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Overweight and Obesity among Preschool Children in Port Harcourt, Nigeria

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Abstract: Childhood obesity portends risk of adult overweight and obesity and its health consequences. This problem is preventable; unfortunately information on the extent of the problem is scarce in Nigeria. This study aimed at determining the prevalence and factors associated with overweight and obesity among preschool children in Port Harcourt. A cross-sectional study was conducted between September and November, 2010. Two hundred and twenty children in pre-nursery and nursery schools in Port Harcourt were studied. Information were obtained using a self-administered questionnaire filled out by their parents. Heights and weights were measured and BMI calculated, CDC BMI-for-age used for classification of overweight and obesity. Analysis was done using Epi Info 6.04 d. The mean age of the preschoolers was 3.2±1.0 years. The prevalence of overweight and obesity were 15% and 8.6%, respectively. There was no significant sex difference ($p = 0.720$), viewing television longer than one hour daily was not associated with BMI ≥ 85 th centile ($p = 0.118$), while consumption of high fat diet ($p = 0.046$) and sugar-sweetened drinks ($p = 0.000$), were associated. Prevalence of overweight and obesity was high among preschoolers in Port Harcourt and was strongly associated with consumption of sugar-sweetened drinks. Mothers in Port Harcourt should be discouraged from giving their children sugar sweetened drinks. More robust studies are needed to confirm findings and identify other risk factors.

Key words: Childhood overweight, obesity, preschool children, Port Harcourt

INTRODUCTION

Childhood obesity is one of the most serious Public Health challenges of the 21st century (WHO, 2014). As early as 1998, the World Health Organization (WHO, 1998), declared obesity in childhood a major public health epidemic requiring urgent intervention. Obesity among under-fives has continued to increase at an alarming rate ("Childhood overweight and obesity," 2014), affecting about 43 million under five aged children in 2010 representing a 60% increase since 1990, (de Onis *et al.*, 2010). Furthermore it has been projected that in 2020 the number of overweight and obese under-fives will hit 60 million globally if intervention measures are not put in place to control the current epidemic (de Onis *et al.*, 2010).

The problem of overweight and obesity in preschool children is global; affecting the developed and developing countries but its impact is more on the developing countries which account for 35 million of the 43 million obese and overweight preschool children worldwide (de Onis *et al.*, 2010). In these poor countries, obesity with its associated chronic debilitating diseases co-exists with infectious diseases which accompany under nutrition, giving a double burden of disease (Obesity Prevention Source, Child obesity: To many kids are too heavy, too soon. Harvard

School of Public Health. Available at www.hsph.harvard.edu/obesity-prevention-source/obesitytrends/global-obesity-trends-in-children).

The prevalence of overweight and obesity differ from country to country. Gaeini *et al.* (2011), reported prevalence rates of overweight of 9.81 and 10.31% and obesity of 4.77 and 4.49% among Iran preschool male and female children respectively. Also in Iran, (Fatemeh *et al.*, 2012), reported prevalence rates of overweight of 10.6% and obesity of 7.6% amongst 2-5 year old kindergarten children in Birjand. Maffeis *et al.* (2006), reported overweight and obesity prevalence rate of 16.6 and 8.0%, respectively among 2 to 6 year old Italian children. In the United State of America, prevalence of obesity among preschool children aged 2 to 5 years was 8.4 and 14.94% among US low income preschool aged children (CDC, 2012). In Africa, the prevalence of childhood overweight and obesity was 8.5% in 2010 and it is estimated to reach 12.7% in 2020 (de Onis *et al.*, 2010). There is profound paucity of data on overweight and obesity among preschool children in Nigeria. Majority of the studies (Ben-Bassey *et al.*, 2007; Akesode and Ajibode, 1983), done concentrated on school aged children and adolescents. However, the prevalence of obesity among preschool children in Enugu Metropolis was 0.5% (Odetunde *et al.*,

2014) and in Lagos State, Senbanjo and Adejuyigbe (2007) reported prevalence rate of overweight and obesity of 13.7 and 5.2%, respectively.

Several risk factors for childhood obesity have been identified. The greatest risk factor is obesity in both parents (Wikipedia, the free encyclopedia. Childhood obesity. Available at www.en.wikipedia.org/wiki/childhood_obesity. Accessed 20th June 2014). The WHO consultation forum on obesity reported that the fundamental cause of obesity epidemic are sedentary lifestyle and consumption of high fat-energy-dense diets. These results from the effects of increased urbanization and industrialization on the society and the behavioral patterns of communities (Obesity, 2000).

