

## A STUDY ON PREVALENCE OF OBESITY IN SCHOOL CHILDREN IN A RURAL POPULATION IN SOUTH KERALA

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### ABSTRACT

#### BACKGROUND

Obesity is defined as having excess body fat due to 'calorie imbalance' -too few calories expended for the amount of calories consumed. Childhood obesity has both immediate and long-term effects on health and well-being. This study is aimed to highlight the burden of obesity among school children. The objectives of this study are to find the prevalence of obesity among school children aged 11-15 years and to compare prevalence of obesity among school children of government and private schools.

#### MATERIALS AND METHODS

School-based cross-sectional study conducted in 2 private and 2 government schools of a rural area in Trivandrum district. Total 800 students (200 from each school) aged 11-15 years in 6<sup>th</sup> to 10<sup>th</sup> standards were selected by systematic random sampling and consent were obtained. Height (cm) and weight (kg) were measured using stadiometer and standardised weighing machine, respectively. Body Mass Index (BMI) was calculated and categorised as underweight, normal, overweight and obese. The prevalence is expressed in percentages.

#### RESULTS

In this study, the total prevalence of overweight and obesity among the total 800 school children is found to be 4% and 1%, respectively. An alarming incidental finding is that the underweight prevalence is 61%, which is significantly high and should be addressed. The overall prevalence of overweight and obesity is 4.25% and 1.75%, respectively in private schools, whereas it is 3.5% and 1%, respectively, in government schools. There is not a significant difference between private and government school children. This may be due to the awareness about problems of obesity and its effects among school children and also timely health checkups in the schools.

#### CONCLUSION

This study done in a rural area found that there is a significant prevalence of obesity and overweight as well as a very high prevalence of underweight. It indicates that childhood obesity is an emerging health problem in rural areas and has to be prevented. Health education should be given to parents, teachers and children regarding dietary habit and sedentary lifestyle.

#### KEYWORDS

Obesity, Overweight, School Children.

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#### BACKGROUND

WHO technical report in 2001<sup>1</sup> defines obesity as having excess body fat. It is the result of 'calorie imbalance' -too few calories expended for the amount of calories consumed and are affected by various genetic, behavioural and environment factors. An article on childhood obesity<sup>2</sup> cites its immediate and long-term effects on health and wellbeing. Immediate health effects of obesity are obese youth are more likely to have risk factors for cardiovascular disease

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such as high cholesterol or high blood pressure, whereas obese children and adolescents are at greater risk for bone and joint problems, sleep apnoea and social and psychological problems such as stigmatisation and poor esteem. The long-term health effects are obese children and adolescents are likely to be obese as adults and are therefore more at risk for adult health problems such as heart disease, type 2 diabetes, stroke, several types of cancer and osteoarthritis. The preventive measures are healthy lifestyle habits, including healthy eating and physical activity, which can lower the risk of becoming obese and developing-related diseases. The dietary and physical activity behaviours of children and adolescents are influenced by many factors of society. Schools play a particularly critical role by establishing a safe and supportive environment with policies and practices that support healthy behaviours. Jagadesan S et al 2014<sup>3</sup> study on prevalence of overweight and obesity in 18,955 school children (age 6-11

years) and adolescents (age 12-17 years) in Chennai found that the prevalence of overweight/obesity was significantly higher in private compared to government schools both by the IOTF criteria and Khadikar's criteria. Overweight/obesity was higher among girls compared to boys. It was also higher among adolescents compared to children. A comparative study done between government and private schools by Patnaik et al<sup>4</sup> on overweight and obesity among adolescents using BMI, waist circumference, hip circumference and waist-hip ratio showed that obesity was significantly higher among private school students (45.2%) when compared to that of government schools (10.5%). A study on risk factors of obesity by Singh et al<sup>5</sup> has shown that increasing screen time (computer, video games, television, etc.), which have replaced other social activities and outdoor games as well as changing lifestyles of family are playing a major role in increasing the childhood obesity, which is commonly observed in the society. The prevalence of obesity among Indian children in urban area ranges from 1% to 12.9% and overweight ranges from 9% to 27.5% and obesity.<sup>6-11</sup> Our study is focused on finding the burden of obesity among school children in a rural area of South Kerala. The main objectives of the study are to find the prevalence of obesity among school children aged 11-15 years with Body Mass Index (BMI) and to compare the prevalence of obesity among school children of government and private schools in a rural area of South Kerala.

