Short Communication

Overweight and obesity among affluent Bengalee schoolgirls of Lake Town, Kolkata, India

Kaushik Bose, Samiran Bisai, Ashish Mukhopadhyay and Mithu Bhadra
Department of Anthropology, Vidyasagar University, Midnapore, West Bengal, India

Abstract

A cross-sectional study was undertaken to determine the prevalence of overweight and obesity among 431 Bengalee schoolgirls aged 6–9 years in Kolkata, India. Anthropometric measurements of height and weight were made on 431 girls. The body mass index (BMI) was computed following the standard equation. Overweight and obesity was defined following the internationally accepted BMI cut-off points. Results revealed that the overall rates of overweight and obesity were 17.63% and 5.10%, respectively. A steady increase in number of overweight individuals was observed from 6 to 9 years. The prevalence of overweight among affluent Bengalee children was higher than those reported from other Asian countries.

Keywords: Bengalee, girls, India, obesity, overweight.

Introduction

Obesity has become a global health problem, affecting more than 1.3 billion adults in both developed and developing countries (WHO 2005). The World Health Organization (1997) has identified an increase in childhood obesity in developed countries, and a high prevalence of childhood obesity has been reported in developing regions such as in Latin America (Filozof *et al*. 2001). Individuals are classified as overweight or obese based on their body mass index (BMI) (Cole *et al*. 2000), with the latter category having the higher BMI. Throughout this paper, these categories are treated as distinct; that is, those counted as obese are not also counted as overweight.

Correspondence: Dr Kaushik Bose, Department of Anthropology, Vidyasagar University, Midnapore 721 102, West Bengal, India. E-mail: banda@vsnl.net

The global prevalence of obesity in children aged 5–17 years is approximately 10%, but this is unequally distributed, with the prevalence ranging from less than 2% in sub-Saharan Africa to over 30% in the Americas (Lobstein *et al*. 2004). Childhood obesity has become a global epidemic, and it is still increasing in developed and developing countries (Chinn & Rona 2002). For example, the prevalence of obesity has almost doubled in children and tripled in adolescents during the last 25 years in America (Dietz 2004). A similar trend has been observed among children in

Canada (Tremblay *et al*. 2002). In Asian countries like China (Wang *et al*. 2002), the prevalence of obesity among children increased from 7.7% to 12.4% between 1991 and 1997, while a similar increase in the prevalence was observed in Japan (Matsushita *et al*. 2004) and Thailand (Mo-Suwan *et al*. 1993). Another recent study (Armstrong *et al*. 2006) also reported high rates of overweight and obesity among children belonging to different ethnic groups in South Africa. However, only limited data are available from the Indian subcontinent about the prevalence of obesity among children (Sidhu *et al*. 2006).

A recent study (Subramanyam *et al*. 2003) from Chennai, India, reported no statistically significant change in the prevalence of obesity in a 17-year time span among girls. It is important for investigations to track obesity from childhood to adulthood. Such studies give information about the long-term consequences of obesity. Moreover, these studies provide valuable insight into the contribution of obesity to adult obesity-related morbidity and mortality (Whitaker *et al*. 1997). Representative data for examining the prevalence of obesity and the diseases associated with it have been collected in most of the developed and many developing countries, but scant data from India are available (Sidhu *et al*. 2006). The present study was undertaken to evaluate the prevalence of overweight and obesity among affluent Bengalee schoolgirls aged 6–9 years from Lake Town, Kolkata.

Materials and methods

This study was conducted during the period January to March 2002, at a girls' school in Lake Town area of Kolkata, India. All girls ($n = 498$) of the primary section (year 1 to year 4) were invited to participate in this study. Measurements were made on 460 girls, as 38 girls declined to participate in the study. Out of these 460 girls, 29 girls were excluded from the investigation due to being outside of the study age range. The final sample size of the study was therefore 431. The distribution of children per age group was 94, 113, 119 and 105 for 6, 7, 8 and 9 years, respectively. All subjects were required to complete a questionnaire that included specific questions on age and ethnicity under the supervision of their class teachers. Formal written ethical consent was obtained from the university and school authorities before commencement of the study. Written consents were obtained from parents of all the subjects after verbal assents were given by the students. All subjects belonged to the upper social class and thus were from affluent families.

Table 1. Cut-off points for overweight and obesity among girls based on BMI as described by Cole *et al.* (2000)

Age (years)	Overweight	Obesity
6.5	17.5	20.1
7.5	18.0	21.0
8.5	18.7	22.2
9.5	19.5	23.5

BMI, body mass index.

Anthropometric measurements included height and weight. Trained investigators made all anthropometric measurements following standard techniques. The weighing scale was calibrated daily before the first measurement was taken. Height and weight were recorded to the nearest 0.1 cm and 0.5 kg, respectively. BMI was computed using the standard formula given below:

$$\text{BMI}\,(\text{kg}/\text{m}^2) = \text{weight}/\text{height}^2.$$

Overweight and obesity was classified following the internationally recommended cut-off points (Cole *et al*. 2000). The mid-point ages 6.5, 7.5, 8.5 and 9.5 years of these cut-off points were utilized. These cut-off points are presented in Table 1. The distributions of height, weight and BMI were normal. A chi-square test was undertaken to test for the association of age with the prevalence of overweight and obesity. Odds ratio was also calculated (age group 6 was set as 1). All statistical analyses were performed using the Statistical Package for Social Sciences 5 (SPSS) package. Statistical significance was set at $P < 0.05$.

