

Overweight and Obesity among Adolescents – A Comparative Study Between Government and Private Schools

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Objective: To compare prevalence of overweight/obesity among adolescent school children of government and private schools.

Methods: A school-based cross-sectional study was conducted in 1800 children aged 10-16 years. Body mass index (BMI), Waist circumference (WC), Hip circumference (HC), and Neck circumference (NC) were measured using standard guidelines.

Results: The prevalence of overweight / obesity was 27.8% (private schools - 45.2%, government schools - 10.5%). BMI, WC, NC, and Waist-hip ratio were significantly higher among private school students.

Conclusion: A differential strategic plan may be needed to prevent and control obesity among adolescent school children.

Keywords: Body mass index, Bodyweight, Prevalence, Socioeconomic status, Students.

The proportion of children in the general population who are overweight and obese has doubled over the past two decades in both developed and developing countries [1,2]. It is observed that 30% of obesity begins in childhood and out of that 50-80% become obese adults [3]. As obesity in adults is difficult to treat and as there are long-term adverse effects associated with childhood obesity, prevention of childhood obesity has become a public health priority [4]. Considering the limited availability of data from Odisha regarding the distribution of adolescent obesity, we studied the prevalence of obesity among school-going adolescents in government and private schools.

METHODS

This school-based cross-sectional study was conducted from July to December 2013, in 12 schools of Bhubaneswar. Sample size was calculated with an estimated prevalence of overweight and obesity among school-going adolescents of 20% [5], an allowable error of 10%, and a non-response rate of 10%. It was decided to cover about 10% (12 schools) out of the total 112 schools that were enlisted with the education office. Six government and six private schools were chosen randomly. From each school 150 students were selected to reach the desired sample size by selecting thirty

students from each class by systematic random sampling from the attendance register. In case of absentees, the next roll number was included. Thus a total of 900 students each from government and private schools were enrolled. Ethical clearance was obtained from Institutional ethics committee and permission from Principal/ Headmasters of the schools were taken prior to the study. Data collection was done by taking assent from adolescent students.

Anthropometric measurements viz. height, weight, Waist circumference (WC), Hip circumference (HC), and Neck circumference (NC) were measured. Height was measured by stadiometer to the nearest centimetre without shoes. Weight was measured with light clothing and without shoes to the nearest 100 grams. WC (cm) was measured using plastic tape measure at midpoint between the costal margin and iliac crest in the mid-axillary line in standing position and at the end of gentle expiration. Hip circumference was measured in centimetres at the prominence of buttocks. NC was measured in the midway of the neck, between mid-cervical spine and mid anterior neck, to within 1 mm, using non-stretchable plastic tape with the subjects standing upright. Blood pressure (BP) was measured with a standard clinical sphygmomanometer with appropriate-sized cuffs, using a stethoscope placed over the brachial artery pulse. Body mass index (BMI) was calculated by weight in kg divided by height

squared in meter square. All anthropometric measurements and data collection by questionnaire were done by two trained Medical Social Workers and BP was measured by four medical interns. BP was measured 3 times in right arm, sitting position at 0, 5 and 30 minutes and the average of readings was taken.

As per recommendation of Khadilkar, *et al.* [6], children were categorized according to their BMI using BMI percentile curves for Indian boys and girls from 5-17 years. They were classified as: underweight (BMI <3rd percentile), normal (BMI 3rd percentile to adult equivalent of BMI <23), overweight (Adult equivalent of BMI 23 to adult equivalent of BMI 27.99) or obese (adult equivalent of BMI ≥ 28). Data were analyzed using SPSS 20.0. Independent samples *t* test was applied to compare the means, and the proportions were compared using Chi square test. *P* value of <0.05 was considered statistically significant.

