Original Article

Prevalence of Overweight and Obesity among Health-care Workers in University of Benin Teaching Hospital, Benin City, Nigeria

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Abstract

Background: Overweight and obesity seem to be responsible for the occurrence of noncommunicable diseases among the health-care workers. This study was conducted among the health-care workers in the University of Benin Teaching Hospital (UBTH), Benin City, South-South Nigeria, to determine the prevalence of overweight and obesity and assess their lipid profile. **Subjects and Methods:** Three hundred and twenty-five hospital workers ranging from doctors, nurses, and other health-care workers were recruited for this study. Demographic and socioeconomic data were collected using a structured questionnaire. One hundred and sixty (49%) were male while 165 (51%) were female with average age of 40.9 ± 8.8 years and average body mass index (BMI) of 26.7 ± 5.9 kg/m^2. BMI and blood pressure measurements were taken using standard techniques. BMI was classified using the National Institutes of Health criteria, 2000. **Results:** Based on BMI, the prevalence of overweight and generalized obesity among health-care workers in the UBTH, Benin City, were 31.7% and 25.5%, respectively. Overweight and obesity are more common among female health-care workers than their male counterparts. Using the waist circumference, approximately 60% of the health-care workers had central obesity, while 57.2% are either overweight or obese. More than half of the overweight and obese patients have elevated low-density lipoprotein-cholesterol. **Conclusion:** The high prevalence of overweight and obesity seen among health-care workers calls for the introduction of therapeutic lifestyle modification in this group of workers. Even though there was no significant difference in the lipid levels across the BMI categories, the means of total cholesterol were found to be elevated among health-care workers.

Keywords: Health-care workers, obesity, overweight

Introduction

Overweight and obesity can be described as the imbalance between energy intake and expenditure such that excess energy is stored in fat cells.[1] They are disorders of energy metabolism involving excess adipose tissues stored which may be associated with medical and psychological morbidity.[1] Overweight and obesity are the fifth leading risk of global death with at least 2.8 million adults deaths each year from complications of overweight and obesity.[2] The World Health Organization stated that 1.9 billion of the world population are overweight while 650 million are obese as at 2016.[2] In addition, 44% of diabetes mellitus burden, 23% of ischemic heart diseases, and 7%–41% of certain cancer burden are attributable to overweight and obesity.[2]

Health risks associated with obesity include coronary heart disease and other atherosclerotic cardiovascular diseases, stroke, type 2 diabetes mellitus, high blood pressure, kidney disease, sleep apnea, osteoarthritis, gallstones, fatty liver disease, stress incontinence, and other gynecological abnormalities (amenorrhea and menorrhagia) and various cancers.[3] Sabir *et al*. reported obesity and increasing age are the major risk factors fueling increased prevalence of type 2 diabetes mellitus among Nigerians.[4] Dankyau *et al*. reported high prevalence of overweight and obesity among tertiary hospital workers in Northern Nigeria.[5] High prevalence of hypertension was reported by Owolabi *et al*. among health-care

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workers in Nigeria despite their awareness of the disease.[6] It has also been reported that increased body mass index (BMI) predisposes to certain cancers.[7]

Overweight and obesity were previously considered as the problem of the high-income countries as two-third of the USA population are obese; they are now on the increase in low- and middle-income countries, most especially in the urban settings.[8] In Nigeria,[9] the prevalence of obesity ranges from 8.1% to 22.2%. According to Hruby and Hu, nutritional transition, sedentary lifestyle, changing methods of transportation and increasing urbanization are fuelling noncommunicable diseases.[10] Poor eating habits including increased consumption of energy-dense food, high level of sugar, and saturated fats combined with physical inactivity have led to increased prevalence of overweight and obesity in many parts of the world.[11]

Health-care workers are not spared from the problems of overweight and obesity. Health-care workers who are directly involved in the management of patients are seen to be either overweight or obese.[12] This is taking a toll on the level of care rendered to the patients.[9] Health-care workers are being faced with various complications of excessive weights thereby affecting patients' confidence in their counsel or care.[12] The prevalence of overweight and obesity has been reported to be high among Nigerians. A systematic review reported the prevalence of overweight as 20.3%–35.1%, while the prevalence of obesity as 8.1%–22.2%.[13] Therefore, the need to assess the prevalence of overweight and obesity among the health-care workers.

This study determined the prevalence of overweight and obesity and lipid levels among health-care workers in the University of Benin Teaching Hospital (UBTH).

Subjects and Methods

Study location and population

This cross-sectional study was carried out in UBTH, Advanced Clinical Investigation Laboratory in the Department of Chemical Pathology from March 2017 to June 2017. Hospital workers obtained questionnaires from the Department of Chemical Pathology reception, encouraged to fast overnight, and present themselves for anthropometric measurement and blood collection the following morning.

