Section: Pediatrics

Original Research Article

STUDY OF BODY MASS INDEX IN SCHOOL CHILDREN OF AGE 6-12 YEARS NEAR THE BPT HOSPITAL MUMBAI: A RETROSPECTIVE CROSS SECTIONAL STUDY

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ABSTRACT

Background: To assess the prevalence of overweight and Obesity among school children near the BPT Hospital and explore it's associations with socioeconomic factors, dietary habits and physical activity.

Materials and Methods: A retrospective cross-sectional study utilised data from thesis conducted in 2013.Total of 1050 children aged 6-12years from three schools representing different socioeconomic backgrounds were enrolled. Anthropometric measurements were taken and BMI was calculated using standard guidelines. Information on dietary intake, physical activity and socioeconomic status was collected through questionnaires.

Results: Out of the total sample set, 16 children were underweight,880 had normal BMI,126 were overweight and 28 were obese. Overweight and Obesity were more prevalent in in high income groups (15.2% and 3.4%) compared to low income groups (5.4% and 1.1%). Boys had a higher prevalence of overweight and Obesity than girls. Additionaly, junk food consumption was significantly higher among children from high-income families.

Conclusion: The findings emphasize the need for school based interventions to promote healthy dietary habits and physical activity particularly targeting high income groups. Addressing gender-based disparities in physical activity is also essential.

Keywords: Body mass index, school children, Obesity, Overweight, socioeconomic status.

INTRODUCTION

The increasing prevalence of childhood overweight and obesity is a significant public health concern worldwide. Countries such as Brazil, China, the United States, and Canada have reported sharp rises in obesity rates over the past decades.[1,2] Childhood BMI is a well-established predictor of adult BMI, as demonstrated in a Louisiana cohort study involving 2,610 children aged 2 to 37 year.[3] While obesity remains a concern, undernutrition persists in many regions. Cross-cultural studies have reported high rates of underweight children, including 59.8% in rural India.[4] and 66-70% in South Africa, where 5% of children were overweight.[5] This dual burden of malnutrition highlights the need for region-specific interventions.

School-based BMI surveillance systems play a crucial role in monitoring trends, evaluating interventions, and informing policy decisions. Evidence suggests that healthier school environments are linked to reductions in obesity prevalence.[6] Additionally, socioeconomic and environmental factors contribute significantly to obesity disparities.[7,8]

This study, conducted as part of a DNB thesis in 2013, assessed the prevalence of overweight and obesity among school children aged 6 to 12 years from low, middle, and high-income groups near BPT Hospital, Mumbai. It also explored associations between BMI, dietary habits, physical

activity and socioeconomic factors. Despite the time elapsed, the findings remain relevant for understanding historical obesity patterns and evaluating the effectiveness of subsequent public health interventions. This retrospective analysis offers valuable insights to inform ongoing and future strategies for childhood obesity prevention.

MATERIALS AND METHODS

Study Design and Setting

This retrospective, cross-sectional study was conducted using data from a study performed in 2013. The study included 1,050 school children aged 6 to 12 years from three schools near a hospital in Mumbai, representing low, middle, and high-income groups.

Sample Size and Selection

A stratified random sampling method was used. Fifty students were selected from each class across the three schools. To ensure gender parity, 25 male and 25 female students were chosen from each class using the school attendance register.

Inclusion Criteria

Children aged 6 to 12 years.

Written consent obtained from parents and school authorities.

Exclusion Criteria

Children with known medical conditions or on medications that could contribute to obesity.

Data Collection

Data was collected using three structured forms designed for:

1. Children: Capturing demographic details, anthropometric measurements, and physical activity.
2. Parents: Assessing dietary habits, energy intake, and family environment.
3. School Authorities: Evaluating school policies on physical activity, nutrition, and the availability of snacks and junk food.

Anthropometric Measurements

Height and weight were measured using portable, calibrated stadiometers and electronic weighingscales with an accuracy of 0.1 cm and 100 grams, respectively. Measurements were taken with the child standing in socks, in a standardized posture, with the head aligned in the Frankfurt plane. Body Mass Index (BMI) was calculated using the formula:

BMI ={Weight (kg)}/{Height (m)}^2}

Data Management and Standardization

The data on dietary intake was initially collected in descriptive form. For uniformity, a qualifieddietitian standardized the data by converting meal descriptions into caloric and protein intake estimates.