## MATERIALS AND METHODS

The study design is school-based cross-sectional study conducted in four schools of a rural area (Neyyattinkara taluk) in Trivandrum district. Two government schools and two private schools were chosen randomly. The study population were the school children aged 11-15 years, i.e. students studying from 6<sup>th</sup> to 10<sup>th</sup> standards in the government and private schools in Neyyattinkara taluk in Trivandrum district. Ethical clearance was obtained from Institutional Review Board and study was carried out after obtaining permission from the school authorities. Informed consent was obtained from the parents of the selected study subjects. The total sample size was 800 students. Private and government schools, 2 in number were selected randomly from the study area. In each school, 200 students were enrolled for this study. 40 children aged 11-15 years were selected from each standard (6<sup>th</sup> to 10<sup>th</sup> standards) by systematic random sampling method. Every 5<sup>th</sup> student was enrolled as per the school register in each standard till the required sample size was achieved. In case, the selected student was absent, the very next consecutive student was selected. Height was measured in cm using a stadiometer and weight was measured in kg using a standardised weighing machine. Anthropometric measurements were done by the investigator in the examination room of the school. BMI was calculated using formula weight in kg divided by height in square meters (m<sup>2</sup>). Body Mass Index (BMI) was categorised as underweight, if less than 18.5, normal range is 18.5-24.9, overweight range is 25-29.9 and obesity, if greater than 30. Sample size was calculated with

an estimated prevalence of 20% as per similar study conducted previously by Ramachandran et al.<sup>6</sup> The formula used is, sample size =  $4PQ/L^2$  where prevalence (P) = 20; Q = 100-P = 100-20 = 80; L = 15% of P = 15 x 20/100 = 3. Therefore,  $4PQ/L^2 = 4 \times 20 \times 80 / (3)^2 = 6400/9 = 711$ . In our study, 800 children was surveyed, 400 from government schools and 400 from private schools selected by systematic random sampling method.

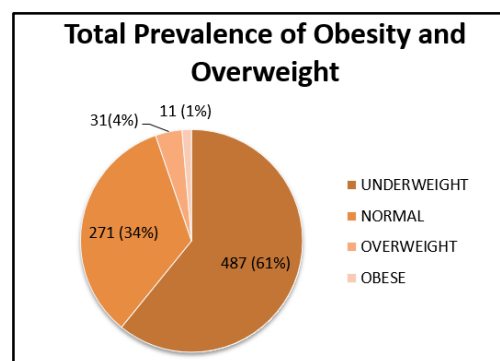
## RESULTS

A total of 800 school children of 6<sup>th</sup> to 10<sup>th</sup> standards of 2 private and 2 government schools in the study area participated in the study. Out of the 800 school children, 375 (46.9%) were males, while 425 (53.1%) were females with a mean age of 12.5 ± 1.8 years.

The prevalence of underweight, normal, overweight and obesity peaks among the four selected schools is shown in Table 1. The prevalence of overweight in the second private school was 7% and that of obesity in the first private school was 2.5% were high when compared to the other schools. However, the other frequencies were almost the same in all 4 schools.

Table 2 shows the comparison of prevalence of obesity among school children of private and government schools in a rural area, South Kerala. In private schools, the prevalence of overweight and obesity is 4.25% and 1.75%, respectively and in government schools, the prevalence of overweight and obesity is 3.5% and 1%, respectively. Even though, the private school children obesity is higher than that of government school children, there is not much a difference in the percentages. This is also evident in table 3, which shows the mean value of BMI of school children of both private and government schools. The means of BMI are almost similar in both types of schools.

Figure 1 shows the overall prevalence of underweight, normal weight, overweight and obesity among school children of 11-15 years studying in 6<sup>th</sup> to 10<sup>th</sup> standards in a rural area. A total of 800 school children of 6<sup>th</sup> to 10<sup>th</sup> standard participated in the study. Of them, only 271 (34%) were normal, 487 (61%) were underweight, 31 (4%) were overweight and 4 (1%) were obese. Prevalence of overweight and obesity in rural area is much less than that in urban area, but the alarming finding is that the prevalence of underweight is 61%, which has to be addressed.



