

Original Article

Socio-demographic correlates of overweight and obesity among adolescents of an urban area of Delhi, India

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Abstract

Introduction: The problem of overweight and obesity is not confined only to developed countries. It may lead to adverse metabolic changes and increased risk of non communicable diseases. Most studies conducted in India are school based. The present community based study was undertaken to assess the prevalence of overweight and obesity and its sociodemographic correlates among adolescents of an urban area of Delhi.

Material and Methods: A cross-sectional, community based study, using systematic random sampling was carried out during 2011 on 811 adolescents of both sexes from an urban area in South-West Delhi. A pre-designed and pre-tested proforma was used to collect information on socio-demographic and anthropometric variables. Subjects were classified as overweight or obese on the basis of NCHS/CDC 2000 Age and Sex Specific Percentile Growth Charts.

Results: Prevalence of overweight and obesity was 15.1% and 7.2% respectively. When analyzed by gender, prevalence of overweight and obesity was 17.4% and 7.7% among boys and 12.4% and 6.7% among girls respectively. Logistic regression analysis revealed that prevalence was significantly higher among subjects studying in private schools (OR: 2.56; CI: 1.77 – 3.71)

Conclusion: Overnutrition is an emerging health problem in adolescent population which needs to be addressed with priority.

Keywords: Adolescence, Overweight, Obesity, Prevalence, India.

Introduction:

In India, under nutrition was the focus of health workers as childhood obesity was rarely seen¹. But the last quarter of twentieth century has seen childhood obesity emerging as an epidemic in developed countries and a cause of concern worldwide as it is being reported in significant numbers from nations, previously considered poor or developing². According to WHO, 22 million children (under 5 year of age) are overweight³. In national surveys conducted in USA from 1960-1990, the prevalence of overweight in children increased from 5% to 11%. It is a growing nutrition concern in countries like India, which are witnessing nutrition transition. Studies on urban Indian school children from selected regions report a high prevalence of obese and overweight children⁴.

The most significant long term consequence of childhood and adolescent overweight and obesity are their persistence into adulthood with all of the

associated health risks such as dyslipidemia, hyperinsulinemia, Type II Diabetes Mellitus, Hypertension, Cardiovascular diseases, arthritis and behavioural problems⁵.

Obesity can be seen as the first wave of a defined cluster of non-communicable diseases called "New World Syndrome" creating an enormous socio-economic and public health burden in poorer countries¹. Hence evaluation of overweight and obesity in children is important as it provides an opportunity to identify the problems and prevent disease progression into adulthood⁶. The data on prevalence of overweight and obesity among adolescents from India, which is also undergoing an epidemiological transition, is scarce and predominantly institution based. In view of this, a community based study was planned to assess the prevalence of overweight and obesity and its sociodemographic correlates among adolescents of an urban area of Delhi, India.

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Material and Methods:

Study design and setting:

We conducted a community based cross sectional study among adolescents aged 10-19 years in Raj Nagar I, Palam, an urban area of South West Delhi. Majority of the people are Hindus and belong to upper - middle and lower – middle socio-economic strata of society. All the houses are cemented with basic amenities like piped water supply, electricity and an attached sanitary latrine. All children in the defined age group were included in the study.

Sample size and Sampling design:

There were nearly 2400 adolescents which comprised 20% (as per Census 2001) of the total population of the study area which was projected to be 12000 in 2010 according to the departmental survey carried out in 2009.

The sample size was estimated by using the formulae $4pq/d^2$ where the prevalence of obesity in adolescents was taken as 11.1%². The required precision of the estimate (d) was set as 20%. Using the above mentioned formulae, the sample size was estimated to be 810. Systematic random sampling technique was used to enroll study subjects. Out of 867 subjects enlisted from 2549 households, 56 (6.4%) either did not give consent or were unavailable. The response rate was 94.6% and the final sample size studied was 811.

Study questionnaire:

A pre-designed and pre-tested questionnaire was used to elicit information after getting written informed consent on family characteristics like type of school, religion, type of family, education and occupation of parents, total family income and information on individual characteristics like age, sex and education status. Anthropometric measurements were also taken. The

proforma was pre-tested and necessary modifications were made before the start of study.

Data collection:

The study was approved by the institutional ethical committee. Data was collected from January 2011 to December 2011. Body weight was measured using an electronic weighing machine to the nearest 100 gms with the subject standing barefooted with light minimal clothing. Height was measured to the nearest of 0.5 cm with the subject standing barefooted using a portable stadiometer. Calibration of the instrument was done weekly with known standards.

BMI was calculated as weight in Kg / Height in metre². Overweight and obesity was assessed by BMI for age and sex. Adolescents who had BMI for age 85th and < 95th percentile for reference population were classified as overweight and those with BMI for age e" 95th percentile of reference population were classified as obese according to NCHS/CDC 2000 age and sex specific percentile growth charts⁷.

