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Prevalence of Childhood Obesity among School Children of Pantnagar

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Abstract: A cross – sectional study was conducted to determine the prevalence of childhood obesity among school children (6 – 12 years). A total of 1277 children were selected for the study. BMI for age was calculated and compared with revised growth chart suggested by IAP (Indian Academy of Paediatrics) for 5 – 18 year old children for boys and girls separately. BMI for age criteria for children ranging between 85th to 95th percentiles were considered as overweight and above 95th percentile were defined as obese. The overall prevalence of obesity and overweight was found to be 2.58% and 6.03%. Higher prevalence of overweight and obesity were found in boys as compared to girls. Private school children were more obese than those studying in government school. Prevalence of overweight and obesity were found to be higher in upper class and upper middle class.

Keywords: Triple burden, epidemiological transition, sedentary lifestyle, percentiles.

I. INTRODUCTION

The prevalence of overweight and obesity has increased substantially over the past three decades. Developing countries like India is now facing triple burden of malnutrition, underweight/ micronutrient deficiency and obesity. India is experiencing rapid Nutrition transition along with epidemiological transition. Earlier, the incidence of communicable diseases was high. But now the incidence of communicable diseases is decreasing, while the prevalence of non-communicable disease like heart disease, CVD, diabetes including obesity is increasing in epidemic proportions^{2, 10}. Obesity is considered as one of the most serious health challenges of the 21st century. Obesity in children is an equally significant public health concern. Obesity is defined as condition of excessive fat accumulation in adipose tissue, to an extent that health may be impaired. According to Lobstein et al. (2004), global prevalence of overweight was found to be ~10% whereas 2-3% children of age group 5-17 years were obese, as per IOTF (now known as World Obesity Clinical Care) criteria. In India, 20.6% and 18.3% of boys and girls are respectively overweight including obesity in 2015 according to World obesity map¹². Childhood obesity has been linked to both environmental and genetic factors. But the prevalence of childhood obesity has been increasing worldwide at an alarming rate due to changes in dietary pattern and lifestyles³. Various factors contributing towards childhood obesity include consumption of energy dense fast foods, shifting to sedentary lifestyle⁴ with no physical activity⁶, excessive use of electronic media and busy schedule of family. Childhood obesity increases the risk for chronic diseases like obesity, cardiovascular disease, diabetes¹¹ etc. Therefore, the present study was carried out to examine the prevalence of obesity and overweight among school children.

II. MATERIALS AND METHODS

A. Data sources and Study Population

This cross- sectional study covered two private and two government schools present inside G.B. Pant University of Agriculture and Technology, Pantnagar Campus, U.S. Nagar (Uttarakhand). The study population included a total of 1287 children studying in class 1 to 5th standard were selected by purposive sampling. All children less than 6 years of age and more than 12 years of age were excluded from the study. So, after excluding the children not meeting the inclusion criteria, a total of 1277 children were selected for the study. In order to conduct a study involving school children, institutional consent as well as parental consent was taken.

B. Measurements

Anthropometric measurements used for this study are weight and height. Height was measured in centimetres (cm) using a vertical measuring rod (anthropometer) with the subject standing straight and head held in straight horizontal plane and weight was measured in kilograms (Kg) using a standardized weighing machine, every time calibrated to zero before taking weight. Before measurements, participants were asked to wear minimum of clothes only and to stand upright without shoes. Head wears were also removed. For calculating the age of the child, date of birth was taken from school register/ record.

BMI (Body Mass Index) was calculated as weight (in Kilogram) divided by height (in meter square). BMI for age was compared with revised growth chart suggested by IAP (Indian Academy of Pediatrics) for 5 – 18 year old children for boys and girls separately. Also, BMI for age percentile was calculated using medscape Body Mass Index Percentile calculator (<http://reference.medscape.com/calculator/>). BMI percentile was calculated separately for both boys and girls because amount and distribution of body fat differs between girls and boys. Children with BMI values below 5th percentile and above 95th percentile were defined as underweight and obese respectively. BMI for age criteria for children ranging from 5th to 85th percentile and between 85th to 95th percentiles were considered as normal and overweight respectively. Prevalence of obesity was also defined according to socioeconomic status (SES). Overweight and obese children were classified into five categories namely upper class, upper middle class, lower middle class, upper lower class and lower class as per the modified Kuppaswamy’s socioeconomic status scale. For defining socioeconomic status of overweight/ obese child, occupation of father was taken into consideration. However, for those children not having father, occupation of mother was used.