RESULTS

The age (SD) was 13.0 (1.43) year, with 51.7% boys. It was observed that 27.8% of adolescents were overweight/ obese [overweight – 16.4% (7.6% and 25.2% in govt. spot schools, respectively) and obesity – 11.4% (2.9% and 20% in government and private schools, respectively). The prevalence of overweight/obesity among private school children (45.2%) was significantly higher than government schools (10.5%) (*P*<0.001). Anthropometric measurements including systolic and diastolic BP were significantly higher among private school adolescents (**Table I**).

DISCUSSION

This cross-sectional study found one-third of school-going adolescents to be overweight/obese, with the proportion significantly higher in private schools. The

prevalence was higher than that reported from Ahmedabad [7], which could be attributed to the differences in cut-off criteria used or due to local dietary and life-style factors. Others have also reported comparable results [5-9].

Jagadesan, *et al.* [8] reported a higher prevalence of overweight/obesity in private schools compared to government schools both by the IOTF criteria and by Khadilkar criteria. We followed the latter criteria, which picks overweight and obesity with lesser cut-offs than other criteria. Socioeconomic status and lifestyle factors like decreased physical activity, increased intake of junk foods and transportation to schools by buses may be the factors of high proportion of overweight/obesity among private school adolescents. Further, with the rapid changes in dietary pattern, area-specific reasons for high prevalence of overweight/obesity in our study cannot be ruled out and that necessitates further exploration.

It was noticed that height, weight, BMI, waist circumference, waist-hip ratios, and neck circumference were significantly higher among private school adolescents than government school adolescents. Further, the present study also revealed that both systolic and diastolic blood pressures were significantly different among private and government school adolescents (*P*<0.001), which is a serious concern.

Since it was a school based study the age group covered was 10-16 years and the findings cannot be generalised to all adolescents. Moreover, inter-cluster differences cannot be ruled out.

The findings of the study suggest that there is a need for differential strategic plan, especially for private schools, may be in terms of periodic screening followed by counselling of parents and children. School health

TABLE I ANTHROPOMETRIC AND BLOOD PRESSURE MEASUREMENTS OF SCHOOL GOING ADOLESCENTS (N=1800)

Measurements	Govt. Schools (n=900)		Private School (n=900)		P value	Total	
	Mean (SD)	95% CI	Mean (SD)	95% CI		Mean (SD)	95% CI
Height (cm)	146.6 (11.2)	145.0-147.4	153.9 (10.8)	153.2-154.6	<0.001	150.3 (11.6)	149.7-150.8
Weight (kg)	30.1 (9.3)	35.5-36.7	49.3 (13.7)	48.4-50.2	<0.001	42.7 (13.5)	42.1-43.3
BMI (kg/m ²)	16.6 (3.6)	16.4-16.9	20.6 (4.8)	20.3-20.9	<0.001	18.6 (4.7)	18.4-18.8
Waist Circumference (cm)	62.4 (8.8)	61.8-63.0	72.4 (11.01)	71.6-73.1	<0.001	67.4 (11.1)	66.8-67.9
Hip Circumference (cm)	72.3 (9.6)	71.7-72.9	82.7 (11.01)	82.0-83.4	<0.001	77.5 (11.6)	77.0-78.1
Waist-Hip Ratio	0.86 (0.1)	0.86-0.87	0.9 (0.08)	0.87-0.88	<0.05	0.87 (0.09)	0.867-0.875
Neck circumference (cm)	28.2 (2.5)	28.0-28.3	30.7 (2.9)	30.5-30.9	<0.001	29.4 (3.02)	29.3-29.6
Systolic blood pressure	116.3 (12.6)	105.9-107.4	107.9 (11.6)	112.9-114.6	<0.001	110.2 (12.4)	109.6-110.8
Diastolic blood pressure	77.6 (11.3)	67.9-69.2	63.5 (8.2)	74.7-75.8	<0.001	71.9 (9.7)	71.5-72.4

WHAT THIS STUDY ADDS?

- The prevalence of overweight and obesity among adolescents in private schools is significantly higher than those in government schools.

programs with special focus on educating students and teachers regarding possible adverse effect of overweight and obesity should be carried out.

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