Several problems have been associated with overweight and obesity among preschool children. Studies (Freedman *et al.*, 2005; Childhood obesity facts) have shown that children who become obese as early as two years of life are likely to be obese adults who are prone to developing health problems such as heart diseases, type 2 diabetes, stroke, several types of cancer and osteoarthritis. Obese children are often teased, harassed and discriminated against by their peers and family members, putting them at risk of developing psychological problems and school phobia (Discrimination, 2007). These chronic diseases are a huge burden on the health system. Concerted efforts must therefore be made to prevent obesity and overweight in preschool children in order to ensure a healthy adult population in the future. There is scarcity of data on overweight and obesity in preschool children in Port Harcourt. This study therefore aimed to determine the prevalence of overweight and obesity among preschool children in Port Harcourt as well as identify some factors associated with overweight and obesity in these children.

MATERIALS AND METHODS

Study area: This study was conducted in Port Harcourt City Local Government Area. Port Harcourt is the capital of Rivers State in the Niger Delta Region of Nigeria. It is cosmopolitan oil city with a population of 1, 382, 592 (Federal Republic of Nigeria, 2006) Port Harcourt City Local Government is one of the two Local Government Areas in Port Harcourt and has about 40 pre-nursery and nursery schools.

Study population: The study population consisted of children between the ages of 2 and 5 years. Children who had any chronic illness were excluded.

Study design: The study was a descriptive cross-sectional study conducted between September and November, 2010.

Sampling method: Through a multistage sampling technique, 220 children derived using formula for

calculating proportion, prevalence of obesity of 13.7% from a study done in South West Nigeria (Senbanjo and Adejuyigbe, 2007), at 5% margin of error and 95% Confidence Interval were studied. Children who had any chronic medical conditions were excluded.

Schools in the Local Government Area were clustered based on geographical locations into four. Ten schools were randomly selected proportionate to the size of the clusters. Classes were stratified according to age and samples were allocated proportionate to the size of the class. Overall, 220 children who met the eligibility criteria were selected by simple random sampling using the class lists.

Data collection: Information was sought from the mothers of the selected children using self-administered questionnaires. The information included; socio-demographic data, dietary habits based on daily consumption of sugar-sweetened drinks and daily total screen time. The food types were classified into fruits/vegetables; grains/cereals and fatty/fried foods according to their energy content, using examples of locally available foods. Fruits and vegetables for low-energy and fatty/fried foods for high-energy.

Measurements: The weights and heights of the children were measured to the nearest 0.5 kg using a spring balance weighing scale with pointer at zero mark and scale on a firm horizontal surface and with child clad in minimum clothing. Three measurements of each pupil were taken at the same time by a single observer and averaged (MCHB Training Module. Accurate weighing and measuring infants, children and adolescents: technique: <http://www.cdc.gov/growthcharts/background.htm> at <http://depts.washington.edu/growth/module5/text/page1a.htm>. Accessed on 15/06/2013).

Heights were measured without shoes with child standing erect on a flat surface with a horizontal gaze and measurements taken to the nearest 0.1 cm using a non-expandable meter rule.

Overweight and obesity were defined as BMI ≥ 85 to ≤ 95 th centile and BMI > 95 th centile, respectively, underweight as < 5 th centile and normal weight as between 5th and 85th centiles, (Use and interpretation of the WHO and CDC Growth Charts for children from Birth to 20 years in the United States. At <http://www.cdc.gov/nccdph/dnpa/growthcharts/resources/growthcharts.pdf>. Accessed on 18/06/2013).

Data analysis: Data were entered into excel worksheet and analyzed using Epi Info 6.04 d. Chi square was used to test for association between independent variables (age, sex, television viewing and diet) and BMI ≥ 85 th centile, at 5% significant level and 95% Confidence Interval. Data were presented using frequency tables.

Ethical considerations: Ethical approval for this study was given by the University Port Harcourt Teaching Hospital Ethical Committee and other necessary permissions obtained from the appropriate authorities. Also the consent parents of subjects were obtained verbally.

RESULTS

Of the 220 children studied, 101 (45.9%) were females and 119 (54.1%) males, the mean age of the preschoolers was 3.2±1.0 years.

