

Prevalence of Overweight and Obesity in Adolescent Children: A Cross-sectional Study

Jacob K Jacob¹, Shiji K Jacob², Savio Bonnie George³

¹Professor, Department of General Medicine, Government Medical College, Kalamassery, Ernakulam, Kerala, India, ²Professor, Department of Pediatrics, Government Medical College, Kalamassery, Ernakulam, Kerala, India, ³Lecturer, Department of General Medicine, Government Medical College, Kalamassery, Ernakulam, Kerala, India

Abstract

Introduction: Obesity is the most prevalent form of nutritional disorder in many of the affluent countries. Obesity is a state of excess adipose tissue mass.

Materials and Methods: Secondary data analysis of a school-based cross-sectional study in a rural and urban school of Kochi city. Weight, height, sex, and age routinely recorded by health visitors. Height, weight, and body mass index (BMI) standardized for age and sex. SD score >1.04 for BMI (>85th centile) was defined as overweight and >1.64 (>95th centile) as obese.

Results: Out of the 254 girls of the rural school, 6 were obese (8.74%) and 25 were overweight (42.66%). Of these, obesity and overweight were more common among 12-year-old girls, 6.06% and 12.12%, respectively. Of the 220 girls of urban schools, 6 were obese (11.08%) and 21 were overweight (49.9%). Of these, obesity and overweight were more common in the 13 years old age group of 3 (5.56% and 8 (14.81%), respectively. Of the 191 boys of the rural school, only 1 (1.27%) was obese and 12 (29.13%) were overweight. Of these, obesity and overweight were more in the 14 year age group of 1 (1.27%) and 4 (5.06%), respectively. Of the 272 boys of the urban school, 15 (21.91%) were obese and 38 (55.74%) were overweight. Of this, obesity was more among the 14-year-old children. Obesity in girls showed no statistical significance with the urban and rural population ($P = 0.9, 64,233$).

Conclusions: Obesity is a serious health issue, resulting in both mortality and morbidity. We need to promote early intervention programs which should be aimed at weight reduction. Parents and children must be counseled not to eat junk foods and carbonated drinks.

Key words: Adolescent, Obese, Overweight, Prevalence

INTRODUCTION

Obesity is the most prevalent form of nutritional disorder in many of the affluent countries. Obesity is a state of excess adipose tissue mass. According to the WHO statistics, more than 1.6 billion people ≥ 15 year old are overweight or obese. As per various recent studies in India, 10-15% of school children are overweight. More than 66% of US adults are categorized as overweight or obese, and the prevalence of obesity is increasing rapidly in most of the industrialized world. Obesity is also associated with

an increased risk of multiple health problems, including hypertension, Type 2 diabetes, dyslipidemia, obstructive sleep apnoea, non-alcoholic fatty liver disease, degenerative joint disease, and some malignancies; childhood obesity is not only confined to industrialized countries. Therefore, a rational clinical approach needs to be applied to preventing and treating this disorder.¹

Visceral adipose tissue is significantly related to concentrations of plasma low-density lipoprotein cholesterol and triglycerides in 11-15 year old as well as to concentrations of basal insulin and high-density lipoprotein cholesterol (inversely) in females aged 10-16 years.^{2,3}

MATERIALS AND METHODS

The study was a cross-sectional, randomized, epidemiological study among adolescent school students of the rural and

Access this article online



www.ijss-sn.com

Month of Submission : 07-2016
 Month of Peer Review : 08-2016
 Month of Acceptance : 09-2016
 Month of Publishing : 09-2016