C. Statistical Analysis

The data collected were fed in MS Excel. Mean and SD (Standard deviation) was calculated for BMI, height and weight. Chi-square value was computed to find the significant association between BMI of school children and selected variables such as age, gender and type of school.

III. RESULTS AND DISCUSSION

A total of 1277 school children of age 6- 12 years were selected for the purpose of study, out of which 692 (54.19%) were boys and 585 (45.81%) were girls respectively. Girls were less in number as compared to boys under study. The distribution of the study subjects by age and sex is presented in Table 1. The mean BMI, height and weight were found to be $15.90 \pm 2.21 \text{ Kg/m}^2$, $128.38 \pm 11.14 \text{ cm}$ and $26.68 \pm 7.29 \text{ Kg}$ respectively. Prashanth and Remya, 2016 studied the prevalence of obesity among school children of 6- 12 years in Kerala and found mean BMI to be $17.7 + 4.0 \text{ kg/m}^2$ which was higher than mean BMI of Pantnagar school children.

Table 1: Distribution of study subjects according to age and sex

Age (years)	Gender				Total
	Boys (N= 692)		Girls (N= 585)		
	N	%	N	%	N
6 – 7	91	13.15	94	16.07	185
7 – 8	153	22.11	129	22.05	282
8 – 9	120	17.34	108	18.46	228
9 – 10	134	19.36	122	20.85	256
10 – 11	149	21.53	105	17.95	254
11 – 12	45	6.50	27	4.62	72
Total	692	100.0	585	100	1277

The overall prevalence of obesity and overweight was found to be 2.58% and 6.03% among school children of Pantnagar which was almost comparable to those reported by Premanath et al. (2010). Among the 1277 subjects, 6.50% of the boys were overweight, and 3.32% were obese, 77.02% normal and 13.15% were underweight. While 5.47% of the girls were overweight and 1.71% was obese, 79.49% normal and 13.33% were under weight (Table 2).

Table 2: Prevalence of overweight/obesity on the basis of gender and BMI- for- age percentile categories

Gender	BMI- for- age percentile category							
	Underweight		Normal		Overweight		Obese	
	N	%	N	%	N	%	N	%
Boys (N= 692)	91	13.15	533	77.02	45	6.50	23	3.32
Girls (N= 585)	78	13.33	465	79.49	32	5.47	10	1.71
Total (N=1277)	169	13.23	998	78.15	77	6.03	33	2.58

Table 3 shows distribution of obesity by age. Both obesity and overweight were found to more among the smaller children in age group of 9 – 10 years with 33.33% and 20.78% respectively (figure 3).

Table 3: Distribution of overweight and obesity according to age

Age (years)	Overweight (N= 77)		Obesity (N= 33)		Total
	N	%	N	%	
6 – 7	13	16.88	5	15.15	18
7 – 8	14	18.18	5	15.15	19
8 – 9	13	16.88	6	18.18	19
9 – 10	16	20.78	11	33.33	27
10 – 11	15	19.48	5	15.15	20
11 – 12	6	7.79	1	3.03	7
Total	77	100.00	33	100.00	110

Chi- square value was computed to find the significant association between BMI of school children and selected variables such as age, gender and type of school. To compute the chi- square value, children above 85th percentile for age and sex were considered obese and below 85th percentile for age and sex were considered non obese. The computed chi-square values are presented in table 4. The data presented in table 4 shows that BMI of the children was significantly associated with type of school but was not significant with age and gender. Students studying in private school show high prevalence of obesity than those studying in government school.