Using Fisher's formula, $n = Z^2pq/d^2$, for calculating sample size, a total of 339 participants were required for this study. However, 325 participants returned their questionnaires and came for blood sample collection. Three hundred and twenty-five apparently healthy individuals were randomly recruited from the hospital workforce.

Workers who cannot stand, chronically ill, pregnant, and individuals on lipid-lowering medications were excluded from the study. Ethical clearance was obtained from the Ethical Committee of the UBTH and the study was performed according to Declarations of Helsinki.

Informed consent was obtained from the participants, data were protected through password in personal computers and participants reports were given to them.

Blood pressure and anthropometric measurements

Eligible participants who have fasted 8–12 h were made to rest for 5 min before blood pressure was measured. Blood pressure (systolic and diastolic) was measured using Accouson® mercury sphygmomanometer and Litmann® stethoscope by the same person. The cuff was wrapped around the left mid-upper arm. Systolic blood pressure was detected initially by palpation and later by the Korotkoff sound (phases I and V) for systolic and diastolic blood pressures, respectively. Participants were weighed with light clothing, without shoes to the nearest 0.5 kg, and height measured (to the nearest 0.1 cm) using a stadiometer (RGZ-120) in the Advanced Clinical Investigation Laboratory. BMI was calculated as weight divided by height square meter in kg/m^2. BMI of 18–24.9, 25–29.9, and >30 kg/m^2 were considered as normal weight, overweight, and obesity, respectively.[3] Waist circumference was measured midway between the inferior margin of the last rib and the iliac crest in a horizontal plane with the nonstretchable measuring tape not compressing the soft tissue and participant standing erect with the feet 25–30 cm apart to ensure weight was evenly distributed.

Hip circumference was measured around the pelvis at the point of maximum protrusion of the buttocks posteriorly and pubic symphysis anteriorly.[14] Using the National Institutes of Health (NIH) 2000 criteria, waist circumference of >102 cm and >88 cm were considered as elevated. Hip circumference of >95 cm and >98 cm are elevated in male and female, respectively.

Subject preparation and sample collection

The participants were told to fast overnight for about 8–12 h. Venipuncture site was cleaned with 70% methylated spirit and allowed to dry. Three milliliter of whole blood was collected for lipid profile, dispensed into a labelled plain bottle; allowed to clot, centrifuged for 15 min at 3000 revolution per minute and serum was transferred into a plain bottle and stored for not >2 weeks in the −80°C freezer located in Advanced Clinical Investigation Laboratory in the Department of Chemical Pathology until they were analyzed.

Biochemical assay of the fasting serum lipid profile

Serum total cholesterol and triglyceride levels were determined using the cholesterol oxidase (CHOD-PAP) and lipase enzymatic spectrophotometric methods.[15] Low-density lipoprotein-cholesterol (LDL-C) was calculated using Friedewald equation[16] (LDL-C [mmol/L] = total cholesterol-[HDL-cholesterol]–[triglyceride/2.2]) while non-HDL-cholesterol was calculated as (total cholesterol–HDL-cholesterol).[17]

The reference intervals of various lipids in our center are as follow: total cholesterol (2.38–4.65 mmol/l), triglycerides (0.22–0.87 mmol/l), HDL-cholesterol

(0.75–1.55 mmol/L), LDL-cholesterol (1.99–3.36 mmol/l), and non-HDL-cholesterol (1.63–3.10 mmol/l).

Statistical analysis

Data collected were analyzed using SPSS version 20 (IBM, Chicago, IL, USA). Data were presented using tables and bar chart. Quantitative variables were expressed as mean ± standard deviation, while qualitative data were presented using frequencies and proportion. Difference between two groups was tested using Student's *t*-test while differences in more than two groups were tested using analysis of variance (ANOVA).

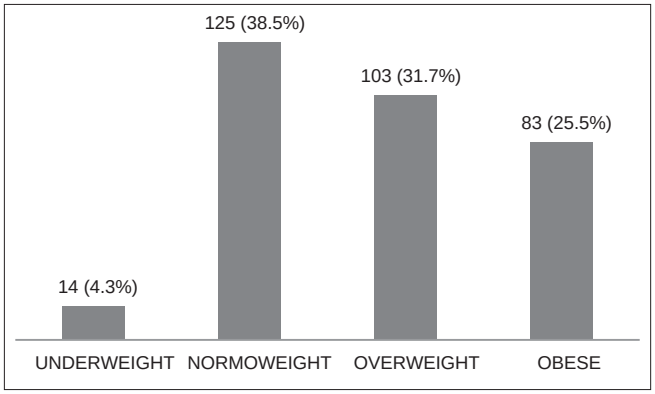

Figure 1: Prevalence of obesity, overweight, ideal weight, and underweight in the study population

