ORIGINAL ARTICLE

A Study on Prevalence of Overweight and Obesity among Adolescent children in an Urban Field Practice area of a Teaching Medical College in South India

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Citation

Article Cycle

Abstract

Background: Obesity is a major public health problem, causing a significant morbidity and mortality. **Aim**: The aim of the study was to assess the prevalence of overweight and obesity among adolescents aged (10-19 years) and to describe certain socio-economic, demographic characteristics related to overweight and obesity among adolescents. **Material & Methods**: A Community Based Cross Sectional Study conducted at the Field Practice Area of Urban Health Training Centre. A total of 900 adolescents between 10-19 years were enrolled. Parameters of height, weight and waist circumference and hip circumference were measured and recorded. Following the completion of the questionnaire, the results were compared against the body mass index (BMI). Questions from the GSHS (Global School- based student health survey) Questionnaire were also applied. **Results**: The prevalence of overweight and obesity was 18.7% and 5.8% among adolescents aged (10-19 years). It was found that the prevalence of overweight and obesity was more in boys compared to girls. The present study found a positive association of overweight and obesity with age, SES. **Conclusion**: The prevalence of overweight and obesity were high among boys and need to be addressed by primary and secondary methods of prevention.

Keywords

Overweight; Obesity; School Children

Introduction

Obesity is becoming a worldwide problem affecting all levels of society and thus is being described as the global epidemic and its prevalence is increasing in the developing countries also. (1) Prevalence varies within the country because of differences in the lifestyle, mainly in the dietary patterns and physical activities. Also, the other factors such as urbanization and industrialization are the main culprits for the increase in the prevalence of childhood obesity. (2) Globally the prevalence of childhood obesity varies from over 30% in USA to less than 2% in sub-Saharan Africa.(3)

The increased prevalence of paediatric obesity demonstrates the need for a simple anthropometric tool that can be used to assess and identify children who are at risk of becoming obese. (4) An increase in the prevalence of childhood obesity is associated with potential medical complications of obesity noted in adolescence and especially in adulthood. (5) Many countries in South-East Asia including India are going through an economic and nutrition transition. The nutrition transition is associated with a change in dietary habits, decreasing physical activity thus rising prevalence of obesity. (6)

Aims & Objectives

To estimate the prevalence of Overweight and Obesity among adolescents aged 10-19 years in an Urban India.

Material & Methods

The present study is a cross-sectional study undertaken to know the prevalence and also to find out the various socio-demographic and risk factors associated with overweight and obesity among adolescents. All the Adolescents aged between 10 - 19 years in the field practice area of Urban Health Training Centre during the summer of 2014 were included. All those who were unwilling for the study were excluded. The Study Tools composed of a Personal data questionnaire that elicits information about participants socio-economic, demographic profile and GSHS (Global School based student health survey).

The sample size was estimated by using obesity taken at 10% (Many studies have shown that the prevalence of overweight among adolescents varies between 10 % and 30%). (7) The Minimum percentage was taken into consideration for estimation of sample size. Hence P = Prevalence = 10% q = 1- p = 90 % L = allowable error = 20% Sample size n= 4Pq/ L² n = 900. The sampling method used was Probability proportional to size (PPS) Sampling Technique. PPS is used to decide the number of adolescents to be included from each ward and Simple random sampling was applied to select the households from each ward. Data collection began after obtaining permission from the Institutional Ethical Committee (386/IEC/2013)

Selection of study subjects was by visiting each and every house. Adolescents of each house interviewed. Informed consent was obtained from the parents. A Pre-designed, pre-tested questionnaire proforma along with GSHS was administered to each adolescent to collect data on socio economic demographic profile (Age, Sex, Religion, Education, dietary pattern, physical activity level, TV watching, intake of different food items etc). Parameters on Height and Weight were measured and recorded following completion the questionnaire. Weight (kg) was taken with the help of weighing scale measuring the weight in the unit "kg" with an error of 0.1kg without shoes and heavy clothing; the weighing scale was regularly calibrated with known standard weights Portable anthropometric rod was used to measure height (cm), with an error nearest to 0.1cm; the participants were instructed to stand in erect position with their feet not wide apart and eyes looking straight. Data was entered in MS-Excel Spreadsheet and analyzed using SPSS version 15. The statistical tests used were in percentages and chi-square test was used to measure association. A 'P' value of less than 0.05 was considered to be statistically significant.