Table 4: Association between BMI of children and selected demographic variables

S.No.	Variables	Non – obese N (%)	Obese N (%)	Chi - square	p value
1.	Gender				
	Boys	624 (90.17)	68 (9.83)	2.82	p > 0.05 (0.09)
	Girls	543 (92.82)	42 (7.18)		
2.	Age in years				
	6 – 9 years	868 (91.27)	83 (8.73)	0.06	p > 0.05 (0.80)
	10 – 12 years	299 (91.71)	27 (8.28)		
3.	Type of school				
	Private school	602 (86.62)	93 (13.38)	44.03	p < 0.05** (3.24 * e ⁻¹¹)
	Government School	565 (97.07)	17 (2.92)		

** means significant at 1% and 5% level of significance

A. Prevalence Of Obesity According To Socioeconomic Status (Ses)

The prevalence of overweight and obesity and its relationships with socioeconomic status are present in table 5. The subjects belonging to high socioeconomic status were having significantly higher body mass index than the subjects from low socioeconomic status group (figure 4). Highest prevalence of both overweight and obesity was present in upper middle class followed by upper class with 32.88% overweight and 30.00% obese children. Less prevalence was found in lower middle class and upper lower class. In the present study, prevalence of overweight and obesity were found to be higher in upper class similar to that stated by Cherian et al., 2012; Tharkar and Viswanathan, 2009.

Table 5: Distribution of overweight and obesity according to SES (socioeconomic status)

Socioeconomic class	Overweight (N = 73)		Obese (N = 30)		Total
	N	%	N	%	
Upper class	24	32.88	9	30.00	33
Upper middle class	36	49.32	17	56.67	53
Lower middle class	9	12.33	3	10.00	12
Upper lower class	4	5.48	1	3.33	5
Lower class	0	0.00	0	0.00	0
Total	73	100.00	30	100	103

IV. CONCLUSION

The present findings indicate that prevalence of childhood obesity in Pantnagar is not as high as the incidence reported at other places. However, we found higher frequency of obesity in boys as compared to the girls. Childhood obesity is major public health problem. Hence, effective preventive strategies such as high intake of dietary fibre, increased physical activity and school based nutrition education program should be encouraged and adopted to halt this epidemic.

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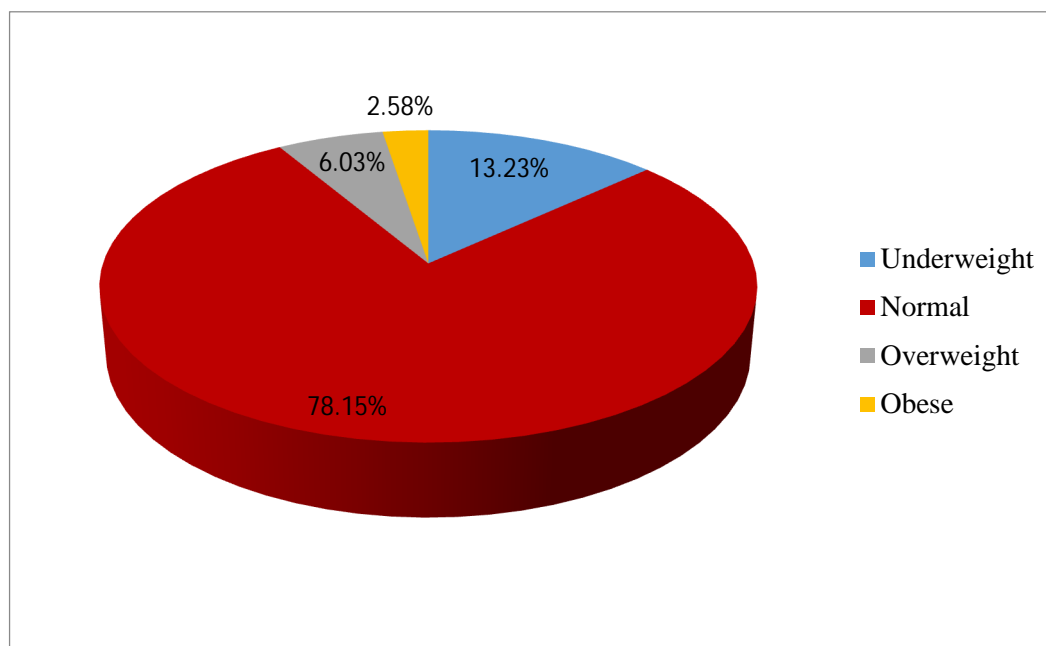