Table 1: General and anthropometric characteristics of the participants

Characteristics	Mean±SD		*P*
	Male (*n*=160)	Female (*n*=165)	
Age (years)	40.08±8.41	41.81±9.10	0.261
Weight (kg)	72.39±14.44	75.52±14.53	0.170
Height (m)	1.68±0.08	1.65±0.07	0.451
BMI (kg/m²)	25.66±5.61	27.77±6.02	0.192
WC (cm)	90.33±15.50	88.72±15.10	0.341
HC (cm)	102.84±15.71	103.56±15.84	0.693
WHR	0.878±0.06	0.857±0.058	0.554
WHtR	0.538±0.097	0.538±0.099	0.801
SBP (mmHg)	117.45±15.40	115.04±15.81	0.462
DBP (mmHg)	78.11±15.06	83.41±13.40	0.220

BMI: Body mass index, WC: Waist circumference, HC: Hip circumference, WHR: Waist–hip ratio, WHtR: Waist–height ratio, BP: Blood pressure, SBP: Systolic blood pressure, DBP: Diastolic blood pressure, SD: Standard deviation

Results

A total of 325 health-care workers with average age of 40.08 ± 8.41 years (male) and 41.81 ± 9.10 years (female) were recruited for this study. The average BMI of the individuals was 25.66 ± 5.61 kg/m² (male) and 27.77 ± 6.02 kg/m² (female). The mean waist circumference for male and female participants was 90.33 ± 15.50 and 88.72 ± 15.10 cm, respectively [Table 1].

Using NIH 2000 criteria for BMI classification, the prevalence of overweight among male and female health-care workers were 28.1% and 35.2%, respectively ($P = 0.001$) while in the overall, 31.7% of the health-care workers are overweight [Figure 1]. Obesity was noticed in 18.8% of the males and 32.1% in the female health-care workers ($P = 0.000$). In total, the prevalence of obesity was 25.5%. More so, central obesity was noticed in 62.1% of the participants while 57.2% of the participants have overweight or obesity ($P = 0.242$).

Approximately one in three of the overweight and obese health-care workers are involved in regular physical exercise while 6.8% of the overweight and 12.0% of the obese have checked their lipid profiles before the study was conducted [Table 2]. There is no significant difference between the levels of total cholesterol ($P = 0.183$) and triglyceride (0.977) across the BMI categories [Table 3]. Reduced HDL-cholesterol is the commonest pattern of dyslipidaemia seen across the BMI categories which is not statistically significant ($P = 0.389$) [Table 4]. In total, the prevalence of obesity was 25.5%. More so, central obesity was noticed in 62.1% of the subjects while 57.2% of the subjects have overweight or obesity ($P = 0.242$). The prevalence of overweight and obesity in the study population are 31.7 and 25.5% respectively [Figure 1].

Discussion

Overweight and obesity are global public health problems that cut across all ages, sex, and races.[12] Overweight and obesity negatively affect most body systems (endocrine, gastrointestinal, nervous, and cardiovascular)[18] and predispose

Table 2: Social behaviors and risk factors related to body mass index of the study population

	Underweight (*n*=14), *n* (%)	Ideal weight (*n*=125), *n* (%)	Overweight (*n*=103), *n* (%)	Obese (*n*=8), *n* (%)	*P*
Smoking	2 (14.3)	4 (3.2)	2 (1.9)	3 (3.6)	
Alcohol intake	7 (50)	68 (54.4)	56 (54.4)	43 (51.8)	
Regular exercise	3 (21.4)	41 (32.8)	30 (29.2)	25 (30.1)	0.704
Intake of fruits and vegetables	6 (42.9)	40 (32.0)	29 (28.2)	26 (31.3)	
History of hypertension	3 (21.4)	18 (14.4)	17 (16.5)	14 (16.9)	
History of lipid check	2 (14.3)	10 (8.0)	7 (6.8)	10 (12.0)	0.964
History of aspirin therapy	2 (14.3)	7 (5.6)	5 (4.9)	5 (6.0)	

Table 3: Body mass index and biochemical characteristics of the participants based on their body mass index

Parameters	BMI category				*P*
	Underweight	Ideal weight	Overweight	Obese	
BMI (kg/m^2)	16.4±1.46	22.4±1.60	27.02±1.28	34.68±4.51	0.000
TC (mmol/L)	5.78±1.47	5.00±1.43	5.04±1.24	5.04±1.26	0.183
TRIG (mmol/L)	0.92±0.60	0.92±0.52	0.896±0.50	0.85±0.39	0.977
HDL-C (mmol/L)	0.95±0.12	0.99±0.14	0.96±0.13	0.99±0.16	0.414
LDL-C (mmol/L)	4.41±1.41	3.59±1.46	3.66±1.29	3.67±1.33	0.163
Non-HDL-C (mmol/L)	4.83±1.49	4.00±1.48	4.08±1.28	4.05±1.30	0.111