Results

The present study was carried out among 900 participants in the Urban area of Kancheepuram District in Tamil Nadu. The Socio-demographic data of the study population showed that a majority 436 (48.4%) belonged to the age group of 10-13 years and 414 (46%) were in the age group of 14-16 years. Very little 50(5.6%) belonged to higher age groups i.e. 17-19 years. Gender wise, the distribution of male and female were 476 (52.9%) and 424(47.1%) respectively. Nearly 3/4th (637) of the study participants were studying in Government School with only a little 41(4.5%) from College. With regards to the Socio-economic status, it was found that the majority 491 (54.6%) belongs to the Upper Middle Class with 108 (12%) people belonged to the lower middle class. The dietary habits of the study population showed that more than 2/3rd i.e. 737 (81.9%) were mixed diet consumers (Table 1).

On assessing the Life style habits of the study participants, it was found that 368 (40.3%) drank carbonated drinks at least once a week, 210(23.3%) drank twice a week. 58 (6.4%) consumed carbonated drinks thrice weekly and 164 (18.3%) had never consumed the drink. As far as Junk food consumption, it was found that more than half 572(63.6%) had consumed junk food at least once a week, followed by 122 (13.6%) twice a week and 41 (4.6 %) consume junk food on all days of the week. With regards to the distance travelled to reach

school, more than half the students travelled less than 20 minutes to the reach the school while about 83 (9.2%) took about 40 – 49 minutes to reach the school. A Majority 409 (45.4%) used bicycle as the mode of transportation to reach the school, while 328 (36.4 %) walk to reach the school. About 10 percent (89) use bus to travel while, 16 (1.8%) and 58 (6.5%) travelled by car and motorcycle respectively. Also 614 (68.2%) participated in some form of outdoor sports. More than half of the study participants i.e. 499 (55.4%) spent about 1-2 hours watching the television, while 236 (26.2%) spent about 3-4 hours watching the television. It was observed that more than 80 percent (736) consumed some kind of Snack while watching television. (Table 2)

The Present study among 900 study participants showed 168 (18.7%) to be overweight, while 52 (5.7%) were Obese. While 545 (60.5%) were normal, 135 (15%) were underweight. (Table 3). The cumulative percentage of overweight & obesity was found to be (95%CI= 21.6-27.3)

On Comparing the Body Mass Index (BMI) with the variables, it was found that factors like religion, type of School, were statistically significant (p <0.05). Surprisingly the Socio-economic status did not have any significance on the BMI. The mode of Transport to school, doing physical exercises and other sports activities (indoor & outdoor) were also found to be statistically significant. But the time of travel was found to be a statistically significant variable. Sleep duration more than 8 hours and watching TV more than 2 hours were also found to be a significant factor and snacking during watching TV was also found to be significant. (Table 4)

Discussion

The present epidemiological cross-sectional study was carried out in urban health training centre of a Teaching medical college in South India. This study consisted of 900 adolescents between ages 10-19 years were undertaken to know the prevalence of overweight and obesity and also to study certain associated risk factors. The present study showed the prevalence of overweight and obesity among 10-19 years adolescents was 24.5%. (95%CI= 21.6-27.3) out of which 18.7% (168) were overweight and 52(5.8%) were obese. A study conducted by T. Agarwal *et al* among affluent adolescent school children in Ludhiana in the year 2008 revealed that the prevalence of overweight was 12.7% and obesity

was 3.4% respectively. (8) Similarly a study done by M. Shashidhar *et al* among 12-15 years adolescent in Mangalore in the year 2012 revealed that the prevalence of overweight and obesity was 9.9% and 4.8% respectively.(7)

In another study conducted by Chhatwal *et al* among 9-15 years school children in Punjab in the year 2004 revealed that the prevalence of overweight and obesity was 14.2% and 11.1% respectively. (9) In a study done by S Kumar *et al* among affluent school children aged 10-15 years in the Davangere city in the year 2006 revealed that the prevalence of obesity was 5.74%. (3)

Association of Sex with Overweight & Obesity

The present study shows that the prevalence of overweight and obesity were more among male with 20.3% and 10.7% respectively, which was significantly associated with overweight and obesity. A study done by Gupta DK *et al*, Males and privately-funded school children had significantly higher increase in prevalence and risk of being overweight and obese. (10) In another study by Kunwar R *et al*, the prevalence of overweight and obesity among girls was 9.76% and 1.22%; and among boys, it was 10.97% and 3.23%, respectively. (11)

Association of Age with Overweight and Obesity

The present study shows that prevalence of overweight were more among 15-19 years students with 20 % and obesity were more among 10-14 years students with 7.4% respectively. Age was significantly associated with overweight and obesity. Overweight and obesity were more common among boys as compared to girls under the age of 13 years but trend changed afterwards as found by Kunwar R. (11)

