OVERWEIGHT AND OBESITY STATUS OF SCHOOL ADOLESCENTS IN PORTHARCOURT, SOUTHERN NIGERIA

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ABSTRACT

BACKGROUND: Adolescent overweight and obesity has been linked to obesity in adult life, with its associated risks of chronic diseases including cardiovascular diseases. Thus, prevention aimed at early screening and surveillance should be the key. The aim of this study is to determine the prevalence of overweight and obesity among schooling adolescents in Port Harcourt.

MATERIALS AND METHODS: A cross sectional study was carried out on 2,282 secondary school students aged 10–19 years, using a structured questionnaire to obtain data. Weights and height were measured using standard methods. The Body Mass Index (BMI) was calculated from their weights and heights in kg/m.2 The nutritional status of the students was determined using the BMI percentile charts for age and gender as recommended by the World Health Organisation in 2007.

RESULTS: The prevalence of overweight and obesity were 13.2% and 4.6%. The female subjects had a higher prevalence of overweight and obesity (14.6% and 5.2%) than the males (11.4% and 3.8%) and this difference was statistically significant (P = 0.041).

CONCLUSION: The prevalence of overweight and obese adolescents in Port Harcourt is high. We recommend that health education with emphasis on lifestyle changes and behavioral modification that will promote healthy eating and regular physical activities be inculcated into the curriculum of secondary schools in Nigeria.

KEYWORDS: Overweight, Obesity, Adolescents, Nigeria.

INTRODUCTION

Childhood obesity is an important predictor of adult obesity.[1-3] Overweight and obese adolescents are likely to stay obese into adulthood and are more likely to develop chronic diseases.[4-6] Global rates of obesity have increased over the past two decades.[7] Obesity was once considered a problem of high-income countries, however, overweight and obesity are now on the rise in low and middle-income countries, particularly in urban settings.[8] The rate of increase of childhood overweight and obesity is 30% higher in low and middle-income countries than in developed countries.[8-11]

Previous studies shows that in the United States of America, from 1980 to 2012, the percentage of children aged 12–19 years who were obese rose from 5% to nearly 21%.[12] In Africa, the estimated prevalence of childhood overweight increased from 4% in 1990 to 7% in 2011, and is expected to reach 11% in 2025.[13] However, a study of African adolescents aged 11–17 years from seven countries, reported a prevalence of overweight to range between 8.7% in Ghana to 31.4% in Egypt, and obesity ranged between 0.6% in Benin to 9.3% in Egypt.[14] Another study of Ghanian and Ugandian school adolescents, found that 10.4% girls and 3.2% boys were overweight.[15] In Nigeria, there have been varied reports on the prevalence of overweight and obesity ranging between 1 - 19%.[16-23] A recent study by Adesina et al[23] in Port Harcourt reported that 6.3% and 1.8% of adolescents aged 10–19 years were overweight and obese respectively.

Obesity is a risk factor for a range of conditions including cardiovascular diseases, diabetis mellitus and premature death.[24-26] In addition, psychological disorders such as depression occur with increased frequency in obese children.[27] Obesity and its associated diseases not only have a negative impact on

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the quality and duration of life, they also constitute a financial burden for its victims and the health care system. Once obesity is established in children (as in adults) it is hard to reverse.[7] Therefore, monitoring the prevalence of obesity in order to plan services for the provision of care and to access the impact of policy initiatives is essential.[7] Therefore, efforts at curbing this global public health menace should be aimed at prevention, and schools can be used as screening points and to help adolescents adopt and maintain healthy lifestyles to prevent overweight and obesity.

Port Harcourt is an urban city with all the trappings of urban life including a widespread proliferation of fast food outlets responsible for high fat convenient and inexpensive high calorie foods and beverages, which are thought to contribute to overweight status in adolescents.[28] The present study aims to determine the prevalence of overweight and obesity among adolescents in Port Harcourt.

METHODOLOGY
A cross-sectional study was carried out between May and June 2014 of 2,282 secondary school students aged 10–19 years selected through a multi-staged stratified sampling technique. The schools were first stratified into public and private schools, and ten secondary schools (5 public, 5 private) were selected by simple random sampling. The study was conducted in Port Harcourt city, Southern Nigeria over a period of eight weeks. It is an urban city, highly industrialized and oil and gas exploration is the mainstay of the economy.

Permission was obtained from the Rivers State Ministry of Education and from the Head teachers of the 10 selected schools and the parents or guardians and assent from the selected students. This study was carried out on school days in the various schools and the subjects were interviewed on relevant information. Apparently healthy secondary school students aged 10 to 19 years in the selected schools, who gave assent for the study, and whose parents/ guardians gave consent, made up the study population. Students with known chronic illnesses such as sickle cell anaemia, renal diseases, endocrine diseases and asthma were excluded, as these conditions could negatively affect their growth status. Weight was measured using a well calibrated, portable bathroom scale (Hana scale, model BR-9011) in kilograms (kg). Height was measured using a portable stadiometer well calibrated up to 2 meters. The Body Mass Index (BMI) for each student was calculated using the formula weight/height^2 (kg/m^2). The nutritional status of the students was determined using the BMI percentile charts for age and gender as recommended by the World Health Organisation in 2007.[29]

Data Analysis
Data entry and analysis was done using SPSS software version 21.0 (IBM Corporation, Atlanta, GA, USA). These results are presented as tables in simple proportions. Bivariate analysis was done with chi-square (^{2}) test to examine the relationship between age, gender and overweight and obesity. In all cases, a probability value (p value) of < 0.05 was regarded as statistically significant.

