Research Paper

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Trends in Weight Abnormality of School Children and Adolescents in Nigeria

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The objective of this study was to determine the pattern of weight abnormality in school children and adolescents in Ota, Nigeria. A total of 926 subjects (male: 357; female: 569) aged 2-19 years, randomly selected from schools in Ota, Nigeria, participated in the study. The subjects were divided into five age groups: early childhood (2-5 years), middle childhood (6-9 years), late childhood (10-12 years), early adolescence (13-16 years) and late adolescence (17-19 years). Body mass indices (BMI) were calculated as 'weight(kg)/height(m)^2'; body weights were defined using CDC age- and sex-specific BMI cut-offs. Weights and heights of subjects increased proportionately with age, indicative of a progressive growth pattern. Abnormal body weights occurred in 22.4% of the subjects (underweight, 9.0%; overweight, 9.1%; obesity, 4.3%). Weight abnormality reduced as the age of subjects increased; it was 43.8, 31.1, 20.0, 19.5 and 17.7%, respectively for early childhood, middle childhood, late childhood, early adolescence and late adolescence. Underweight occurred most in early childhood while overweight and obesity peaked at middle childhood. Weight deficiency was higher in males (10.4%) than females (7.9%) whereas weight excess was 12.6% in males and 13.9% in females. The study showed that weight deficiency and weight excess co-exist in School children and adolescents in Ota, Nigeria. Whereas weight deficiency due to under-nutrition prevailed in early childhood, weight excess resulting from over-nutrition was more prevalent in the older children and adolescents.

Key words: Underweight, overweight, obesity, children, adolescents, Nigeria

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INTRODUCTION

Poverty and under-nutrition had for over three decades dictated the focus of research and policy on nutritional improvement in many developing countries such as Nigeria; obesity, due to its association with wealth and affluence, was thought to have low prevalence in these nations (Johnson, 1970; Wang *et al.*, 2002). Recent studies however indicate a rising prevalence of obesity in several developing countries (Bakari *et al.*, 2007; Durazo-Arvizu *et al.*, 2008; WHO, 1998), an upsurge attributed to nutritional transition and declining physical activities (Caballero, 2005; De Onis and Blossner, 2000). Children are not left out in the growing scourge of adiposity! Rising incidence of child obesity has also been reported in several developing nations (De Onis and Blossner, 2000; Wang and Lobstein, 2006). Studies in countries such as Brazil and China also indicate a transition from caloric deficiency to excess in the burden of nutritional concerns among older children and adolescents (Wang *et al.*, 2002). Childhood obesity is a significant risk for myriad health problems such as diabetes, high blood pressure and high cholesterol in both childhood and adult life (Akpa and Mato, 2008; Kadiri and Salako, 1997; Reilly, 2005).

In spite of the global rise in adiposity, under-nutrition still remains a major problem in many developing nations. As a result, many developing countries are currently facing a challenge of over-nutrition coexisting with under-nutrition (Wang *et al.*, 2002; Caballero, 2005; De Onis and Blossner, 2000). Although recent studies have reported rising incidence of adult obesity in Nigeria (Akpa and Mato, 2008; Bakari *et al.*, 2007; Kadiri and Salako, 1997), there is little information on overweight and obesity amongst Nigerian children and adolescents. This may not be unconnected with a widely held view that under-nutrition is the lot of the Nigerian child. The present study examined the prevalence of obesity, overweight and underweight amongst young persons aged between 2 and 19 years in Ota, Nigeria. Data on the current trend in body weight abnormality of school children and adolescents in Nigeria is vital for a knowledgeable handling of their nutritional needs.

