Original Article

A Study On Association Of Over Nutrition Among Adolescents With Diet And Physical Activity

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Abstract

Background- Adolescent and childhood Obesity is a public health issue because of its increasing prevalence and adverse consequences on health such as type 2 Diabetes Mellitus and cardiovascular diseases. This study aims to determine association of overweight and obesity in adolescents with modifiable risk factors.

Methodology- This was a cross-sectional study which was conducted among the children aged between 10 to 19 years in urban population of district Ghaziabad among 1128 study participants through a house-to-house survey, using a pre-designed, semi-structured questionnaire.

Results- Prevalence of overweight and obesity increased with increase in age, urban based residence and high socio economic status. It was also significantly associated with increase in consumption of unhealthy food, decrease in frequency of vegetable and fruit intake and decrease in level of physical activities.

Conclusion- Obesity was significantly associated with area of residence, type of school, gender, food habits and a sedentary lifestyle.

INTRODUCTION

Obesity may be defined as an abnormal growth adipose tissue due to an enlargement of fat cell size or an increase in fat cell number or a combination of both. Overweight is usually due to obesity but can arise from other causes such as abnormal muscle development or fluid retention.[1] Body weight is determined by an interaction between genetic, environmental, psychological factors acting through the physiological mediators of energy intake and expenditure. Likewise, etiology of overweight and obesity is multi-factorial because they are not single disorder but a heterogeneous group of conditions with multiple determinants.[2] Nowadays, obesity is a major serious public health problem and a big challenge, since its prevalence is accelerating rapidly not only in developed but also in developing countries.[3] It is now being considered as "global epidemic."[4,5]

Adolescence is defined as the period of physical and psychological development from onset of puberty to maturity. In chronological development, it is the period between 10- 19 years. Nutrition plays a significant role in growth and development of human life especially during adolescence. Adolescence is also a time where eating patterns and lifestyles are established and are likely to continue for a lifetime.[1,6]

Obesity among children and adolescent is progressively being observed over a period of time which is associated with varying lifestyle of families with increased purchasing power, luxurious living, increasing hours of inactivity due to television, video games, and computers, which seems to substitute the outdoor games and other social activities. [7,8]

Overweight and obesity have been identified as primary contributing factors in chronic disease. In fact, weight gain has been identified as contributing to more than 34% of mortality in people younger than 60 years of age in some countries.[9] The impact of obesity is not restricted to this but it extends to the psychological side. There is documented association between obesity and depression.[10]

The major risk factors of cardiovascular diseases that have been established to some extent by patterns of behaviour in late childhood and adolescence are easier to modify early in young age rather than at later ages or after the onset of disease. Majority of the adolescents are school going and this age group is particularly receptive to any suggestion given to them regarding health needs. Schools provide perfect platform to sensitize them about future health risks.[11]

Moreover, obese and overweight adolescents whom are more likely to be obese in adulthood and thereby higher morbidity and mortality also have non-health implications. Overweight and obesity entail health risks with potential effects in social and economic wellbeing of an individual and the community. Therefore, understanding the factors that are associated with the prevalence of overweight and obesity among children and adolescents is critical to the development and implementation of effective prevention and management strategies.[12,13]
Prevalence and associated factors of adolescent's obesity and overweight in Ghaziabad district is not well known by the health care providers and the policy makers, as there is not enough data that documents the problem. To develop and control strategies, the prevalence, causes and factors associated with them should be well studied and documented.

This study seeks to establish the status of overweight and obesity among urban as well as rural school adolescents in Ghaziabad district. Findings from this study would be helpful in raising awareness among teachers, parents and other stakeholders about the impacts that overweight and obesity have on the adolescent's health, social and academic performance.

MATERIALS AND METHODS

Study design- This cross-sectional study was conducted in Rural and Urban areas of Ghaziabad and Community Medicine Department, Santosh Medical College, Pratap Vihar, Ghaziabad, using a pre designed semi structured questionnaire. Sampling frame were Intermediate schools in the urban and rural areas of Ghaziabad district. Study unit were all school going adolescents aged from 10 to 19 years studying up to intermediate schools in urban and rural areas of District Ghaziabad among the selected schools. Before starting the survey Approval was taken from the medical ethics committee of Santosh Medical College.