Statistical study:

Data was analyzed using SPSS 12.0.1 (SPSS for Windows, version 12.0.1.2001. Chicago: SPSS Inc.) . All the entries were double checked for any possible keyboard error. Prevalence of overweight and obesity was expressed as percentages. Association of each of the variable with overweight and obesity (outcome variable) was assessed with the chi square test and the strength of their association was computed by odds ratio (95% confidence interval) using logistic regression analysis. Variables showing statistically significant association with the outcome variables ($p < 0.05$) were considered as potential risk factors of overweight and obesity. $P < 0.05$ was considered as statistically significant.

Table 1: Age and sex wise distribution of study subjects (n=811)

Age	Male	Female	Total
10	40 (49.4)	41 (50.6)	81
11	39 (47.0)	44 (53.0)	83
12	52 (57.8)	38 (42.2)	90
13	49 (57.0)	37 (43.0)	86
14	35 (44.3)	44 (55.7)	79
15	39 (48.8)	41 (51.3)	80
16	44 (51.2)	42 (48.8)	86
17	42 (56.0)	33 (44.0)	75
18	43 (58.1)	31 (41.9)	74
19	41 (53.2)	36 (46.8)	77
Total	424 (52.2)	387 (47.8)	811

Table 2: Sociodemographic characteristics of study subjects (n=811)

Determinant	No (%)	Overweight (%)	Obesity (%)	P value
Sex				
Boys	424(52.2)	74(17.4)	32(7.6)	0.11
Girls	387(47.8)	48(12.4)	26(6.7)	
School *				
Govt.	462(63.2)	53(11.3)	27(5.8)	<0.001
Pvt.	268(36.8)	59(22.0)	31(11.6)	
Family type				
Nuclear	632(77.9)	91(14.4)	58(9.2)	<0.001
Joint	179(22.1)	31(17.3)	0	
SES †				
Upper lower	46(5.6)	0	4(8.8)	0.09
Lower middle	266(32.7)	35(13.1)	15(5.7)	
Upper middle	479(59.1)	84(17.5)	37(7.7)	
Upper	20(2.6)	3(15.0)	2(10.0)	

*81 study subjects were not going to school at the time of interview

† Socio-economic status

P value less than 0.05 is considered as significant

Table 3: Correlates of overweight and obesity by logistic regression analysis.

Variable	Overweight/Obesity No. (%)	OR (95% CI)	P value
Overall	180 (22.2)	-	-
Sex:			
Female	74 (19.1)	1	0.19
Male	106 (25.0)	1.26 (0.88 – 1.80)	
Family Type:			
Joint	31 (17.3)	1	0.31
Nuclear	149 (23.6)	1.27 (0.80 – 2.01)	
Type of School:			
Govt.	80 (18.3)	1	<0.001
Private	90 (33.6)	2.56 (1.77 – 3.71)	
SES:			
Upper lower	4 (8.8)	1	0.78
Lower middle	50 (18.8)	1.18 (0.37 – 3.75)	
Upper middle and above	126 (26.2)	1.64 (0.53 – 5.10)	0.39

Results:

A total of 867 children (10-19 years) consented to participate in the study. Data were collected for 811 subjects. There were nearly equal proportions of boys (52.2%) and girls (47.8%) in the study. More than half (63.2%) attended government run schools and lesser number (36.8%) attended private aided schools. Majority of the adolescents (77.9%) lived in nuclear families. Almost two-third (61.7%) of the subjects belonged to upper middle and upper socio-economic status and very few (5.6%) belonged to upper lower class. None of the study subjects belonged to lower class as per the modified Kuppuswamy scale for urban area with Consumer Price Index of 2010⁸ (Table 1)

According to NCHS/CDC 2000 age and sex specific percentile growth charts, the overall prevalence of overweight and obesity was 15.1% and 7.2% respectively. When analyzed according to gender, prevalence of overweight and obesity was more among adolescent boys (17.4% and 7.6% respectively) than adolescent girls (12.4% and 6.7% respectively) but the difference was not found to be statistically significant. Similarly, higher socio-economic group adolescents were more overweight and obese but this finding was also not statistically significant. The prevalence of overweight and obesity among the adolescents studying in private schools (33.6%) was significantly higher ($p < 0.001$) than among those studying in government schools (17.4%). Similarly it was significantly higher ($p < 0.001$) among those adolescents residing in nuclear families (23.6%) than joint families (17.3%). (Table 2) To adjust for potentially confounding variables and to study the possible mediating factors, bivariate logistic regression analysis was carried out. In the model, overweight and obesity were dependent variables; sex, type of family, type of school and socioeconomic status formed independent variables. The risk of overweight/obesity was higher among males, those residing in nuclear families or of upper class but significant association was found among those studying in private schools than those studying in government schools (OR 2.56; 95% CI=1.77-3.71). (Table 3)

Discussion:

Obesity is now a global problem, spreading even to the developing World, where it is an increasing threat to health. There has been a trend towards increasing prevalence of obesity as well as its metabolic complications in developing countries. India is in the midst of an escalating 'epidemic' of Type 2 Diabetes

and Coronary Heart Disease (CHD). It is now emerging convincingly that the genesis of these disorders begins in childhood, with childhood obesity serving as an important factor. In recent years, Type 2 diabetes is beginning to emerge even in children⁹⁻¹⁰.