Data Entry and Analysis

The data was entered into Microsoft Excel 2007 with range checks applied to prevent errors. It was subsequently reviewed for accuracy. Descriptive statistics were used for analysis, with resultspresented as frequencies and percentages.

Ethical Considerations

Informed consent was obtained from the parents and school authorities. Ethical approval was granted by the relevant institutional ethics committee.

RESULTS

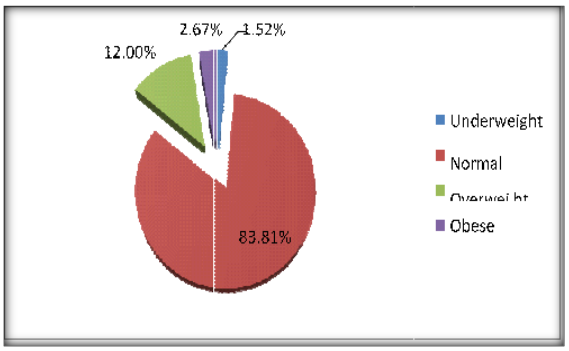

Figure 1: Overall distribution of weight categories

Out of the total sample set, 16 children were found to be underweight, 880 were in the normal range, 126 overweight, and 28 were obese.

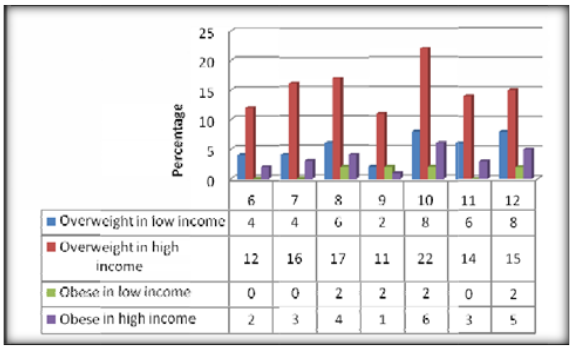

Figure 2: Prevalence of overweight and obesity in different age groups in the income groups

The result showed distribution of overweight and obesity in children with ages ranging from 6 years to 12 years in our sample set.

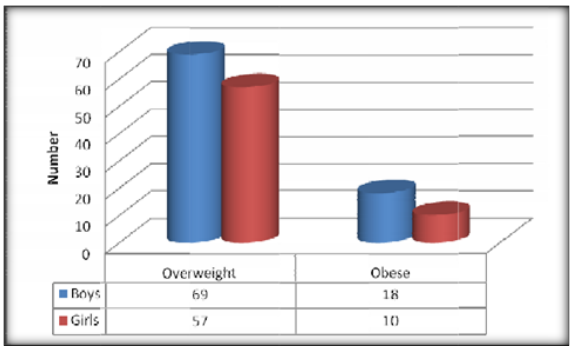

Figure 3: Prevalence of overweight and obesity according to gender

The graph showed that more number of boys was overweight and obese than girls.

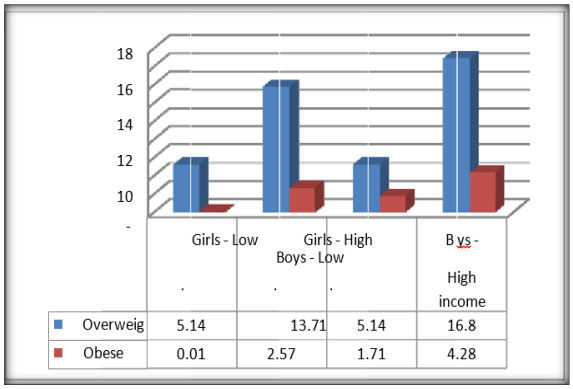

Figure 4: Prevalence in different genders of the two income groups

The graph showed incidence of overweight and obesity in boys and girls of different income groups.

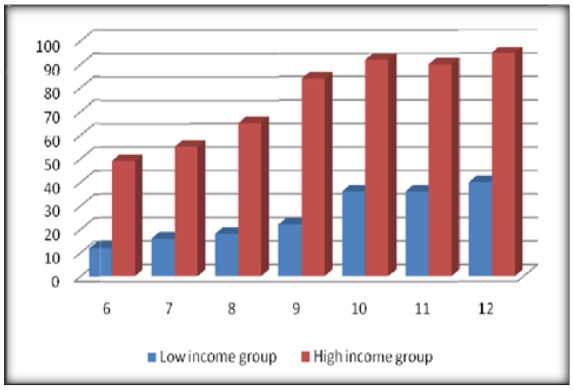

Figure 5: Consumption of junk foods across age groups in the two income groups

The graph showed percentage of children in both income groups from the sample set who consume junk food more than thrice a week.