Figure 1: Overall prevalence of obesity

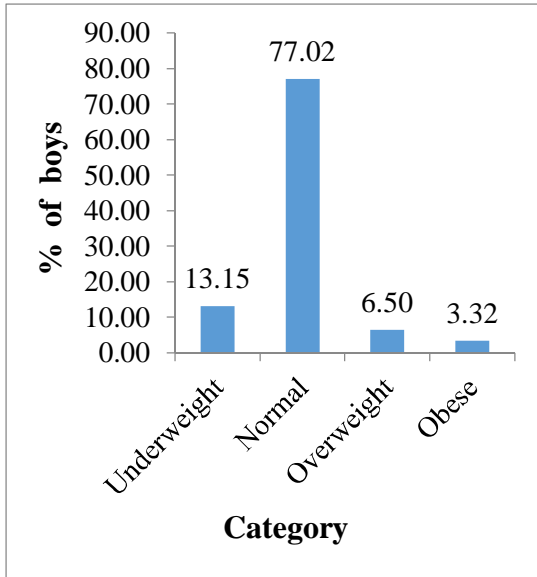


Fig 2.a. Distribution of overweight/ obesity in boys

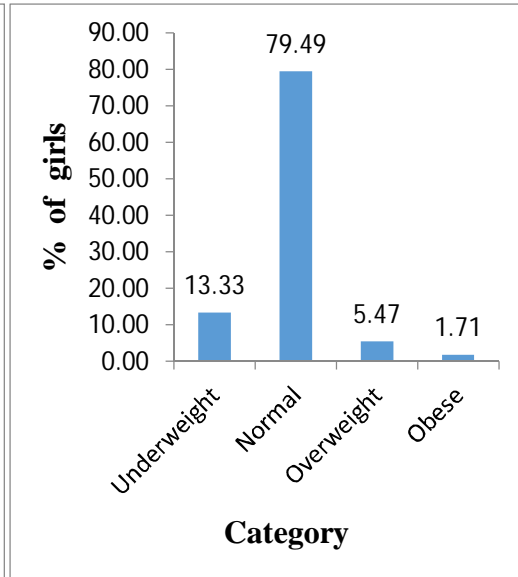


Fig 2.b. Distribution of overweight / obesity in girls

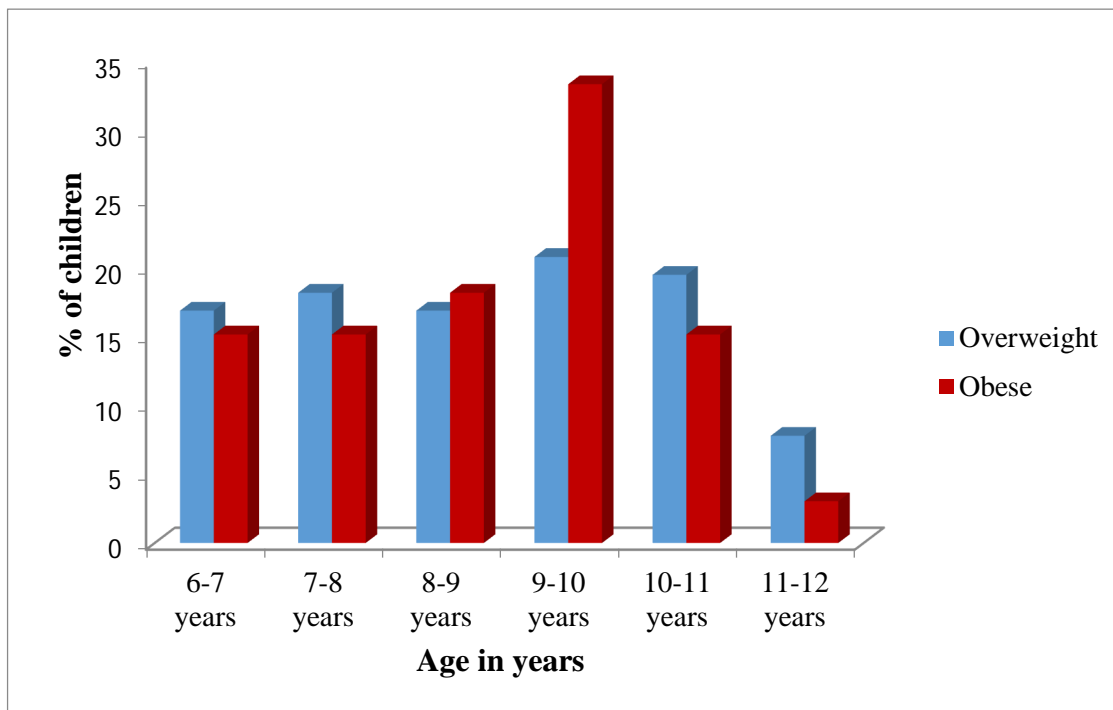


