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Overweight and Obesity: Does It Occur In Nigerian Adolescents in an Urban Community?

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ABSTRACT: Background: Childhood obesity is a serious public health problem because of its strong association with adulthood obesity and the related adverse health consequences. The published literature indicates a rising prevalence of childhood obesity in both developed and developing countries. However, there are few studies on prevalence of obesity on Nigerian adolescents in an urban community.

Objective: The objective of this study was to estimate the prevalence of overweight and obesity in Nigerian adolescents from urban community.

Methods: A cross-sectional school based survey was conducted to determine the prevalence of overweight and obesity in adolescents of urban Sagamu community. A probability proportional to size was used to select 11 schools where 1638 participants, ages 12-18 years were selected. Their weight, height, body mass index and triceps skinfold were assessed. Overweight and obesity was defined using IOTF, CDC and NHANES III cutoff points.

Results: The prevalence of overweight seems high in both genders (0-8.1% and 1.3-8.1% in males and females respectively) while obesity prevalence was low (0-2.7% and 0-1.9% in males and females respectively). More adolescents could be classified as obese when triceps skinfold was used as a measure of obesity.

Conclusion: More adolescents demonstrated high prevalence of overweight and low prevalence of obesity.

Key Words: Prevalence; Overweight; Obesity; Adolescent; Nigeria.

Introduction

Obesity had reached epidemic proportion worldwide especially in the developed nations both in children and adults¹⁻³. The prevalence of overweight and obesity have increased dramatically over the past few decades in most industrialized countries. During the same time period, many developing countries have undergone an economic transition from societies characterized by subsistence agriculture to increased urbanization and industrialization⁴.

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Overnutrition is an emerging problem in segments of sub-Saharan African society, particularly where lifestyles become urbanized and westernized⁵ and data have accumulated on the adverse health effects of obesity in developed and developing nations. Increased risk for diabetes, dyslipidemia, coronary heart disease, atherosclerosis, hypertension, high blood cholesterol concentration, stroke, certain cancers and arthritis have been reported to be associated with obesity⁶⁻¹⁴. Other comorbidities are also associated with childhood obesity. These include orthopedic problems, such as Blount's disease, skin fungal infections, and acanthosis nigricans, hepatic steatosis and steato-hepatitis; pseudotumor cerebri; and psychological and behavioral problems¹.

The increase in obesity prevalence has been observed in the United States and internationally from pre-schoolchildren to adolescents¹⁵⁻²⁰. Childhood obesity is not limited to the industrialized countries. In a review, de Onis and Blössner reported rapidly increasing prevalence of overweight and obesity among pre-schoolchildren in developing countries²¹. In Tunisia, 9.1% of adolescent girls are at risk for being overweight (BMI/age $\geq$ 85th percentile)²². The burden of nutritional problems is shifting from energy imbalance deficiency to excess among older children and adolescents in Brazil and China. The annual rates of increase in the prevalence of overweight were 0.5% in Brazil and 0.2% in China²³. Iranian prevalence of 15% for overweight and 5% for obesity was also reported²⁴. The overall prevalence of overweight and obesity were 11.1% and 14.2% respectively in Indian adolescents².

In Nigeria, the prevalence of obesity among 457 school children in the age group 6-19 years is 3.2% for males and 5.1% for females based on weight for age while 3.7% males and 3.3% females were classified as obese when triceps skinfold thickness was used as the basis of obesity²⁵. Also, 18% of children aged 5-15 years from a relatively privileged section of a community were found to be obese²⁶.

With this background, little is known about prevalence of obesity in Nigerian adolescents' population. Therefore, the aim of this study was to find the prevalence of overweight and obesity in Nigerian adolescents in an urban community.

Materials and Methods

Subjects: We carried out a cross-sectional survey of secondary school students in Sagamu local government area of Ogun state, Nigeria during 2006 school year. There are 31 secondary schools in the area, 16 public and 15 private schools. The sample of 11 schools was drawn by stratifying the school into public and private schools and randomly selecting schools with probability proportional to size. The sample of schools was drawn by the help of zonal education authority. Participants were drawn from the selected schools. In all 1638 (790 male and 848 female) apparently healthy students were selected. Their age ranged between 12 and 18 years.

Procedure

Ethical approval was sought and obtained for this study from the Institutional Review Committee of University of Ibadan and University College Hospital, Ibadan. Informed consent was sought from the participants and their parents; permission was sought from local education authority and the principals of the selected schools. The nature, purpose and procedure of the study were explained to the participants in detail. The biodata of each participant was taken: this included age (as at last birth day) and sex.

Anthropometric Measurements

Weight and height were measured using portable weighing scale (Camry model BR9012 made in China) and stadiometer (Wunder, made in China) respectively as described in previous study²⁷. The BMI was then computed using a standard formula [BMI= weight (kg)/height² (m²)].