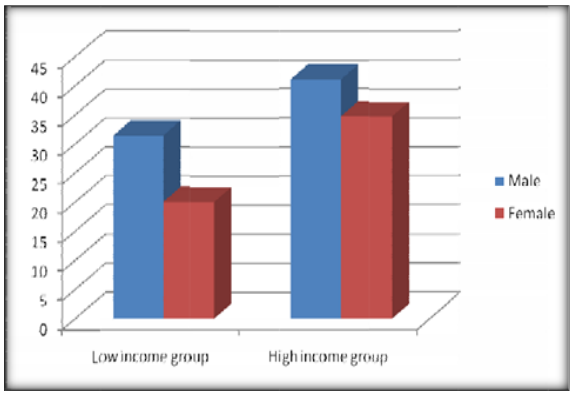

Figure 6: Consumption income groups of junk foods more than thrice by boys and girls in different

The graph showed percentage of girls and boys consuming junk foods more than thrice a week.

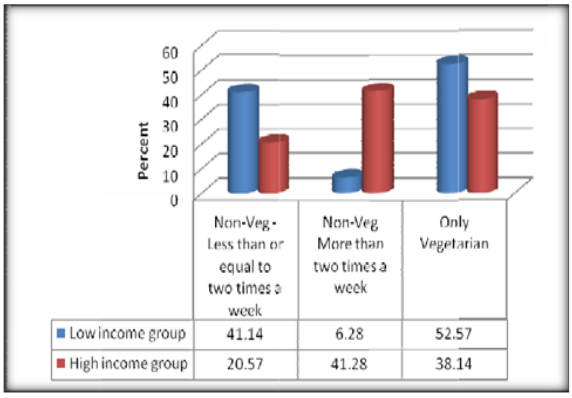

Figure 7: Frequency of non-vegetarian consumption in the two income groups

The graph showed percentage of children consuming only vegetarian foods, non-vegetarian less than twice a week, and non-vegetarian more than twice a week.

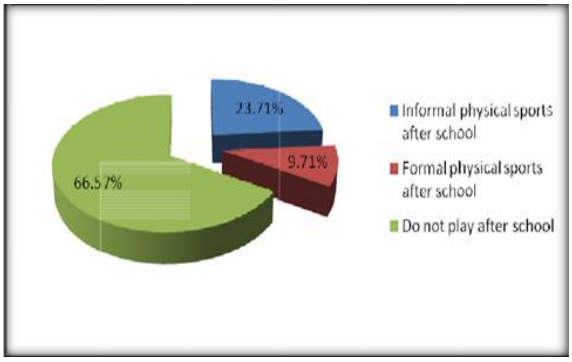

Figure 8: Children engaging in physical sports after school

The graph showed percentage of children engaging in formal and informal physical sports after school.

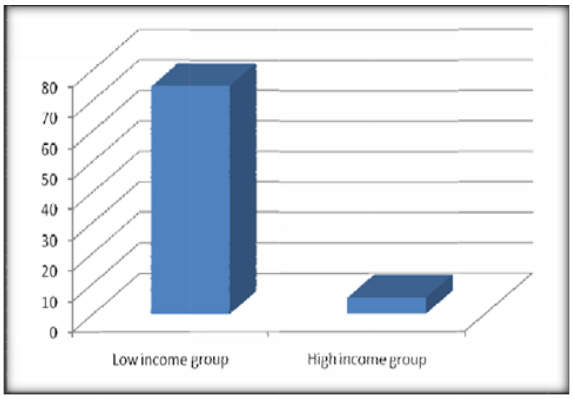

Figure 9: Percentage of children either walking or riding a bicycle for more than a kilometer to reach school.

The graph showed percentage of children either walking or riding a bicycle for more than a kilometer to reach school.

