Prevalence of Overweight, Obesity and Underweight among School Going Children in Rural and Urban areas of Thiruvananthapuram Educational District, Kerala State (India)

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Citation

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Abstract

Objective: Objective of this study was to assess the prevalence of overweight, obesity and under weight among school children in the rural and urban areas of Thiruvananthapuram Educational District.
Methodology: A total of 3886 children from 10-15 years of age were screened from rural and urban schools. Overweight and Obese children were then identified using the IOTF cut-off values3
Results: The results of the study exposed the fact that the percentage of overweight and obese children are growing in both rural and urban areas of Kerala like in other states of India and different of the world. The study also showed that when obesity and overweight were seen more in boys, underweight and severe underweight seemed to be more in girls indicating an increasing trend in the percentage of overweight in boys compared to girls. When the prevalence of overweight and obesity were higher among urban children, the percentage of underweight and severe underweight was higher among rural children.
Conclusion: The increasing trend of the modern day epidemic of overweight / obesity in children calls for immediate action in both rural and urban areas to reduce the incidence through appropriate nutritional intervention programmes involving school children, their parents and school authorities.

INTRODUCTION

Historically, a fat child means a healthy child, one who is likely to survive the rigors of under nourishment and infection. But unlike the past, today obesity or over weight in childhood is considered as a major health risk condition developed mainly due to malnutrition and improper lifestyle and which can lead to a number of health problems both in childhood and later in adulthood. According to Swaminathan [1] a person whose body weight is higher than normal by 15-20 percent is considered as overweight and by 25 percent is considered as obese. A child is considered as obese when the total body weight is more than 25 percent fat in boys and 32 percent in girls [2] .

Overweight is associated with the onset of major chronic diseases leading to complications and also psychosocial problems in children and adults. The greater concern is that the risks of overweight during childhood will persist into adolescence and adulthood. Tackling the problems of the growing numbers of overweight individuals is a major challenge for most countries. Hence close monitoring of overweight prevalence in children and adolescents and taking timely preventive measures will be an effective approach in dealing with the problem of obesity.

During the past two decades, the prevalence of obesity in children has risen greatly worldwide and this excessive fatness has arguably become a major health problem of both developed and developing countries. Overweight and obesity during childhood is a matter of growing concern in India also. Most individuals develop their eating and activity patterns during childhood. The transition in nutrition and life style by the popularity of fast foods, soft drinks, sedentary life style, lack of exercise, increased television watching and computer use are the common trends adopted by children today. These may be the causes of overweight seen in children of both rural and urban areas. Kerala has made remarkable achievement on par with the developed countries

in the field of women and children's health during the last few decades. However, overweight and obesity is a growing health concern in Kerala too; the consequences of which can cause disaster to our future generation.

The present study is therefore carried out in schools of Thiruvananthapuram educational district to see the extent of overweight, obesity and underweight among the children of Kerala.

OBJECTIVE

Objective of this study was to assess the prevalence of overweight, obesity and under weight among school children in the rural and urban areas of Thiruvananthapuram Educational District.

MATERIALS AND METHODS

Ten major schools having high number of student enrollment in Thiruvananthapuram Educational District were selected and all children from the age group of 10 to 15 studying in these schools were screened for overweight, obesity and malnutrition. Screening for overweight and obesity was done based on the IOTF cut off values for BMI suggested by Cole et al [3] . Children were also grouped as underweight and severe malnutrition based on BMI.

ANTHROPOMETRIC MEASUREMENTS

Nutritional anthropometry is the measurement of human body at various ages and levels of nutritional status and it is based on the concept that an appropriate measurement should reflect any morphological variation occurring due to a significant functional physiological change [4] . In this study height, weight, mid upper arm, waist and hip circumference were recorded. Body Mass Index from weight and height measurements and Waist Hip ratio were calculated from the waist and hip circumferences.

HEIGHT

The height of children was measured using a stadiometer. Height was read to the nearest 0.5cm. An average of three measurements was taken as final measurement of the height of the respondent.

