International Journal of Community Medicine and Public Health
Fahim MA et al. Int J Community Med Public Health. 2023 Nov;10(11):4364-4368
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20233479

Original Research Article

A study on prevalence and socio demographic factors associated with overweight and obesity among high school children of Raichur city

M. A. Fahim[1]*, Din Prakash Ranjan[2], Rahul C. Kirte[2]

[1]Department of Community Medicine, Faculty of Medical Sciences, KBN University, Kalaburagi, Karnataka, India
[2]Department of Community Medicine, Raichur Institute of Medical Sciences, Raichur, Karnataka, India

Received: 06 September 2023
Accepted: 19 October 2023

***Correspondence:**
Dr. M. A. Fahim,
E-mail: drmafahim@gmail.com

ABSTRACT

Background: Overweight/obesity among children is an emerging public health problem in our country. Overweight/obesity is a form of development-driven malnutrition that is emerging among all ages and socio-economic groups. Childhood overweight/obesity is a risk factor for later adult diseases and is associated with impaired health during childhood itself which may continue untreated for many years. The belief that overweight/obesity was the problem of developed countries alone is no longer true. India is one of the developing countries showing emerging and rising trends of overweight/obesity.
Methods: A cross sectional study was undertaken in high schools of Raichur city. Data was collected by interviewing 1900 study subjects using pre-tested semi-structured questionnaire and by physical examination. The data was analyzed using percentages, proportions, odds ratio and Chi-square test with the help of Epi Info 7 software.
Results: Prevalence of overweight and obesity among high school children of Raichur city was found to be 4.57% and 5.11% respectively. Significant association of overweight/obesity was found with gender, age, religion, socio-economic status, parent's education, type of diet and physical exercise.
Conclusions: Considering association of overweight/obesity with various risk factors, preventive measures like lifestyle modifications, changes in dietary pattern and regular exercise should be promoted in these age group children.

Keywords: Overweight, Obesity, BMI, High school, Childhood, Raichur

INTRODUCTION

Throughout much of the history of mankind, the overt manifestations of body weight gain in children and adults have been considered as the signs of personal health and family wealth and an indicator of the economic prosperity of the societies. Until recently, in most developing societies, being thin has been equated with poor health. Increase in body weight and girth have often been perceived as being attractive. As developing societies are industrialized and urbanized, the standards of living continued to rise; obesity and weight gain began to pose a growing threat to the health of the citizens. Obesity is now widely prevalent in several developing countries, particularly those in rapid transition and is affecting both children and adults.[1]

In last three four decades fundamental changes in social and economic situation occurred all over the world, thus leading to the presence of modern conveniences in homes as well as at the work place. These changes have shifted societies from communicable to non-communicable diseases (NCD).[2-4] The health of children and youth is of fundamental importance. Over one-fifth of our population comprises of children aged 5-14 years that is, the group

covering primary and secondary education. As today's children are the citizens of tomorrow's world, their survival, protection, and development are the prerequisite for the future development of humanity. Without ensuring optimal child growth and development, efforts to accelerate economic development significantly will be unsuccessful.[5] Nationally representative data are lacking and extensive literature search did not provide any information about studies conducted among high school children in Raichur city to assess the prevalence and determinants of overweight and obesity. Studies of such a nature will be useful tools in planning and developing appropriate intervention methods.

METHODS

A cross-sectional study was conducted in high school students of Raichur city from January 2016 to June 2016. Permission was also taken from Block education officer of Raichur city and from the principals of the schools to conduct the study in their respective schools. Data was collected using a pre-tested semi-structured questionnaire after taking the verbal consent of the students and explaining each question to the students and their physical examination was done. A study conducted by Kotian et al among 12 to 15 year old children, from January to April 2010 in the city of Mangalore, found the prevalence of overweight and obesity to be 9.9% and 5.3% respectively.[6] These prevalence rates were considered to calculate the sample size. Relative precision of 20% of prevalence.

$$n = (z2pq)/d2$$

Where n=Sample size estimate, z=Standardized normal deviate (1.96)~2, p= Proportion of target population with characteristic being measured, q= (100-p) and d= Relative precision. Using the above formula for overweight the sample size was calculated as n=900 and for obesity the sample size was calculated as n=1900. The sample size for obesity of 1900 was be a better option for a good study, hence sample size of 1900 was considered for conducting this study.