Results

There were age differences in mean height, weight and BMI among the girls (Table 2). Mean height increased steadily from 115.2 cm at age 6 years to

Table 2. Mean anthropometric characteristics of 6–9-year-old Bengalee schoolgirls in Lake Town, Kolkata, India

Age (years)	*n*	Mean height (cm)	Mean weight (kg)
6	94	115.2 (6.3)	20.4 (4.4)
7	113	121.6 (5.8)	24.2 (5.5)
8	119	126.9 (6.9)	27.2 (7.0)
9	105	131.5 (6.9)	30.6 (7.4)

Standard deviations are presented in parentheses.

Table 3. Prevalence of overweight and obesity based on BMI*

Age (years)	*n*	BMI	
		Overweight (%)	Obesity (%)
6	94	9.57	4.26
7	113	16.81	6.19
8	119	20.17	5.04
9	105	22.86	4.76
Total	431	17.63	5.10

BMI, body mass index. *The international criteria for BMI (Cole *et al*. 2000) were used to classify children as overweight and obese.

131.5 cm at age 9 years. Similarly, mean weight also increased from 20.4 kg at age 6 years to 30.6 kg at age 9 years. Mean BMI increased consistently from age 6 years to age 9 years (15.2, 16.2, 16.7 and 17.6 kg m^{-2} at ages 6, 7, 8 and 9, respectively).

Table 3 presents the prevalence of overweight and obesity among the subjects. The overall prevalence rates of overweight and obesity were 17.63% and 5.10%, respectively. There was a significant increase (chi-square for linear trend = 6.325; $P = 0.0119$) in the rate of overweight with increasing age. The odds ratios (age group 6 was set as standard) for ages 7, 8 and 9 were 1.91, 2.39 and 2.80, respectively. The highest rate was observed among 9-year-old girls (22.86%), while the lowest rate was found among 6-year-olds (9.57%). The rate of obesity was similar in all ages.

Discussion

One of the limitations of this study was the small sample size from a very select population, i.e. affluent girls from only one school. However, the findings are interesting; they showed a steady increase in the prevalence of overweight subjects with age. A similar trend has been reported among affluent Punjabi children (Sidhu *et al*. 2006). The rates of overweight and obesity observed among Bengalee children in the present study are close to those reported among Punjabi children (Sidhu *et al*. 2006). A comparison of the rates of overweight and obesity among children of various Asian countries is presented in Table 4. The comparative profile of these studies showed that the prevalence of overweight among affluent Bengalee children was higher than those reported from other Asian countries. This is a cause for concern because with increasing age, many overweight children may become obese. Obesity was more common among Thai and Chinese children than among the Bengalee children of the present study. There is a paucity of information about obesity in the Indian subcontinent (Sidhu *et al*. 2006) and limited data from the state of West Bengal. There are several causes for overweight and obesity among affluent children, such as socio-economic status, physical inactivity and diet rich in fat. Moreover, as reported in various research studies from developed countries (Mo-Suwan *et al*. 1993; Whitaker *et al*. 1997; Lobstein *et al*. 2004), in most of the high-income populations, overweight and obesity tracks from childhood to adulthood. If the current trends of overweight and obesity track from childhood to adulthood in developing countries also, as has been observed in the developed nations, then

Table 4. Prevalence of overweight and obesity in Asian children*

Country	Overweight (%)	Obesity (%)	Reference
China	3.10	7.90	Wang (2001)
Hong Kong	9.80	1.80	Cole *et al*. (2000)
Japan	14.60	4.60	Matsushita *et al*. (2004)
Singapore	7.00	1.00	Cole *et al*. (2000)
Thailand	–	10.10	Langendijk *et al*. (2003)
Chennai, India	15.80	2.70	Ramachandran *et al*. (2002)
Chennai, India	9.67	6.23	Subramanyam *et al*. (2003)
Punjab, India	14.31	6.27	Sidhu *et al*. (2006)
Kolkata, India	17.63	5.10	Present study

BMI, body mass index. *The international criteria for BMI (Cole *et al*. 2000) were used to classify children as overweight and obese in all these studies.

West Bengal may experience in the next few decades a prevalence of adult overweight and obesity similar to or higher than those presently observed in the developed nations. Thus, immediate appropriate health promotion and intervention programmes must be given highest priority among schoolchildren. As there are many comorbidities associated with overweight and obesity (Kopelman 2002), prevention of childhood obesity is of much importance from the public health viewpoint. Although the results of the present study are based on a small sample, they are indicative of the obesity threat, which is likely to be present among affluent Bengalee children. Further studies are needed among this ethnic group on larger samples to validate the results of the present study. Such studies will have immense value in combating the threat of obesity-related non-communicable chronic diseases among adults in West Bengal. Effective treatment of childhood overweight and obesity not only improves physical and psychological health during childhood, but is also an important component of community-wide prevention of adult obesity (Steinbeck *et al*. 2006).

In conclusion, this article highlights the problem of overweight and obesity among affluent Bengalee girls, which may have serious public health implications. Areas of future research should include studying the prevalence, causes and consequences of childhood obesity among not only Bengalee children, but also those belonging to other ethnic groups of India. Effective health promotion and intervention studies can be formulated based on these studies. Future research should concentrate upon the potential public health implications of these findings.

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