WEIGHT

Body weight is the most widely used sensitive and simplest reproducible anthropometric measurement. It indicates the body mass and is a composite of all body constituents like water, mineral, fat, protein and bone. It reflects more recent nutrition [5] .

For taking the weight of the respondent, platform-weighing balance was used, as it is portable and convenient to use in the field. The weight was recorded to the nearest 0.25 kg. Each reading was taken thrice and the average was taken as the final measurement.

BODY MASS INDEX (BMI)

BMI can be used to grade Chronic Energy Deficiency (CED) and is regarded as a good indicator of nutritional status. BMI, which is expressed as a ratio of Weight to Height Square is an indicator of general obesity and also gives the magnitude of protein calorie malnutrition [6] .

Body Mass Index of the respondents was computed using the formula,

BMI = Weight (kg)/Height (meters squared)

Overweight and Obese children were then identified using the IOTF cut-off values [3]

RESULTS AND DISCUSSION

A total of 3886 children from 10-15 years of age were screened from rural and urban schools. The results obtained on comparison of the children based on their BMI are presented in Tables 1 and 2.

Table 1 gives the age wise distribution of the total number of children screened and it was grouped in to 5 groups namely obesity, overweight, normal weight, underweight and severe underweight based on their BMI.

As could be seen in Table 1, from the overall screened sample of 3886, 4.99 per cent were obese, 17.73 per cent were overweight, 58.67 per cent were normal weight, 16.16 per cent were underweight with a BMI less than 15, and 2.44 per cent were severely underweight with a BMI less than 13. The results revealed that when about 22.72 per cent of the children were above normal weight and 18.60 per cent were below normal weight, only 58.67 per cent were of normal weight. An interesting observation made was that the overall prevalence of overweight and underweight was comparable at 16 to18 percent. The study thus exposed the fact that undernourished and severely undernourished is still prevailing in the state just as overnourished children. Even with all the progress made in health and nutrition, Kerala still has severely undernourished children especially in the rural areas.

Figure 1

Table 1: Comparison of prevalence of overweight and obesity in rural and urban school children in Thiruvananthapuram educational district

Group	Age	No	Obese		Overweight		Normal		Underweight		Severe underweight	
			No	%	No	%	No	%	No	%	No	%
Rural Girls	10	170	1	0.58	9	5.39	89	52.35	55	32.30	15	8.30
	11	172	2	1.16	15	8.70	87	50.50	56	32.39	12	6.97
	12	159	9	5.66	22	13.83	80	50.30	43	27.04	5	3.14
	13	194	6	3.09	30	15.46	131	67.50	23	11.85	4	2.06
	14	115	2	1.74	15	13.04	87	75.60	9	7.80	2	1.74
	15	79	0	0.00	15	18.99	58	73.40	6	7.59	1	1.27
Total		889	20	2.25	106	11.92	532	59.84	192	21.60	39	4.39
Urban Girls	10	198	11	5.5	34	17.2	101	51	44	22	7	3.5
	11	194	11	5.7	38	19.58	109	56	31	15.97	5	2.57
	12	171	8	4.67	33	9.3	110	64.3	17	9.94	3	1.75
	13	154	10	6.5	49	31.8	83	53.89	12	7.79	0	0
	14	144	6	4.2	26	18.05	107	74	4	2.77	1	0.69
	15	19	1	5.26	4	21	14	73.7	0	0	0	0
Total		880	47	5.34	184	20.9	524	59.55	108	12.27	16	1.81
Girls Total		1769	67	3.79	290	16.39	1056	59.69	300	16.96	55	3.11
Rural Boys	10	45	1	2.22	5	11.11	16	35.50	20	44.00	3	6.60
	11	60	2	3.33	5	8.30	29	48.30	17	28.30	7	11.66
	12	68	2	2.94	6	8.82	43	63.23	15	22.05	2	2.94
	13	73	3	4.11	7	9.59	43	58.90	19	26.02	1	1.37
	14	85	1	1.18	7	8.24	67	78.80	10	11.76	0	0.00
	15	78	3	3.84	4	5.12	62	79.49	8	10.26	1	1.28
Total		409	12	2.93	34	8.31	260	63.57	89	21.76	14	3.42
Urban Boys	10	357	26	7.30	73	20.4	164	45.9	84	23.5	11	3
	11	384	28	7.30	85	22	192	50	67	17.45	12	3.1
	12	295	22	7.45	61	20.68	170	57.6	40	13.56	2	0.678
	13	303	19	6.27	71	23.4	190	62.7	23	7.59	0	0
	14	284	19	6.69	58	20.4	185	65	20	7.04	1	0.35
	15	85	1	1.17	16	18.82	63	74	5	5.88	0	0
Total		1708	115	6.73	364	21.31	964	56.44	239	13.99	26	1.52
Boys Total		2117	127	5.99	398	18.80	1224	57.82	328	15.49	40	1.89
Grand Total		3886	194	4.99	689	17.73	2280	58.67	628	16.16	95	2.44