Corresponding Author: Dr. Jacob K Jacob, Bethel, Moolepadam, Kalamassery - 683 104, Ernakulam, Kerala, India.
 Phone: +91-9446035690. E-mail: jacobkjacob@yahoo.com

urban school of a city in Kerala. A total number of 937 school children aged 12-15 years of both urban and rural school had participated in this study. Out of them, 445 were from the rural school, and 492 were from the urban school. The body weight was measured barefoot using a measuring scale and height to the nearest centimeter was taken. Body mass index (BMI) was calculated as weight (in kilograms) divided by height (in meter squared). For adolescent children, after BMI is calculated, the BMI number is plotted on the CDC BMI-for-age growth charts (4) (for either girls or boys) to obtain a percentile ranking. Percentiles are the most commonly used indicator to assess the size and growth patterns of individual children in the United States. Percentiles are used for adolescent because the amount of body fat differs between boys and girls and body fat also changes with age. The percentile indicates the relative position of the child's BMI number among adolescent children of the same sex and age. Healthy children have a BMI percentile ranging between 5th percentile and 85th percentile. The children whose weight were >85th to <95th percentile were considered as overweight and obese who were ≥95th percentile (WHO 2000).

Chi-square test was used to find out the significance. Odd's ratio indicates that there is a strong hazardous association between sex and obesity.

RESULTS

Of the 254 girls of the rural school, 6 were Obese (8.74%) and 25 were overweight (42.66%). Of these, obesity and overweight were more common among 12-year-old girls, 6.06% and 12.12%, respectively (Table 1 and Figure 1).

Of the 220 girls of urban schools, 6 were obese (11.08%) and 21 were overweight (49.9%). Of these, obesity and overweight were more common in the 13 years old age group of 3 (5.56%) and 8 (14.81%), respectively (Table 2 and Figure 2).

Of the 191 boys of the rural school, only 1 (1.27%) was obese and 12 (29.13%) were overweight. Of these, obesity and overweight were more in the 14 year age group of 1 (1.27%) and 4 (5.06%), respectively (Table 3 and Figure 3).

Of the 272 boys of the urban school, 15 (21.91%) were obese and 38 (55.74%) were overweight. Of these, obesity was more among the 14-year-old children (Table 4 and Figure 4).

Obesity seems to be growing in children regardless of sex. In the USA, 16% of children and adolescent are obese

and 20% are overweight. 4% of adolescents have severe obesity. It can be noted that there is a sex-wise variation in the prevalence of overweight and obesity in children irrespective of the place as revealed in many studies done

Table 1: The prevalence of obesity among girls of rural schools

Group	Age	No	n (%)		
			Obese	Overweight	Normal and underweight
Rural girls	12	66	4 (6.06)	8 (12.12)	54 (81.82)
	13	20	0 (0)	2 (10)	18 (90)
	14	112	1 (0.89)	7 (6.25)	104 (92.86)
	15	56	1 (1.079)	8 (14.29)	47 (83.93)
Total		254	6 (8.74)	25 (42.66)	223 (87.8)

Table 2: The prevalence of obesity among girls of urban schools

Group	Age	No	n (%)		
			Obese	Overweight	Normal and underweight
Urban girls	12	57	1 (1.75)	5 (8.77)	51 (89.47)
	13	54	3 (5.56)	8 (14.81)	43 (79.63)
	14	56	0 (0)	8 (14.29)	48 (85.71)
	15	53	2 (3.77)	0 (11.32)	51 (84.91)
Total		220	6 (11.08)	21 (49.19)	193 (87.73)

Table 3: Comparison of obesity among rural and urban girls

Locale	Obese	Overweight	Normal and underweight	Total
Girls				
Rural	6	25	223	254
Urban	6	21	193	220
Total	12	46	416	474
Expected				
Rural	6.43,03,797	24.6,49,789	222.91,98,312	254
Urban	5.56,96,203	21.3,50,211	193.08,01,688	220
Total	12	46	416	474
P	0.9,64,233			

Table 4: The prevalence of obesity among boys of rural schools

Group	Age	No	n (%)		
			Obese	Overweight	Normal and underweight
Rural boys	12	26	0 (0)	2 (7.69)	24 (92.31)
	13	26	0 (0)	3 (11.54)	23 (88.46)
	14	79	1 (1.27)	4 (5.06)	74 (93.67)
	15	60	0 (0)	3 (5)	57 (95)
Total		191	1 (1.27)	12 (29.3)	178 (93.2)

