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Original Research Article

Association between obesity and anxiety among an adolescent population of Rajkot district, Gujarat, India: a cross sectional and descriptive study

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ABSTRACT

Background: Proper good nutrition are essential for mental development, physical growth, health and wellbeing and survival of adolescents. School based data of India shows a prevalence of obesity is 5.6% to 24.0% among children and adolescents. Psychosocial complications associated with obesity include poor self-image, depression, and difficulties in both social environment and home. This study was carried out with an objective to find out prevalence of malnutrition and associated factors.
Methods: A cross sectional study conducted among 1026 school going adolescents from 4 schools of Rajkot, Gujarat, India. Depression and anxiety were measured using Beck Depression Inventory and Beck Anxiety Inventory. Chi-square test was applied as test of significance.
Results: Majority of the students (58.1%) were belonged to early adolescent age group. About 67.1% were males. About 16.6% were underweight and 1.2% were obese. Overweight was more prevalent in girls (5.6%) as compared to boys (1.2%). Prevalence of anxiety and depression was 9.9% and 18.5% respectively. Anxiety was frequently found in overweight and obese adolescents (82.0%) as compared to only underweight and normal adolescents (7.1%, $p<0.0001$).
Conclusions: The prevalence rate of overweight and obesity were 9.7% and 4.3%. Girls are more affected with overweight. Significant number of adolescents was suffering from anxiety (9.9%) and depression (18.5%). Anxiety was frequently found in overweight and obese adolescents. There is need of immediate action to prevent adolescent obesity. Assessment of anxiety and depression among students with proper counselling should be carried out at least once a year.

Keywords: Adolescent, Anxiety, Depression, Obesity, Underweight

INTRODUCTION

Today, every fourth person in India is an adolescent (10-19 years).[1] According to the World Health Organization (WHO), adolescence is the period of life that extends from 10 to 19 years.[2] Adolescence is divided into three phases: (1) Early age- 10-13 years (2) Middle age- 14-16 years (3) Late- 17-20 years.[3]

Proper good nutrition are essential for mental development, physical growth, health and wellbeing and survival of adolescents.[4] Increased nutritional needs to this juncture relate to the fact that adolescents gain up to 50% of their adult weight, more than 20% of the adult height and 50% of their skeletal/bone mass during this period.[5] The rapid adolescent growth spurt demand extra nutritional requirements. Inadequate nutrition in this

period can retard growth and sexual maturation and lead to chronic diseases. Inadequate nutrition of girls during adolescence can have serious consequences throughout the reproductive year.[4]

School based data of India shows a prevalence of obesity is 5.6% to 24.0% among children and adolescents. Potential medical complication of obesity include hypertension, diabetes mellitus, dyslipidemia, coronary artery disease, stroke, premature joint destruction, arthritis, cholecystitis, some cancers and premature deaths. Obesity can also interfere to psychosocial development. Psychosocial complications associated with obesity include poor self-image, depression, and difficulties in both social environment and home.[4]

This study was carried out with an objective to find out prevalence of malnutrition and associated factors.

METHODS

This cross sectional study was carried out during April 2014 to December 2015 after approval from Institutional Ethics Committee of the P. D. U. Govt. Medical College, Rajkot. Total four schools of Rajkot were randomly selected by computer generated random number.

Inclusion criteria

- Students from 5th to 12th standard (10-19 years)
- Both gender

Exclusion criteria

- Adolescents who were absent on the day of visit were excluded
- Those who denied consent were excluded.

Total 1026 adolescents (688 boys and 338 girls) were included. Written informed consent was taken from each participant. A predefined questionnaire was given to be filled by themselves. Questionnaire included information regarding age, sex, standard, socioeconomic status and health problems. Height, weight and blood pressure were recorded. Body mass index (BMI) was calculated using the formula weight (Kg) divided by height in square meters (m^2). Nutritional status of adolescent is classified according to World Health Organization approved CDC age specific BMI charts. Undernutrition was defined as BMI<5 percentile, overweight is defined as BMI between 85-95 percentile and obesity is defined as BMI>95 percentile. Beck Anxiety Inventory (BAI) with 21 items was used for anxiety. The total score is calculated by the sum of the 21 items. Score of 0-21= low anxiety, score of 22-35= moderate anxiety, score of 36 and above= potentially concerning levels of anxiety. Beck Depression Inventory was used as psychological instrument for detecting early symptoms of depression in adolescents.[5] Score of 1-10 is normal, 11-16 is mild mood disturbance, 17-20 is borderline clinical depression, 21-30 is moderate depression, 31-40 is severe depression and >40 as extreme depression.