When compared to the prevalence studies done before two decades or more in Kerala, it was found that the rate of underweight is reducing, but at the same time the rate of overweight and obesity is increasing. Studies done by Ramachandran [7] in 1000 adolescent children of Thiruvananthapuram and Geetha [8] on high school girls of Thiruvananthapuram also revealed 5.4 percent and 2.2 percent of obesity respectively. The results of the present study is also consistent with the above studies revealing that obesity and overweight in children are gradually growing like other developed and developing countries of the world. Studies reveal that in India, Kerala is not the only state facing the problem of overweight and obesity; it is also growing in other states too.

In a study conducted in Delhi by Kapil et al. [9] the overall prevalence of obesity was 7.4 percent in children from affluent families and in another obesity study done by Ramnath [10] in 1500 school children of Meerut UP, prevalence was 9 percent.

Yet in another study by Popkin [11] in all the five metros of Delhi, Mumbai, Chennai, Hyderabad and Kolkata it had been noticed that one out of every five school children or 20 percent are overweight.

When the sex wise comparison of all the boys and girls were made (Table 1), it was noted that out of a total of 3886 children screened, 1769 were girls, and 2117 were boys. Among the total girls, 16.39 percent were overweight and 3.79 percent were obese. Similarly among total boys 18.80 percent were overweight and 5.99 percent were obese.

While obesity seems to be growing in children regardless of sex, 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 in India and abroad. The present study also compares the sex wise variation seen in children. The prevalence of overweight and obesity among boys was found to be higher than that of girls. When the prevalence of obesity was 3.9 percent in girls of 10-15 years age, prevalence in boys was noticed to be 5.99 percent. Similarly the overweight prevalence in girls was 16.45 percent, whereas that in boys was 18.80. Studies by Kapil et al. [9] , also indicated that the prevalence of obesity was lower in girls (6%) as compared to boys (8%). On the contrary, studies done by Mudur [12] in three major Indian cities found that more girls were overweight and obese than boys. All these studies therefore indicate that the sex of the child has an influence on the prevalence of overweight and obesity.

Age wise comparison of boys and girls from both rural and urban areas were also made. And it was found that 12 year old rural girls' and13 year old urban girls had the highest rate of obesity. Similarly for overweight, 15 year old girls have the highest predominance in both rural and urban areas.

Like wise in the case of boys, 13 year old rural boys had the highest obesity, and among urban boys 12 year old had the highest obesity prevalence. When the prevalence of overweight was compared, it was the highest in 13 year old boys in both rural and urban areas.

Another interesting reveal was that obesity was lowest in 15 year old girls in the rural area and 14 year old girls in the urban areas. Among boys, 15 year old urban boys and 14 year rural boys have the lowest obesity.

It is also interesting to note that among rural girls obesity seems to increase from 10 years (0.58 per cent) and reaches the peak at 12 years (5.66 per cent) and then gradually start decreasing as age advances and is lowest at 15 years with zero per cent prevalence.