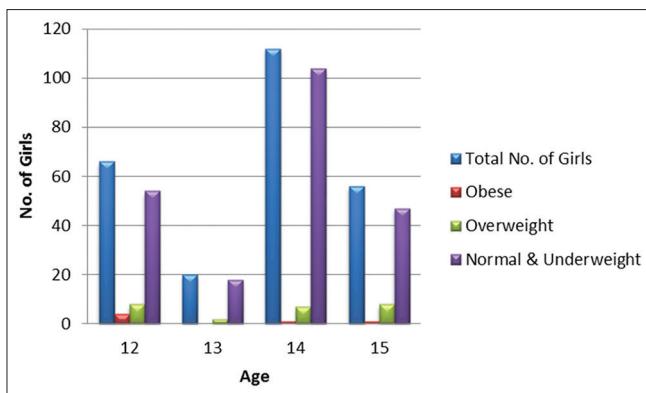


Figure 1: The prevalence of obesity among girls of rural schools

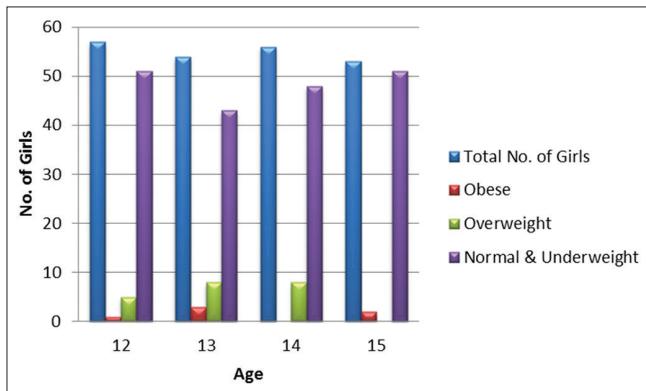


Figure 2: The prevalence of obesity among girls of urban schools

in India and abroad. The present study also compares the sex-wise variation seen in children. The prevalence of obesity among boys was found to be higher than that of girls. However, girls were found to be more overweight than boys. Studies by Kapil *et al.* also indicated that the prevalence of obesity was lower in girls (6%) as compared to boys (8%).⁴ Kotani *et al.* found that the proportion of obese children in their population had increased from 5% to more than 10% over two decades.⁵ All these studies, therefore, indicate that the sex of the child has an influence on the prevalence of overweight and obesity.

The rural and urban population of boys as well as girls were tabulated and significance values calculated. Obesity in girls showed no statistical significance with the urban and the rural population ($P = 0.964233$) Table 5. Boys showed a higher incidence of obesity in the urban setting as compared to the rural population ($P = 0.000284$) (Table 6).

DISCUSSION

We have found a highly significant increase in the number of overweight and obese children.

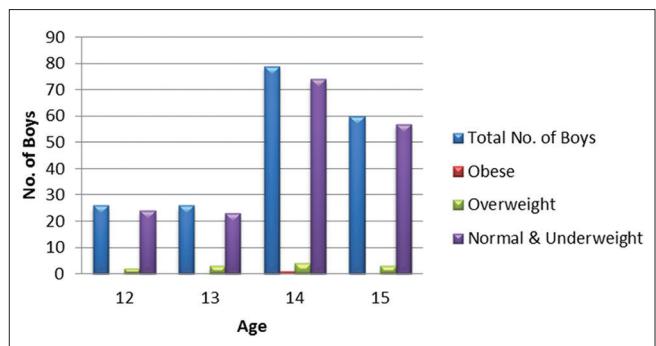


Figure 3: The prevalence of obesity among boys of rural school

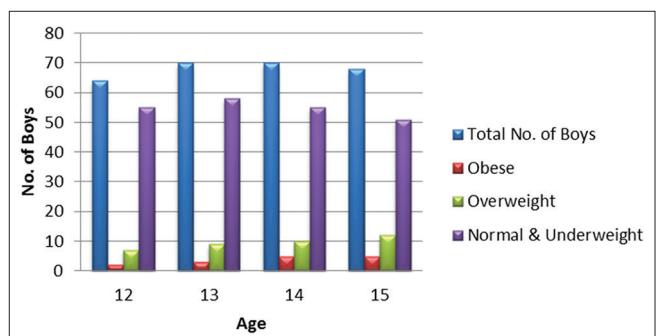


Figure 4: The prevalence of obesity and overweight among urban boys

The increase in weight and BMI over time has not been accompanied by an increase in height.

