Original Research Paper

Community Medicine

PREVALENCE OF OVERWEIGHT AND OBESITY AMONG URBAN SCHOOL GOING ADOLESCENTS (10-17 YEARS) AND ASSOCIATED RISK FACTORS IN SOUTHERN CITY OF MAHARASHTRA: A CROSS-SECTIONAL STUDY.

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ABSTRACT **Background:** Obesity has become a health problem in developed and developing countries. Obesity is associated with premature deaths due to diabetes, CHD and hypertension. Adolescent age is a phase of life which is important for laying the foundation of good health. Behavioural patterns are established during this period e.g., dietary habits, physical exercise, substance use etc. Screening of adolescents for overweight and obesity at periodic intervals can help to modify the lifestyle factors which may help in preventing lifestyle diseases in their adulthood. **Aims And Objectives:** To estimate the prevalence of overweight and obesity among urban school going adolescents (10-17 years) and study some of the associated risk factors. **Materials And Methods:** It was a cross-sectional study conducted in urban school going adolescents in the age group of 10-17 years (class V to X) of the Government/ Government Aided and private schools in the southern city of Maharashtra. A self-designed semi-structured questionnaire was administered to the study participants to obtain their sociodemographic profile, socio environmental factors followed by anthropometric measurements. WHO z-score reference charts were used to classify BMI. **Results:** Prevalence of overweight and obesity was 10.80% and 6.93% respectively. Socioeconomic class, consumption of junk food, physical activity and sleep duration were significantly associated with the overweight and obesity. **Conclusion:** Overweight and obesity are associated with multiple factors, that need to be addressed in adolescent phase itself, for prevention and control of other lifestyle diseases later in life.

KEYWORDS : adolescents, overweight, obesity, lifestyle

INTRODUCTION:

Obesity has become a health problem in developed and developing countries. Obesity is associated with premature deaths due to diabetes, CHD and hypertension[1]. Epidemic of overweight and obesity (globesity) is the result of epidemiological and nutritional transition and if immediate actions are not taken millions will suffer various kinds of health disorders in near future.[2] Globally prevalence of obesity had tripled between 1975 and 2016[3].

According to the World Health Organization, for children aged 5-19 years, overweight is defined as BMI-for-age greater than 1 SD, and obese as a BMI-for-age greater than 2 SD above the WHO growth reference median[4]. CNNS 2018 is a recent large population-based cross- sectional study conducted in India in which prevalence of overweight and obesity of urban adolescents is reported as 9.7% and 2.2% respectively.[5]

Sedentary lifestyle with low energy expenditure and intake of high calorie diet with little or no nutritional value are the most important factors in the causation of obesity.

Adolescent age is a phase of life which is important for laying the foundation of good health. Behavioural patterns are established during this period e.g., dietary habits, physical exercise, substance use etc. Screening of adolescents for overweight and obesity at periodic intervals can help to modify the lifestyle factors which may help in preventing lifestyle diseases in their adulthood.

The present study was conducted to estimate the prevalence of overweight and obesity among urban school going adolescents (10-17 years) and study some of the associated risk factors, in southern city of Maharashtra.

MATERIALS AND METHODS:

It was a descriptive cross- sectional study carried out among school going adolescents from class V to X in Government/ Government aided and private schools of Latur, a southern city of Maharashtra during 1st Jan 2023- 31st June 23.

Sample size was calculated by using the formula $n = Z^2 pq/ l^2$ at 95% confidence interval and taking allowable error of 20%. Prevalence of overweight and obesity was taken 11.9% (CNNS-2018[5]) for calculating the sample size. Calculated sample size was 711. By adding 10 % extra (for non-response and long absenteeism) to calculated sample size; final sample size was 782. However out of 782 students selected by random sampling, only 750 students were included in final analysis. 32 study participants were either absent or did not return the completely filled questionnaire on the day of examination.