Association of Type of School with Overweight and Obesity

The present study shows that the prevalence of overweight was more among college students (31.7%) and obesity was more among govt. school students (8%) respectively. Hence type of school was highly associated with overweight and obesity. A study done by Gupta *et al* among adolescent aged between 14-17 years in New Delhi in the year 2011 revealed that the prevalence of both overweight and obesity was significantly higher among those adolescent studying in privately funded schools.10 Another study done by Preetam BM *et al* among school children aged 6-12 years in Pondicherry in the year 2011 revealed that children from private

schools are at greater risk of being overweight and obese. (12)

Association of socio-economic status with overweight and obesity

The present study shows that according to the SES majority adolescents belonged to class II 491 (54.6%) and class III 179 (19.9%) and Class I 122(13.6%) and class IV 108 (12%). A study done by Ramachandran A *et al* among adolescent school children aged 13-18 years in madras in the year 2022 revealed that prevalence of overweight increases with an increase in SES. (13)

Association Between Overweight, Obesity and Participation In Outdoor Sports

The present study shows that the prevalence of both overweight and obesity were more in those who did not participated in any of the outdoor sports which were found to be statistically highly significant. A study done by Goyal RK *et al* among adolescent school children aged 12-18 years in ahmedabad in the year 2010 reveled that the physical activity like outdoor sports have a remarkable effect on prevalence of overweight and obesity.(14)

Association between Overweight, Obesity and Participation In Indoor Sports

The Present study shows the prevalence of both overweight and obesity were maximum in those who played sedentary indoor games. Hence participation in indoor sports was significantly associated with overweight and obesity. A study done by M. Shashidhar *et al* among 12-15 years adolescent in Mangalore in the year 2010 showed that from a multivariate logistic regression that the prevalence of overweight and obesity was 7.3 times higher in those who participated in playing games on the computer for more than 4 hours a day.(7)

Association between Overweight, Obesity and Participation In Physical Activity

The present study reveals that the prevalence of both overweight and obesity were more among those participants who did not participated in any of the physical activities which were found to be statistically highly significant. A study done by Goyal RK *et al* on adolescent school children aged 12-18 years in Ahmadabad in the year 2010 revealed that those students with reduced physical activities like exercise have remarkable effect on the prevalence of overweight and obesity.(14) A study done by S Kumar *et al* among affluent school children aged 10-15 years in Davangere city in the year 2007 revealed

that lack of physical activity was an important factor associated with overweight and obesity.(3)

Association of Watching Television With Overweight, Obesity.

The present study shows that the prevalence of overweight and obesity was more in those subjects who watched television for 1-2 hours per day 499 (55.4%). Hence watching TV was significantly associated with overweight and obesity. A study done by M. Shashidhar *et al* among 12-15 years adolescent in Mangalore in the year 2010. Showed that a multivariate logistic regression revealed that the prevalence of overweight and obesity was 7.3 times higher than in those reported watching television for more than 4 hours a day.7Additionally, Bharati *et al* found a positive association between obesity and TV watching and also between obesity and consumption of fast food. (15)

Association between Overweight, Obesity and Duration Of Sleep

The present study shows that overweight was more in those subjects who slept for 8-10 hours per day 312 (34.7%) and was found to be statistically significant

A study among Chinese school Children showed that who were obese were also more likely to have shorter sleep times compared to children of normal weight. (16)

Association of Snacking with Overweight & Obesity

The present study shows that the prevalence of overweight and obesity were high in those who were consuming junk foods as compared to those who were not consuming which were found to be statistically highly significant. Similarly, M Steiner-Asiedu *et al* showed that snacking on foods with high sugar content were associated with high likelihood of being overweight and obese. (17) In contrast, Boon TY, *et al*., observed 156 students in Kuala Lumpur and went on to conclude that there was no significant association between snacking patterns and BMI. (18)

Conclusion

The prevalence of overweight and obesity is 18.7% and 5.8% among adolescents aged 10-19 years. It was found that the prevalence of overweight and obesity was more in boys compared to girls. The present study found positive association of overweight and obesity with age, type of school, use of mode of transport to school, participation of outdoor sports, participation in indoor sports,

duration of TV watching, duration of sleep, habit of eating snacks while watching TV. Lifestyle modification plays an important role in reducing risk of overweight and obesity among adolescents. The children and more importantly the parents should hold knowledge of the various methods of improving life style. In age of digital world, where there modernisation and automation are playing an important role, there should be focus on Non-exercise physical activities.

