

# Prevalence of Obesity and Overweight among School Going Children in Rural Areas of Ernakulam District, Kerala State India

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## Abstract

**Objective:** Objective of this study was to assess the prevalence of overweight, obesity among school children in the rural areas of Kochi District.

**Methodology:** A total of 1098 children from 6-15 years of age were screened from rural school. Overweight and Obese children was determined by the BMI percentile by plotting the BMI number on the appropriate CDC BMI-for-age growth chart

**Results:** The results of the study exposed the fact that the percentage of overweight and obese children are growing in rural areas of Kerala. The study also showed that obesity was seen more in boys.

**Conclusion:** Obesity is now the most common disorder affecting children and adolescents, reflecting the current epidemic. Precise causes of this marked increase in prevalence are unclear, but results from both increased intake of energy –dense food and reduced exercise. Energy expenditure has fallen due to an increase in sedentary behaviour. Hence appropriate nutritional intervention programmes involving school children, their parents and school authorities has to be conducted.

**Keywords:** Kerala, Prevalence, Obesity, Overweight, Rural, School children

## INTRODUCTION

Obesity is one of the most serious public health problems.<sup>1</sup> It has become a global pandemic. Obesity implies excess fat and not merely excess weight. Body weight is determined by an interaction between genetic, environmental, psychological factors acting through the physiological mediators of energy intake and expenditure. Management of childhood obesity is challenging with major impetus on life style measures. According to a WHO report, there are 1 billion overweight people in the world, of whom 300 million are obese. Concurrently, a growing prevalence of obesity and its related chronic diseases is being observed in these countries. Increasing obesity is already a major concern in developed countries for pre-school children as well as school children. In developing countries, this rising epidemic along with the persistence of under nutrition and infections typifies the 'Double Burden of Malnutrition' (DBM),<sup>2</sup> which is becoming a great concern for African countries. Indeed, the DBM is a real threat at the population, household and

even individual level, and it is now observed among school children. Rural areas of developing countries are generally prioritized as regards nutrition intervention, because under nutrition is more widespread than in urban areas. However, a shift is occurring and children in the cities are at risk of both over-nutrition and under nutrition. The prevalence of child obesity is increasing rapidly worldwide. Childhood obesity has more than tripled in the past 30 years. The prevalence of obesity among children aged 6 to 11 years has increased from 6.5% in 1980 to 19.6% in 2008. The prevalence of obesity among adolescents aged 12 to 19 years has increased from 5.0% to 18.1%.<sup>3,4</sup> Obesity is the result of a caloric imbalance (too few calories expended for the amount of calories consumed) and is mediated by genetic, behavioural, and environmental factors.<sup>5</sup> It is associated with several risk factors for later heart disease and other chronic diseases including hyperlipidaemia, hypertension hyperinsulinemia, and early atherosclerosis. Obesity has become a global health problem, affecting more than 1.3 billion adults in both developed and developing countries.<sup>6</sup>

## MATERIALS AND METHODS

The study was a cross-sectional randomized epidemiological study among school students of rural school of Kochi city. A total number of 1098 school children aged 6 to 17 years had participated in this study. Out of them, 537 were boys and 561 were girl. The body weight was measured without shoes using a measuring scale and height to the nearest centimetre was taken. Body Mass Index (BMI) was calculated as weight (in kilograms) divided by height (in meter squared). For children and teens, after BMI is calculated, the BMI number is plotted on the CDC BMI-for-age growth charts<sup>7</sup> (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 children and teens 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 children of the same sex and age. Healthy children have a BMI percentile ranging between 5<sup>th</sup> percentiles to 85<sup>th</sup> percentile. The children whose weight were more than 85<sup>th</sup> to less than the 95<sup>th</sup> percentile were considered as overweight and obese who were equal to or greater than the 95<sup>th</sup> percentile (WHO 2000). Chi-square-test was used to find out the significance between sex and rural school children with respect to childhood obesity. Odd's ratio indicates that there is strong hazardous association between sex and obesity.

## RESULTS

Table 1 gives the age and sex wise distribution of the total number of children screened. A total of 1098 children from 6-17 years of age were screened from a rural school of which 537 were boys and 561 were girls. Figure 1 shows the distribution of the sex in the present study. Table 2 shows the 95<sup>th</sup> percentile of BMI of boys and girls in the present study. Healthy children have a BMI percentile ranging between 5<sup>th</sup> percentile to 85<sup>th</sup> percentile. The children whose weight were more than 85<sup>th</sup> to less than the 95<sup>th</sup> percentile were considered as overweight and obese who were equal to or greater than the 95<sup>th</sup> percentile.