Nineteen (8.6%) were obese, 33 (15%) were overweight, 65.9% had normal body mass index (BMI), 23 (10.5%) were underweight. The combined prevalence of obesity and overweight was 23.6%, females (24.8%) and Males (22.7%). There was no statistically significant gender difference in prevalence of obesity and overweight, $p = 0.72$.

Nearly two-thirds (62.12%) of the preschoolers viewed television for more than one hour a day. While 71.15% of those with BMI \geq 85th centile viewed for more than one hour, 58.90% of those with BMI \geq 85% centile viewed for one hour. Screen-time was however not significantly associated with BMI \geq 85th centile, $p = 0.118$.

Overall, 138 (71.13%), 20 (10.31%) and 36 (18.56%) of the children preferred grains, fruits and fatty acids respectively. Though only 18.56% of the children preferred fatty foods, those with BMI \geq 85th centile constituted a higher percentage (28.00 vs 15.28%). This difference was found to be statistically significant, $p = 0.046$.

On consumption of sugar-sweetened drinks, 44.44% of the children consumed more than one bottle of sugar-sweetened drinks in two days, out of which those who had BMI \geq 85th centile were 88.46%, showing a very high percentage. The difference was highly statistically significant $p = 0.000$.

DISCUSSION

This study showed a high prevalence of obesity and overweight (23.6%) among preschoolers in Port Harcourt with the proportion of those who were overweight almost twice as high as those who are obese (15.0 and 8.6%). Preference for fatty foods and sweetened drinks were found to be associated with overweight and obesity while gender and television viewing were not.

Most of the studies, (Ben-Bassey *et al.*, 2007; Akese *et al.*, 1983; Odetunde *et al.*, 2014) found on obesity in Nigeria were done on young people and adults, only the study in Lagos, (Senbanjo and Adejuyigbe, 2007) was on preschoolers.

Comparing our study with other studies was affected due to the different reference standards and periods of study in different studies. The pattern of overweight and obesity varied from country to country, (Gaeini *et al.*,

Table 1: Age/Sex distribution of the study population

Age (years)	Female (%)	Male (%)	Total (%)
2-	29 (46.8)	33 (53.2)	62 (28.2)
3-	39 (49.4)	40 (50.6)	79 (35.9)
4-	25 (46.3)	29 (53.7)	54 (24.5)
5	8 (32.0)	17 (68.0)	25 (11.4)
Total (%)	101 (45.9)	119 (54.1)	220 (100)

Table 2: BMI Distribution of the study population

Weight status	Frequency (%)
Obese	19 (8.6)
Overweight	33 (15.0)
Normal weight	145 (65.9)
Underweight	23 (10.5)
Total	220 (100.0)

2011; Fatemeh *et al.*, 2012; Maffei *et al.*, 2006) these variations could be a reflection of cultural and environmental differences.

There was no significant sex difference in prevalence of obesity and overweight. This was in tandem with findings from Nigeria, (Senbanjo and Adejuyigbe, 2007) Italy, (Maffei *et al.*, 2006), USA, (CDC, 2012) and India, (Kaur *et al.*, 2010) but in contrast with findings from UK, (Reiley *et al.*, 2005) and France, (de Onis *et al.*, 2000)

Prevalence of overweight among preschoolers in Nigeria was reported as 4.0% in 1990, (Martorell *et al.*, 2000), 13.7% in (Senbanjo and Adejuyigbe, 2007) and 15% in 2010 by our study, an increase of more than three times between 1990 and 2010. This seeming rapid increase in 20 years might be due to differences in study design, rapid urbanization and shift in dietary behavior following improvement in socio-economic status of families due to industrialization, thus in line with current trends.

Obesity prevalence in this study was similar to that reported in USA, (CDC, 2012) and Italy, (Maffei *et al.*, 2006) among preschoolers. This is not surprising because Port Harcourt city is the capital of the oil state and most of the pre-nursery and nursery schools are private schools patronized by affluent families. However, it was higher than that reported by Senbanjo and Adejuyigbe (2007); Kaur *et al.* (2010) and Kuma *et al.* (2008), but lower than the report from Egypt, (de Onis *et al.*, 2010). Obesity in Nigeria was estimated at 0.7% in 1990, (Martorell *et al.*, 2000), 5.2% in 2007, (Senbanjo and Adejuyigbe, 2007) and our study showed 8.6% in 2010, also suggesting that obesity is increasing rapidly by 65.38% between 2007 and 2010 in preschoolers in Nigeria. The implication of increasing prevalence of overweight and obesity in children is a high burden of non-communicable diseases in the future for Nigeria. There is need for an urgent intervention to reverse this trend.