The American College of Sports Medicine guidelines for skinfold measurement was followed to measure triceps skinfold thickness using Skinfold caliper (FAT-O-METER, Novel products Inc., Pat. No.4.233.743). The triceps skinfold was taken at the level of mid-point between the acromion and olecranon processes as described by ISAK²⁸. Two readings were taken on each site and the average was used in the computation.

Determination of Overweight and Obesity

The International Obesity Task Force (IOTF) BMI cutoff points for children was used to define overweight and obesity²⁹. These age- and gender-specific cutoff points were derived from a large international sample with regression techniques, by passing a line through the adult cutoff points at 18 years. Participants with BMI values corresponding to an adult BMI of $<25 \text{ kg/m}^2$ were classified as normal weight, participants with BMI values corresponding to an adult BMI of 25 to 29.9 kg/m^2 were classified as overweight, and participants with BMI values corresponding to an adult BMI of 30 kg/m^2 were classified as obese. Center for Disease Control (CDC) 2000 cutoff point BMI was also used for comparison ($\geq 85^{\text{th}}$ percentile = overweight and $\geq 95^{\text{th}}$ percentile = obese).

The triceps skinfold thickness was used as an indicator of obesity in term of overfatness. Overfatness was defined as values $\geq 85^{\text{th}}$ percentile of National Health and Nutrition Examination Survey (NHANES) III.

Data analysis

Statistical analysis was carried out using statistical software package SPSS version 11.0. Descriptive statistics of mean and standard deviation were used to examine the age- and gender-specific anthropometric indices and independent t-test was applied to see the differences between the parameter or variable of the genders. Based on the IOTF, CDC and NHANES III cutoff point prevalence of overweight and obesity were calculated. P-value < 0.05 was considered to be statistically significant.

Results

A total of 1638 secondary school children participated in this study. They comprised 790(48.2%) males and 848(51.8%) females. One thousand four hundred and twelve were from public secondary schools and 226 from private secondary schools in Sagamu local government area of Ogun State, Nigeria. The ratio of their school type was 6.25:1(public: private schools), whereas the whole population's ratio is 5.33:1.

Table 1 presents the mean (SD) values for body weight, height, BMI and triceps skinfold by age and gender. Females between 12 and 15 years old are significantly heavier and taller than males counterparts who are significantly heavier and taller between 16 and 18 years old. Females had significantly higher mean of BMI with exception of age 16 years old. There was no significant different in the mean values of BMI at age 14, 17 and 18 years olds. Throughout the age groups, females had significantly thicker triceps skinfold.

Tables 2 and 3 contain the age-and sex-specific prevalence of overweight and obesity/overfatness. In males, overweight seem to be prevalent between ages 16 and 18 years while obesity seem not to be prevalent except at age 16 years using IOTF and CDC cutoff points. Obesity in term of overfatness in males ranges from 0.7% to 2.4% with exception of age 13 years. Overweight seem to be prevalent in females except at age 16 years which was low on both IOTF and CDC cutoff point. Obesity was not prevalent in females with exception of ages 12 and 16 years. Overfatness varies between 0.8% and 3.8% in females.

Discussion

The main aim of this study was to find the prevalence of overweight and obesity in Nigerian adolescents in an urban community. The sample size in this study (1638) is comparable to those used in previous studies^{2, 18, 30}. The weight, height and BMI of participants in this study are fairly comparable with their age group counterpart in Adekola-Johh and Balogun et al studies³¹⁻³².

Table 1: Descriptive Statistics of Anthropometric Indices of Participants by Age and Gender.

Age(yrs)	number		weight(kg)			height(m)			BMI(kg/m2)			TSF(mm)		
	Male	female	X±SD Male	X±SD female	p	X±SD Male	X±SD female	p	X±SD Male	X±SD female	p	X±SD Male	X±SD female	p
12	83	99	34.9±5.7	39.2±7.5	.00	1.43±.08	1.47±.07	.00	16.97±1.74	18.02±2.42	.00	7.1±3.7	11.9±5.4	.00
13	101	126	35.9±6.0	41.4±6.6	.00	1.44±.08	1.51±.07	.00	17.09±1.44	18.17±2.10	.00	6.6±2.7	1.2±4.4	.00
14	126	162	41.7±7.8	44.5±7.6	.00	1.51±.08	1.54±.07	.00	18.23±2.05	18.72±2.42	.06	6.6±2.7	12.9±4.8	.00
15	129	140	42. ±8.2	47.6±6.7	.00	1.54±.10	1.57±.06	.00	17.77±1.66	19.38±2.33	.00	6.2±2.7	14.2±4.6	.00
16	149	157	51.9±10.4	48.5±7.1	.00	1.59±.09	1.57±.06	.02	20.34±3.49	19.58±2.66	.03	6.2±2.9	15.8±5.2	.00
17	88	94	55.7±8.1	51.4±6.3	.00	1.64±.06	1.59±.06	.00	20.59±2.58	20.38±2.20	.56	6.2±3.2	16.4±5.2	.00
18	114	70	58.3±8.3	52.6±7.3	.00	1.67±.07	1.58±.06	.00	20.86±2.56	20.93±2.45	.85	6.1±3.2	16.4±6.1	.00

Key

BMI: body mass index

TSF: triceps skinfold

Table 2: Percentage of Male Overweight, Obese and Triceps Skinfold (TSF) ≥85th NHAES III Percentile.