Sample size:

The present study was conducted on overweight and obesity among school going adolescents in District Ghaziabad. A mean prevalence of 24% was obtained from previous studies and was used to calculate sample size required to conduct the present study. The minimum sample size was calculated to be 563. So the sample size that was considered for this study was 564 each for Urban & Rural areas. Data of all 564 adolescents was collected from schools of urban areas and equal number of adolescents from rural areas of Ghaziabad. The total sample size for the study was 1128. Out of this, equal proportion of samples were collected from Private Schools and Government Schools in both Urban and Rural areas respectively i.e., 282 school going adolescents from each group. All students aged 10 to 19 years with informed and written consent forms signed by their parents or by self were included in the study. Students whose parents refused to give permission and those who gave incomplete responses were excluded from the study.

Results

Table 1

Socio Demographic features	Independent variables	Number N=1128	Percentage N(%)
Age	10 - 12	393	34.84
	13 - 15	367	32.5
	16 - 18	368	32.6
Gender	Male	508	45
	Female	620	55
Socio Economic Status	I	196	17.4
	II	259	22.9
	III	71	6.3
	IV	232	20.6
	V	370	32.8
Father's Education	Professional degree	56	9.92
	Post Graduate and above	94	16.6
	Graduate, intermediate or high school diploma	222	39.3
	High school certificate	258	45.7
	Middle school, primary school or illiterate	219	38.8
	Illiterate	279	49.4
Mother's Education	Professional degree	31	5.5
	Post Graduate and above	70	12.4
	Graduate, intermediate or high school diploma	186	32.9
	High school certificate	240	42.5
	Middle school, primary school or illiterate	276	48.9
	Illiterate	325	57.6
Father's Occupation	Professional	122	21.6
	Semi Professional	163	28.8
	Clerk, Shop owner, farmer	146	25.8
	Skilled worker	67	11.8
	Semi-skilled worker	77	13.7
	Unskilled worker	542	96

	Unemployed	11	2
Mother's Occupation	Professional	41	7.3
	Semi Professional	28	4.9
	Clerk, Shop owner, farmer	42	7.4
	Skilled worker	16	2.8
	Semi-skilled worker	53	9.39
	Unskilled worker	271	48
	Unemployed	677	120

Table 1 shows sociodemographic profile of the study subjects. 34.84% students were of age group 10-12 years, 32.5% were of age group 13-15 years and 32.6% were of 16-18 years of age. There were 55.5% male students and 45% female students. In government school maximum number of fathers of the students had completed high school and mothers were illiterate whereas in private school most of the parents had completed graduation. In urban areas maximum number of parents had completed their graduation while in rural areas majority were illiterate. In government school maximum number of fathers were clerks, shop owners or farmers. In urban areas maximum number of fathers were professional or semi-professional whereas in rural areas majority were unskilled workers. Mothers of majority of students were housewives. Among urban study subjects, in private school majority of the students (39.7%) were from the SES I. whereas in government school majority of the students (29.1%) were from the SES IV In rural area majority of the students in private school belongs to SES I,while majority of the students in government school belongs to SES IV.

Table 2

Socio demographic features	Variables	Overweight and obesity		Chi- Square test value and P value
		NO (n=966) N (%)	YES (n= 162) N (%)	
Age	10-12 (n=393)	361(91.9)	32 (8.1)	X^2 = 99.12, p=<0.001
	13-15 (n=367)	323 (88.0)	44 (12.0)	
	16-18 (n= 368)	282 (76.6)	86 (23.4)	
Gender	Male (n=620)	505 (81.4)	115 (18.6)	X^2 = 21.54, p=<0.001
	Female (n=508)	461 (90.7)	47 (9.3)	
Area of Residence	Urban (n= 564)	450 (79.8)	114 (20.2)	X^2 = 31.39, p=<0.001
	Rural (n= 564)	516(91.5)	48 (5.8)	
Type of School	Private (n=564)	453 (80.3)	111 (19.7)	X^2 = 31.39, p=<0.001
	Govt (n=564)	513 (90.9)	51 (9.1)	
Per capita income	<5000 (n=862)	780 (90.5)	82 (9.5)	X^2 = 69.88, p=<0.001
	>5000 (n= 266)	186 (69.9)	80 (30.1)	