Sampling technique

Population proportionate sampling technique was used. Total numbers of schools in Raichur city are 95 and they are divided into 5 regions. In each region schools are separated into two groups as government and private. A proportionate sample size was be taken from both the groups of each region according to the strength of students in that group. Total numbers of students in high schools of Raichur city are 10709. The numbers of students in each region are as follows: Central=2217 (govt-418, private-1799), North=1415 (govt-855, private-560), South=1610 (govt-728, private-882), East=2298 (govt-670, private-1628), West=3168 (govt-772, private-2396). Calculation of sample size for each region was as mentioned; Central=2217x1900/10709=393.34~393, North=1415x 1900/10709=251.05~251, South=1610x1900/10709= 285.64~286, East=2298x1900/10709=407.71~408, West= 3170x1900/10709=562.42~562. Calculation of sample size for Govt and private schools of each region was done as mentioned; Central: Govt=393x418/2217=74.09~74, Private=393x1799/2217= 318.90~319, North: Govt=251x 855/1415=151.66~152, Private=251x560/1415=99.33~ 99, South: Govt=286x 728/1610=129.32~129, Private= 286x882/1610=156.67~157, East: Govt=408x670/2298= 118.95~119, Private= 408x1628/2298=289.04~289, West: Govt=562x772/3168=136.95~137, Private=562x2396/ 3168=425.04~425. Sample to be taken from govt and private schools of each region: Central: Govt-74, Private-319, North: Govt-152, Private-99, South: Govt-129, Private-157, East: Govt-119, Private-289, West: Govt-137, Private-425.

Schools were randomly selected from both government and private school list of each region. Sample size from both Government and Private schools of each region was taken as calculated. Schools were visited once and all the high school children present at the time of visit were taken as study subjects. If the required sample size for that zone was not available in one school then one more school randomly selected from that zone was visited to complete the sample size for that zone. Clinical examination and anthropometric measurements of height and weight were taken using standard equipments to calculate Body mass index (BMI). Weighing machine used for the study was calibrated daily. Health education regarding the risk factors for overweight / obesity and other non-communicable diseases and the preventive measures for these were given at the end of filling the questionnaire and examination.

Data analysis

Data was entered into Microsoft Excel sheet and analysed using Epi Info 7 software. Adiposity varies with age and gender during childhood and adolescence; therefore WHO Z-scores for different age for both sexes were used to classify children based on their BMI [7]. The prevalence of overweight and obesity was estimated. Descriptive statistics like frequency and percentages were used. Association of various risk factors with overweight and obesity were compared using odds ratio and chi-square test. The statistical significance was evaluated at 95% confidence level ($p<0.05$).

RESULTS

Of the 1900 study subjects in our study, 864 (45.47%) were girls and 1036 (54.53%) were boys. The mean age of study subjects was 14.08±1.06 years with a range from 13 to 18 years. Majority of the study subjects were from class V (39.47%) followed by class IV (25.21%) and class III (18.01%). 1193 (62.78%) students were underweight, 1523 (27.52%) in normal range. 87 (4.57%) were overweight, and 97 (5.13%) were obese. Among girls, 59 (3.11%) were overweight, and 67 (3.53%) were obese.

Table 1: Distribution of study subjects according to nutritional status.

Gender	Underweight, N (%)	Normal, N (%)	Overweight, N (%)	Obese, N (%)	Total, N (%)
Boys	201 (10.57)	605 (31.84)	28 (1.46)	30 (1.58)	864 (45.47)
Girls	322 (16.96)	588 (30.95)	59 (3.11)	67 (3.53)	1036 (54.53)
Total	523 (27.53)	1193 (62.79)	87 (4.57)	97 (5.11)	1900 (100)

Table 2: Factors contributing to overweight/obesity.

