

Original Research Article

Prevalence and determinants of obesity and overweight among college students of Gujarat, India: a cross sectional study

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ABSTRACT

Background: Early adulthood obesity itself is a predictor of adult obesity and of higher than expected adult morbidity and mortality. The objective of this study was to know the prevalence and determinants of obesity in college students of Vadodara and Patan city of Gujarat, India.

Methods: The present cross sectional study was undertaken during April 2017 to March 2018 in randomly selected 5 Colleges of Vadodara city and Patan City of Gujarat. Total 1330 students between the age group of 18 to 23 years were examined and BMI were calculated. The prevalence of overweight and obesity were determined based on the International Obesity Task Force criteria. Various determinants of obesity and overweight were studied by interviewing students. Thus collected data was analyzed using SPSS 17 (Trial version).

Results: Out of 1330 students, males were 49.6% Prevalence of obesity and overweight was 6.1% and 11.0% respectively. The prevalence of obesity and overweight was higher amongst less active group (6.5% and 13.4% respectively). Prevalence of obesity and overweight was significantly higher in the group of students who spent >2 hours daily in front of television or computers. The prevalence of obesity and overweight was significantly higher amongst group of students who took daily calories above recommended dietary allowance (21.5% and 22.8% respectively). The prevalence of obesity and overweight was significantly higher who took junk food (9.3% and 14.8% respectively).

Conclusions: High prevalence of obesity and overweight in college students indicate an urgent need to increase awareness via education and motivation of all stakeholders.

Keywords: Obesity, Overweight, Prevalence, Determinant, College students

INTRODUCTION

Worldwide, disease profile are transforming at a rapid pace catching the attention of medical professionals and policy makers alike. This is particularly true in low and middle-income countries that form the major chunk of global population. The emerging epidemics of obesity, cardiovascular disease and diabetes form the crux of this phenomenal change. Among these entities, obesity has become a colossal epidemic causing serious public health concern and contributes to 2.6 million deaths worldwide

every year.^{1,2} The prevalence of obesity has increased worldwide in almost every country in all the age groups. The steep increase has prompted this development to be called an epidemic and because it is worldwide, a pandemic.³

It has been estimated that worldwide over 22 million students under the age of 20 are obese, and one in 10 students is overweight. Globally the prevalence of early adulthood obesity varies from over 30% in USA to less than 2% in Sub-Saharan Africa. Currently the prevalence

of obese college students is 20% in UK and Australia, 15.8% in Saudi Arabia, 15.6% in Thailand, 10% in Japan and 7.8% in Iran. In China, the prevalence of obesity among students aged 7-9 years increased from 1-2% in 1985 to 17% among girls and 25% among boys in 2000.⁴

Indian data regarding current trends in early adulthood obesity are emerging. Available studies of Delhi and Chennai has shown the prevalence of 7.4% and 6.2% respectively. A study conducted among adolescent college students in South Karnataka has shown the prevalence of overweight and obesity to be 9.9% and 4.8% respectively.⁵

Aetiopathogenesis of early adulthood obesity is multi factorial. Interactions between genetic, neuro endocrine, metabolic, psychological, environmental and socio-cultural factors are clearly evident in early adulthood obesity. Early adulthood obesity affects self-esteem and has negative consequences on the cognitive and social development. Conditions such as type 2 diabetes mellitus, hypertension and hypercholesterolemia, which were noted primarily in adults, are becoming more common among students with the increase in the prevalence of obesity. Early adulthood obesity itself is a predictor of adult obesity and of higher than expected adult morbidity and mortality. Due to difficulty in the treatment of obesity in adults and the many long-term adverse effects of early adulthood obesity, prevention of early adulthood obesity has now been recognized as a public health priority.⁵ With this background in mind, the present study was undertaken to know the prevalence and determinants of obesity in college students of Vadodara and Patan city.