The data were entered into Microsoft excel 2010 spreadsheet and analyzed using EPI INFO Version 7 software. Qualitative data were presented as frequency and percentage and compared with Chi square test. The p-values equal to or less than 0.05 was considered as significant.

RESULTS

Total 1026 students of 10-19 age groups were included in this study. Socio-demographic detail is shown in Table 1.

Table 1: Socio-demographic detail of study participants.

Socio demographic detail	Number of students	Percentage
Age (years)		
10-13	596	58.1%
14-16	390	38.0%
17-19	40	3.9%
Gender		
Male	688	67.1%
Female	338	32.9%
Socioeconomic status		
I (upper class)	51	5.0%
II (upper middle class)	228	22.2%
III (lower middle class)	451	42.5%
IV (upper lower class)	240	23.4%
V (lower class)	56	5.6%
Total	**1026**	**100.0%**

Majority of the students (596, 58.1%) were belonged to early adolescent age group and only 40 students (3.9%) were in late adolescent age group. Mean age was 13.3 years with SD of 1.64 years. Out of 1026 students, 688 (67.1%) were males and 338 (32.9%) were females with male to female ratio 2.03:1. Maximum adolescents (451, 42.5%) were coming from class III followed by class IV (240, 23.4%) and class II (56, 5.5%).

Table 2 shows that out of 688 boys, 158 boys (23.0%) belonged to class IV and Class V whereas out of 338 girls, 138 girls (40.8%) belonged to class IV and Class V. This observation indicates that proportion of girls from lower socioeconomic class was significantly higher as compared to boys ($p<0.0001$).

Figure 1 shows that majority of students were from grade VIII (28.1%), grade VII (27.6%) and grade VI (23.3%). Very few numbers of students in the grade 5, 10, 11 and 12 can be explained by their absenteeism and their reluctance to participate in the study.

Table 2: Socioeconomic status according to gender.

Socio-economic status	Boys	Girls	Total	Chi square and p-value
Class I, II and III	530 (77.0%)	200 (59.1%)	730 71.2%)	
Class IV and V	158 (23.0%)	138 (40.8%)	296 (28.8%)	χ^2=34.36, df=2, p<0.0001
Total	**688 (100%)**	**338 (100%)**	**1026 (100%)**	

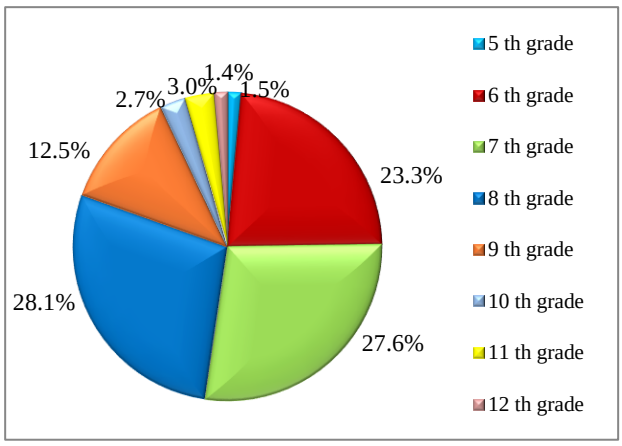

Figure 1: Grade wise distribution of school going adolescents (N=1026).

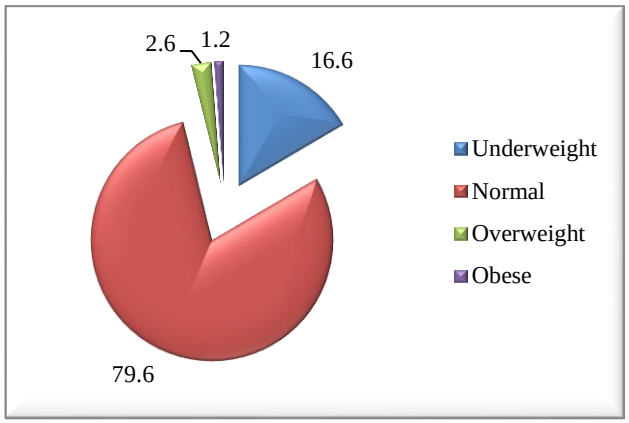

Figure 2: Nutritional status of patients according to WHO CDC growth chart.

Table 3: Relationship of various socio-demographic factors to nutritional status.