Inclusion Criteria:

Study participants in class V to X in the age group of 10-17 years residing in corporation area, whose parents had given consent/ accent, were included in the study.

Exclusion Criteria:

Study participants with serious systemic diseases, physical or mental problems were excluded from the study.

Methodology:

Approval of institutional ethics committee was obtained before starting the study. We used stratified random sampling to draw the sample from study population of class V to X in the city. The middle and secondary schools in the city were enlisted first and two government/ government aided schools and two private schools were selected randomly (lottery method) from the list. As the proportion of students in class V- X from both sectors was nearly equal we included equal number of students from each sector for the present study. Also, proportionate sample was taken from each class so as to recruit proportionate number from each age group. Students were randomly selected from each class.

According to the World Health Organization, for children aged 5-19 years, overweight is defined as BMI-for-age greater than 1 SD, and obese as a BMI-for-age greater than 2 SD above the WHO growth reference median[4]

Height and weight were measured only with school uniform

after removing shoes, jackets, wallets etc. Height was measured with wall mounted tape in centimetres to the nearest of 0.5 centimetre, while weight was measured with standardized weighing machine (to nearest of 100 gm).[6] BMI was calculated in Kg/ m[2]. WHO Z-score reference charts were used for classifying adolescents' BMI.

A self-designed semi-structured questionnaire was administered to the study participants to obtain other relevant information. They were asked to fill the relevant information with the help of their parents.

Recommended physical activity for adolescents is ≥ 1 hour per day[7,8,9]. Sleep duration of 9 hours for age below 13 years and 8 hours above 13 years was recorded as adequate[10]

RESULTS:
Out of total 750 study participants 46.26% were early adolescents, 49.73% were middle adolescents and 4% were late adolescents (Table.1). Total boys in study population were more (61.07%) as compared to girls (38.93%). Study participants belonging to Hindu and Muslim religion were 71.33% and 19.34% respectively while 9.33% belonged to other religions. Study participants belonging to socioeconomic class I, II, III, IV and V were 46.27%, 29.34%. 16.53%, 6.13% and 1.73% respectively. Total of 49.6% study participants were from Government and Government Aided schools while 50.4% belonged to private school.

Prevalence of overweight among school going adolescent was 10.80% while that of obesity among them was 6.93%. (Fig. 1). Prevalence of overweight and obesity was found to increase with age. We found prevalence of overweight and obesity 13.33% and 16.67% among the late adolescents which was considerably higher than that among early (10.09% and 6.34% respectively) and middle adolescents (11.26% and 6.70 % respectively). Prevalence of overweight and obesity was higher among boys (6.80 % and 4.40 % respectively) as compared to that in girls (4% and 2.53% respectively).

Although there was higher prevalence of overweight and obesity among the middle and late adolescents (Table 2), we found no significant association between higher age group and overweight and obesity (p > 0.05). Prevalence of overweight and obesity was slightly higher among boys (18.78%) as compared to girls (16.19%) but this difference was not statistically significant (p> 0.05). Also, there was no significant association of overweight and obesity with religion.

Prevalence of overweight and obesity was higher among the study participants who belonged to Socioeconomic class I and II (20.81%) as compared to class III, IV and V (8.20%). This difference was statistically significant (p < 0.001). Similarly, proportionately more students in private school were overweight and obese (22.75%) as compared to students in Government and Government schools (12.63%). This difference was statistically significant (p < 001).

Adolescents, who were consuming ≥ 3 servings of junk food per week, had higher prevalence of overweight and obesity (24.44%) as against those who were consuming < 3 servings of junk food per week (11.54%). This difference was statistically highly significant. (p < 0.00001)

Adolescents with physical activity more than > 60 min per day had lower prevalence of overweight and obesity (6.98%) as compared to their physically less active counterparts (19.13%) and this difference was statistically significant (0.01).