Table 2 showed that the prevalence of overweight and obesity increased with increase in age and it was statistically highly significant. Significantly higher proportions of males were overweight and obese compared to females. It was seen that significantly higher proportion of urban based residence students were obese and overweight compared to the rural based students. Significantly higher proportion of the private school students were overweight and obese compared to government school students. It was seen that significantly higher proportion of the students were overweight and obese who belonged to the families who had per capita monthly income of more than 5000 rupees.

Table 3

Dietary practices	Variables	Overweight and obesity		Chi- Square test value and P value
		NO (n=966) N(%)	YES (n= 162) N(%)	
Intake of vegetables	Nil(n=37)	20 (54.1)	17 (45.9)	X^2 = 58.8, p=<0.001
	1 time/day(n=279)	218 (78.1)	61 (21.9)	
	2 or more times a day(n=812)	722 (88.9)	90 (11.1)	
Intake of fruits	Nil(n=232)	166 (71.5)	66 (28.5)	X^2 = 48.1, p=<0.001
	1 time/day(n=532)	470 (88.3)	62 (11.7)	
	2 or more times a day(n=364)	330 (90.7)	34 (9.3)	
Intake of carbonated drinks	Nil(n=660)	585 (88.6)	75 (11.4)	X^2 = 33.04, p=<0.001
	1 time/day(n=291)	254 (87.3)	37 (12.8)	
	2 or more times a day(n=177)	127 (71.7)	50 (28.3)	
Intake of fast food in restaurants	Nil(n=208)	188 (90.4)	20 (9.6)	X^2 = 6.82, p=0.03
	1-2 times/week (n=630)	540 (85.7)	90 (14.3)	
	3 or more times/week(n=290)	238 (82.1)	52 (17.9)	
Intake of second helpings during meals	Healthy (n=557)	509 (91.4)	48 (8.6)	X^2 = 29.52, p=<0.001
	Junk (n=571)	457 (80.0)	114 (20.0)	
Intake of meal after fast food	Yes (n= 274)	224 (81.7)	50 (18.3)	X^2 = 4.44 , p=0.035
	No (n= 854)	742 (86.9)	112 (13.1)	
Intake of Milk	Yes (n= 847)	725 (85.6)	122 (14.4)	X^2 = 2.25 , p=0.13
	No (n= 281)	241 (85.8)	40 (14.2)	

From table 3 it was seen that the prevalence of overweight and obesity significantly increased with decrease in frequency of vegetable intake, fruit intake. Whereas, the prevalence of overweight and obesity significantly increased with the increase in frequency of carbonated drinks, fast food, unhealthy junk food as second helping meals and intake of meals after a fast food meal. No association was seen with frequency of milk intake for the prevalence of obesity in the study population.

Table 4

Physical activity pattern	Variables	Overweight and obesity		Chi- Square test value and P value
		NO (n=966) N (%)	YES (n= 162) N (%)	
Vigorous physical activity	<3 days/week (n=515)	375 (72.8)	140 (27.2)	X^2 = 126.69, p=<0.001
	>3 days/week (n=613)	591 (96.4)	22 (3.6)	
Strengthening exercises	<3 days/week (n=872)	735 (84.3)	137 (15.7)	X^2 =5.69, p=0.02
	>3 days/week (n=256)	231 (90.3)	25 (9.7)	
Moderate physical activity	<5days/week (n=548)	424 (77.4)	124 (22.6)	X^2 = 59.21, p=<0.001
	>5 days/week(n=580)	542 (93.4)	38 (6.6)	
No. of days of physical education classes/week	<5days/week (n=918)	769 (83.8)	149 (16.2)	X^2= 14.01, p=0.0001
	>5 days/week(n=210)	197 (93.8)	13 (6.2)	
Time spent in watching TV/Computer	<2 hours (n= 748)	690 (92.5)	58 (7.5)	X^2= 78.82, p=<0.0001
	>2 hours (n= 380)	276 (72.6)	104 (27.3)	

From table 4 it was seen that the prevalence of overweight and obesity significantly increased with decrease in frequency of vigorous physical activity, strengthening exercises frequency, moderate physical activity, and number of days spent on physical education classes in a week. The students who used to spend two or more hours watching TV in a day in last week were found to be obese and overweight.

