Lifestyle Patterns and Prevalence of Overweight and Obesity among Rural School Children of Age 6 to 9 Years of District Una, Himachal Pradesh.

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Abstract: BACKGROUND: Many studies have reported prevalence of overweight and obesity in children and adolescents from urban areas as well as of underweight or malnutrition from rural areas. With changing lifestyles everywhere, a need was felt to study the prevalence of overweight and obesity among rural children also. METHODOLOGY: Present cross-sectional study was planned involving 210 school children (103 boys and 107 girls of age 6-9 years) from various private schools of district Una, Himachal Pradesh, India. IOTF (International Obesity Task Force) cutoffs for BMI were used. Information about lifestyle, eating habits, physical activity and socio-economic status was collected through well designed questionnaire, which was filled by the parents of the children. The population studied mostly belonged to lower and upper middle class. SPSS version 17.0 was used to analyze the data. RESULTS: Overweight and obesity among children was found to be 14.8%. Time spent in physical activity has reduced greatly; also there was increased sedentary lifestyle among rural children. 93.5% of overweight and obese children were considered fine (according to their weight) by their parents. The children, who did not have their food timely, ate less frequently and ate junk food more than 3-times a week, were found to be more overweight and obese. CONCLUSION: Percentage of overweight and obese children (14.8%) seen in the study has provided evidence that it is not only the urban population or the higher socioeconomic class groups that are affected with the lifestyle related problems but changing lifestyle has affected rural children also.

Key Words: Rural, body mass index, lifestyle, overweight, obesity, school children

Introduction:
Important change in our modern industrial society is that physical activity is almost nonexistent, particularly those in the middle and upper classes.(1) As a result, prevalence of overweight and obesity has been spreading worldwide with globalization and modernization. The global trend in overweight prevalence and number of children affected is rising, from 4.8% in 1990 to 6.1% in 2014.(2) The National Institute of Nutrition, Hyderabad has done pioneering work on nutritional aspects and conducted surveys on a cross section of urban and rural population belonging to different economic strata.(3) It is indeed ironic; the children living in India disproportionately suffer from undernutrition, more so in the rural areas than their urban counterparts.(4) Recent study reported acute and chronic nutritional stress on rural Indian school children of Maharashtra.(5)

Health problems related to obesity are not only physical but psychological and social as well and it has the capacity to harm any system in a child’s body.(6,7) Obese children have high risk of cardiovascular diseases, high blood pressure and increased cholesterol levels. Childhood obesity increases the risk of having insulin resistant type 2 diabetes. Children may have high risk of having respiratory problems like asthma shortness of breath etc. The physical effects may also reflect on musculoskeletal system.(6)

Studies on school children from urban cities like New Delhi, Chennai, Hyderabad etc, has shown the prevalence of 6-8% and 9-12 % of obesity and overweight respectively.(8-12) If we see the projection of future health complications, these lifestyle diseases are going to cause the utmost burden to future societies. Eradication of extreme poverty and hunger (Millennium development goals, MDGs) by the year 2015 has helped to decline the proportion of underweight children from 25% to 15% between 1990 and 2012; however there is uneven distribution of improvements between and within different regions.(13)

Studies on prevalence of overweight and obesity among middle to high socioeconomic group status have shown that eating habits like junk food, chocolate, eating outside at weekend and physical activities like exercise, sports, sleeping habit in afternoon have remarkable effect on prevalence of overweight and obesity.(8)
Thus many studies have reported prevalence of overweight and obesity in children and adolescents from urban areas, studies from rural areas mainly emphasized the prevalence of underweight. So, the main idea in this paper is to study the lifestyle pattern, overweight and obesity among school going rural children.

**Objectives**

- To study the prevalence of overweight/obesity among school going children from rural area, of district Una, Himachal Pradesh.
- To analyze the effect of lifestyle and socioeconomic status among normal, overweight, underweight and obese children.

Significance of the study: the study will assess the prevalence of overweight and obesity among rural children who were otherwise supposed to be affected mostly with under nutrition.

**Materials and Methods**

The present cross-sectional study was conducted on 210 school children (103 boys and 107 girls of age 6-9 years) from various private schools of district Una, Himachal Pradesh. District Una has agriculture based economy with majority of Hindu and Sikh religion. Children studied were mainly Hindu (Rajput, Bhati, Sainis and Brahmin). Prior permission was taken from the Head of the schools and from the parents of the children for conducting the study. Lifestyle related information (eating habits, physical activity and socioeconomic status) were collected through well designed proforma (Questionnaire) which were filled by the parents of the children. Aggarwal socioeconomic status scale was utilized for the estimation of overweight and obese children. International Obesity Task Force (IOTF) classification was brought down on the point vertex.