It can also be seen from the results that overweight and

obesity was comparatively higher in urban boys and girls than rural boys and girls. When area wise comparison of weight status of boys were made, amid 409 rural boys and 1708 urban boys 8.31 percent were overweight in rural areas, and 21.31 percent were overweight in urban areas. Obesity prevalence was noted to be 2.93 percent among rural boys and 6.73 percent in urban boys.

When girls alone were considered, it was noted that out of a total of 889 rural girls and 880 urban girls the overweight prevalence was noted to be 11.92 and 20.90 percent respectively. And the obesity was found to be 2.25 percent in rural girls and 5.34 percent in urban girls.

. In order to see whether this difference in prevalence was statistically significant, statistical analysis (Z- test) was carried out and the results are presented in Table 2.

The prevalence of overweight is found to be statistically different (Z = 15.3**) between rural boys (8.31 %) and urban boys (21.31%) of 10-15 years of age group. Also, it was noted that a statistically significant difference (Z = 10.23**) existed in the prevalence of overweight among rural girls (11.92 %) and urban girls (20.9%) of the same age group.

Figure 2

Table 2: Comparison of childhood overweight and obesity in rural and urban areas.

Groups	Percentage Prevalence		Z-test	
	Overweight	Obesity	Overweight	Obesity
Rural Girls	11.92	2.25	10.23**	6.94**
Urban Girls	20.90	6.94		
Rural Boys	8.31	2.93	15.3**	7.36**
Urban Boys	21.31	6.73		

The prevalence of obesity in urban boys (6.73%) of 10-15 years of age group is noted to have a highly significant difference (Z = 7.36**) compared to that of rural boys (2.93%) in the same age group. Similarly there existed a highly significant difference (Z = 6.94**) in obesity between urban girls (5.34 %) and rural girls (2.25%) of the similar age groups. An increasing trend in the prevalence of overweight and obesity was observed in children from urban areas than rural areas.

Thus, in the present study, the prevalence of overweight and obesity was found to be higher and significant in urban boys and girls compared to rural boys and girls. The overweight prevalence in urban boys was found to be 21.31 percent whereas that in rural boys was only 8.31 percent where the difference was significant at 1 percent level. Similarly when the prevalence of overweight was 20.90 percent among urban girls it was only 11.92 percent in rural girls. This difference was also significant at 1 percent level. School surveys done by Mudur [12] in Indian cities have also showed that 30 percent of the adolescents from India's higher economic groups were overweight, and 14 percent of them were from urban schools. Bhave et al. [13] found in his study that at least 1 in every 10 urban middle class children was overweight. In the present study prevalence of obesity was also noted to be significantly higher in urban boys (6.73%) compared to (2.93%) in rural boys. Similarly, obesity in urban girls was higher than that in rural girls with significant difference at 1 percent level. Gross and Monterio [14] also had reported that overweight and obesity was more prevalent in urban population, particularly among higher socioeconomic groups.

CONCLUSION

The results of the study expose the fact that the percentage of overweight and obese children are growing in Kerala also like in other states of India and other parts of the world. The study also showed that when obesity and overweight were seen more in boys, underweight and severe underweight seemed to be more in girls indicating an increasing trend in the percentage of overweight in boys compared to girls. The results of the area wise comparison of boys and girls indicated that in rural area the rate of underweight and severe underweight were higher compared to overweight and obesity respectively. However in urban areas obesity and overweight predominated with higher prevalence than underweight and severe underweight in both boys and girls. The rate of severe underweight is low; but its prevalence was more than double in rural areas compared to urban areas.

In short the study showed an increasing trend of overweight in children particularly in boys of urban areas. In rural areas also an increasing trend of overweight and obesity was seen although underweight children are still prominent. This calls for immediate action in both rural and urban areas to reduce the incidence of malnutrition through appropriate nutritional intervention programmes involving school children, their parents and school authorities. If immediate measures are not taken the condition can lead to serious problems beyond repair.

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