METHODS

The present study was a cross sectional study undertaken in 5 colleges, which were selected randomly from list of all colleges from Vadodara and Patan city during April 2017 to March 2018. All students between the age group of 18-23 years were included after written informed consent. The sample size was calculated based on an estimated prevalence of obesity of 8% by pilot study, with 80% power, 95% confidence and 5% level of significance with an allowable error of 10% to obtain an age and gender-specific representative sample of students. 1300 college going students of age group 10- 15 years were the calculated sample size of the study but since all the students, studying in all classes selected colleges, belonging to the 18-23 years age group were included in the study population, the final study population was 1330 students. These students were examined and interviewed using pre-designed, pre-tested, semi-structured Performa. Height was measured in centimeters (cm) using a stadiometer. Weight was measured in kilograms (kg) using a standardized weighing machine. Body mass index (BMI) was calculated using the formula weight (kg) divided by height in square meters. Waist circumference was measured in centimeters using a non-stretchable fiber

measuring tape. The prevalence of overweight and obesity were determined based on the IOTF (International Obesity Task Force) criteria. Before conducting the study approval was obtained from institutional ethical committee for human research. Data safety and confidentiality was also given due consideration. The file containing identity related details was kept password protected and the filled Performa were kept in lock with key accessible only to researcher. Various determinants of obesity and overweight were studied by interviewing students. Thus collected data was analyzed using SPSS 17 (trial version).

RESULTS

Out of 1330 students males were 49.6% and females were 50.4%. Overall, the total number of obese students identified in whole study population was 81 (6.1%) and numbers of overweight students were 146 (11.0%). Overall prevalence of obesity was more among male population (6.4%) as compared to that in females (5.8%). Though the prevalence of overweight was more among males (11.3%). Different categories of BMI and gender of the students were not significantly associated (Table 1).

The prevalence of obesity was found to be highest among 23 years age group (9.1%). The prevalence of overweight was maximum in 21 year age group (15.8%). The Chi square test applied between different age groups and BMI category (Obese and Overweight taken together and Normal) was found to be significant, indicating thereby the statistical association of increasing age with the prevalence of obesity and overweight (Table 2).

The numbers of students with total sports-physical activity time per week ≤ 2 hour were only 382. The prevalence of obesity and overweight was higher amongst less active group (6.5% and 13.4% respectively) as compared to more active group. Though the association was not significant (Table 3). The number of students, who spent above 2 hours in front of television or computers for any purpose, was 277. The prevalence of obesity and overweight was significantly higher (17.7% and 21.3%) amongst those who spent greater time in front of television, mobiles and computers as compared to the other group who spent ≤ 2 hours in front of television or computers per day (Table 4).

The number of students with daily calorie intake $>RDA$ (Recommended Dietary Allowance) was 241. The prevalence of obesity and overweight was significantly higher amongst group who took daily calories above RDA (21.5% and 22.8% respectively) as compared to the other group as shown in Table 5. The numbers of students taking junk foods more than twice a week were 696. The prevalence of obesity and overweight was significantly higher in them (9.3% and 14.8%) as compared to those who took junk food less than or equal to 2 times per week (2.5% and 6.8% respectively) as shown in Table 6. The number of students taking

vegetarian diet was 765 as compared to those who took mix diet who were 565. The prevalence of obesity and overweight was significantly higher amongst those who took mix diet (8.1% and 13.1%, respectively) as compared to vegetarians as in Table 7. The number of students with either parents having history of obesity was

98. The prevalence of obesity and overweight among students having parents with history of obesity was 225.5% and 23.4%, respectively which was significantly higher than those without parental history of obesity (4.5% and 9.9%) as in Table 8.

Table 1: Gender wise distribution of the students according their BMI category.

Sex	Obese		Overweight		Normal		Total	
	N	%	N	%	N	%	N	%
Male	42	6.4	75	11.3	544	82.3	661	100
Female	39	5.8	71	10.6	559	83.6	669	100
Total	81	6.1	146	11.0	1103	82.9	1330	100

χ^2 value=0.37; D.F.=2; p=0.82.