Body weight was taken in kilograms with portable weighing machine. The subject with minimum clothing was asked to stand erect on a horizontal platform with equal pressure on both the feet. Weighing scale was calibrated to the zero before taking every measurement. For height children were asked to stand with both heels touching each other along a vertical wall, looking forward so that the visual axis is parallel to the plane surface of the floor (best approximation of F.H. plane). The anthropometer was held vertically in front of the subject in sagittal plane and the horizontal movable arm was brought down on the point vertex. International Obesity Task Force (IOTF) classification was utilized for the estimation of overweight and obese children. Overweight was defined as children with BMI value between 85th to 95th percentile for a specific age and sex by Cole et al., 2000.(16)

- Below 5th percentile : Underweight
- Between 5th and 85th percentile : Normal weight
- Between 85th and 95th percentile : Overweight
- Above 95th percentile : Obese

Overweight and obese categories were clubbed together in order to simplify the data.

**Inclusion Criteria:** All 6-9 year old children present on the day of the survey were included. Children included in the study were all healthy and did not suffer from any disease.

**Statistical Analysis:** SPSS version 17.0 was used to analyze the data. For statistical computation cross-tabs, t-test, and Chi-square were used.

**Results**

A total of 210 school children were part of the study with almost equal number of boys and girls (Table 1). Girls were found to be taller than boys at 6 and 9 years of age. A gradual increase in height can be seen in both boys and girls. The difference between boys and girls for height was found to be statistically non-significant. Both girls and boys have very little difference in their weight in each age group (Table 2).

**Table 1: Age and sex wise distribution of boys and girls.**

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Boys (n)</th>
<th>Girls (n)</th>
<th>Total Frequency</th>
<th>Total Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>27</td>
<td>26</td>
<td>53</td>
<td>25.24</td>
</tr>
<tr>
<td>7</td>
<td>28</td>
<td>26</td>
<td>54</td>
<td>25.71</td>
</tr>
<tr>
<td>8</td>
<td>29</td>
<td>27</td>
<td>56</td>
<td>26.67</td>
</tr>
<tr>
<td>9</td>
<td>23</td>
<td>24</td>
<td>47</td>
<td>22.38</td>
</tr>
<tr>
<td>Total</td>
<td>107 (50.95%)</td>
<td>103 (49.04%)</td>
<td>210</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Table 2: Mean height and weight of boys and girls according to age.**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Boys</th>
<th>Girls</th>
<th>t value</th>
<th>Mean±SD</th>
<th>Mean±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height (cm)</td>
<td>116.7±5.69</td>
<td>119.7±6.11</td>
<td>-0.49</td>
<td>1.81</td>
<td>1.29</td>
</tr>
<tr>
<td>Weight (Kg)</td>
<td>18.8±1.46</td>
<td>19.6±3.69</td>
<td>-0.72</td>
<td>0.17</td>
<td>0.92</td>
</tr>
</tbody>
</table>

Within each group of boys and girls, maximum numbers of children fall under normal category only (chi-square 0.74, non significant). Boys were found to be more underweight as compared to girls. Percentage of normal weight girls exceeds percentage of normal weight boys by 3.4%. Overweight and obesity of 7.6% and 7.1% was found in girls and boys respectively. Maximum percentage of school going children fall under normal weight category (81.4%) but there is good percentage of overweight and obese children also (see Table 3).

**Table 3: Distribution of children according to their BMI.**

<table>
<thead>
<tr>
<th>BMI Category</th>
<th>Girls</th>
<th>Boys</th>
<th>Total Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>5</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Normal Weight</td>
<td>82</td>
<td>89</td>
<td>171</td>
</tr>
<tr>
<td>Overweight and obese</td>
<td>16</td>
<td>15</td>
<td>31</td>
</tr>
<tr>
<td>Total</td>
<td>103</td>
<td>107</td>
<td>210</td>
</tr>
</tbody>
</table>