Associated factors	Nutritional status				Total
	Underweight <5th percentile (%)	Normal 5-85th percentile (%)	Overweight 85-95th percentile (%)	Obese >95th percentile (%)	
Age (χ^2=3.28, df=3, p-value=0.77)					
10-13 years	102 (17.1%)	471(79.0%)	16 (2.7%)	7 (1.8%)	596
14-16 years	64 (16.4%)	311 (79.7%)	11 (2.8%)	4 (1.0%)	390
17-19 years	4 (10.0%)	35(87.5%)	0 (0.0%)	1 (2.5%)	40
Gender (χ^2=20.65, df=3, p-value=0.0001)					
Boys	106 (15.4%)	566 (82.3%)	8 (1.2%)	8 (1.2%)	688
Girls	64 (18.9%)	251 (74.3%)	19 (5.6%)	4 (1.2%)	338
Socioeconomic status (χ^2=5.51, df=3, p-value=0.13)					
Class I, II and III	114 (15.6%)	593 (81.2%)	15 (2.1%)	8 (1.1%)	730
Class IV and V	56 (18.9%)	224 (75.7%)	12 (4.1%)	4 (1.4%)	296
Total	**170**	**817**	**27**	**12**	**1026**

Figure 2 shows that more than 3/4th of adolescents (817, 79.6%) have normal weight. Total 170 (16.6%) were underweight and 12 (1.2%) were obese.

Factors associated with nutritional status were presented in Table 3. Proportion of underweight was higher in early adolescent (17.1%) and middle adolescent (16.4%) as compared to late adolescent (10.0%) but statistically not significant (p=0.77). Similarly obesity was more prevalent (2.5%) in late adolescent as compared to middle (1.0%) and early adolescent (1.8%) but statistically not significant (p=0.77). Overweight is more prevalent in girls (19, 5.6%) as compared to boys (8, 1.2%) as p-value was 0.0001. Proportion of underweight and obese was nearly similar in girls and boys (boys versus girls: underweight- 15.4% versus 18.9%, obese- 1.2% versus 1.2%). Significant difference was not observed for nutritional status among adolescent of different socioeconomic status.

In Table 4, anxiety was observed in 102 adolescents (9.9%). About 82.0% overweight and obese adolescents

had anxiety as compared to only 7.1% underweight and normal adolescents which was statistically significant (p<0.0001).

Table 4: Relation between nutritional status and anxiety of school going adolescents.

Nutritional status	Anxiety		Total
	Absent	Present	
Under weight and normal	917 (92.9%)	70 (7.1%)	987
Over weight and obese	7 (18.0%)	32 (82.0%)	39
Total	**924 (90.1%)**	**102 (9.9%)**	**1026**

χ^2=235.4, df=1, p-value<0.0001

Table 5 shows total 190 adolescent (18.5%) were suffering from depression. Proportion of depression was higher in overweight and obese adolescent (25.6%) as compared to underweight and normal adolescent (18.2%) but statistically not significant.

Table 5: Relation between nutritional status and depression of school going adolescents.

Nutritional status	Depression		Total
	Absent	Present	
Underweight and normal	807 (81.8%)	180 (18.2%)	987
Overweight and obese	29 (74.4%)	10 (25.6%)	39
Total	**836 (81.5%)**	**190 (18.5%)**	**1026**

χ^2=0.91, df=1, p-value=0.33

DISCUSSION

In this study, prevalence of underweight, overweight and obese among adolescents was 16.6%, 2.6% and 1.2% respectively.

Other studies from India documented higher prevalence of overweight and obese than present study (Prasad RV et al: Overweight- 9.7%, Obese- 4.3%; Brahmbhatt et al: Overweight- 13.3%, Obese- 5.4%; Chhatwal J et al: Overweight- 14.2%, Obese- 11.1%%; Shah et al: Overweight- 9.2%, Obese- 5.6%;).[6-9]

In the study, age and socioeconomic status was not significantly associated with nutritional status. Overweight was more prevalent in girls (5.6%) as compared to boys (1.2%). However, proportion of underweight and obese was similar in girls and boys (boys versus girls: underweight- 15.4% versus 18.9%, Obese- 1.2% versus 1.2%).

Gender

In a study conducted by Goyal RK et al, prevalence of overweight and obese was higher among boys as compared to girls (boys versus girls: overweight- 14.3% versus 9.2%; obese- 2.9%% versus 1.5%, p<0.05).[9] Similar finding was reported by Chhatwal J et al (boys versus girls: overweight- 12.4% versus 9.9%; obese- 15.7% versus 12.9%, p<0.05).[8] However in the study of Banerjee et al, proportion of overweight was not significantly differing in both groups (boys- 2.8%, girls- 4.0%, p=0.2) while underweight was commonly seen in boys (37.8%) than girls (27.5%, p<0.001).