Factors	Overweight/Obese, N (%)		Total, N (%)	Test	P value
	Yes	No			
Gender					
Boys	806 (93.29)	58 (6.71)	864 (100)	OR=1.92; 95% CI=1.32-2.66 χ^2=15.99; df=1	<0.001
Girls	910 (87.84)	126 (12.16)	1036 (100)		
Age (years)					
13	583 (89.41)	69 (10.59)	652 (100)	χ^2=21.29; df=3;	<0.001
14	654 (93.96)	42 (6.04)	696 (100)		
15	332 (85.56)	56 (14.44)	388 (100)		
>15	147 (89.63)	17 (10.63)	164 (100)		
Type of family					
Nuclear	1274 (90.48)	134 (9.52)	1408 (100)	OR=1.07 CI=0.76-1.51 χ^2=0.173, df=1	0.67
Joint	442 (89.84)	50 (10.16)	492 (100)		
Religion					
Hindu	1093 (87.72)	153 (12.28)	1246 (100)	χ^2=27.87; df=1	<0.001
Muslim & Christians	623 (97.34)	31 (2.66)	654 (100)		
Socio-economic Status					
Class I	87 (83.65)	17 (16.35)	104 (100)	χ^2=30.52; df =4	<0.001
Class II	187 (83.11)	38 (16.89)	225 (100)		
Class III	301 (88.01)	41 (11.99)	342 (100)		
Class IV	440 (91.86)	39 (8.14)	479 (100)		
Class V	701 (93.47)	49 (6.53)	750 (100)		
Birth order					
1	785 (89.10)	96 (10.90)	881 (100)	χ^2=3.846; df=3	0.278
2	636 (90.37)	65 (9.27)	701 (100)		
3	198 (92.52)	16 (7.48)	214 (100)		
>3	97 (93.26)	7 (6.74)	104 (100)		
Father's education					
Illiterate	357 (92.25)	30 (7.75)	387 (100)	χ^2=26.93; df=4	<0.001
Primary/middle school	409 (94.90)	22 (5.10)	431 (100)		
High School	525 (89.90)	59 (10.10)	584 (100)		
Intermediate/Diploma	188 (86.64)	29 (13.36)	217 (100)		
Graduate/Postgraduate	237 (84.34)	44 (15.66)	281 (100)		
Mother's education					
Illiterate	388 (94.17)	24 (5.83)	412 (100)	χ^2=36.16, df=4	<0.001
Primary/middle school	365 (92.88)	28 (7.12)	393 (100)		
High School	627 (89.83)	71 (10.17)	698 (100)		
Intermediate/Diploma	212 (88.70)	27 (11.30)	239 (100)		
Graduate/Postgraduate	124 (78.48)	34 (21.52)	158 (100)		
Family history					
Present	617 (90.34)	66 (9.66)	683 (100)	OR=1.003 CI=0.731-1.378; χ^2=0.0005, df=1	<0.981
Absent	1099 (90.30)	118 (9.70)	1217 (100)		

OR-Odds ratio, χ2-Chi-square, CI-Confidence interval

Among boys, 28 (1.46%) were overweight and 30 (1.60%) were obese. The overall prevalence of overweight/obesity was found to be 9.68% (Table 1). A statistically significant upward trend in prevalence of overweight/obesity was found with female gender, increasing age, higher socioeconomic class, higher father's and mother's education and in Hindu students (Table 2).