Proportion of overweight and obesity among adolescents with adequate sleep was considerably lower (14.22%) than that in adolescents with inadequate sleep (38.8%).   Inadequate sleep was found significantly associated with overweight and obesity. (p < 0.00001)

Table 1. Sociodemographic Profile Of Study Participants

Variable	N= 750 n (%)	
Age	10- 13yr	347 (46.26)
	13-16yr	373 (49.73)
	16-17yr	30 (4)
Gender	Male	458 (61.07)
	Female	292 (38.93)
Religion	Hindu	535 (71.33)
	Muslim	145 (19. 34)
	Others	70 (9.33)
SES	I	347 (46.27)
	II	220 (29.34)
	III	124 (16.53)
	IV	46 (6.13)
	V	13 (1.73)
Type of school	Govt./Aided	372 (49.6)
	Private	378 (50.4)
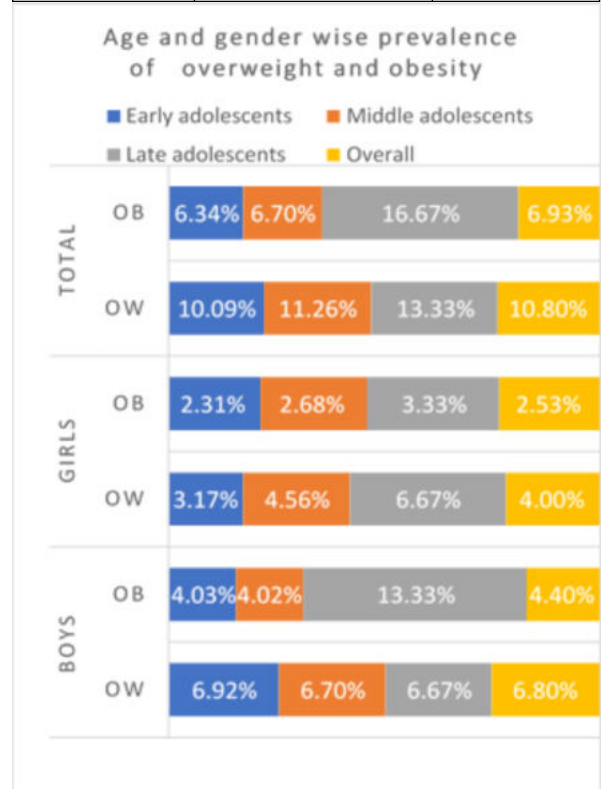
Fig 1. Age and Genderise Prevalence of Overweight & Obesity

Table 2. Factors Associated With Overweight And Obesity

Variable	N= 750 n (%)	Normal or Thinner n=617	0W & OB n = 133	P–value
Age group				0.17 df =2
10- 13yr	347 (46.26)	290 (83.57)	57 (16.43)	
13- 16yr	373 (49.73)	306 (82.04)	67 (17.96)	
16-17yr	30 (4)	21 (70)	9 (30)	
Gender				0.35 df =1
Male	458 (61.07)	372 (81.22)	86 (18.78)	
Female	292 (38.93)	245 (83.90)	47 (16.10)	
Religion				0.49 df =2
Hindu	535 (71.33)	435 (81.31)	100 (18.69)	
Muslim	145 (19.34)	124 (85.52)	21 (14.48)	
Others	70 (9.33)	58 (82.86)	12 (17.34)	
SES				0.0001 df =1
I & II	567 (75.6)	449 (79.19)	118 (20.81)	
III, IV & V	183(24.4)	168 (91.80)	15 (8.20)	

School				0.0002
Govt./ Aided	372 (49.6)	325 (87.37)	47 (12.63)	df =1
Private	378 (50.4)	292 (77.25)	86 (22.75)	
Junk food				< 0.00001
≥ 3 serves/ w	360 (48)	272 (75.56)	88(24.44)	df =1
< 3 serves/ w	390 (52)	345 (88.46)	45 (11.54)	
Physical				0.0055
activity	86 (11.47)	80 (93.02)	6 (6.98)	df =1
≥ 60 min	664 (88.54)	537 (80.87)	127 (19.13)	
< 60 min				
Sleep				< 0.00001
Adequate	640 (85.33)	549 (85.78)	91 (14.22)	df =1
Inadequate	110 (14.67)	68 (61.82)	42 (38.18)	

DISCUSSION:

The presents cross- sectional study was conducted in to estimate the prevalence overweight and obesity and to study some of the associated risk factors among school going adolescents in class V to X (10-17 years) in northern city of Maharashtra, India.