In adults, BMI is useful in the assessment of fatness. Concerns have been expressed regarding its use in children because it varies with height and does not take into account the differences in the timing of growth in height and weight among various ethnic groups.⁶ Nevertheless, it is easy to measure and has been validated against calculations of body density. For these reasons, it has been recommended by the American Society of Clinical Nutrition and others as a reliable measurement of overweight and obese children.⁷

Obesity increases the likelihood of morbidity and mortality.⁸ Calle *et al.* prospectively examined the risk of death related to BMI in over a million adults and concluded that heavier men and women in all age groups had an increased risk of death.⁹ Must and Strauss reviewed the risks and consequences of obesity in childhood and adolescence and concluded that an aggressive approach to prevention and treatment was required.¹⁰ Treatment of obesity is most successful if realistic goals are set; a balanced diet is emphasized; a safe rate of weight loss of about 0.5 kg a week is achieved through moderate reduction of energy intake (about 20-25% decrease); increased physical activity

Table 5: The prevalence of obesity among boys of urban schools

Group	Age	No	n (%)		
			Obese	Overweight	Normal and underweight
Urban boys	12	64	2 (3.13)	7 (10.94)	55 (85.94)
	13	70	3 (4.29)	9 (12.86)	58 (82.86)
	14	70	5 (7.14)	10 (14.29)	55 (78.57)
	15	68	5 (7.35)	12 (17.65)	51 (75)
Total		272	15 (21.91)	38 (55.74)	80.51

Table 6: Comparison of obesity among rural and urban boys

Locale	Obese	Overweight	Normal and underweight	Total
Boys				
Rural	1	12	178	191
Urban	15	38	219	272
Total	16	50	397	463
Expected				
Rural	6.6,00,432	20.6,26,34,989	163.77,32,181	191
Urban	9.3,99,568	29.3,73,65,011	233.22,67,819	272
Total	16	50	397	463
P	0.00,284			

is emphasized as much as diet; parental support is strong; and behavior therapy is provided to help both child and parents achieve the diet, exercise, and behavior goals.

Dietary assessment helps to identify both the amount eaten and the child's and family's eating patterns. The prescribed diet should be simple, explicit, and unambiguous so that it is easy to implement and monitor and not subject to confusion or easy rationalization of exceptions. Epstein *et al.* developed the "traffic light diet," which defines all foods by their energy content into red (stop), yellow (proceed with caution), and green (go).¹¹ Children count the number of servings consumed for each color as well as calories. Three key settings for implementing childhood obesity management support programs have been identified: The family, the school, and primary care. The provision of education on eating and lifestyle behavior to parents has been shown significantly to reduce the prevalence of obesity in children of participating families.¹² By directing preventive efforts at the family of susceptible children, there is the bonus that all members of the family are likely to benefit. Holding classroom lessons on nutrition and physical health was accompanied by improvements in indices of fitness and body fat levels.¹³ Nevertheless, maintaining these programs in the school curriculum in the long term has proved difficult owing to competition for school time, the need for teacher supervision, and financial limitations.

The delivery of programs through primary care has received a little formal assessment. Frequent contact with health professionals from an early age has been identified as an important strategy for effective management of obese children through the provision of advice, encouragement, and support for adopting healthy household eating and exercise patterns at an early stage in life.¹⁴ The incidence of childhood obesity is on the increase and obesity most likely will persist into adulthood.¹⁵ It results in considerable morbidity and mortality, especially due to cardiovascular disease. Physical activity, diet regulation in the form of reduction of high fat and high-calorie foods should be encouraged to reduce overweight and obesity.¹⁶⁻¹⁸

CONCLUSION

The present findings indicate that prevalence of childhood obesity in Kerala - Ernakulam district is high. However, we found a higher frequency of obesity in boys as compared to the girls which are statistically significant. Obesity is a serious health issue, resulting in both mortality and morbidity. We need to promote early intervention programs which should be aimed at weight reduction. Parents and children must be counseled not to eat junk foods and carbonated drinks. School and college level health education and biannual screening may be of great help in this regard.