DISCUSSION

In the present study, the overall prevalence of overweight/obesity was 9.68% and the prevalence of overweight and obesity was 4.57% and 5.13% respectively. This is comparable to studies done by Premanath et al conducted in Mysore which reported the prevalence of obesity and overweight to 3.4 and 8.5% respectively.[8] In another study done by Kalpana CA in 35 schools of Coimbatore, the overall prevalence of overweight and obesity among school children was observed to be 7.6% and 5.6% respectively.[9]

The prevalence of overweight/obesity was found more in girls (12.16%) as compared to boys (6.71%) with the odds ratio of 1.92 and the difference was found to be statistically significant. Similar finding was reported from studies done in Puducherry by Preetam BM and in Saudi Arabia by El-Hazmi MA where it was observed that the prevalence of overweight/obesity was high in girls compared to boys.[10,11] This could be due to the fact that during puberty, females have tendency to accumulate more fat and male adolescents have larger amount of lean mass compared to females thus the amount of body fat in males decreases by approximately 40%.[12,13] In contrast to the above findings, the prevalence of overweight / obesity was found high in boys as compared to girls in other studies.[14-17]

The highest prevalence of overweight/obesity was found in the age 15 years (14.44%) followed by 10.63% in the age >15 years, 10.59% in the age 13 years. The difference in prevalence of overweight/obesity between different age groups was statistically significant ($p<0.048$). In a study done by Mohanty B in Puducherry, the Prevalence of overweight (5.2%) and obesity (3.89%) was found high in 15-year age group and a positive correlation was found between age and obesity.[18] The prevalence was found high in the age group >15 years as compared to <15 years in a study done by Bharati et al.[19] This could be due to the fact that fat tissue and overall body weight increases in children during puberty. The number of fat cells increases during periods of rapid growth up to 16 years of age, after which increased fat ordinarily accumulates by increasing size of the fat cells already present.[20] But the findings in a study done by Chaatwal showed that Prevalence of obesity decreased significantly with age, from 18.5% at 9 years to 7.6% at 14 years, rising at 15 years to 12.1%.[15] The prevalence of overweight/obesity was high in Hindus (12.28%) and in Muslims and Christians combined it was 2.66%, these results are comparable to a study done by Bharati et al where the prevalence of overweight/obesity was high in Hindu children in school going children of Wardha city.[19]

The relationship between prevalence of overweight/obesity and socioeconomic status was statistically significant with high proportion of overweight/obesity seen in class II and I (16.89% and 16.35%) respectively. Our study results are similar to other studies where the prevalence was high in children belonging to high socio-economic status.[15,21] Overweight/obesity was found more in subjects whose father and mother were graduates or postgraduates (15.66% and 21.52% respectively). A study by Bharati et al has mentioned that parents' educational status has an effect on children's obesity. It was noticed that the prevalence of overweight/obesity was high in children whose father and/or mother were graduates.[19] But in a study done by Chaput et al low parental educational status was significantly associated with childhood overweight/obesity.[22] The prevalence of overweight/ obesity was observed more in study subjects with birth order of 1 (10.90%), followed by birth order of 2 (9.27%) but the difference was not statistically significant. This is in comparison with study done by Bullapa et al in which also overweight/obesity was found highest among subjects with birth order 1 (10.82%) followed by birth order 2 (9.19%).[23]

Limitations

Study findings were based on oral questionnaire (except for measurement of height and weight) which are subjected to reporting and recall bias. Genetic and psychological factors of obesity could not be examined because of lack of resources.

CONCLUSION

Majority of the study subjects were aged 14 and 13 years. Girls were more than boys. The prevalence of overweight/obesity in children were observed to be 4.50% and 5.13% respectively. Prevalence of overweight and obesity was 1.92 times more in girls than boys. Education of parents and socio-economic status has direct relationship on childhood obesity. Non-vegetarian diet had a direct influence on the prevalence of overweight/obesity. Regular class hours on healthy food habits, nutritive values of different food items, lifestyle and behavioural modification should be incorporated in school schedule. Periodic health checkups in the schools should be made compulsory which is useful for early detection of childhood obesity. Every student should be motivated to take part in outdoor games and sports, irrespective of gender. The children as well as parents should be educated about obesity problems.

