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Original Research Article

Risk Factors Associated with Obesity among Adolescent Students: A Case Control Study

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ABSTRACT

Objective: Obesity has emerged as a global public health problem affecting all ages and both sexes. The seeds of behavioral factors associated with obesity are implanted during childhood and adolescence. The present study was undertaken to identify the behavioral correlates of overweight/obesity among school going adolescents in Hyderabad (India).
Methods: A case-control study was carried out in two schools and 57 cases (overweight and obese) and equal number age and sex matched controls were studied.
Results: The study revealed that decreased outdoor physical activity, measured by fewer hours of outdoor games, motorized conveyance to school and longer hours of TV watching was significantly associated with overweight/obesity. In addition, higher consumption of junk food, irregularity of meals and lack of parental supervision of diet were also correlated with overweight/obesity. A higher rate of overweight/obesity among children whose mothers were working is also reported.
Conclusion: This case-control study confirmed the findings of earlier cross-sectional studies, and also revealed that children of working mothers may be at higher risk of overweight/obesity.

Key Words: Overweight, Obesity, Case-control study

INTRODUCTION

World Health Organization has defined overweight and obesity as abnormal or excessive accumulation of fat that may impair health. [1] Recent WHO global estimates indicate that in 2014 more than 1.9 billion adults, 18 years and older, were overweight. Of these over 600 million were obese. The pandemic of obesity and overweight has also engulfed children and adolescents. It is estimated that 200 million school-aged children worldwide are overweight, of which 40-50 million are obese. [2] Once considered a high-income country problem, overweight and obesity are now on the rise in low- and middle-income countries particularly in urban settings. [3] The fundamental cause of obesity and overweight is an energy imbalance between calories consumed and expended. The epidemic of obesity and overweight has been fuelled by an increase intake of energy-dense food that are high in fats, coupled with an increase in physical inactivity due to the increasingly sedentary work, changing

modes of transportation and decrease in outdoor recreational activities. [3]

Obesity is a major risk factor for non communicable diseases such as cardiovascular diseases, diabetes, musculoskeletal disorders and cancers of breast, endometrial and colon. Obesity has played an important role in causing "double burden" of diseases that developing countries are now facing. Childhood and adolescent obesity is a risk factor for obesity during adulthood, as well as increased incidence of cardiovascular diseases. [4]

Various studies conducted in India during last decade have revealed a rising trend in prevalence of overweight and obesity among children and adolescents. [5,6] The present study has been undertaken to identify various behavioral factors that are associated with obesity and overweight among urban school going adolescents.

MATERIALS AND METHODS

A case-control study was conducted among students of standards 8^{th} to 10^{th} in two schools in Hyderabad. Cases (obese and overweight) were identified based on internationally accepted cut-offs based on age and gender. [7] Controls were group-matched by age (±1 year) and gender. Based on prevalence of risk factor among controls as 10%, level of significance 5% and Odds Ratio of 4, a sample size of 114 (57 cases and 57 controls) was calculated. Known cases of diabetes mellitus, hypothyroidism and students on chronic medication were excluded from the study. The data were compiled on Excel spreadsheet and analyzed using SPSS software. Permission of Institutional Ethical Committee, administrative authorities of the concerned schools and informed consent of parents were obtained.

RESULTS

A total of 114 students (57 cases and 57 controls were included in the study. The distribution of the cases and controls as per age, sex and class they were studying is shown in Table 1.

Table 1: Distribution of Study Population as per Age, Sex and Class

Study variable		Number of cases (n=57)	Number of Controls (n=57)
Age	14 years	15	15
	15 years	16	16
	16 years	26	26
Sex	Boys	27	27
	Girls	30	30
Standard	8^{th}	17	17
	9^{th}	16	16
	10^{th}	24	24

Association of Obesity/overweight with Economic Status of the Family and Employment Status of Mothers

An attempt was made to study the association between economic status (per capita income) and prevalence of overweight/obesity. However, both schools being private schools, all students belonged to higher income group. Hence, the results could not be analyzed, and are not presented. An analysis of association between obesity/overweight and working mother showed a statistically significant association ($p< 0.001$)

Table 2: Employment Status of Mothers & Prevalence of Obesity/overweight

Employment Status of Mother	Cases (Obese/ overweight) n=57	Controls (Normal BMI as per age & gender (n=57)	P value
Employed	47	8	P<0.001
House maker	10	49	

Diet, dietary habits and Overweight/ Obesity. Diet is one of the two major causes of higher BMI, the other being lack of physical activity. Various dietary factors studied during the study are presented in Table 3.