Figure 3: Distribution of overweight and obesity according to age

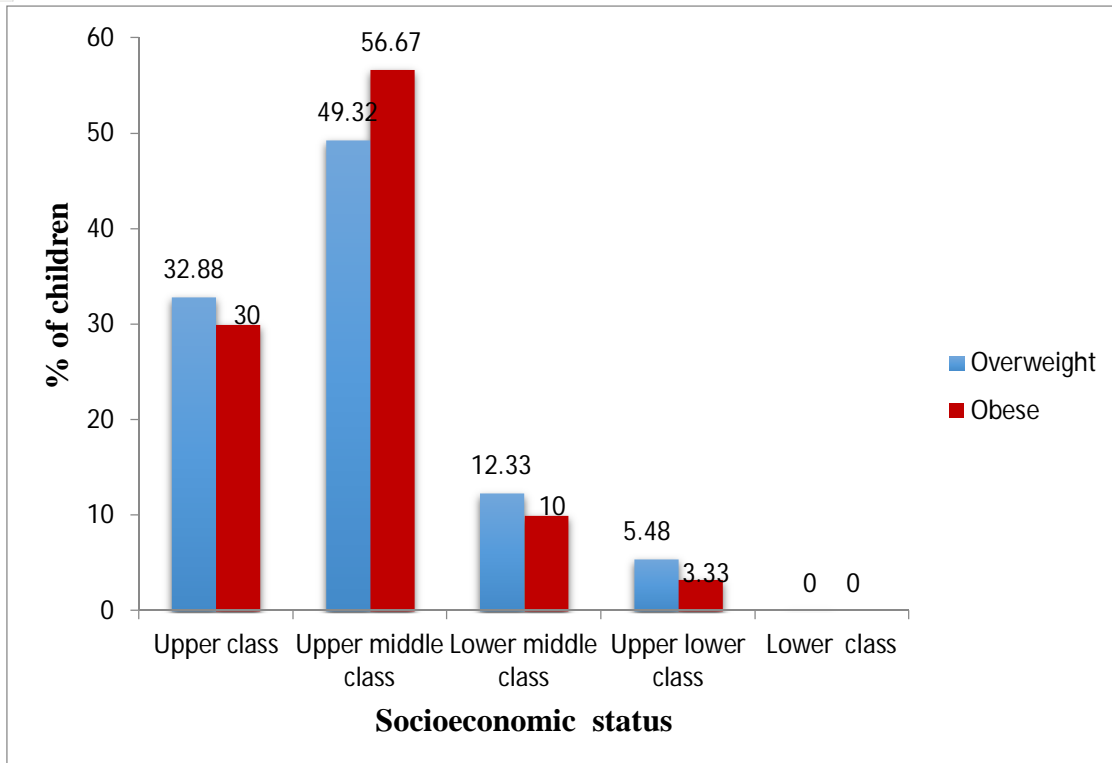


Fig. 4: Distribution of overweight and obesity according to SES (Socioeconomic status)



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