ACKNOWLEDGEMENTS

Authors are thankful to all the school students who participated in the study without them this study was not possible. Authors are also thankful to school authorities for allowing us to conduct the study and all the interns who helped in data collection.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Shetty PS, Obesity in Children in Developing Societies: Indicator of Economic Progress or a Prelude to a Health Disaster. Indian Pediatr.1999;36:11-5.
2. Ulijaszek SJ. A disorder of convenience. Obesity Rev. 2007;8(1):183-7.
3. Farooqi IS, O'Rahilly S. Genetic factors in human obesity. Obesity Rev. 2007;8(1):37-40.
4. Rahim HF, Rmeileh NME, Husseine A, Ottesen GH, Jervell J, Bjertness E. Obesity and selected co-morbidities in an urban Palestinian population. Int J Obesity. 2001;25:1736.
5. Ashok NC, Kavitha HS, Kulkarni P. A comparative study of nutritional status between government and private primary school children of Mysore city. Int J Health Allied Sci. 2014;3(3):164-9.
6. Kotian MS, Kumar G, Kotian SS. Prevalence and determinants of overweight /obesity among adolescent school children of south Karnataka, India. Indian J Community Med. 2010;35(1):176-8.
7. Dietary guidelines for Indians-A manual. Available at: https://www.nin.res.in/downloads/DietaryGuidelinesforNINwebsite.pdf. Accessed on 20 February 2023.
8. Premanath M, Basavanagowdappa H, Shekar MA, Vikram SB, Narayanappa D. Mysore childhood obesity study, Indian Pediatr. 2010;47:171-3.
9. Kalpana CA, Lakshmi UK. Prevalence of overweight/obesity among school children in Coimbatore city, Tamil Nadu. Int J Curr Res. 2011;3(8):12-6.
10. Preetam BM. Study of childhood obesity among school children aged 6 to 12 years in union territory of Puducherry. Indian J Community Med. 2011;36(1):45-50.
11. El-Hazmi MA, Warsy AS. The prevalence of obesity and overweight in 1-18 year-old Saudi children. Ann Saudi Med. 2002;22(5-6):303-7.
12. La Merrill M, Birnbaum LS. Childhood obesity and environmental chemicals. Mt Sinai J Med. 2011;78(1):22-48.
13. Strauss RS. Childhood obesity. Pediatr Clin North Am. 2002;49(1):175-201.
14. Lakshmi UK. Prevalence of overweight/obesity among school children in Coimbatore city, Tamil Nadu. Int J Curr Res. 2011;3(8):12-6.
15. 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.
16. Kumar KM. Prevalence of obesity among high school children in Dakshina Kannada and Udupi districts. Nitte Univ J Health Sci. 2011;1(4):16-20.
17. Ramachandran A. Prevalence of overweight in urban Indian adolescent school children. Diabetes Res Clin Pract. 2002;57(3):185-90.
18. Mohanty B. The prevalence of overweight/obesity in school going children of Pondicherry. Indian J Community Med. 2009;31(4):15-9.
19. Bharati DR, Deshmukh PR, Garg BS. Correlates of overweight & obesity among school going children of Wardha city, Central India. Indian J Med Res. 2008;127(6):539-43.
20. Laxmaiah A, Nagalla B, Vijayaraghavan K, Nair M. Factors affecting prevalence of overweight among 12- to 17-year-old urban adolescents in Hyderabad, India. Obesity. 2007;15(6):1384-90.
21. Vohra R, Bhardwaj P, Srivastava JP, Srivastava S, Vohra A. Overweight/obesity among school-going children of Lucknow city. J Family Community Med. 2011;8(2):59-62.
22. Chaput JP, Brunet M, Tremblay A. Relationship between short sleeping hours and childhood overweight/obesity: results from the 'Québec en Forme' Project. Int J Obes. 2006;30(7):1080-5.
23. Bullappa A, Mahendra BJ, Harish BR. A study of overweight and obesity in government and private high school children of Mandya city. Int J Sci Study. 2014;2(7):107-10.

Cite this article as: Fahim MA, Ranjan DP, Kirte RC. A study on prevalence and socio demographic factors associated with overweight and obesity among high school children of Raichur city. Int J Community Med Public Health 2023;10:4364-8.