Results
Two thousand two hundred and eighty two students were recruited for this study. There were 1022 males (44.8%) and 1260 females (55.2%), giving a male to female ratio of 1:1.2. They were aged 10 – 19 years, with a mean age of 14.96 ± 2.1 years. As shown in table 1, majority of the subjects were aged 15–17 years, while the 19 year olds were the least represented.

Anthropometry of the subjects
The mean weight of the subjects was 52.50 ± 11.17 kg (range 26–102 kg). The mean height of the subjects was 1.58 ± 0.08 m (range 1.3 – 1.9 m). The mean BMI of the subjects was 21.05 ± 3.35 kg/m^2 (range 13.3 - 44.4 kg/m2). The females had significantly higher mean weights than the males (P < 0.01), however, there was no significant gender difference in the mean heights and BMI of the subjects as shown on table 2. The relationship between the age of the subjects and their weights, heights and BMI respectively was statistically significant (P < 0.01) as shown in table 3.

Prevalence of overweight and Obesity
Of the 2,282 subjects, 1842 (80.7%) had normal weight, 301 (13.2%) were overweight while 104 (4.6%) were obese as shown in table 4. The female subjects had a higher proportional prevalence of overweight and obesity (14.6% and 4.6%) compared to the males (11.4% and 3.8%) respectively and this difference was statistically significant (P = 0.041) as shown in table 5.

The proportional prevalence of the overweight subjects increased from ages 10–12 years and from 14-15 years with a peak prevalence at 15 years (22.6%) and then dropping to 19 years. Similarly, the proportional prevalence of obesity increased with age to a peak at 16-17 years (21.4%), then dropping gradually to 19 years. The relationship between age and overweight and obesity respectively was statistically significant (P = 0.021) as shown in table 6.

DISCUSSION
In this study, the prevalence of overweight and obesity amongst the adolescents were 13.2% and 4.6% respectively. These prevalence rates are higher than those previously reported by other researchers in Nigeria.[16,17,19-21] Previous studies done in the same

54

location as the present study reported prevalence rate of overweight and obesity of 1.8–6.3% amongst school adolescents aged 10–19 years.[23,30] This high prevalence found in the present study draws attention to different epidemiological studies which have reported an increasing prevalence of overweight and obesity amongst adolescents over the last three decades.[14,31] This has been attributed to rapid urbanization and westernization, leading to adoption of unhealthy lifestyles contributing to their overweight and obese status.[28] The reported prevalence of overweight adolescents in this study is similar to the 13.8% prevalence found in a recent study in Lagos, Nigeria.[22] This is not surprising, as these are two large cosmopolitan cities in Nigeria, with all the trappings of urban life and proliferation of fast food chains within the cities, responsible for high fat and calorie foods and beverages contributing to overweight status of these adolescents. The 4.2% prevalence of obesity is similar to that reported amongst adolescents in Ile Ife, South West Nigeria.[18] It is however still lower than the prevalence rates reported in developed countries like Italy (8.4%),[32] USA (15%), France (14%), United Kingdom (20%) and Spain (35%).[33]

The higher prevalence of overweight and obesity found amongst females in this study compared to males is in keeping with previous reports by Adesina et al[23] and Ene-Obong et al[21] amongst adolescents in Southern Nigeria, similar location as the present study. Gender differences in the prevalence of overweight and obesity in children and adolescents have been reported by different researchers, and varies from place to place.[15-23,32] In Nigeria, most studies have shown a higher prevalence amongst females, than males.[16,18,21,23] This is in contrast however to findings of previous studies in high-income countries which showed a higher prevalence of overweight among adolescent boys than girls.[32,34] Reasons for the different patterns in low and medium-income countries and high-income countries have been postulated to include cultural beliefs about body image,[35] and higher levels of physical activity including harder chores and manual labour among adolescent boys in low and medium-income countries than girls.[14,35,36] In a study of black African adolescent girls, it was found that two thirds of the girls perceived fatness as a sign of happiness and wealth, whilst the obese girls who preferred being fat looked at it as a sign of respect.[37] In the present study, being overweight tended to increase gradually with age to a peak at 15 years, while the risk of being obese was higher at 16-17 years. This is similar to reports by Olumakaiye[38] among adolescents in Osun State, South West Nigeria. There have been varied reports on the effect of age on overweight and obesity among adolescents. While Zephier et al[39] found that the prevalence of obesity in males increased with age among American Indian school children and adolescents, Maruf et al[16] reported a decreasing prevalence of obesity with age amongst adolescents in Nigeria. Reasons for these differences in the trend of age on overweight and obesity are unknown and further studies need to be done especially in this region to find explanations.

