Original Research Article.

Correlation of Socioeconomic Factors with Obesity and Overweight Among School Going Adolescent Population in Rural and Urban Area

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ABSTRACT

Background: Globally, the increased prevalence of overweight and obesity among adolescents has led to increased morbidity and premature mortality in adults due to various metabolic diseases. As adolescents comprises approximately one fifth of the total Indian population, their health status and nutrition clearly depicts the working of the country towards health and burden of diseases in future.

Objectives: The objective of the present study is to study the prevalence of obesity and overweight in adolescents and to correlate various socioeconomic factors with obesity and overweight in adolescent population in district Patiala, Punjab.

Methods: A cross-sectional study was conducted among 600 school going adolescents (10-19 years) from 5th to 12th class of government and private schools in rural and urban area of district Patiala, Punjab. A self-designed, semi- structured questionnaire was used to assess the socio-demographic profile, socio-economic status, socio-environmental factors followed by anthropometric measurement of the children.

Results: The overall prevalence of overweight and obesity was found to be 12.8% and 4.5% respectively. Prevalence of overweight and obesity was 5.8% and 3.3% among males and 7% and 1.1% among females. Higher prevalence of the disease was also seen in urban area, nuclear family upper socio-economic class and lower education status of parents.

Conclusion: Overweight and obesity among adolescents have multifactorial causes and need holistic approach at the earliest for control and prevention.

Keywords: Obesity, Overweight, Adolescents, Anthropometry.

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INTRODUCTION

Obesity in adolescents has emerged as an important global health problem. India is experiencing an increase in prevalence of obesity in pediatric population in last three decades.[1] Obesity in childhood is associated with metabolic syndrome in later life which includes hypertension, type 2 diabetes, dyslipidemia and fatty liver disease. Cardiovascular events and mortality in adults are associated with obesity in childhood.[2]

It was found in one of the studies that rural population in northern India has more cases of obese and overweight children than undernutrition cases rural India.[3] In all over the world, due to overweight and obesity approximately 3.4 million adults die.[4] In the world estimated of 10% of school aged children between 5 to 17 years of age, are overweight and obese. In Indian subcontinent, the total estimates of the prevalence of overweight and obesity among children were 2% to 36%.[5]

According to Centers of Disease Control and Prevention (CDC) classification for 2-19 years of age, overweight is defined as children body mass index (BMI) value between 85th - 95th percentile for a specific age and gender.[6] Similarly, obesity is defined as with BMI value above 95th percentile for that specific age and gender.[6]

Overweight and obesity both are considered as the result of a complex interplay of genetic, hormonal and nutritional factors, physical activity as well as social and environmental factors.[7] However, through early and effective prevention overweight and obesity and their related diseases can be controlled.[8] Particularly those factors which are modifiable, such as environmental and behavioral factors, are very important in the prevention of overweight and obesity.[9]

Many Studies have shown that various factors play role in prevention of this disease, such as limited consumption of sugars sweetened beverages, daily breakfast, decreases consumption of trans fat, reduced screen time, and increased physical activity, are essential in preventing childhood obesity.[10] Family factors such as socioeconomic status, support in mental health problems also contribute in preventing overweight.[11]

One study on Latinos in the USA found that mothers with higher education had children with higher BMI compared to mothers with lower education status.[12]

Similarly education status of the father also showed positive correlation with childhood obesity in Croatia.[13] Systematic review evidence from some of the sub-Saharan African countries showed that higher parental education level and BMI, to be negatively associated with lower child physical activity and higher adiposity.[14]

The most practical means for the nutritional status for assessment in a population are anthropometric measures.[15]

As it is universally applicable, simple to use, cost effective, and non-invasive and an excellent tool for guiding public health policies as well as individual interventions.[16] In this study, the use of appropriate anthropometric indicators (BMI (Body Mass Index), weight for age, height for age, weight for height) allows the identification of the nature and extent of protein energy malnutrition in the community.

AIMS AND OBJECTIVES:

1. To study the prevalence overweight and obesity among school going adolescent population in rural and urban areas of district Patiala, Punjab
2. To study the correlation of various socioeconomic factors with obesity and overweight in school going adolescent population of rural and urban areas of district Patiala, Punjab

MATERIALS AND METHODS
Inclusion Criteria
10-19 yrs. age group
Exclusion Criteria
Any student with diagnosed case of any chronic disease such as congenital heart disease, chronic renal failure, chronic liver failure, any blood disorder such as thalassemia or leukemias.
Method
A cross-sectional study was conducted among 600 school going adolescents (10-19 years) from 5th to 12th class of government and private schools in rural and urban areas of district Patiala, Punjab from august 2022 to April 2023.
Sample Size and Design
A total of 600 (300 rural and 300 urban) students were studied. Informed written consent from school authorities was obtained after explaining the purpose of study.
Data Analysi
The analysis was performed using SPSS Version 21 software. The appropriate statistical methods (mean values, standard deviation, Chi-square test and independent t test) were applied as per requirement.
Ethical Considerations
The present study did not impose any financial burden to the participants and informed and written consent from the subject and class teacher was taken before conducting the study. The study was cleared by ethical committee.