We found the prevalence of overweight and obesity 10.80% and 6.93% respectively. Combined prevalence of overweight and obesity was 17.73%. Gautam et al.[11] had reported similar prevalence (10.8% and 6.2% respectively for overweight and obesity) in Udupi, Karnataka. Similarly, Bhattad et al.[12] had reported prevalence of overweight and obesity 9.8% and 5% respectively. Thakre et al.[13] had reported prevalence of overweight and obesity 16.19% in 10-16 years age group in their study conducted at Nagpur.

Tapnikar et al.[14,] Solunke et al.[15] and Dabade et.al[16] had reported the prevalence of overweight and obesity in school going adolescents 14% and 13.6% and 11.66% respectively, which is less compared to the present study. Goyal et al.[17] (25.18%) Muralidhar et al.[18] (23.83%), Prajapati et al.[19] (27.01%), Seema et al.[20] (23.9%) and Tripathi et al [21] (32.7%) had reported much higher prevalence of overweight and obesity in their studies.

We did not find any association of age, gender and religion with the overweight and obesity. These findings are consistent with the study of Thakre et al.[13]. Gautam et al.[11h] had also found no association of gender with overweight and obesity. However, Goyal et al[17] and Chaitali et al.[22] had found significant association of gender with overweight and obesity. We found that higher socioeconomic status was significantly associated with the overweight and obesity. (p = 0.0001) Also, type of school (which is dependent on socioeconomic status) was also found significantly associated with overweight and obesity. (p= 0.002). Similar findings are reported by Gautam et al.[11], Dabade et.al[16] and Goyal et al[17].

In the present study, we found that frequent consumption of junk food (≥ 3 servings per week) was significantly associated with the overweight and obesity. (p < 0.00001). Gautam et al.[11], Solunke et al.[15], Thakre et al.[13] had revealed similar findings.

We found significant association of physical inactivity with overweight and obesity. (p= 0.0055). Similar findings are revealed in the studies of Solunke et al.[15] and Thakre et al.[13].

In our study it was found that inadequate sleep was significantly associated with overweight and obesity. (p < 0.00001). Similar findings are reported by Thakre et al.[13], Tapnikar et al.[14] and Dabade et.al[16].

Limitations Of The Study:

It was a school based descriptive cross-sectional study. Community-based case control study or cohort study will be more appropriate for testing the relationship of overweight and obesity with the risk factors. Risk factors like junk food intake, physical activity and sleep duration were recorded as a response recorded from participants which are liable to recall bias to more or less extent. Also, other unidentified confounding factors like genetic factors may have affected the results of our study.

CONCLUSIONS:

Prevalence of overweight and obesity was considerably higher among school going adolescents. Higher socioeconomic status, private type of school, physical inactivity, junk food intake and inadequate sleep were found significantly associated with the overweight and obesity. As adult obesity has its roots in childhood and adolescence, adolescent age group should be a priority group for focusing preventive strategies to curb the overweight and obesity. Prevention programs should be incorporated into school activities; reinforcing both healthy dietary habits and healthy lifestyles.

Recommendations:

Periodic monitoring of weight and BMI is necessary in schools. Physical activity of an hour or more per day should be ensured by school authorities and parents. Promotion of healthy food habits like adequate sleep, recommended physical activity and avoiding junk food intake is the key for prevention of overweight and obesity among adolescents.

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