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Research Paper

Overweight and obesity among school children of Allahabad

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■ **ABSTRACT :** Overweight and obesity in children is gradually becoming a major public health problem due to changes in life style and increasing hours of physical inactivity. A cross sectional study was carried out in six different schools on 2436 school children age between 11 to16 yrs. Out of them, 1146 children were from private schools and 1290 were from government schools of this samples examined, boys and girls were 1200 and 1236, respectively. Weight and height of children were measured and body mass index was obtained by calculation. The prevalence of overweight, obesity and underweight was found to be12.1 per cent,5.41 per centand 3.89 per cent, respectively. The prevalence of overweight and obesity was found to be significantly higher among boys (14% and 7.08%) than girls (10.27 % and 3.80%).Children studying in private school had significantly higher rate of overweight and obesity than those from government school (19.45% vs 6.00% ; 10.38% vs 1.08%). Prevalence of obesity was significantly higher among children who spent long hours on computer /videogames (>10hrs/week), indoor games(>10hrs/ week), watching T.V.(>20 hrs/week), sleeping(>10 hrs/day) whereas involvement in exercises/ cycling, outdoor games/ sports (>30min/day) significantly lowered the obesity.

■ **KEY WORDS :** Body mass index, Obesity, Overweight, Physical activity

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Childhood overweight and obesity are global problem that are on rise (WHO, 2005). The proportion of children in the general population who are overweight and obese has doubled over the past two decades in developed and developing countries including India (Bundred *et al*., 2001 and Ogden *et al*., 2002). Childhood obesity is increasing being observed with the changing life, style of families with increased purchasing power, increasing hours of inactivity due to a addiction to television, videogames and computer, which have replaced outdoor games and other social activities (Singh and Sharma, 2005). School based data in India demonstrates prevalence of obesity in the range of 5.6 per cent to 24 per cent among children and adolescents (Greydanus and Bhave, 2004).

Obesity in childhood is an important risk factor for obesity in adulthood and up to 80 per cent of them become obese adults (Elizabeth *et al*., 2004) with all the associated health risk problems including coronary artery disease, hypertension, diabetes, obstructive sleep apnoea, osteoarthritis as well as psycho-social outcomes. In the Harvard study, morbidity from cardio-vascular disease, diabetes, obesity related cancer and arthritis were 50-100 per cent higher in obese individuals who were also obese as children (Must *et al*., 1992).Due to the difficulty of curing obesity and overweight in adults and many long term adverse effects of childhood obesity, the prevention of child obesity has been recognized as a public health priority (Power *et el.*, 1997).

Evidence revealed prevention and management of childhood obesity is one of the effective ways to prevent obesity in adult life (WHO, 2000).

In view of this knowledge, It is sought to estimate the prevalence of overweight and obesity in children of age from 11 to 16 years and to identify the risk factors leading to rise in obesity.

■ RESEARCH METHODS

A cross sectional study was carried out on students

studying between 6 th to 11th standards in Allahabad city during September 2011 to February 2012. A total number of 2436 school children aged between 11-16 yrs were studied. 1290 (52.95%) were from government school and 1146 (47.05%) were from private school. In the govt. school, 543 (42.09%) were boys and 747 (57.91%) were girls while in private school, 657 (57.33%) were boys and 489 (42.67%) were girls.

Sampling procedure:

A multistage stratified cluster sampling procedure was done. Total 6 numbers of colleges were selected.2 Colleges were randomly selected from government, semi government and private sectors in order to recruit children from different socio-economic strata. Probability proportional to the size of population (PPS) technique was used to select the sample size. It was assumed that at least 50 children would be studied from each class. Children were randomly selected from each class. A consent was taken from the Principal of colleges before the initiation of the study.