**Figure 1. Overall Prevalence of Underweight, Normal Weight, Overweight and Obesity in School Children (11-15 Years) in a Rural Area, South Kerala**

Criteria (BMI)	Private Schools		Government Schools	
	Private School 1	Private School 2	Government School 1	Government School 2
Underweight (<18.5)	134 (67%)	110 (52%)	121 (60.5%)	122 (61%)
Normal (18.5-24.9)	58 (29%)	79 (39.5%)	69 (34.5%)	70 (35%)
Overweight (25-29.9)	3 (1.5%)	14 (7%)	7 (3.5%)	7 (3.5%)
Obese (>30.0)	5 (2.5%)	2 (1%)	3 (1.5%)	1 (0.5%)
<b>Total</b>	<b>200</b>	<b>200</b>	<b>200</b>	<b>200</b>

**Table 1. Prevalence of Underweight, Normal Weight, Overweight and Obesity Among School Children of Private and Government Schools in a Rural Population in South Kerala**

Criteria (BMI)	*Private Schools	**Government Schools
Underweight (<18.5)	244 (61%)	243 (60.75%)
Normal (18.5-24.9)	132 (33%)	139 (34.75%)
Overweight (25-29.9)	17 (4.25%)	14 (3.5%)
Obese (>30.0)	7 (1.75%)	4 (1%)
<b>Total</b>	<b>400</b>	<b>400</b>

**Table 2. Comparison of Prevalence of Obesity among School Children of Private and Government Schools in a Rural Area, South Kerala**

\*In private schools- Prevalence of overweight and obesity is 4.25% and 1.75%, respectively.

\*\*In government schools- Prevalence of overweight and obesity is 3.5% and 1%, respectively.

Criteria (BMI)	Private Schools	Government Schools
Underweight	15 ± 2.4	15 ± 2.0
Normal	20 ± 1.9	20 ± 2.1
Overweight	26 ± 2.0	26 ± 1.6
Obese	32 ± 2.3	32 ± 2.4

**Table 3. The Mean Value of BMI of School Children of both Private and Government Schools in a Rural Area, South Kerala**

**DISCUSSION**

The World Health Organization (WHO)<sup>12</sup> regards obesity as one of the most serious public health problems in the world that can affect young children and adolescents. There are very few reports from the developing world on the prevalence of obesity among children, even though in developed countries, it has reached epidemic proportions. In countries such as India that undergo nutritional transition, a rapid increase in obesity and overweight is observed.

Table 1 shows the prevalence of overweight and obesity in school children of standards 6<sup>th</sup> to 10<sup>th</sup> of two private schools and two government schools in a rural area in Trivandrum, Kerala, which was estimated by using the individual weight and height measures to calculate the BMI. Total prevalence of overweight and obesity among the total 800 school children is found to be 4% and 1%, respectively (Figure 1). An alarming finding is that the underweight prevalence is 61%, which is significantly high and should be addressed.

The comparison between government and private school children is shown in table 2 where the overall prevalence of

overweight is 4.25% and prevalence of obesity is 1.75% in private schools, whereas the overall prevalence of overweight is 3.5% and prevalence of obesity is 1% in government schools. Therefore, the prevalence of overweight and obesity in private schools is slightly higher than that of government schools, but statistically insignificant. These results are similar to that of Shiny George et al<sup>13</sup> study on the prevalence of overweight and obesity in rural adolescent school going children.

In our study, there is not a very significant difference in the prevalence of obesity and overweight among private and government school students (Table 2) and is evident in the means of BMI also (Table 3). This may be due to the awareness about problems of obesity and its effects among school children and also timely health checkups in the schools.

But, astonishingly the number of underweight students both in the private and government schools was strikingly high (Table 4). The prevalence of underweight in private schools is 61% and the prevalence of underweight in government schools is 60.75%. This may be due to insufficient nutrients in midday meals that is supplied in the schools or also could be due to their daily routine that involves more physical activities.

Children and adolescents are often considered the priority population for intervention strategies because, firstly weight loss in adulthood is difficult and there are a greater number of potential interventions for children than for adults. Schools are a natural setting for influencing the food and physical activity environments of children.

**CONCLUSION**

Our study is a school-based cross-sectional study that was conducted in school students of 6<sup>th</sup> to 10<sup>th</sup> standards of two private schools and two government schools in a rural area, Neyyattinkara taluk in Trivandrum district of Kerala and we found that there is a significant prevalence of obesity and overweight and there is a relatively high prevalence of overweight and obesity in the private schools than in government schools. It indicates that childhood obesity is an emerging health problem in rural areas as well as the need of effective preventive measures to halt this epidemic at its beginning. It is recommended that consumption of nutritious food should be encouraged and consumption of high fat and high energy food should be avoided by children. Sedentary lifestyle should be discouraged. Increased physical activity like playing outdoor games, walking, cycling should also be encouraged in obese children. Health education should be

given to parents, teachers and children regarding dietary habit and sedentary lifestyle.

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