MATERIALS AND METHODS

A total of 926 subjects ((357 males and 569 females) aged 2-19 years were selected from four educational institutions in Canaanland, Ota and divided into 5 age groups as shown in Table 1. The weight, height, age and sex of the subjects were studied. Weights (in kg) were measured to the nearest 0.1 kg using Produex™ digital balance (Springfield, USA). Heights (in m) were measured with calibrated meter rule to the nearest 0.001 m without shoes, cap or hair ornaments. Body mass indices (BMI) were calculated as weight (kg)/height $(m)^2$. Body weight category of each subject was determined based on CDC age-and sex-specific BMI cut-offs for children and adolescents (CDC, 2011). Body weight categories were defined as: underweight (BMI<fifth percentile); normal weight (BMI>fifth percentile<eighty-fifth percentile); overweight (BMI>eighty-fifth percentile<ninety-fifth), obesity (BMI>ninety-fifth percentile).

RESULTS AND DISCUSSION

The weights and heights of both the male and female subjects consistently increased with age. Table 2 shows the distribution of body weight abnormalities in both sexes among the different age brackets. Underweight was most prevalent (29.1%) in early childhood (pre-school children). This reduced drastically to 9.7% in middle childhood (primary school children) and further to 6.0% in late childhood (junior secondary school children). Weight excess peaked at middle childhood (primary school children) with overweight and obesity recording 12.2 and 9.2%, respectively. Late childhood recorded the same prevalence (6.0%) for underweight, overweight and obesity. Underweight was more prevalent in boys (10.6%) than the girls (7.9%) whereas overweight was more in the females (9.3%) compared to the males (8.4%). There was no significant difference in the prevalence of obesity in both sexes; it was 4.4% in females and 4.2% in the males. On the average, the prevalence of weight excess (13.3%) was higher weight deficiency (8.9%).

Weights and heights of subjects in both sexes were proportionately related to age. Growth was therefore deemed to be progressive vis-α-vis age of subjects. The females' weights peaked at early adolescence though their heights progressed into late adolescence. This was in contrast to the males that continued to appreciate in both heights and weights till late adolescence. The trend is quite normal considering the fact that females are known to attain physical maturity earlier than males of their age. Girls tend to become very concerned about their weight and shape as they enter the adolescent age and most of them prefer to be slime fit.

Prevalence of underweight was very high (29.1%) in early childhood (pre-school children). This may be attributed to the problem of malnutrition associated with this age bracket in Nigeria. Protein-energy malnutrition

Table 1: Schools and age groups of subjects

Group	Age (Years)	Classification	School type	Institution(s)
1	2-5	Early childhood	Pre-school	Kingdom Heritage Model School
2	6-9	Middle childhood	Primary	Kingdom Heritage Model School
3	10-12	Late childhood	Junior Secondary	Faith Academy and Covenant University Secondary School
4	13-16	Adolescence	Senior Secondary	Faith Academy
5	17-19	Late Adolescence	Tertiary	Covenant University

Table 2: Distribution of body weight abnormalities among the age groups and sexes of school children and adolescents in Ota, Southwest Nigeria

Age group	Age (Years)	Sex	Prevalence (%) Underweight	Overweight	Obesity	Weight excess	Total abnormality
1	2-5	Male	27.3	9.1	6.1	15.2	42.5
		Female	33.3	6.7	6.7	13.3	46.6
		Total	29.2	8.3	6.3	14.6	43.8
2	6-9	Male	6.0	10.8	8.4	19.3	25.3
		Female	12.4	13.3	9.7	23.0	35.4
		Total	9.7	12.2	9.2	21.4	31.1
3	10-12	Male	4.2	4.2	4.2	8.3	12.8
		Female	11.5	7.7	7.7	15.4	26.9
		Total	8.0	6.0	6.0	12.0	20.0
4	13-16	Male	6.3	9.4	3.1	12.5	18.8
		Female	6.1	9.9	3.8	13.6	19.8
		Total	6.2	9.7	3.6	13.3	19.5
5	17-19	Male	12.4	7.2	2.0	9.2	21.6
		Female	5.3	8.1	2.1	10.2	15.5
		Total	7.8	7.8	2.1	9.9	17.7
All	2-19	Male	10.6	8.4	4.2	12.6	21.2
		Female	7.9	9.5	4.4	13.9	21.8
		Total	9.0	9.1	4.3	13.4	22.4