Data collection :

The anthropometric measurements were taken and BMI was calculated. Standard charts for BMI for age and gender were used as reference standards. Children with body mass index above 95 percentile were considered as obese, those between 85 and 95 percentile as overweight, and those will below the 5 percentile were considered as underweight (Agarwal *et al*., 2001)

100 identified obese children as cases and 100 normal weight children as controls were selected while selecting controls, it was kept in mind to maintain the similarity of age, sex and income group between case and control.

2 types of questionnaires were used to elicit information. Questionnaire A was used to collect data on socio-demographic details like age, gender, type of school etc.

Questionnaire B was used to collect specific information related to physical activities. Prevalence of obesity, overweight and underweight were presented in percentages. Multiple logistic analysis was carried out to examine the association between physical activity and obesity.

■ RESEARCH FINDINGS AND DISCUSSION

A total of 2436 students in the age group of 11-16 years was studied. Out of them, 1200 were boys (49.26%) and 1236 girls (50.74%). 1290 (47.1%) students were from government school and 1146(47.1%) from private schools. Overall, prevalence of overweight, obesity and underweight among children was 12.11 per cent, 5.41 per cent, and 3.89 per cent, respectively.

The proportion of overweight, obesity as well as under nutrition was found to be higher among boys as compared to girls (14% vs10.27%, 7.08% vs 3.80%, 3.91% vs 3.88%) (Table 1).

The prevalence of overweight and obesity among girls tended to decrease from 13.30 per cent and 4.12 per cent at 12 years to 8.57 per cent and 2.85 per cent at 15 years, respectively whereas in boys no definite pattern was observed. The prevalence of overweight among boys was found about double to that of girls at age 16 whereas prevalence of obesity was twice in girls compared to boys at age 16 (Table 2).

Children studying in private schools had significantly higher rate of overweight and obesity than those from government schools (19.45% vs 6.00 %, 10.38% vs 1.08%). The prevalence of underweight was significantly higher in government school children than from private school children (6.75 % vs 1.13%) (Fig. 1).

Prevalence of obesity was significantly higher among children who spent long hours on watching T.V.(>20 hrs/week), played computer/videogames(>10 hrs/week), indoor games (>10 hrs/ week), sleeping (> 10 hrs/day) whereas participation in exercises/cycling, outdoor games/ sports (>30 min/day) significantly lowers the obesity. On applying odds ratio and 95 per cent confidence interval the results were found statistically significant (Table 3).

Kapil *et al*. (2002); Ramachandran *et al*. (2002) and Sharma *et al*. (2007) found that the prevalence of obesity was 6 per cent, 5.4 per cent, and 7.4 per cent, respectively consistent with the findings of the present study. Studies done by Mohan *et al*. (2004) and Aggarwal *et al*. (2008) in Ludhiana reported a prevalence of overweight to be 11.6 per cent and 12.7 per cent, respectively similar to the results.

Prevalence of both overweight and obesity was higher among boys compared to girls which correlates with the study made by Kapil *et al*. (2002).

The present study revealed that about 17.52 per cent school children were above normal weight and 3.89 per cent were below normal weight exposing the fact that obesity is now so common that it is replacing the under nutrition (Park, 2009).

When the results of the present study are compared to the survey done by National Diabetes Obesity and Cholesterol Foundation in 2010 on 11,940 children age bracket of 14-18

Table 1 : Prevalence of obesity, overweight and underweight by sex

Grade	Boys (n=1200)	Girls (n=1236)	Total (n=2436)	Chi-square	p value
Overweight	168 (14%)	127 (10.27%)	295 (12.11%)	7.93	0.004*
Obesity	85 (7.08%)	47 (3.80%)	132 (5.41%)	12.79	0.0003*
Underweight	47 (3.91%)	48 (3.88%)	95 (3.89%)	0.002	0.967