Table 2: Distribution of students according their age and BMI category.

Age group (years)	Obese		Overweight		Normal		Total	
	N	%	N	%	N	%	N	%
18	9	4.6	13	6.6	175	88.8	197	100
19	11	5.2	16	7.5	186	87.3	213	100
20	12	5.2	21	9.2	196	85.6	229	100
21	14	5.8	38	15.8	189	78.4	241	100
22	14	6.4	29	13.2	176	80.4	219	100
23	21	9.1	29	12.6	181	78.4	231	100
Total	81	6.1	146	11.0	1103	82.9	1330	100

χ^2 value=20.7; D.F.=10; p<0.05.

Table 3: Distribution of students according to their total sports-physical activity per week and their BMI category.

Total sports physical activity time per week	Obese		Overweight		Normal		Total	
	N	%	N	%	N	%	N	%
≤2 hours	25	6.5	51	13.4	330	86.4	382	100.00
>2 hours	56	5.9	95	10.0	773	81.5	948	100.00
Total	81	6.1	146	11.0	1103	82.9	1330	100.00

χ^2 value=1.533; D.F.=2; p=0.4.

Table 4: Distribution of students according to their total sedentary time before TV/computers daily and their BMI category.

Total sedentary time for TV/computers/mobiles daily	Obese		Overweight		Normal		Total	
	N	%	N	%	N	%	N	%
>2 hours	49	17.7	59	21.3	169	61.0	277	100
≤2 hours	32	3.0	87	8.3	934	88.7	1053	100
Total	81	6.1	146	11.0	1103	82.9	1330	100.00

χ^2 value=131.52; D.F.=2; p<0.0001.

Table 5: Distribution of students according to their daily total calorie intake in terms of recommended dietary allowance and BMI category.

Recommended dietary allowance	Obese		Overweight		Normal		Total	
	N	%	N	%	N	%	N	%
>RDA	52	21.5	55	22.8	134	55.6	241	100
≤RDA	29	2.6	91	8.3	969	89.0	1089	100
Total	81	6.1	146	11.0	1103	82.9	1330	100.00

χ^2 value=115.19; D.F.=2; p<0.0001.

Table 6: Distribution of students according to their junk food intake frequency per week and their BMI category.

Junk food frequency per week	Obese		Overweight		Normal		Total	
	N	%	N	%	N	%	N	%
>2 times	65	9.3	103	14.8	528	75.9	696	100
≤2 times	16	2.5	43	6.8	575	90.7	634	100
Total	81	6.1	146	11.0	1103	82.9	1330	100.00

χ^2 value=53.528; D.F.=2; p<0.0001.

Table 7: Distribution of students according to the type of their diet and BMI category.

Type of diet	Obese		Overweight		Normal		Total	
	N	%	N	%	N	%	N	%
Vegetarian	35	4.5	72	9.4	658	86.0	765	100
Mix	46	8.1	74	13.1	445	78.8	565	100
Total	81	6.1	146	11.0	1103	82.9	1330	100.00

χ^2 value=12.869; D.F.=2; p<0.01.

Table 8: Distribution of students according to history of obesity in either parents and their BMI category.

History of obesity in either parent	Obese		Overweight		Normal		Total	
	N	%	N	%	N	%	N	%
Present	25	25.5	23	23.4	50	51.0	98	100
Absent	56	4.5	123	9.9	1053	85.5	1232	100
Total	81	6.1	146	11.0	1103	82.9	1330	100.00

χ^2 value=93.544; D.F.=2; p< 0.0001.