has been identified as a major underlying cause of morbidity and mortality of a large proportion of children below five years in Nigeria (ENHANSE, 2007). It is estimated that over one million children under the age of five die annually in Nigeria (Ngowu *et al.*, 2008). Low body weight had been reported to be associated with greater mortality risk; it was suggested that people who are underweight do not have a lot of nutritional reserves to call upon when illness does occur (Flegal *et al.*, 2005). High prevalence of underweight therefore makes these age bracket vulnerable to infectious diseases such as malaria, pneumonia, diarrhoea, measles and HIV/AIDS which is said to account for more than 70% of the deaths in Nigeria. As long as underweight remains high in early childhood, the likelihood of cutting down under-five mortality rates is low; thus, Nigeria may not be able to achieve the Millennium Development Goal (MDG-4) of reducing child mortality by a two-third by 2015. Efforts must therefore be intensified to improve the nutritional status of this age group as this will contribute to their mental and physical development, as well as improved health and school performance through reduced vulnerability to diseases. It is important to state that schools selected for this study are fee paying institutions, mainly accessible to children from middle class and relatively affluent families. Underweight in this case may be related to the children's preference for less nutritive

foods such as sweetened biscuits and drinks as well as the children's inability to feed well at school. Parents and teachers of pre-school children must partner to effectively take care of the children and to feed them as and when due. The age bracket represents a critical period of rapid physical, cognitive and psychosocial development of the child. The quality and intensity of care, nutrition and stimulation given to a child at this period determines not only the child's survival but to a large extent the level of physical and cognitive development the child can attain (UNICEF, 2011a, b).

There was a drastic reduction in the prevalence of under-nutrition at middle childhood. At this stage, the children can readily eat by themselves and take more solid food. Consequently, they tend to gain weight and become more robust. As this happens, the children suddenly move from the state of weight deficiency to weight excess. Both overweight and obesity had the highest prevalence in middle childhood. Weight excess, presumably as a result of favorable protein-energy balance (over-nutrition), continued from this stage (middle childhood) to late adolescent stage. Overweight was the most prevalent abnormality from middle childhood through late adolescence and indeed the overall most significant abnormality in this study. Overweight pattern showed two bursts (high prevalence), at middle childhood (12.2%) and early adolescence (9.7%).

The fluctuations suggest that weight gained may be used for growth at the developmental stage of the subjects rather than as a build-up towards obesity. In this light, overweight may be considered harmless and probably beneficial to the growth and wellbeing of young people. Moreover, overweight was found not to be associated with excess mortality (Flegal *et al.*, 2005).

The occurrence of obesity increased from 6.3% in early childhood to peak at 9.2% in middle childhood; it then declined steadily to the lowest value of 2.1% in late adolescence. Obesity was more prevalent in children (6.0-9.2%) than in adolescents (2.1-3.4%). The high incidence of obesity in children means that the problems of under-nutrition as well as over-nutrition exist in these age groups. Similar situation has been reported in some other developing countries (Gardner *et al.*, 2010; Wang *et al.*, 2002). Family background may also have a role to play in this. Children of the affluent are predisposed to obesity and overweight due to over-nutrition whereas underweight due to under-nutrition may pervade in children of the less affluent families. It is interesting to note that the adolescents have lower prevalence of obesity compared with the children. Although childhood obesity has been identified as a significant risk for adult obesity and myriad co-morbidities obesity (Reilly, 2005), the finding did not indicate that childhood obesity will necessarily translate into adult obesity. In all the age groups, apart from early childhood, the percentage prevalence of weight excess was higher than that of weight deficiency. Weight excess (overweight and obesity) was more prevalent in girls compared to boys. The implication of the findings is that although over-nutrition and under-nutrition coexist, the challenge of over-nutrition appears to be of greater consequence in older children and adolescents whereas under-nutrition pervades in early childhood.