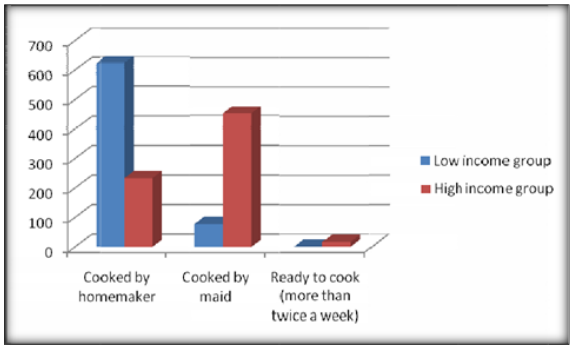

Figure 10: Graph showing whether mothers or maids cook food, and usage of ready to eat foods

The graph showed percentage of children whose mothers or maids cook food at home. Further, the chart also showed percentage of homes using ready to cook food for more than twice a week.

DISCUSSION

Although this study is a part of DNB thesis in 2013.it's publication is significant in understanding the historical prevalence of obesity and it's determinants. It provides a reference point for comparing current data and evaluating the effectiveness of public health interventions implemented in the past decade. Additionaly, the study highlights challenges that may persist today, underscoring the need for continued efforts to combat childhood obesity.

Schools can play an important role in preventing obesity in children and adolescents. More than 95% of young people are enrolled in schools,[10] and schools have long promoted physical activity and healthy eating. Research has shown that well-designed, well-implemented programs can effectively promote these behaviors,[11-13] and the Centers for Disease Control and Prevention (CDC) has identified 10 key strategies that schools can use to prevent obesity by promoting physical activity and healthy eating.[14]

5.4% children in low income group and 15.2% children in high income group were found to be overweight. Similarly, 1.1% children in low income group and 3.4% children in high income group were found to be obese. This shows that incidence of overweight and obesity in high income group was found to be far higher than low income group. In fact, there was negligible incidence of obesity in low income group. The prevalence in this particular sample set compares quite differently with other wider studies. For instance, IASO data suggests 15.2% boys and 14.4% girls are overweight in India, and 5.4% boys and 3.9% girls are obese.[15] This data compares with data in our high income group, but compares differently with our low income group data. In average terms, our data suggests lower incidence of overweight and obesity in the sample set. It was found that only 20.8% children in low income group and 60.8% in high income group had sufficient consumption of fruits and vegetables. This shows that there is a major difference in diet profiles of the two income groups. Additionally, this shows that the overall percentage of children having adequate fruits and vegetables is abysmal. Such a data perhaps points to lack of awareness about dietetics in parents and schools. In a study carried out in Kochi, Kerala. The sample included children from 3 schools belonging to lower middle higher income group in the age range of 6-15 years. Obesity was reported to be 3% for boys and 5.3% for girls.[16]

As for physical activity, 29.1% children in low income group engaged in physical sports after school regularly, while in the high income group only 21% children did that. Only 6.5% children in low economic group and 11.2% children in high economic group participated in formal exercise regime at home. As per chart 5.O, the number of children engaging in physical sports decreases as age increases. Physical activity in girls was found to be abysmal. Only 12% girls in low income group and 6.2% girls in high income group played regular sports. However, 74.5% children either walked or bicycled for more than one kilometer in the low income group, as compared to a small 5.2% in high income group. These numbers show extremely low physical activity in children, especially in the high income group, pointing to prevalence of sedentary lifestyle. Further, these numbers show especially low physical activity in girls of the high income group. A pilot BMI screening program was developed based on the findings of these focus groups; 4 elementary schools were recruited to examine parental reaction to BMI measurement in schools.[17,18] All 4 schools conducted height and weight measurements; however, the 2 intervention schools had BMI results mailed to parents, whereas the remaining 2 schools did not mail results home. A follow-up survey found that 78% of parents in all 4 schools believed it was important for schools to assess and send home BMI results as part of annual student health screening reports. Parents of older students and girls were less likely than parents of younger children and boys to want the annual BMI screening information.[19, 20]

It is important to implement structured school health programme to promote healthy eating habit, encourage physical activity through regular sports sessions and provide parental counselling on childhood nutrition and physical activity

CONCLUSION

The study based on 2013 data revealed a higher prevalence of overweight and Obesity in high income group children. Gender disparities in physical activity further emphasize the need for targeted interventions. School and parent must work collaboratively to create a healthier environment for children.

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