REFERENCES

1. World Health organisation WHO Consultation on Obesity. Global prevalence and secular trends in obesity. In: World Health Organisation, editor. *Obesity Preventing and Managing the Global Epidemic*. Geneva: WHO; 1998: 17-40.
2. Brambilla P, Manzoni P, Sironi S, Simone P, Del Maschio A, di Natale B, *et al.* Peripheral and abdominal adiposity in childhood obesity. *Int J Obes Relat Metab Disord* 1994;18:795-800.
3. Caprio S, Hyman LD, McCarthy S, Lange R, Bronson M, Tamborlane WV. Fat distribution and cardiovascular risk factors in obese adolescent girls: Importance of the intraabdominal fat depot. *Am J Clin Nutr* 1996;64:12-7.
4. Kapil U, Singh P, Pathak P, Dwivedi SN, Bhasin S. Prevalence of obesity amongst affluent adolescent school children in delhi. *Indian Pediatr* 2002;39:449-52.
5. Kotani K, Nishida M, Yamashita S, Funahashi T, Fujioka S, Tokunaga K, *et al.* Two decades of annual medical examinations in Japanese obese children: Do obese children grow into obese adults? *Int J Obes Relat Metab Disord* 1997;21:912-21.
6. Prentice AM. Body mass index standards for children. Are useful for clinicians but not yet for epidemiologists. *BMJ* 1998;317:1401-2.
7. Bellizzi MC, Dietz WH. Workshop on childhood obesity: Summary of the discussion. *Am J Clin Nutr* 1999;70 1 Part 2:173S-5S.
8. Dietz WH. Childhood weight affects adult morbidity and mortality. *J Nutr* 1998;128:411-4S.
9. Calle EE, Thun MJ, Petrelli JM, Rodriguez C, Heath CW Jr. Body-mass index and mortality in a prospective cohort of U.S. adults. *N Engl J Med* 1999;341:1097-105.
10. Must A, Strauss RS. Risks and consequences of childhood and adolescent obesity. *Int J Obes Relat Metab Disord* 1999;23 Suppl 2:S2-11.

11. Epstein LH, Wing RR, Valoski A. Childhood obesity. *Pediatr Clin North Am* 1985;32:363-79.
12. Epstein LH, Valoski A, Wing RR, McCurley J. Ten-year follow-up of behavioral, family-based treatment for obese children. *JAMA* 1990;264:2519-23.
13. Gortmaker SL, Peterson K, Wiecha J, Sobol AM, Dixit S, Fox MK, et al. Reducing obesity via a school-based interdisciplinary intervention among youth: Planet Health. *Arch Pediatr Adolesc Med* 1999;153:409-18.
14. Pronk NP, Boucher J. Systems approach to childhood and adolescent obesity prevention and treatment in a managed care organization. *Int J Obes Relat Metab Disord* 1999;23 Suppl 2:S38-42.
15. Chinn S, Rona RJ. Prevalence and trends in overweight and obesity in three cross sectional studies of British Children, 1974-94. *BMJ* 2001;322:24-6.
16. Sahota P, Rudolf MC, Dixey R, Hill AJ, Barth JH, Cade J. Randomised controlled trial of primary school based intervention to reduce risk factors for obesity. *BMJ* 2001;323:1029-32.
17. James J, Thomas P, Kerr D. Preventing childhood obesity: Two year follow-up results from the Christchurch obesity prevention programme in schools (CHOPPS). *BMJ* 2007;335:762.
18. Victora CG, Barros F, Lima RC, Horta BL, Wells J. Anthropometry and body composition of 18 year old men according to duration of breast feeding: Birth cohort study from Brazil. *BMJ* 2003;327:901.

How to cite this article: Jacob JK, Jacob SK, George SB. Prevalence of Overweight and Obesity in Adolescent Children: A Cross-sectional Study. *Int J Sci Stud* 2016;4(6):50-54.

Source of Support: ICMR-STS 2014, **Conflict of Interest:** None declared.