CONCLUSION

The prevalence of overweight and obesity amongst adolescents in Port Harcourt is high and seems to be increasing. Female adolescents had a significantly higher prevalence of overweight and obesity than the males. We therefore recommend that adolescents be screened regularly in schools and lifestyle changes aimed at healthy eating and regular physical activity be inculcated into the school curriculum of all secondary schools to prevent overweight and obesity amongst adolescents.

Conflicting interest: The authors have no conflicting interests.

Authors' contributions: Joyce Okagua conceived of the idea for the study, designed the questionnaire, collected and wrote the manuscript. Balafama A. Alex-Hart also collected the data and analyzed, while Tamunopriye Jaja also collected the data and revised the manuscript and made significant intellectual contributions. All the authors read and approved the final manuscript.

55

Tables
Table 1: Age distribution of the subjects

Age	No	%
10	66	2.9
11	136	6.0
12	133	5.8
13	170	7.4
14	293	12.8
15	488	21.4
16	453	19.9
17	320	14.0
18	179	7.8
19	44	1.9
Total	**2282**	**100.0**

Table 2: Anthropometry of the subjects by gender

Anthropometry	Sex	No.	Mean ± SD	T-test	P-value
Weight	Male	1022	48.55 ± 13.04	-8.676	0.000
	Female	1260	53.51 ± 10.40		
Height	Male	1022	1.58 ± 0.12	0.913	0.362
	Female	1260	1.58 ± 0.07		
BMI	Male	1022	21.44 ± 3.70	-0.766	0.444
	Female	1260	21.56 ± 3.45		

Table 3: Mean Anthropometry of the subjects by Age

Age	Weight (kg) Mean ± SD	Height (m) Mean ± SD	BMI (kg/m^2) Mean ± SD
10	37.76 ± 8.99	1.45 ± 0.08	18.69 ± 3.36
11	40.88 ± 10.56	1.49 ± 0.07	19.95 ± 3.16
12	45.29 ± 8.86	1.52 ± 0.07	20.43 ± 2.54
13	49.21 ± 11.66	1.55 ± 0.09	21.32 ± 4.11
14	52.13 ± 9.180	1.58 ± 0.07	21.55 ± 4.10
15	54.04 ± 8.52	1.59 ± 0.08	21.50 ± 3.18
16	55.53 ±11.86	1.59 ± 0.08	22.04 ± 3.28
17	56.48 ± 10.50	1.60 ± 0.07	22.08 ± 3.65
18	55.67 ± 8.48	1.60 ± 0.07	21.39 ± 2.49
19	57.46 ± 10.26	1.60 ± 0.06	21.50 ± 3.58
Total	**52.50 ± 11.17**	**1.58 ± 0.08**	**21.05 ± 3.35**
Anova (f)	**60.273**	**63.796**	**5.668**
P-value	**0.000**	**0.000**	**0.000**

Table 4: Prevalence of overweight and obesity in the subjects

BMI percentile	No.	(%)
Under weight	35	1.5
Normal weight	1842	80.7
Over weight	301	13.2
Obese	104	4.6
Total	**2282**	**100**

Table 5: Prevalence of overweight and obesity by gender

BMI percentile	Male	Female	Total (%)
Under weight	18 (1.8)	17 (1.3)	**35 (1.5)**
Normal weight	848 (83.0)	994 (78.9)	**1842 (80.7)**
Over weight	117 (11.4)	184 (14.6)	**301 (13.2)**
Obese	39 (3.8)	65 (5.2)	**104 (4.6)**
Total	**1022 (100.0)**	**1260 (100.0)**	**2282 (100)**

$\chi^2 = 8.28$, P-value = 0.041

Table 6: Prevalence of overweight and obesity by age in the subjects

Age	underweight No	underweight %	Normal No	Normal %	Overweight No	Overweight %	obesity No	obesity %	Total No	Total %
10	1	2.9	51	2.8	8	2.7	6	5.8	66	2.9
11	2	5.7	103	5.6	21	7.0	10	9.6	136	6.0
12	1	2.9	93	5.0	30	10.0	9	8.7	133	5.8
13	2	5.7	133	7.2	27	9.0	8	7.7	170	7.4
14	4	11.4	231	12.5	45	15.0	13	12.5	293	12.8
15	9	25.7	399	21.7	68	22.6	12	11.5	488	21.4
16	7	20.0	375	20.4	52	17.3	19	18.3	453	19.9
17	7	20.0	265	14.4	29	9.6	19	18.3	320	14.0
18	2	5.7	154	8.4	19	6.3	4	3.8	179	7.8
19	0	0.0	38	2.1	2	0.7	4	3.8	44	1.9

Fisher's Exact = 43.956, P-value = 0.021

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58

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59