Age

Deshmukh PR et al showed that thinness was significantly higher in early adolescence (57.0%) than in late adolescence (48.5%).[11] National Nutrition Monitoring Bureau (NNMB) also documented that undernutrition decreased from 78% among 10-13 years to 66% among 14-17 years.[7]

Socio economic status

Chhatwal J et al reported that the prevalence of obesity was higher in higher socioeconomic class group as compared to lower socioeconomic class group.[8] Eating habit like junk food, chocolates, eating outside at weekend and low physical activity like exercise, sports, TV watching/computer games having remarkable effect on overweight and obesity.[12]

In the present study, prevalence of anxiety and depression was 9.9% and 18.5% respectively. Anxiety was frequently found in overweight and obese adolescents (82.0%) as compared to only underweight and normal adolescents (7.1%, p<0.0001). However, nutritional status was not associated with depression (Overweight and obese adolescent- 25.6% versus underweight and normal adolescent- 18.2%).

In a study by Rath et al analysis of data indicated that obese individuals possessed higher level of depression as compared to non-obese individuals.[13] In the present study, it was observed that depression was not significantly associated with obesity but in study by Chauhan S et al, showed highest prevalence of depression was seen in obese (48.7%) study subjects and a statistically significant association was found between BMI and depression which is contrary to present study.[14]

Limitation of present study was the lack of full participation of 10-12th standard students this may have imposed a selection bias.

CONCLUSION

The prevalence rate of overweight and obesity were 9.7% and 4.3%. Girls are more affected with overweight. Significant number of adolescents was suffering from anxiety (9.9%) and depression (18.5%). Anxiety was frequently found in overweight and obese adolescents. There is need of immediate action to prevent adolescent

obesity. Assessment of anxiety and depression among students with proper counselling should be carried out at least once a year.

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REFERENCES

1. Handbook S. Rashtriya Kishor Swasthya Karyakram. Adolescent Health Division Ministry of Health and Family Welfare Government of India. 2014.
2. Kliegman RM, Stanton BMD, St. Geme J, Schor NF. Growth, Development and Behavior. In: Text book of paediatrics. 20th ed. Elsevier publication; 2016:84.
3. World Health Organization. Turning the tide of malnutrition: responding to the challenge of the 21st century. Geneva: World Health Organization; 2000.
4. Chaturvedi S, Kapil U, Gnanasekaran N, Sachdev HP, Pandey RM, Bhanti T. Nutrient intake amongst adolescent girls belonging to poor socioeconomic group of rural area of Rajasthan. Indian Pediatr. 1996;33:197-202.
5. Galal O, Hulett J. The relationship between nutrition and children's educational performance: a focus on the United Arab Emirates. Nutrition Bulletin. 2003;28(1):11-20.
6. Prasad RV, Bazroy J, Singh Z. Prevalence of overweight and obesity among adolescent students in Pondicherry, South India. Int J Nutrition, Pharmacol, Neurol Dis. 2016;6(2):72.
7. Brahmbhatt KR, Oza UN. Obesity among adolescents of Ahmedabad city, Gujarat, India- a community based cross-sectional study. Int J Biol Med Res. 2012;3(2):1554-7.
8. Chhatwal J, Verma M, Riar SK. Obesity among pre-adolescent and adolescents of a developing country (India). Asia Pacific J Clin Nutrition. 2004;13(3):231-5.
9. Goyal RK, Shah VN, Saboo BD, Phatak SR, Shah NN, Gohel MC, et al. Prevalence of overweight and obesity in Indian adolescent school going children: its relationship with socioeconomic status and associated lifestyle factors. Int J Pharm Clin Res. 2015;7(1):61-3
10. Banerjee S, Dias A, Shinkre R, Patel V. Under-nutrition among adolescents: A survey in five secondary schools in rural Goa. National Med J India. 2011;24(1):8.
11. Deshmukh PR, Gupta SS, Bharambe MS, Dongre AR, Maliye C, Kaur S, Garg BS. Nutritional status of adolescents in rural Wardha. Indian J Pediatr. 2006;73(2):139-41.
12. Prasad VG, Katta H, Malhotra V. Risk factors associated with obesity among adolescent students: A case control study. Int J Health Sci Res. 2015;5:1-5.
13. Rath S, Behura S. Obesity-depression link and Indian adolescents: An empirical study. Indian J Health Wellbeing. 2015;6(11):1132-4.
14. Chauhan S, Lal P, Nayak H. Prevalence of Depression among school children aged 15 years and above in a public school in Noida, Uttar Pradesh. J Acad Industr Resear. 2014 Nov;3(6):269-73.

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