Recommendation

The curriculum should encourage more physical activities in school especially in higher age groups. In the present system, there is less emphasis on sports activities as the child gets older. This situation has got to change.

Limitation of the study

The study findings were based on oral questionnaire except measurement of height and weight which were prone to recording bias. Being a cross-sectional study design, there also inherent limitations of determining the temporal association.

Relevance of the study

The consequence of obesity can be serious if left unattended, therefore there should be a principle in order to 'catch them young' at school and colleges. If the BMI is maintained within normal limits, the quality of life will be improved and the complications of obesity will be postponed. Literature review also showed not many community-based studies, on school going children especially in South India.

Authors Contribution

MJ conceived the idea, design and was involved in Literature search, data acquisition and analysis and Manuscript review. RR and DK was involved in Literature search, data analysis, statistical analysis, manuscript preparation, editing and Review.

References

1. Kaur S, Sachdev HP, Dwivedi SN, Lakshmy R, Kapil U. Prevalence of overweight and obesity amongst school children in Delhi, India. Asia Pac J Clin Nutr. 2008;17(4):592-6. PubMed PMID: 19114395.[PubMed].

2. Bisai S, Khongsdier R, Bose K, Bhunia AK, Mahalanabis D Koziel S. Prevalence Of Overweight And Obesity Among Bengalee Adolescents In Midnapore Town, West Bengal, India. International Journal of Current Research 2010;10:74-83.

3. Kumar S, Mahabalaraju DK, Anuroopa MS. A study on prevalence of obesity and its influencing factor among affluent school children of davangere city. Indian J Community Med 2007;1(1):15-7.

4. Shaikh WA, Patel M, Singh SK. A study on Association of Adiposity with Pulse Pressure Amongst Gujarati Indian Adolescents. Indian J Community Med 2010;35(3):406-8.

5. Gupta M, Patil R, Khan MI, Gupta SK. The Prevalence of Obesity and Hypertension in Urban Tamilnadu. Journal of Clinical and Diagnostic Research. 2011;5(3): 586-588.

6. Kalpana CA, Lakshmi UK. Prevalence Of Overweight And Obesity Among School Children In Coimbatore City, Tamilnadu. International Journal of Current Research 2011;3(8):12-16.

7. Kotian MS, Kumar SG, Kotian SS. A study on prevalence and determinants of overweight andobesity among adolescent school children of south karnataka, India. Indian J Community Med 2010;35(1):176-78.

8. Aggarwal T, Bhatia RC, Singh D, Sobti PC. Prevalence of obesity and overweight in affluent adolescents from Ludhiana, Punjab. Indian Pediatr. 2008 Jun;45(6):500-2. PubMed PMID: 18599939.[PubMed].

9. Chhatwal J, Verma M, Riar SK. Obesity among pre-adolescent and adolescents of a developing country (India). Asia Pac J Clin Nutr. 2004;13(3):231-5. PubMed PMID: 15331333.[PubMed]

10. Gupta DK, Shah P, Misra A, Bharadwaj S, Gulati S, Gupta N, Sharma R, Pandey RM, Goel K. Secular trends in prevalence of overweight and obesity from 2006 to 2009 in urban asian Indian adolescents aged 14-17 years. PLoS One. 2011 Feb 23;6(2):e17221. doi: 10.1371/journal.pone.0017221. PubMed PMID: 21383840; PubMed Central PMCID: PMC3044166.[PubMed]

11. Kunwar R, Minhas S, Mangla V. Is obesity a problem among school children? Indian J Public Health. 2018 Apr-Jun;62(2):153-155. doi: 10.4103/ijph.IJPH_430_16. PubMed PMID: 29923543.[PubMed]

12. Mahajan PB, Purty AJ, Singh Z, Cherian J, Natesan M, Arepally S, Senthilvel V. Study of childhood obesity among school children aged 6 to 12 years in union territory of puducherry. Indian J Community Med. 2011 Jan;36(1):45-50. doi: 10.4103/0970-0218.80793. PubMed PMID: 21687381; PubMed Central PMCID: PMC3104708.[PubMed]

13. Ramachandran A, Snehalatha C. A study on Rising Burden of Obesity in Asia. J Obes 2010:1-8.

14. Goyal RK, Shah VN, Saboo BD, Phatak SR, Shah NN, Gohel MC, Raval PB, Patel SS. Prevalence of overweight and obesity in Indian adolescent school going children: its relationship with socioeconomic status and associated lifestyle factors. J Assoc Physicians India. 2010 Mar;58:151-8. PubMed PMID: 20848812.[PubMed].