Age (yrs)	body mass index				TSF %≥85 th cutoff point(n)
	IOTF Overweight(n)	obese(n)	CDC2000 overweight(n)	obese(n)	
12	2.4(2)	0	3.6(3)	0	2.4(2)
13	0	0	0	0	0
14	0.8(1)	0	0.8(1)	0	1.6(2)
15	0.8(1)	0	0.8(1)	0	0.8(1)
16	8.1(12)	2.0(3)	7.4(11)	2.7(4)	0.7(1)
17	6.8(6)	0	6.8(6)	0	1.1(1)
18	7.0(8)	0	4.4(5)	0.9(1)	1.8(2)

Quite number of adolescents (0-8.1% in males and 1.3-8.1% in females) are overweight in either IOTF or CDC cutoff point, indicating that to some extent there is high prevalence of overweight in Nigerian adolescents living in an urban community. As this study was a cross-sectional and no previous overweight and obesity prevalence studies have been carried out in Sagamu, changes in the prevalence of adolescent overweight and obesity overtime cannot be ascertained. However, this finding was similar to that of Prista et al who reported an increased prevalence of 4.8% and 7.7% in males and females Mozambique children respectively³³. The present study's observation was less than that of Indian boys and girls who had prevalence of 15.7% and 12.9% respectively².

Table 3: Percentage of Female Overweight, Obese and Triceps Skinfold (TSF) $\geq 85^{\text{th}}$ NHAES III Percentile.

Age (yrs) point(n)	IOTF		body mass index CDC2000		TSF % $\geq 85^{\text{th}}$ cutoff
	Overweight(n)	obese(n)	overweight(n)	obese(n)	
12	8.1(8)	0	7.1(7)	1.0(1)	2.0(2)
13	4.8(6)	0	4.8(6)	0	0.8(1)
14	3.1(5)	0	3.1(5)	0	2.5(4)
15	4.3(6)	0	3.6(5)	0.7(1)	1.4(2)
16	2.5(4)	1.3(2)	1.3(2)	1.9(3)	3.8(6)
17	4.3(4)	0	3.2(3)	0	1.1(1)
18	7.1(5)	0	4.3(3)	0	

This study found a low prevalence of obesity in males at age 16 years (0.9-2.7%) while the females prevalence ranges between 0 and 1.9% across the ages on either IOTF or CDC cutoff point. This observation was low compared with previous studies carried out on Nigerian children. Akesode and Ajibode reported prevalence of 3.2% and 5.1% in males and females while Owa and Adejuyigbe reported 18% for all children ages 5-15 years^{25, 26}. The variance in this observation might be due to difference in sample size used. The present study used larger sample size (1638 vs. 457). Though the prevalence of underweight was not reported in this study, it is evident that both under- and overweight coexist together. This demonstrates the degree of heterogeneity in health and nutrition problems in developing countries. This was supported by finding of Wang and Lobstein who reported that a number of lower- and middle-income countries have experienced a transition from under- to over-nutrition problems or, quite frequently a double burden of both malnutrition and obesity³.

When triceps skinfold thickness was used as a measure of obesity in term of overfatness, more adolescents can be classified as obese. Prevalence of 0-2.4% and 0.8-3.8% in males and females respectively were observed. This finding was similar to that of Monyeke et al, who observed more boys to be obese when sum of triceps and subscapula skinfolds was used as a measure of overfatness³⁰.

Another finding in this study is that both IOTF and CDC BMI references used compared fairly well for overweight and obesity in both genders. Prevalence of 0-8.1% vs. 0-7.4% and 0-2% vs. 0-2.7% for males overweight and obesity respectively; 2.5-8.1% vs. 1.3-7.1% and 0-1.3% vs. 0-1.9% for females overweight and obesity respectively. This was similar to Kain et al finding who reported that in 6-y-old Chilean children, the CDC and IOTF criteria generated comparable prevalence estimates for overweight, but the IOTF reference value for obesity generated a lower prevalence estimate than did the CDC reference value³⁴. Also, the reference values of IOTF gave lower estimates than did the CDC-US growth charts for young children but higher estimates for older children³⁵.

In summary, we have a situation in which some percentage of Nigerian adolescents in an urban community demonstrated overweight and small percentage demonstrated obesity in term of overfatness.

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