BMI: Body mass index, TC: Total cholesterol, TRIG: Triglyceride, HDL-C: High-density lipoprotein-cholesterol, LDL-C: Low-density lipoprotein-cholesterol, Non-HDL-C: Nonhigh-density lipoprotein-cholesterol

Table 4: Frequency distribution of gender, anthropometric parameters and lipid abnormalities of the the study population

	Underweight (*n*=14), *n* (%)	Ideal weight (*n*=125), *n* (%)	Overweight (*n*=103), *n* (%)	Obese (*n*=83), *n* (%)	*P*
Sex					
Male	7 (50)	78 (62.4)	45 (43.7)	30 (36.1)	0.001
Female	7 (50)	47 (37.6)	58 (56.3)	53 (63.9)	
BMI category					
Male	7 (4.4)	78 (48.8)	45 (28.1)	30 (18.8)	0.001
Female	7 (4.2)	47 (28.5)	58 (35.2)	53 (32.1)	
Elevated WC	10 (71.4)	61 (48.8)	63 (61.2)	68 (81.9)	
Elevated TC	10 (71.4)	54 (43.2)	46 (44.7)	31 (37.3)	
Reduced HDL-C	13 (92.9)	98 (78.4)	85 (82.5)	71 (85.5)	0.389
Elevated TRIG	2 (14.3)	8 (6.4)	7 (6.8)	1 (1.2)	
Elevated LDL-C	11 (78.6)	66 (52.8)	59 (57.3)	46 (55.4)	

WC: Waist circumference, TC: Total cholesterol, BMI: Body mass index, HDL-C: High-density lipoprotein-cholesterol, LDL-C: Low-density lipoprotein-cholesterol, TRIG: Triglyceride

individuals to noncommunicable diseases. Complications arising from overweight and obesity create more morbidities for the dwindling population of health-care workers to manage.[13]

Health-care workers, most especially the doctors and nurses who have direct contact with patients and often time influence their behaviors ought to have a healthy physique. Overweight and obese doctors and nurses might have difficulty in counseling overweight and obese patients even though the patient's clinical state would improve after they have shed more weight.[9]

Our study revealed that 1 in 4 of health-care workers is obese. The observed prevalence of obesity is in agreement with a study conducted in England where 25% nurses and physicians are obese.[19] In fact, significantly higher number of nurses was reported to be overweight or obese when compared with the control group.[19] Disrupted sleep pattern and chronic stress have been implicated in the causation of overweight and obesity among health-care workers as they bring about subnormal hypothalamus–pituitary–adrenal axis.[20] The biological clock is affected by disturbances in the circadian rhythms. The hypothalamus houses the suprachiasmatic nucleus which is known to generates the circadian rhythm that regulates most physiological processes such as sleep, wakefulness, body temperature, and the production of some hormones such as melatonin (hormone involved in sleep), ghrelin (hunger hormone), leptin (fullness/satiety hormone), and cortisol (stress hormone). These hormones are known to maintain healthy weight. Misalignment in circadian rhythm has been reported among shift workers.[20,21]

In this study, using NIH criteria, central obesity was seen in nearly two-thirds of the health-care workers. This was higher than the prevalence of central obesity (49.7%) reported by Iwuala *et al*.[22] We observed that female health-care workers have higher prevalence of obesity. This finding is also in tandem with the work of Skaal and Pengpid, among South African health-care workers where female and older health-care workers were more obese than men and younger counterparts with 1 in 3 of the health-care workers suffering from obesity-related health problems.[23] In Ghana, Kasu *et al*. reported higher prevalence of overweight/obesity among female health-care workers as they are less involved in physical activities than their male counterparts.[24]

Our study revealed that approximately 1 in 3 of overweight or obese health-care workers is involved in regular physical exercise. Obese diabetic patients may not receive adequate information from health-care workers on how to lose weight since they are overweight or obese themselves.

Conclusion

The prevalence of overweight and obesity among health-care workers in the UBTH is high. These health workers might be at risk of noncommunicable diseases. Hence, there is a need for

advocacy on therapeutic lifestyle modification among health-care workers. Even though there is no difference in lipid levels across the BMI categories, levels of total cholesterol are still above the reference intervals for the population. Moreso, obesity should be viewed as a disease rather than risk factor for other diseases.

Limitation

Some of the questionnaires were not returned. This lowers the sample size and the reliability of the results.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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