Percentage of children taking their meals on time: Children who took their meals on time fall under normal weight category (87.1%). Those who did not take their meals on time were found to be overweight and obese (71%). (Figure 1) Of underweight category, 87.5% children also took their meals on time. Of normal weight category, 81.1% children took their meals on time while only 12.9% do not. This clearly shows that taking meals on time affects the weight status of children. (Chi square =53.012, ***p<0.001)
Frequency of meals taken by children: Parents were asked to fill in the proforma if their child takes his/her food 3-6 times a day or more than that. Normally it is taken at three times a day and if the child is taking his/her food more than thrice a day then he/she is considered as frequent eater. (Fig 2) About 87.1% of overweight and obese children, 87.5% of underweight children do not take food more frequently. Of normal weight category, 62.6% children took their food more than three times a day. On the whole 53.3% had the habit of eating more frequently while 46.7% do not. Those children who ate frequently in small quantities had less weight as compared to those eating three times a day. (Chi square = 31.584, *** p<0.001)

Distribution of children based on their mode of transport to school: Out of the total overweight and obese children about 71.0% preferred bus/car as a mode of transport to school. Only 50% underweight and 49.1% normal group children prefer bus/car. (Fig 4) Thus maximum percentage of children under each category of body mass index was using bus/car for transport. Only 7.6% children preferred little walking and then school bus. While about 40% children preferred walking or cycling. When the three categories were compared the maximum percentage of children using bus/car falls in overweight/obese category. (Chi square= 6.856, Non-significant)

Distribution of children based on their sedentary habits: Maximum percentage of underweight (87.5%) and normal weight (74.9%) children spent only 1-2 hours/day in watching TV, playing video games, using computer etc. (Fig 5) Children of overweight and obese category (35.5%) spent good number of hours in such activities. Majority of the total population 69.5% spent 1-2 hours/day only. Overweight/obese category spent the maximum number of hours (3to5 hrs or more) in sedentary activities when compared with their counterparts. (Chi square=57.419, p***<0.001)

Distribution of children based on the perception of their parents regarding their child’s physical activity: Distribution of children based on their sedentary habits: Maximum percentage of underweight (87.5%) and normal weight (74.9%) children spent only 1-2 hours/day in watching TV, playing video games, using computer etc. (Fig 5) Children of overweight and obese category (35.5%) spent good number of hours in such activities. Majority of the total population 69.5% spent 1-2 hours/day only. Overweight/obese category spent the maximum number of hours (3to5 hrs or more) in sedentary activities when compared with their counterparts. (Chi square=57.419, p***<0.001)

Distribution of children based on the perception of their parents regarding their child’s physical activity: Parents reported about their own view regarding the activeness of their child. They selected if their child is not active, moderately active or very active. (Fig 6) Among parents, 86.2% had the perception that his/her child is very active. Out of the total overweight and obese group 64.5% parents consider their child as in-active and 35.5% considered their children as active. 96.5% of the normal weight category children were considered as very
active by their parents. In underweight category 62.5% children were rated as very active by their parents while 37.5% as not active. Only 2.9% parents rated their children as moderately active. Parents of overweight/obese children were biased in their opinion regarding the weight of their children. (Chi-square value = 118.326, ***p<0.001)

Figure 7: Distribution of children based on the perception of parents regarding weight of their child

Parents were asked to select out of the two options, if their child is having fine weight or he/she needs to lose some weight. (Fig 7) About 91.9% parents have the perception that their child’s weight is fine which includes 87.5% underweight category children, 91.8% normal weight and 93.5% of overweight and obese category children. Thus out of the total overweight and obese category children 93.5% were considered as fine weight and only 6.5% parents rated their overweight and obese child for losing weight. (Chi-square value = 0.323, Non-significant)

Figure 8: Distribution of children according to their physical activity.

Distribution of children based on the perception of parents regarding weight of their child: Parents were asked to report number of times their children go for good physical activity per week. Parents were given three options - 0 times, 1-2 times and 3-4 times a week. According to their replies children were then categorized into different categories of BMI. Maximum percentages of children, about 70% of the totals were involved in physical activity tasks for only 1-2 times a week. Out of the total overweight and obese children 22.6% were not involved in any type of physical activity type while 71% did have physical activity for 1-2 times a week. Physical activity was found to be less among underweight children (50% no physical activity). (Chi square = 3.106, *p<0.05)

Figure 9: Distribution of children according to their physical activity as helping at home