DISCUSSION

In our study the prevalence of obesity was more in males (6.4%) as compared to females (5.8%) and also the prevalence of overweight was slightly higher in males (11.3%) as compared to females (10.6%). In the study by Thaddanne et al the prevalence of obesity was more in females (6.8%) as compared to males (4.62%), but the prevalence of overweight was slightly higher in males (10.25%) as compared to females (9.69%).² In the study done by Ghonge et al and Kumar et al in Davangere, prevalence of obesity among females (8.82%) was more than that among males (4.10%).^{3,6} In Agarwal et al prevalence of obesity among girls was (6.7%) higher as compared to that amongst boys (5.4%).⁷

In our study overall prevalence of obesity and overweight was 6.1% and 11.0% respectively. In Thaddanne et al overall prevalence of obesity and overweight was 5.62% and 9.99% respectively.¹ Similar prevalence of obesity and overweight in college students were found in studies done by Ghonge et al, Kapil et al, Kotian et al, Premnath et al and Kadiilkar et al.^{4,8-11} In our study the prevalence of obesity and overweight was higher amongst less active group (6.5 % and 13.4% respectively) as compared to more active group. In Thaddanne et al the prevalence of obesity and overweight was significantly higher amongst less active group (9.3 % and 13.95% respectively) as compared to more active group.¹ Similar results were obtained in the study done by Ghonge et al and Kotian et al.^{4,9} They showed that obesity was 21 times higher among those students participating less than two hours/

week in any type of physical activity. In a study done by Kumar et al in Davangere showed that those with absent physical activity had 2 times more risk of falling in obese group as compared to those who had more physical activity.⁶

In our study prevalence of obesity and overweight was significantly higher in the group who spent >2 hours daily in front of television or computers. In Thaddanne et al prevalence of obesity and overweight was significantly higher in the group who spent >2hours daily in front of television or computers. The findings are comparable to that of study done by Ghonge et al and Shabana et al in Chennai which showed that greater than 2 hours television watching (or -2.5, p<0.0001) was associated with obesity.^{4,12} The study done by Kuriyan et al in South India also found that the adjusted odds of being overweight for students who viewed television for greater than or equal to 2 hours/day was 19.6 (p = 0.001), when compared to students who viewed television for less than or equal to 45 minutes/day.¹³

In our study the prevalence of obesity and overweight was significantly higher amongst group of students who took daily calories above RDA (21.5% and 22.8% respectively) as compared to the other group. In Thaddanne et al the prevalence of obesity and overweight was significantly higher amongst group of students who took daily calories above RDA (18.57% and 15.19% respectively) as compared to the other group.¹ It is comparable to the findings of Ghonge et al and Kapil et al which showed increased total calorie among obese and

overweight group as compared to normal students.^{4,8} These findings were also similar to that of study done by Ghonge et al and Seema Jain et al.^{4,14} In our study significant association was found between junk food consumption and obesity. Similar findings were also obtained in the studies done by Thaddanne et al, Ghonge et al, Kumar et al, Kotian et al, and Jain et al.^{1,4,6,9,14}

In our study the prevalence of obesity and overweight among students having parents with history of obesity was 25.5% and 23.4% respectively which was significantly higher than those without parental history of obesity (4.5% and 9.9%). In Thaddanne et al the prevalence of obesity and overweight among students having parents with history of obesity was 46.15% and 17.94% respectively which was significantly higher than those without parental history of obesity (4.34% and 9.74%).¹ These findings are consistent with another study done by Thaddanne et al, Ghonge et al and Kumar et al in Davengere parental history of obesity was present for 32.7% of obese students.^{1,3,5} Students with parental history of obesity showed 25.2 times more chances of developing obesity than normal students. 33.8% of the obese girls and 31.6% of the obese boys had history of parental obesity. The findings are in contrast with the study done by Jain et al who found no significant association with family history of obesity.¹⁴

CONCLUSION

The prevalence of obesity and overweight was significantly higher in students with sedentary lifestyle, high consumption of junk food and high calorie diet with positive family history of obesity. High prevalence of obesity and overweight in college students indicate an urgent need to increase awareness via education and motivation of all stakeholders. This will go a long way in preventing early adulthood obesity and thus ultimately stemming the rising tide of non-communicable diseases such as diabetes and cardio vascular disease in India. There is definitely a need for well-planned, large-scale studies using standardized methodologies to estimate the prevalence and determinants of obesity and overweight in college students.

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