Table 1: Prevalence of overweight and associated socioeconomic factors in school going adolescent population

Factors	Normal weight n=523	Overweight n=77	P value
Age			<0.001(HS)
10 – 13	167 (31.9)	49(63.6)	
14 – 16	262(50.1)	25(32.5)	
17 – 19	94(18.0)	03(3.9)	
Sex			0.485(NS)
Male	260(49.7)	35(45.5)	
Female	263(50.3)	42(54.5)	
Area			0.393(NS)
Rural	258(49.3)	42(54.5)	
Urban	265(50.7)	35(45.5)	
Family			0.313(NS)
Nuclear	315(60.2)	51(66.2)	
Joint	208(39.8)	26(33.8)	
Mother's Qualification			0.664(NS)
Illiterate	54(9.4)	2(7.4)	
Primary	219(38.2)	9(33.3)	
Secondary	122(21.3)	4(14.8)	
Higher	135(23.6)	10(37.0)	
Graduate	42(7.3)	2(7.4)	
Postgraduate	1(0.2)	0(0.0)	
Father's Qualification			.0431(NS)
Illiterate	60(10.5)	1(3.7)	
Primary	122(21.3)	4(14.8)	
Secondary	145(25.3)	5(18.5)	
Higher	190(33.2)	13(48.1)	
Graduate	50(8.7)	4(14.8)	
Postgraduate	6(1.0)	0(0.0)	
Socioeconomic Status			0.076(NS)
Lower	5(1.0)	1(1.3)	
Lower Middle	42(8.0)	8(10.4)	
Upper	13(2.5)	2(2.6)	
Upper Lower	417(79.7)	52(67.5)	
Upper Middle	46(8.8)	14(18.2)	

Table 2: Prevalence of obesity and associated socioeconomic factors in school going adolescent population

Factors	Normal weight n=573	Obese n=27	P value
Age			0.006(HS)
10 – 13	200(34.9)	16(59.3)	
14 – 16	276(48.2)	11(40.7)	
17 – 19	97(16.9)	0(0.0)	
Sex			
Male	275(48.0)	20(74.1)	
Female	298(52.0)	7(25.9)	
Area			0.844(NS)
Rural	287(50.1)	13(48.1)	
Urban	286(49.9)	14(51.9)	
Family			0.154(NS)
Nuclear	346(60.4)	20 (74.1)	
Joint	227(39.6)	07(25.9)	
Mother's Qualification			
Illiterate	50(9.6)	6(7.8)	
Primary	201(38.4)	27(35.1)	
Secondary	108(20.7)	18(23.4)	
Higher	125(23.9)	20(26.0)	
Graduate	38(7.3)	6(7.8)	
Postgraduate	1(0.2)	0(0.0)	
Father's Qualification			0.261(NS)
Illiterate	55(10.5)	6(7.8)	
Primary	110(21.0)	16(20.8)	
Secondary	136(26.0)	14(18.2)	
Higher	168(32.1)	35(45.5)	
Graduate	49(9.4)	5(6.5)	
Postgraduate	5(1.0)	1(1.3)	
Socioeconomic Status			0.004(HS)
Lower	6(1.0)	0(0.0)	
Lower Middle	47(8.2)	3(11.1)	
Upper	13(2.3)	2(7.4)	
Upper Lower	455(79.4)	14(51.9)	
Upper Middle	52(9.1)	8(29.6)	

RESULTS

Distribution of study participants: The distribution of study participants as per age and sex are shown in table 1 & 2. Out of 600 total students, 77 were overweight and 27 were obese. out of 77 overweight children 35 were males and 42 were females. out of 27 obese children ,20 were males and 7 were females. Majority of the overweight students (nearly 64%) belong to age group 10-13 years followed by 14-16 years of age group having 25% of students. Majority of the obese students (nearly 60%) belong to age group 10-13 years followed by 14-16 years of age group having 41% of students.

Socio-demographic characteristics: the sociodemographic distribution of the students is shown in Table 1 & 2 Out of 77 overweight students, 42 students belonged to rural area whereas 35 belonged to urban area ,and 51 belong to nuclear family & 26 belong to joint family while Out of 27 obese students, 13 students belonged to rural area whereas 14 belonged to urban area and 20 belong to nuclear family & 07 belong to joint family. In this study the maximum no of overweight (52.4%) and obese (52.1%) were found in children of highly educated parents.