Distribution of children according to their physical activity as helping at home: It was found that in all the body mass index categories maximum percentage of children helped their parents at home in moderate work. (Fig 9) There was less percentage of children who were not involved in any type of work and spending their time sitting and chitchatting. In overweight and obese category also maximum percentage of children (64.5%) helped in moderate works at home. (Chi square = 13.109, *p<0.05)

Figure 10: Distribution of children according to their family socioeconomic status

Distribution of children according to their physical activity as helping at home: It was found that in all the body mass index categories maximum percentage of children helped their parents at home in moderate work. (Fig 9) There was less percentage of children who were not involved in any type of work and spending their time sitting and chitchatting. In overweight and obese category also maximum percentage of children (64.5%) helped in moderate works at home. (Chi square = 13.109, *p<0.05)

Distribution of children according to their family socioeconomic status: (Fig 10) Maximum percentage of children falls under the category of lower middle and upper middle class, 52.9%, 36.2% respectively. And thus 89% of the population belonged to middle class only.

Figure 11: Distribution of children into BMI categories based on their socioeconomic status.

Distribution of children into BMI categories based on their socioeconomic status: Maximum percentages of underweight children belonged to upper middle class, while 55.6% of normal weight children were from lower middle class and equal percentage 45.2% of overweight and obese children belonged to upper middle and lower middle class. (Chi square = 5.273, Non-significant) (Fig 11)

Discussion

It is important to discuss the new and significant observations in the light of previous work. The present study showed the prevalence of overweight and obesity as high as 14.8% among children. (Similar study took place during the same period
when this study was undergoing in Karimnagar town, Hyderabad. The study showed 14.68% of overweight and obesity almost similar to our study, although mean age of the children were 13 years and upper social class were found to be significantly associated with obesity (p<0.05). (9) Pierre et al (2003) in US reported prevalence of overweight among children aged 6-19 years to be as high as 30%. (17) Similar findings have been reported from a study of school age children in Delhi and Udaipur (Kaneria et al., 2006). (18) An important finding of this study is prevalence of obesity among school going children who belonged to lower middle class to be as high as compared to urban survey in various cities. The prevalence of overweight/obesity is found to be almost equal among girls and boys but was higher among girls comparable with figures reported for other developing countries. (19) This difference might be because, children are in preadolescent age, a stage when rapid growth and deposition of fat takes place. Boys tend to deposit more fat free mass than fat mass while girls tend to deposit more fat mass than fat free mass.

A similar study done in Peshawar city, Pakistan showed high prevalence of obesity and overweight in private schools and stressed on its relationship with decreased physical activity and other factors like watching TV, role of media & lack of diet control by parents. (20) Overweight and obese children in the present study used bus or car as transport, watched more television and did not take their meals on time. It is seen that frequency of eating quick foods is also related to BMI. (21) Thus, role of type of food frequency of eating pattern and eating behavior and T.V viewing have special role in obesity. (22) A study conducted in Bangalore city suggested that duration of sleep, television viewing and consumption of fried food may be significant factors that contribute to overweight. (10) Children were found to be spending most of their time with T.V. Computers and Video games. Junk food in rural areas is loved by children which is well advertised and easily available nowadays. Lifestyle habits like frequency of eating fast food, mode of transport, duration and participation in active sports and time available in watching TV showed association with prevalence of overweight. (11) Physical activity pattern as assessed qualitatively by the number of hours of playing games, as an extracurricular habit and helping hand in the household work showed less active children to be overweight and obese. (23) Perception of parents was found to be biased regarding the weight status of the children. Family characteristics play an important role in predisposing the children to overweight and obesity. (24) Parent child correlation for various indices of adiposity in an endogamous Indian population showed in some parent-child groups, skinfold thickness displayed relatively higher value of correlation. (25) Since the population selected for the study belonged mostly to the lower middle class, it can be interpreted that maximum percentage of overweight and obese is not restricted only to high income groups as shown (AIIMS 2008 study) which by other studies highlighted the possible role of change in lifestyle with increase in income levels. (26)

Population studied mostly belonged to lower and upper middle class, thus it is clear that the problem is not restricted to higher income groups only.

**Conclusion**

The children for the study belonged to lower middle class particularly having rural background with agriculture as main occupation. The study concludes that with changes in lifestyle habits it is not only under nutrition that children in rural area are suffering of, but emergence of overweight and obesity is also there irrespective of economic class and area. Due to industrialization and globalization lifestyle changes have their impact in rural background as well.

**Conflict of Interest:** There is no conflict of interest with any person, institute or organization.

**References**


