but the authors related it to night shift work by the nurses. They, however, recommended more studies to prove this hypothesis.

Furthermore, blood glucose level was found to be strongly correlated to BMI, WC, and WHtR. This is similar to reports by several studies and can be explained by the fact that obesity is a major risk factor of diabetes.[3-8,15] Obesity causes insulin resistance, which plays a pivotal role in the pathogenesis of DM.

Analysis of blood pressure indices showed that though SBP, DBP, and MAP correlated significantly with obesity indices, only SBP correlated significantly with blood glucose level. However, Odili and Abatta[15] showed that all blood pressure indices correlated with blood glucose level. The limited correlation of blood glucose level and blood pressure indices in our study may be due to the exclusion of persons known to have diabetes from the study.

Limitations of the study included inability to measure other possible correlates of blood glucose such as plasma lipids and glycated hemoglobin. Other limitations included nonperformance of standard oral glucose tolerance test and limited sample size.

Conclusion

Though the prevalence of undiscovered diabetes was low, the prevalence of obesity and IGT was high, suggesting a population in transition from low prevalence to high prevalence of diabetes. In addition, obesity and glucose intolerance were more common among female compared to those among male participants. Therefore, immense effort is required to educate everyone on therapeutic lifestyle intervention in order to mitigate the increasing prevalence of obesity and glucose intolerance.

Key markers of obesity and systolic blood pressure were significantly correlated to glucose intolerance. Everybody including hospital employees should undergo scheduled screening for glucose intolerance and maintain healthy lifestyles in order to be fit enough to optimally care for patients.

Ethical policy and institutional review board statement

This screening was approved by the management of the Federal Medical Centre Azare, Azare, Nigeria, after due ethical considerations (FMCA/COM/36/VOL.III/S).

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. International Diabetes Federation. IDF Diabetes Atlas, 8th ed. Brussels, Belgium: International Diabetes Federation; 2017. Available from: http://www.diabetesatlas.org. [Last accessed on 2019 Jan 26].
2. Ohwovoriole AE, Kuti JA, Kabiawu SI. Casual blood glucose levels and prevalence of undiscovered diabetes mellitus in Lagos Metropolis Nigerians. Diabetes Res Clin Pract 1988;4:153-8.
3. Ejike CECC, Uka NK, Nwachukwu SO. Diabetes and pre-diabetes in adult Nigerians: Prevalence, and correlations of blood glucose concentrations with measures of obesity. Afr J Biochem Res 2015;9:55-60.
4. Rasaki OS, Kasali FO, Biliaminu SA, Odeigah LO, Sunday AA, Sule AG, *et al*. Prevalence of diabetes and pre-diabetes in Oke-Ogun region of Oyo State, Nigeria. Cogent Med 2017;4:1326211.
5. Adeloye D, Ige JO, Aderemi AV, Adeleye N, Amoo EO, Auta A, *et al*. Estimating the prevalence, hospitalisation and mortality from type 2 diabetes mellitus in Nigeria: A systematic review and meta-analysis. BMJ Open 2017;7:e015424.
6. Uloko AE, Musa BM, Ramalan MA, Gezawa ID, Puepet FH, Uloko AT, *et al*. Prevalence and risk factors for diabetes mellitus in Nigeria: A systematic review and meta-analysis. Diabetes Ther 2018;9:1307-16.
7. World Health Organization. 2018. Obesity and Overweight. Available from: https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight. [Last accessed on 2019 Feb 09].
8. Reilly JJ, El-Hamdouchi A, Diouf A, Monyeki A, Somda SA. Determining the worldwide prevalence of obesity. Lancet 2018;391:1773-4.
9. American Diabetes Association. 2016. Diagnosing Diabetes and Learning about Prediabetes. Available from: http://www.diabetes.org/diabetes-basics/diagnosis/?loc=db-slabnav. [Last accessed on 2019 Jan 26].
10. Centers for Disease Control and Prevention. National Health and Nutrition Examination Survey III; Anthropometry Procedures Manual. Atlanta, GA: Centers for Disease Control and Prevention. 2016. Available from: https://www.cdc.gov/nchs/nhanes/nh3rrm.htm. [Last accessed on 2018 Nov 25].
11. Browning LM, Hsieh SD, Ashwell M. A systematic review of waist-to-height ratio as a screening tool for the prediction of cardiovascular disease and diabetes: 0.5 could be a suitable global boundary value. Nutr Res Rev 2010;23:247-69.
12. Chukwuonye II, Chuku A, John C, Ohagwu KA, Imoh ME, Isa SE, *et al*. Prevalence of overweight and obesity in adult Nigerians—A systematic review. Diabetes Metab Syndr Obes 2013;6:43-7.
13. Iwuala SO, Ayankogbe OO, Olatona FA, Olamoyegun MA, OkparaIgwe U, Sabir AA, *et al*. Obesity among health service providers in Nigeria: Danger to long term health worker retention? Pan Afr Med J 2015;22:1.
14. Vimalananda VG, Palmer JR, Gerlovin H, Wise LA, Rosenzweig JL, Rosenberg L, *et al*. Night-shift work and incident diabetes among African-American women. Diabetologia 2015;58:699-706.
15. Odili AN, Abatta EO. Blood pressure indices, life-style factors and anthropometric correlates of casual blood glucose in a rural Nigerian community. Ann Afr Med 2015;14:39-45.