DISCUSSION

In this cross-sectional study, total 600 school going adolescents (10-19 years) from 5th to 12th class of government and private schools in rural and urban area of district Patiala, Punjab were screened for obesity and overweight via self-designed, semi-structured questionnaire and were assessed for socio-demographic profile, socio-economic status, socio-environmental factors followed by anthropometric measurement of all the adolescents. The overall percentage of overweight and obesity in the screened children in this study was 12.8% and 4.5% respectively. Most of the earlier studies done in children and adolescents in India have reported prevalence based on international cut-off points[17] with a meta-analysis estimating the prevalence of overweight as 12.6% and obesity as 3.4%.[18] Another multicentric study reported an overall prevalence of overweight and obesity in India as 18.2%.[19] Overweight and obesity was found more in early adolescent age group of 10-13 years (63.6 & 59.3% respectively) and decreases as the age groups rise. In NHANES III, another large cross-sectional study done amongst 6 to 17 year old children, the prevalence of overweight was lowest between 9-11 yrs and showed an increase subsequently.[20] The longitudinal study by Whitaker et al., (1997) in 854 children showed obesity prevalence to be 13% at the age group of 9 yrs, which decreased by 14 yrs to 9% followed by an increase subsequently, a finding similar to that in our study.[21] Prevalence of overweight and obesity was found to be 5.8% and 3.3% among males and 7% and 1.1% among females. Our study also shows a higher prevalence rate of overweight and obesity among girls, as did a previous study done in Chennai.[22] The influence of gender and adolescence on obesity can be attributed to the hormonal changes at puberty and the development of

secondary sexual characteristics resulting in fat accumulation and its redistribution in the body.[23]

In relationship to area more overweight children were present in rural area (54.5%) while in case of obesity more children were found in urban area (51.9%). Ying-Xiu Zhang et al. had observed a disparity between urban and rural areas with a rapid increase in the prevalence of overweight and obesity in rural areas. They found urban and rural children having a similar prevalence of combined overweight and obesity.[24] In another study by Ann McGrath et al. rural children had a higher prevalence of obesity than urban children.[25]

This trend of increasing rural obesity could be owing to the high consumption of carbohydrates and fats, increased access to junk and unhealthy foods, lack of knowledge with regard to the nutrition, limited access to healthy food, and diminished physical activity among the rural children. in case of socioeconomic status, maximum percentage of overweight (67.5%) and obese (51.9%) adolescents were found in upper lower class of the society. Research also shows that on rising the burden of obesity among the Asian population found overweight prevalence and obesity was only 22% higher among the high socioeconomic class community.[26]

The prevalence of obesity as well as overweight in low SES group was the lowest as compared to another group. Eating habits like junk food, chocolates, eating outside on weekends and physical activity like exercise, sports, sleeping habit in afternoon having remarkable effect on prevalence on overweight and obesity among middle to high SES group. In the case of prevalence of this disease in the type of family, more no of overweight (66.2%) and obese (74.1%) adolescents were found in nuclear families than joint families. Risk of obesity/overweight was higher in nuclear families.

Similar results were reported in studies done by Padez et al and Guedes et al but Bharati et al reported a higher risk of obesity/overweight in joint families than nuclear families[29,30] Education of parents played important role especially mother's qualification in which this study found maximum no of overweight (52.4%) and obese (52.1%) were found children of highly educated mothers. Employed mothers have less time to pay attention to their children's reasonable nutritional intake and healthy weight management than unemployed mothers. Fewer studies have investigated the relationship between parental education level and child physical activity; however, evidence points to a negative association between parental education and child physical activity in lower economic status countries.[31]

LIMITATIONS
The limitation of our study is that it is restricted to one small district. The findings may not be representative of the whole country or even of the whole State of Punjab. Only a truly representative national study, involving both urban and rural populations, can provide the true picture on the nationwide prevalence of overweight/obesity.

The higher prevalence of obesity among children and adolescents attending private schools and among adolescents in general suggests a need for targeted intervention, as previously stressed. Obese adolescents have a 70%-80% chance of developing adult obesity.[27,28] Thus, inculcating and reinforcing both healthy eating habits and lifestyle needs to be the norm. The Government of

India's National Program on Prevention and Control of Diabetes, Cardiovascular Disease, and Stroke has a school component which needs to be strengthened. There is also an urgent need to increase awareness via education and motivation of all stakeholders. This will go a long way in preventing this disease.

CONCLUSION
Adolescent obesity is a global health issue that is distributed unevenly between and within regions and is likely to have a dynamic causative network. The ongoing pandemic of obesity, particularly, that is, of childhood obesity, has emerged as a huge challenge for pediatricians, epidemiologists, program managers, and policy makers around the world. The economic implications of childhood overweight and obesity will be huge. So, by combining with the closely related burden of non- communicable diseases this threatens to offset by global countries as well as India. To deconstruct the dynamic interplay between multiple factors that cause childhood obesity and to draw a suitably informed picture of its biomedical and socio-environmental determinants, we found a stronger evidence base on Indian research as well.

Health care professionals and policy-makers need to be mindful of new adolescent issues that are developing nowadays. Understanding these are the few variables that help researchers determine which lifestyle changes are needed. At Primary health care (PHC), primary health physicians are the first physicians who confront adolescent obesity. So as primary health physicians we can educate our community people to plan and adopt healthier lifestyles and activities in schools or at home for adolescent groups. Then our adolescent group or next generations will remain away from these problems, that is, fight with obesity like engaging in more and more outdoor activity, increasing daytime physical activity, shifting eating habits, decreasing watching TV time and preventing a sedentary lifestyle.

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