As could be seen in Table 3, from the overall screened sample 3.35 per cent boys were obese, 2.85 per cent girls were obese. The results revealed that 96.9 per cent of the children were of normal weight. Figure 2 shows the distribution of obesity by sex. Figure 3 also shows the prevalence of obesity by sex. Table 4 shows the prevalence of obesity by age. Obesity was more among the smaller children of age group 6, and 9 years with 8.79% and 5.67%

**Table 1: Age and sex distribution of the study group**

Age	Boys	Girls	Total
6	63	28	91
7	28	49	77
8	70	69	139
9	83	58	141
10	67	50	117
11	35	53	88
12	26	66	92
13	26	20	99
14	79	112	172
15	60	56	116
Total	537	561	1098

**Table 2: Prevalence of overweight/obese children from rural areas 95<sup>th</sup> percentile of BMI for Boys and Girls**

Age in years	Boys	Girls
6	18.4142	18.8378
7	19.1524	19.6779
8	20.0679	20.6953
9	21.0889	21.8173
10	22.1541	22.9826
11	23.2136	24.1414
12	24.2299	25.2556
13	25.1781	26.2988
14	26.0466	27.256
15	26.8369	28.1237

**Table 3: Prevalence of obesity by sex**

Sex	Obese	Non obese	Total
Boys	18 (3.35%)	519 (96.65%)	537 (100%)
Girls	16 (2.85%)	545 (97.15%)	561 (100%)
Total	34 (3.10%)	1064 (96.90%)	1098 (100%)

**Table 4: Prevalence of obesity by age**

Age	Obese	Non obese	Total
6	8 (8.79%)	83 (91.21%)	91 (100%)
7	0 (0.00%)	77 (100%)	77 (100%)
8	5 (3.60%)	134 (96.4%)	139 (100%)
9	8 (5.67%)	133 (94.33%)	141 (100%)
10	3 (2.56%)	114 (97.44%)	117 (100%)
11	3 (3.41%)	85 (96.59%)	88 (100%)
12	4 (4.35%)	88 (95.65%)	92 (100%)
13	0 (0.00%)	99 (100%)	99 (100%)
14	2 (1.16%)	170 (98.84%)	172 (100%)
15	1 (0.86%)	115 (99.14%)	116 (100%)
Total	34 (3.10%)	1064 (96.90%)	1098 (100%)

**Table 5: Prevalence of overweight and obesity sex wise**

Sex	Overweight	Obese
Boys	32 (5.96%)	18 (3.35%)
Girls	51 (9.09%)	16 (2.85%)
Total	83 (7.56%)	34 (3.10%)

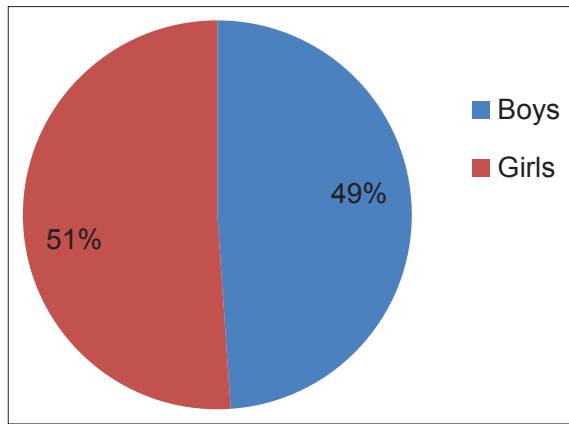


Figure 1: Sex distribution of the study group

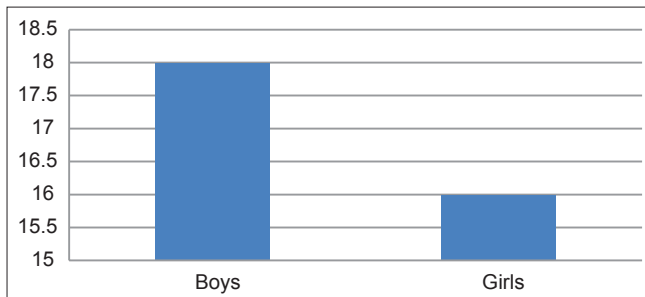


Figure 2: Distribution of obesity by sex

respectively. This can be seen in Graph -1. When the sex wise comparison of all the boys and girls were made (Table 5), it was noted that out of a total of 1098 children screened, 561 were girls, and 537 were boys. Among the total girls, 9.09 percent were overweight and 2.85 percent were obese. Similarly among total boys 5.96 percent were overweight and 3.35 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 obesity among boys were found to be higher than that of girls. But girls were found to be more overweight than boys. Studies by Kapil et al.,<sup>8</sup> also indicated that the prevalence of obesity was lower in girls (6%) as compared to boys (8%). Studies done by Mudur<sup>9</sup> 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 were also made. And it was found that 6 & 9 year old rural children had the highest rate of obesity.