*Significant

Table 2 : Prevalence of overweight ,obesity and underweight by age and gender

Age	Total number	Underweight	Normal	Overweight	Obese
Boys (Years)					
11	119	8(6.72%)	88(73.9%)	12(10.08%)	11(9.24%)
12	218	10(4.58%)	158(72.47 %	31(14.2 2%)	19(8.71%)
13	265	13(4.90%)	198(74.71%)	38(14.33%)	16(6.03%)
14	242	7(2.89%)	180(74.38%	29(11.98%)	26(10.74%)
15	172	2(1.16%)	140(81.39%	22(12.79%)	8(4.65%)
16	184	7(3.80%)	136(79.06%	36(19.56%)	5(2.71%)
Total	1200	47(3.91%)	900(75%)	168(14%)	85(7.08%)
Girls (Years)					
11	138	8(5.79%)	109(78.98%)	15(10.86%)	6(4.34%)
12	218	10 (4.58%)	170(77.98%)	29 (13.30%)	9 (4.12%)
13	238	11 (4.62%)	195(81.93%)	25(10.50%)	6(2.52%)
14	215	8 (3.72%)	186(86.51%)	18(8.37%)	5 (2.32%)
15	210	8 (3.80%)	178 (84.76%)	18(8.57%)	6(2.85%)
16	217	3 (1.38%)	117(81.56%)	22 (10.13%)	15 (6.91%)
	1236	48(3.88%)	1015 (82.11%)	127(10.27%)	47(3.80%)

Table 3 : Logistic regression analysis of obese and normal weight for physical activity

Variables	Normal weight (n=100)	Obese (n=100)	Odds ratio C.I.(95%)	P value
Exercise/cycling				
<30 min/day	35	69	0.2419 (0.134 to 0.4365)	<0.0001*
>30 min/day	65	31		
Outdoor games/dance				
<30 min/day	20	59	0.1737(0.0924 to0.3267)	<0.0001*
>30 min/day	80	41		
Indoor games				
<10 hrs/week	55	32	2.5972(1.46 to4.6201)	0.001*
>10 hrs/week	45	68		
T.V. Viewing				
<20 hrs/week	40	21	2.5079(1.3413to4.6891)	0.003*
>20 hrs/week	60	79		
Playing computer/video				
<20 hrs/week	32	14	2.8908 (1.4298 to 5.8447)	0.002*
>20 hrs/week	68	86		
Sleeping				
<10 hrs/week	60	41	2.1585 (1.2272 to3.7966)	0.007*
>10 hrs/week	40	59		

years it was observed that overall prevalence of overweight and obesity was increased from 14.9 per cent to 17.52 per cent in Allahabad.

Spending long hours on T.V. watching, playing computer or video games, indoor games and sleeping are associated with higher prevalence of obesity consistent with earlier studies (Klesges *et al*., 1993; Giammattei *et al*., 2003 and Bhave *et al*., 2004). Participation in exercise, outdoor games (>30 min /day) significantly lowered the prevalence of obesity. Hence, children should be encouraged to inculcate and adopt healthy lifestyle practices in order to curb the problem of obesity which will help in improving the future health and quality of life.

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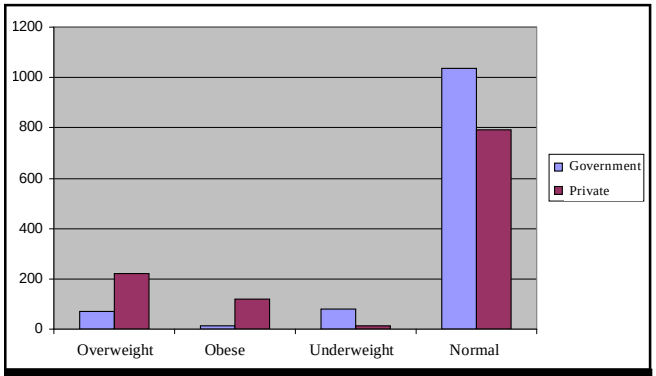

Fig. 1 : Prevalence of overweight, obesity and underweight according to school category

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