Prevalence of Underweight among Government Primary School Children of Chennai

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Abstract

**Introduction:** Childhood is a period of rapid growth after infancy. Among children the nutritional requirements increase because the growth rate increases. One of the major public health problems in many developing countries including India is widespread prevalence of under nutrition among primary school children. The consequences of chronic under nutrition are slower cognitive development, serious health impairments and reduce the quality of survival. Hence early detection of the morbidities through regular screening helps in prompt prevention and treatment of serious complications. This study was conducted to assess the prevalence of underweight among the Government Primary School children in an administrative zone of Chennai city.

**Objective:** To assess the prevalence of underweight based on Body Mass Index percentiles (NCHS & CDC) among Government Primary School children in Pulianthope zone of Chennai.

**Materials and Methods:** A Cross-sectional study was done among 320 Primary school children both boys and girls aged 6 to 10 years studying in classes I – V in Government Primary schools of Pulianthope zone, Chennai during August, 2012. Multi stage random sampling was used. Anthropometric measurements like Height and weight were recorded. Underweight was defined as BMI < 5th percentile for age & sex (NCHS & CDC 2000).

**Results:** The overall prevalence of underweight was 54.3%. It was higher among girls (63%) than boys (47%) and the difference was statistically significant.

**Conclusions:** Under-nutrition is an important public health problem in many developing countries including India. This problem has serious long term consequences for the child and adversely influences development of the nation. The high prevalence of underweight is in spite of a robust mid-day meal scheme and regular school health services in the state. To solve this problem a strong multidisciplinary action is to be implemented at school, community, state and national levels. Also, a thorough investigation of the implementation of mid-day meal scheme is necessary to identify loop holes.

**Keywords:** Underweight, Body Mass Index, School Health, Malnutrition, Child Malnourishment, Growth Monitoring

Introduction

Childhood is a period of rapid growth after infancy. Among children the nutritional requirements are different than that of adults because high growth rate. Monitoring of children’s nutritional status is a fundamental tool for the evaluation of their healthy development. One of the major public health problems in many developing countries including India is widespread prevalence of under nutrition among primary school children.1 The consequences of chronic under nutrition are slower cognitive development, serious health impairments and poor survival. Hence the early detection of childhood malnourishment through regular monitoring helps in prompt treatment and prevention of serious complications.2

According to the gender specific growth chart for 2 to 20 years by National Centre for Health Statistics (NCHS) and Center for Disease Control and Prevention (CDC), if the BMI (Body mass Index) for age percentile is less than 5th percentile, the child is said to have underweight.3 For children BMI age percentile is used, as amount of body fat changes with age and amount of body fat is different between girls and boys. There is limited data on underweight among the Primary school children in Tamil Nadu. So this study was conducted to assess the prevalence of under nutrition among Government primary school children in an administrative zone of Chennai.

Materials and Methods

This Cross -Sectional study was done in Government Primary Schools, Pulianthope Zone of Chennai in 2012. Children studying from classes I to V were included in the study. A study done by Izharul Hasan, et al4 in Bangalore reported that the overall prevalence of underweight among Government Primary School Children was 58.2%. This was taken as basis for calculation of sample size with \( P = 58\% \), \( Q = 42\% \), allowable error of 10% of 58% = 5.8. Assuming 10% non-responsiveness the sample size for the study was 310.

*See End Note for complete author details
Sampling Method

Multi stage random sampling method was used for this study. Chennai district consist of fifteen zones. Among the fifteen zones of Chennai, Pulianthope zone was chosen randomly by lottery method. Pulianthope zone contain 19 Government Primary Schools out of which schools were randomly chosen by lottery method to meet the sample size. The schools selected were C.P.S (Chennai Primary School) V.O.C Play Ground, C.P.S Strahan’s Road Tamil and C.P.S, T.V.K Nagar with 95, 121and 148 students respectively (Total = 364). These schools are under the coverage of school health services of the government Urban Health post. All the children in classes I to V were included and 44 children who were absent on the day of the study were excluded. A total of 320 children were examined from all the three schools.

Data Collection & Analysis

Data collection was done after obtaining informed consent from the School Headmasters. Height was measured using a portable stadiometer accurate to 1 mm. The children were made to stand bare foot on a flat floor with feet together and with heels, shoulders and back of head touching the wall. Weight was measured in kilograms using electronic digital weighing machine to the nearest measure of 0.1 kg.

Body Mass Index (BMI) for each child was calculated according to ‘Quetelets’ Index which is a statistical correlation of the relationship between the height and weight of an individual arrived at by dividing body weight in kilograms by height in meters squared.

\[
BMI = \frac{\text{Weight (Kg)}}{\text{Height}^2 (m)}
\]

For children, BMI Age Percentile is used, as amount of body fat not only changes with age but also is different between girls and boys. According to gender specific growth chart for 2 to 20 years by National Center for Health Statistics (NCHS) and Center for Disease Control and Prevention (CDC), if the BMI for age percentile is less than 5th percentile, the child is said to have underweight. Data was entered in Microsoft Excel and results were analyzed using SPSS. Chi Square and Fishers Exact tests were used and p value < 0.05 was considered as statistically significant.