DISCUSSION

In the present study total students were 1128 out of which 564 students from urban areas and 564 students from rural areas were included. The percentage age distribution was as follows- Students aged from 10 to 12 years were 34.84%, from 13 to 15 years were 32.5% and those from 16 to18 years were 32.6%. The age distribution shows that the emphasis on education was the same in rural as well as urban areas. There were more male students than female students. In the present study, children studying in private school had better educated parents, 35.7% mothers and 45.2% fathers were graduate, intermediate or high school diploma as compared to those in a government school where both mother and father were mostly educated till high school or middle school. More number of urban parents were found to have a higher education status as compared to rural parents. Higher number of fathers from private schools were professionals and semi professionals, compared to that in government schools. Mothers of majority of students in both the groups were housewives. Similarly, maximum number of adolescents in urban areas had fathers who were professional or semi-professional. However, in the rural areas maximum numbers of fathers were unskilled workers and mothers were unemployed or unskilled workers. This pattern may be due to the inclination of better educated parents to admit their wards in private schools. More numbers of better educated people migrate to urban areas to earn a good living. In the present study, students of private school mostly belonged to socioeconomic class I and II while students of government school mostly belonged to socioeconomic class IV and V.

In our study, overweight and obesity were found to be significantly associated with increasing age, male gender, urban residence, private school and higher per capita income. Similar findings were found in other studies in India. In a study conducted by **Rohilla et al**[14] prevalence was overnutrition was found to be 16.7% in urban areas. **Chhatwal et al**[15] reported that prevalence of overnutrition was more in boys (14.2%) than in girls (11.1%). This was in line with our study. However in a study done by **Kaur S et al**[16], higher prevalence of obesity was found in girls as compared to boys. Similarly to our study **Tharkar S et al**[17] and **Goyal RK et al**[18] found that higher prevalence of overweight and obesity in middle SES as compared to low SES which was significant.

We observed that intake of carbonated drinks, fast food and second helpings after meals was directly related with higher prevalence of overweight and obesity. **Ebbeling CB et al**[19] did a randomized controlled trial in which it was found that decreasing sugar sweetened drink consumption had a beneficial effect on body weight. They found that adolescents consuming carbonated drinks were 2.57 times more likely to become obese as compared to their peers, which was similar to the findings of our study. **Nora El-Said Badawi et al**[20] in 2013 observed a higher prevalence of overweight among children who ate more candy and chocolates and less fruits and vegetables. This was in line with our study.

Our study showed that the prevalence of overweight and obesity significantly increased with decrease in frequency of physical activities. A cross-sectional study by **El-Bayoumy I et al**[21] indicated that a lack of physical activity has contributed to the increased prevalence of obesity and overweight among intermediate adolescent school children aged between 10 and 14 years (N = 5402) in Kuwait. In the study by **Vasconcellos et al**[22] it was seen that the prevalence of overweight and obesity significantly increased with decrease in frequency of Vigorous physical activity, strengthening exercises frequency, moderate physical activity. The prevalence of obesity and overweight was highest amongst those students who did not take moderate or vigorous physical activity and there is a cardiovascular risk factor involved with it.

In our study Spending more time in watching TV or computer was directly associated with higher prevalence of overweight and obesity. Similar relationship was observed in the studies listed below. In their study, **Kumar et al**[23] also reported excess TV viewing as potential influencing factors of childhood obesity in a study on affluent school children. Another study conducted by **Kruger R et al**[24] showed that overweight and obese children were least active at all times and they spent time mainly watching TV.

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