While trends of increasing obesity in children have clearly shown in the developed world, studies from India are emerging. Since very few community based studies are available, the present study highlights the magnitude of overweight/obesity in adolescents in an urban area of Delhi.

Our study revealed a very high prevalence of overweight and obesity pooled together in male (25.0%) and female (19.1%) adolescents as per NCHS/CDC BMI-for-age criteria ($\geq 85^{\text{th}}$ percentile for BMI).

These findings were similar to Goyal et al¹¹ in Gujarat, Unnithan et al¹² in Kerala and Chhatwal et al² in Ludhiana where they found near similar prevalence of overweight (13.9%–17.7%) and obesity (5.0%–11.1%). Amin et al¹³ among 10-14 year children of Saudi Arabia also found 14.2% children as overweight and 9.7% as obese. Our prevalence estimates are somewhat lower than some studies done by Augustine et al¹⁴ among 17-19 year females in Kerala, Ahranjani et al¹⁵ among 11-16 year Tehrani adolescents and Patrick et al¹⁶ among 11-15 year adolescents where they found 45.7% of the sample as overweight and obese.

Lower prevalence was also reported in some studies. Banerjee et al¹⁷ in 10-19 year's children in Goa reported 3.3% as overweight. Aggarwal et al¹⁸ among 10-19 year children of Punjab found only 3.4% children as obese. Such low prevalence was also found in Sharma et al¹⁹ who reported 3.5% overweight and 0.4% as obese among 11-17 year adolescents in Shimla. Bishwalata et al²⁰ among 12-19 year Manipuri children found 4.2% and 0.8% children as overweight and obesity respectively.

However, these figures are not comparable directly, because of different age groups included in these studies, different study settings like school based and community based, rural v/s urban areas, different socio-economic status of the subjects and/or the varied methods used for assessing overweight and obesity.

The present study showed that overweight and obesity was higher among male than female adolescents. Comparable results were shown by Goyal et al¹¹ among 12-15 year adolescents of Gujarat where the study reported prevalence of obesity and overweight as 6.7% and 15.1% among males and 6.4% and 13.3% among

females respectively using percentile growth charts. Singh et al²¹ among 12-18 year schoolchildren of Delhi observed that 18.6% of the males and 16.5% of the females were overweight or obese according to percentile for age growth charts. The higher prevalence of overweight and obesity among adolescent boys may be attributable to the cultural advantage males enjoy in our country. They get larger helpings of food, more freedom to go out of the house and indulge in snacking and also do not contribute much to the household chores.

Another interesting finding which was found to be statistically significant was that the children of private schools were more overweight as compared to those attending government schools (22.0% v/s 11.3%). Similar findings were observed in Raj et al²² among 5-16 year children of Kerala and among 9-15 year children of Ludhiana by Chhatwal et al². Laxmaiah et al⁵ among 12-17 year children in Hyderabad also found that prevalence of overweight was significantly higher among adolescents studying in private school than those studying in government schools. This probably could be due to the reason that adolescents attending private schools are better nourished and probably enjoy a higher socio-economic status enabling them to afford enrollment in private schools.

The present study showed that proportion of study subjects who were overweight and obese increased as the socioeconomic status increased. Majority of the study subjects were from upper middle and lower middle socio-economic status. The results were similar to Bishwalata et al²⁰ and McDonald et al²³ in which higher socio-economic status was found to be an independent predictor of higher BMI. Chhatwal et al² in Ludhiana found the prevalence of obesity to be directly proportional to the socio-economic status, being highest among class I and decreasing progressively for both sexes. The findings were similar to the findings of present study. Higher prevalence of overweight and obesity among higher SES could be a reflection of difference in the dietary as well as physical activity pattern among them. The strength of our study is that it is a community based study where data has been collected by house to house visits in the community. Most of the studies in adolescents in India are school based studies.

Some limitations of this study warrant consideration. Firstly, the cross sectional nature of this study design precluded us from inferring a causal relationship between socio-demographic characteristics and child

overweight and obesity. Secondly, the findings of the study may be true for the study population (Internal validity) but may not be generalizable to other populations due to the small sample size (External validity).

Conclusion:

The results of the study highlight the fact that the percentage of overweight and obese children is considerably high in Delhi like in other states of India and other parts of the World. The study also shows that overnutrition is seen more among boys than girls, those residing in nuclear families, among higher SES class and positively associated among those studying in private schools. These findings suggest that children in Delhi are experiencing the adverse effects of epidemiological transition. This calls for immediate action to reduce the incidence of overweight and obesity through appropriate nutritional intervention programmes, health education involving school children, their parents and school authorities regarding adverse effects of overnutrition. Longitudinal studies are warranted to examine the association between socio-demographic factors and change in nutritional status over time in this population.

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