Table 3: Dietary Aspects and Obesity/ overweight

Variable		Cases (Obese/overweight) n=57	Controls (Normal BMI as per age & gender (n=57)	P value
Type of diet	Vegetarian	12	21	p>0.05**
	Non-vegetarian	45	36	
Regularity of meals	Regular	18	53	P<0.001*
	irregular	39	4	
History of consumption of Junk-food (two or more times/ week)	Present	50	38	P<0.05*
	Absent	7	19	
Parents supervise diet	Often	5	54	P<0.001*
	Sometimes	45	1	
	Never	7	2	

*Significant ** Not significant

Various parameters related directly or indirectly with physical activity were studied. The presence or absence of exposure factors among cases and controls are depicted in Table 4

Table 4: Association of Physical Exercise and Obesity/Overweight

Variable		Cases (Obese/overweight) n=57	Controls (Normal BMI as per age & gender (n=57)	P value
Outdoor games (average hr/day)	Less than 1	23	43	P<0.001*
	One or more	34	14	
Mode of conveyance to school	Motorized vehicle	50	3	P<0.001*
	Walk/cycle	7	54	
Total hours of sleep per day	More than 8	27	38	P<0.05*
	Less than 8	30	19	
Time spent on watching TV/computer (average hours/day)	More than 3	47	11	P<0.001*
	Three or less	10	46	
Eating snacks/meals while watching TV	Yes	54	4	P,0.001*
	No	3	53	

*Significant

The knowledge of students regarding effect of overweight on health was inquired and graded as good or poor (Table 5).

Table 5: Knowledge regarding ill effects of obesity on Health

Knowledge	Cases (Obese / overweight) n=57	Controls (Normal BMI as per age & gender (n=57)	P value
Poor	37	42	p>0.05**
Good	20	15	

** Not significant

DISCUSSION

Various studies in India have revealed high prevalence of overweight/obesity among children and adolescents. In a study [8] conducted in Chennai, the researchers reported an overall prevalence of obesity/overweight as 5.2% and 23.8% among adolescent studies in government and private schools respectively, using International Obesity Task Force Criteria. [7] Ramachandran et al conducted a study [9] among urban adolescent school children, and reported prevalence of overweight as 17.8% among boys, and 15.8% among girls. Other studies [10-13] conducted in India has also proved that overweight/obesity is significant public health problem among adolescents, and the trend is on the rise.

The present study was undertaken to identify the behavioral risk factors for overweight/obesity among adolescents. The study revealed that irregularity of meals, frequent consumption of junk food and lack

of parental supervision as risk factors for overweight/obesity among the study population. Similarly, lack of exercise as identified by infrequent outdoor games, conveyance to school by motorized vehicle and longer hours of inactivity (TV watching, sleep) were also associated with overweight/obesity. These finding of the study were in conformity with other recent studies conducted in India which also revealed association of overweight/ obesity with longer hours of TV watching, [14] higher consumption of junk food [15] and less participation in outdoor games. [16] Significant association of overweight/obese adolescents with working mothers as revealed in this study may be confounded due to higher family income and lack of parental supervision.

The study also showed that there is need to educate adolescents regarding risks of obesity, and also ensure that the knowledge is transformed into healthy practices.

CONCLUSION

Public health significance of obesity and its risks are well identified. There is a need to identify various demographic, genetic, behavioral and metabolic factors that are responsible for overweight and obesity. For this larger sample sized studies are recommended. As the habits and behavior get cemented during childhood and adolescence, public health experts, educationists and school authorities should join hands to ensure that today's young adopts healthy life styles so that the humanity marches towards positive health along with economic growth.

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