CONCLUSION

This study shows that weight deficiency and weight excess co-exists in Nigerian children and adolescents. It shows that whereas weight excess, mainly overweight, prevails in older children and adolescents, underweight still pervades in early childhood (under 5). More attention should be given to adequately feed and nurture pre-school children so as to reduce the incidence of weight deficiency. Weight abnormality in children appears to decline with age; the incidence consistently reduced with as the age of the subjects increase. There is a strong indication that childhood obesity may not necessarily translate into adult obesity.

REFERENCES

Akpa, M.R. and C.N. Mato, 2008. Obesity in Nigeria: Current trends and management. Niger. Med. Practitioner, 54: 11-15.

Bakari, A.G., G.C. Onyemelukwe, B.G. Sani, I.S. Aliyu, S.S. Hassan and T.M. Aliyu, 2007. Obesity, overweight and under weight in suburban Northern Nigeria. Int. J. Diabetes Metab., 15: 68-69.

CDC, 2011. CDC 2000 growth charts. Centers for Disease Control. http://www.cdc.gov/growthcharts /cdc_charts.htm

Caballero, B., 2005. A nutrition paradox: Underweight and obesity in developing countries. N. Engl. J. Med., 325: 1514-1516.

De Onis, M. and M. Blossner, 2000. Prevalence and trends of overweight among preschool children in developing countries. Am. J. Clin. Nutr., 72: 1032-1039.

Durazo-Arvizu, R.A., A. Luke, R.S. Cooper, G. Cao and L. Dugas *et al.*, 2008. Rapid increases in obesity in Jamaica, compared to Nigeria and the United States. BMC Public Health, Vol. 8. 10.1186/1471-2458-8-133

ENHANSE, 2007. Child survival situation in Nigeria: A policy brief. The ENHANSE Project/USAID Nigeria. http://pubs.futuresgroup.com/3525ENHANSEchild. pdf

Flegal, K.M., B.I. Graubard, D.F. Williamson and M.H. Gail, 2005. Excess deaths associated with underweight, overweight and obesity. J. Am. Med. Assoc., 293: 1861-1867.

Gardner, K., J. Bird, P.M. Canning, L.M. Frizzell and L.M. Smith, 2010. Prevalence of overweight, obesity and underweight among 5-year-old children in Saint Lucia by three methods of classification and a comparison with historical rates. Child: Care Health Dev., 37: 143-149.

Johnson, T.O., 1970. Prevalence of overweight and obesity among adult subjects of an urban African population sample. Br. J. Prev. Social Med., 24: 105-109.

Kadiri, S. and B.L. Salako, 1997. Cardiovascular risk factors in middle aged Nigerian. East Afr. Med. J., 74: 303-306.

Ngowu, R., J.S. Larson and M.S. Kim, 2008. Reducing child mortality in Nigeria: A case study of immunization and systemic factors. Soc. Sci. Med., 67: 161-164.

Reilly, J.J., 2005. Descriptive epidemiology and health consequences of childhood obesity. Best Practice Res. Clin. Endocrinol. Metab., 19: 327-341.

UNICEF, 2011a. Early childhood care and education. http://www.unicef.org/nigeria/children_1931.html

UNICEF, 2011b. Maternal and child health. UNICEF, Nigeria. http://www.unicef.org/nigeria/children_1926.html

WHO, 1998. Obesity: Preventing and managing the global epidemic. Report of a WHO Consultation on Obesity. World Health Organization, Geneva.

Wang, Y. and T. Lobstein, 2006. Worldwide trends in childhood overweight and obesity. Int. J. Pediatr. Obes., 1: 11-25.

Wang, Y., C. Monteiro and B.M. Popkin, 2002. Trends of obesity and underweight in older children and adolescents in the United States, Brazil, China and Russia. Am. J. Clin. Nutr., 75: 971-977.