#### Epidemiological Test

Odds ratio =  $ad/bc = 1.181358 > 1$

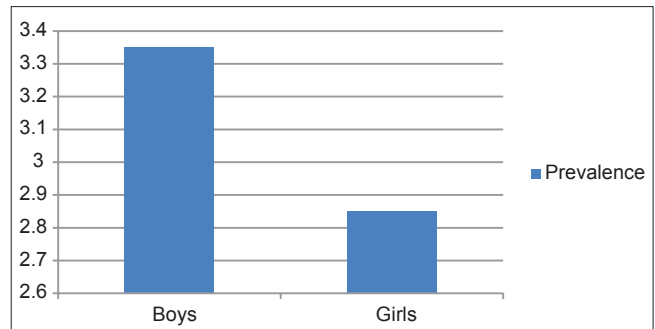
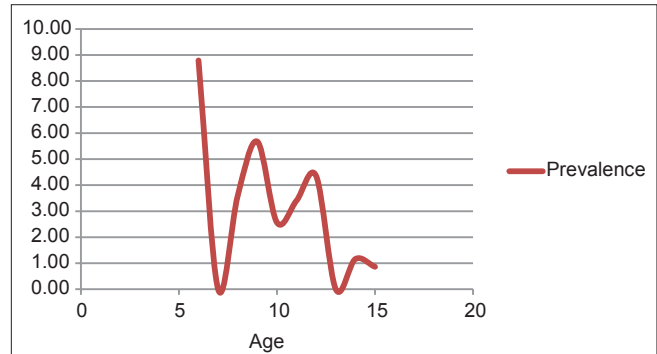


Figure 3: Prevalence of obesity by sex



Graph 1: Prevalence of obesity by age

Odd's ratio indicates that there is strong hazardous association between sex and obesity.

## DISCUSSION

In India, very few studies have been carried out to study the overweight/obesity in rural school children and majority of them have been carried out in cities in high income schools. The present study was carried out in a rural school of Kochi district of Kerala. In our study, obesity was found to be more in boys than girls but girls were more overweight than boys. Studies by Kapil et al.<sup>9</sup> also indicated that the prevalence of obesity was lower in girls (6%) as compared to boys (8%). On the contrary, studies done by Mudur<sup>9</sup> in three major Indian cities found that more girls were overweight than boys. All these studies therefore indicate that the sex of the child has an influence on the prevalence of overweight and obesity.

When compared to the prevalence studies done 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 Ramachandra<sup>10</sup> in 1000 adolescent children of Thiruvananthapuram and Geetha<sup>11</sup> 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 countries of the world. Studies reveal that in India, the problem of overweight and obesity; is also growing in other states too. In another obesity study done by Ramnath<sup>12</sup> in 1500 school children of Meerut UP, prevalence was 9 percent. Yet in another study by Popkin<sup>13</sup> 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. The possible risk factors in causing childhood obesity are sedentary lifestyle which makes them stay physically inactive. Giammattei et al. (2003) also reported that children who spent more time watching television had a higher BMI. Often parents are working and unable to concentrate on balanced nutritional food for their children. They find it easier to let their children consume junk and fast foods. Even the burden of school work and academic competitiveness has decreased the participation in sports and other form of physical activities in urban area which leads to high frequency of overweight and obesity.

## CONCLUSION

The present findings indicate that prevalence of childhood obesity in Kochi is not as high as the incidence reported by other studies. However, we found higher frequency of obesity in boys as compared to the girls. Obesity is a serious problem, which requires immediate attention, creating awareness program in the schools and parents encouraging their children to be involved in more physical exercises, sports and outdoor activities, thus avoiding the march towards obesity. Prevention of obesity in children is easier than in adults. Thus effective

prevention of adult obesity will require the prevention and management of childhood obesity.<sup>14</sup> Thus childhood obesity is an emerging health problem. Hence effective preventive strategies should be developed to halt this epidemic.

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