Most studies reviewed on association of television viewing and childhood obesity were on older children

Table 3: Sex prevalence of overweight and obesity

	Total N = 220	BMI < 85 TH Per-centile (%)	BMI ≥ 85 TH Per-centile (%)	Chi-square	p-value	Crude OR*
Male	119 (100)	92 (77.3)	27 (22.7)			
Female	101 (100)	76 (75.2)	25 (24.8)			
Total	220 (100)	168 (76.4)	52 (23.6)	0.129	0.720	1.12 (CI = 0.60-2.08)

*OR = Odds Ratio, CI = 95% Confidence Interval

Table 4: Factors associated with overweight and obesity (n = 198)*

Screen time/day	BMI ≥ 85 th percentile	BMI < 85 th percentile	Total	Chi square	p = value	Crude OR
(A)						
>1 h	37 (71.15)	86 (58.90)	123 (62.12)			
≤1 h	15 (28.85)	60 (41.10)	75 (37.88)			
Total	52 (100)	146 (100)	198* (100)	2.445	0.118	1.72 (CI = 0.87-3.39)
*22 of the 220 questionnaires not returned						
(B) Food type						
Fatty food	14 (28.00)	22 (15.28)	36 (18.56)			
Non fatty food	36 (72.00)	122 (84.72)	158 (81.44)			
Total	50	144	194*(100)	3.975	0.046	2.16, (CI = 1.01-4.61)
*4 questionnaires had incomplete information on diet						
(C) Consumption of sugar- sweetened soft drinks						
>1 Bottle in 2 days	46 (88.46)	42 (28.77)	88 (44.44)			
≤1 Bottle in 2 days	6 (11.5)	104 (71.23)	110 (55.56)			
Total	52 (100)	146 (100)	198 (100)	55.337	0.000	18.98 (CI=7.6-47.40)

and adolescents, (Singh *et al.*, 2008; Rey-Lopez *et al.*, 2008; O'Brien *et al.*, 2007). Proctor *et al.* (2003) and Boone *et al.* (2007), reported that the more television children watch, the more likely they are to gain weight due to physical inactivity. Mendoza *et al.* (2007), found that ≥2 h watching of television was associated with overweight in preschoolers. However our finding did not agree with these studies probably because we used one hour screen-time while most reviewed studies used two or more hours. The difference between these observations could also be that the other studies were done among older children and adolescents and naturally preschoolers are known to be very active by virtue of their age. This may have compensated for the period of inactivity due to television viewing. Consumption of high fat foods is one of the fundamental causes of obesity, (Obesity, 2000). Our result was consistent with that of Johnson *et al.* (2008) that showed association of energy dense foods with obesity. However the association was not strong probably due to limitations in dietary assessment in this study.

Our study further showed a strong relationship between consumption of sugar sweetened drinks and overweight and obesity among the preschoolers in agreement with many other studies, (Welsh *et al.*, 2005; Ludwig *et al.*, 2000). It is interesting to note that Newby *et al.* (2004), observed that consumption of sweetened drinks was not associated with obesity in children from low-income families in contrast to the finding of Welsh *et al.* (2005). Our findings show that overweight and obesity in childhood is on the increase in Nigeria and has in fact exceeded the estimated 12.7% for Africa by 2020, (de Onis *et al.*, 2010).

This study was limited by the usual difficulties in measuring diet as an exposure, [like portion size and frequency of consumption]. Dietary assessment was

based on subjective measurements which are less reliable than objective methods. Also parental factors and genetic predisposition were not studied. These may have affected the results and consequently the interpretation of our findings.

Conclusion: Prevalence of overweight and obesity was high among preschoolers in Port Harcourt. Preference of fatty foods and sugar-sweetened soft drinks were associated BMI ≥85th percentile. The strong association with sugar sweetened drinks is a cause for worry and demands urgent intervention through nutrition education for mothers, especially of preschool children. Policy makers should address the problem of childhood obesity especially in preschoolers when food habits are formed. More robust studies are needed to confirm findings and identify other risk factor.

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