15. Bharati S, Pal M, Shome S, Roy P, Dhara P, Bharati P. Influence of socio-economic status and television watching on childhood obesity in Kolkata. Homo. 2017 Dec;68(6):487-494. doi: 10.1016/j.jchb.2017.08.005. Epub 2017 Sep 20. PubMed PMID: 29032805.[PubMed].

16. Ji M, Tang A , Zhang Y, Zou J, Zhou G, Yang JDL et al. The Relationship between Obesity, Sleep and Physical Activity in Chinese Preschool Children. Int. J. Environ. Res. Public Health 2018; 15(527):1-10.

17. Steiner-Asiedu M, Jantuah JE, Anderson AK. The Snacking Habits in Junior High School Students: The Nutritional Implication-a Short Report. Asian J Med Sci. 2012; 4(1):42-6.

18. Boon TY, Sedek R, Kasim ZM. Association between snacking patterns, energy and nutrient intakes, and body mass index among school adolescents in Kuala Lumpur. Amer J Food Nutrition2012; 2(3):69-77

Tables

TABLE 1 SOCIO-DEMOGRAPHIC VARIABLES OF THE STUDY PARTICIPANTS

Socio-demographic variables		Frequency	Percent
Age	10-13 years	436	48.4
	14-16 years	414	46
	17-19 years	50	5.6
Gender	Male	476	52.9
	Female	424	47.1
Religion	Hindu	701	77.9
	Muslim	60	6.7
	Christian	139	15.4
Place of Education	Government School	637	70.8
	Private School	222	24.7
	College	41	4.5
Socio-Economic status*	Class 1	122	13.5
	Class 2	491	54.6
	Class 3	179	19.9
	Class 4	108	12
	Total	900	100

TABLE 2 LIFE STYLE HABITS OF THE STUDY PARTICIPANTS

Life Style Habits		Frequency	Percent
Carbonated drinks (No. of Times Weekly)	Never Drank	164	18.3
	Once a week	368	40.9
	Twice a Week	210	23.3
	Thrice weekly	100	11.1
	More than 3 times	58	6.4
Participation in Outdoor sports	Yes	614	68.2
	No	286	31.8
Mode of Transportation to school	Bus	89	9.9
	Bicycle	409	45.4
	Car	16	1.8
	Motor Cycle	58	6.5
	walking	328	36.4
Time Spent watching TV (No. of Hrs Daily)	Less than 1 hour	165	18.4
	1 - 2 hours	499	55.4
	3 - 4 hours	236	26.2
Eating snacks while watching TV	Yes	736	81.8
	No	164	18.2
	Total	900	100

TABLE 3 CLASSIFICATION OF STUDY PARTICIPANTS ACCORDING TO THEIR BODY MASS INDEX (BMI)

Classification	Frequency	Percentage
Underweight	135	15.0
Normal weight	545	60.5
Overweight	168	18.7
Obesity	52	5.7
Total	900	100.0

TABLE 4 ASSOCIATION BETWEEN STUDY VARIABLES & BODY MASS INDEX (BMI)

Variables		Obese & Over Weight	Under Weight & Normal	Chi-Square Test	P Value
Type of School	Others	191 (28.1)	72 (32.7)	1.730	0.110 ***
	Government	489 (71.9)	148 (67.3)		
Socio-economic Status	Low	215 (31.6)	72 (32.7)	0.094	0.410 NS
	High	435 (64.0)	150 (68.2)		
Sleep	>8 hrs	312 (45.9)	179 (81.4)	84.405	0.000 ***
	<8hrs	368 (54.1)	41 (18.6)		
Watching TV	>2 hrs	123 (18.1)	113 (51.4)	95.135	0.000 ***
	<2 hrs	557 (81.9)	107 (48.6)		
	No	15 (9.15)	149 (90.85)		
Walk or Bicycle	No	72 (32.7)	0 (0.0)	241.897	0.000 ***
	Yes	148 (67.3)	680 (100)		
Travel Time	Less	160 (72.7)	475 (69.9)	0.661	0.416 NS
	More	60 (27.3)	205 (30.1)		
	Yes	97 (44.1)	517 (76.0)		
Indoor Sports	Yes	114 (51.8)	150 (22.1)	71.017	0.000 ***
	No	106 (48.2)	530 (77.9)		
Physical Exercises	No	179 (81.4)	476 (70.0)	10.834	0.001 ***
	Yes	41 (18.6)	204 (30)		
	No	58 (26.4)	328 (48.2)		

*** *Statistically significant*