The school authorities were informed about the health status of the students at the end of this study as well as recommended to inform the parents and refer those who were identified to have underweight to the nearby ICDS in Pulianthope for further management.

Results

The age of the children ranged from 6 – 10 yrs. The age distribution of children is shown in Figure 1 and the age distribution according to sex is shown in Table 1. Regarding the gender distribution, 52% were boys and 48% were girls.

![Table 1. Age distribution of children according to sex](image)

<table>
<thead>
<tr>
<th>Age in years</th>
<th>Boys (167)</th>
<th>Girls (153)</th>
<th>Total (320)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 yrs</td>
<td>32 (19%)</td>
<td>35 (23%)</td>
<td>67 (21%)</td>
</tr>
<tr>
<td>7 yrs</td>
<td>29 (17%)</td>
<td>29 (19%)</td>
<td>58 (18%)</td>
</tr>
<tr>
<td>8 yrs</td>
<td>38 (23%)</td>
<td>33 (21%)</td>
<td>71 (22%)</td>
</tr>
<tr>
<td>9 yrs</td>
<td>30 (18%)</td>
<td>29 (19%)</td>
<td>59 (19%)</td>
</tr>
<tr>
<td>10 yrs</td>
<td>38 (23%)</td>
<td>27 (18%)</td>
<td>65 (20%)</td>
</tr>
</tbody>
</table>

The overall prevalence of underweight was 54.3% (95% CI 48.9 to 59.7), Normal weight was 39.6% and overweight was 6.1% as shown in Table 2. Prevalence of underweight was higher among girls (63%) than boys (47%) (Figure 2) and this difference was found to be statistically significant (Table 3). The age wise prevalence of underweight is shown in Table 4 and it was found that the prevalence of underweight significantly increased with age.

![Table 2. Nutritional status of children according to BMI Percentile](image)

<table>
<thead>
<tr>
<th>Nutritional status based on BMI</th>
<th>Boys (167)</th>
<th>Girls (153)</th>
<th>Total (320)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight (BMI &lt; 5th percentile)</td>
<td>78 (47%)</td>
<td>96 (63%)</td>
<td>174 (54.3%)</td>
</tr>
<tr>
<td>Normal weight (5th – 85th percentile)</td>
<td>80 (48%)</td>
<td>47 (31%)</td>
<td>127 (39.6%)</td>
</tr>
<tr>
<td>Overweight (&gt; 85th percentile)</td>
<td>9 (5%)</td>
<td>10 (6%)</td>
<td>19 (6.1%)</td>
</tr>
</tbody>
</table>

![Figure 1. Age distribution of the study population](image)

![Figure 2. Prevalence of underweight according to sex](image)
Table 3. Comparison of underweight among the boys and girls

<table>
<thead>
<tr>
<th></th>
<th>Underweight</th>
<th>Chi square value (P Value)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Present</td>
<td>Absent</td>
</tr>
<tr>
<td>BOYS</td>
<td>78 (47%)</td>
<td>89 (53%)</td>
</tr>
<tr>
<td>GIRLS</td>
<td>96 (63%)</td>
<td>57 (37%)</td>
</tr>
</tbody>
</table>

Chi square 8.26 df 1 P < 0.05 Significant

Discussion

Improved child health and survival are considered universal humanitarian goals. The present study assessed the prevalence of underweight among children aged 6 - 10 years using the BMI percentiles (NCHS & CDC). The overall prevalence of underweight was 54.3% and it was higher among girls (63%) than boys (47%).

A study in 2011 by Izharul Hasan, et al in Bangalore reported that the overall prevalence of underweight among primary school children was 58.2% and 52%. Another study by Joseph et al from rural areas of Karnataka in 2002, reported prevalence of underweight as 60.4%. A study by Sutanu Dutta Chowdhury et al of West Bengal in 2007, found that underweight was high among girls than boys, similarly to the present study.

Studies done by Sanjay Mandot et al and Sutanu Dutta Chowdhury et al reported that under nutrition in school children may be attributed to low socio economic status, poor dietary intake and lack of knowledge about nutrition in the family. Gopal et al recommended that there is a need to revise the current norms used in ICDS programs like increasing the amount of food supplementation and Zalilah et al recommended that active growth monitoring of school children should be implemented, as it is an easy and inexpensive method to obtain information on the health and nutrition of the school children.

Table 4. Comparison of Prevalence of Underweight according to age

<table>
<thead>
<tr>
<th>Age-wise prevalence of underweight</th>
<th>Underweight</th>
<th>Total = 320</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Present</td>
<td>Absent</td>
</tr>
<tr>
<td>6 years</td>
<td>21 (31%)</td>
<td>46 (69%)</td>
</tr>
<tr>
<td>7 years</td>
<td>34 (59%)</td>
<td>24 (41%)</td>
</tr>
<tr>
<td>8 years</td>
<td>44 (62%)</td>
<td>27 (38%)</td>
</tr>
<tr>
<td>9 years</td>
<td>38 (64%)</td>
<td>21 (36%)</td>
</tr>
<tr>
<td>10 years</td>
<td>36 (56%)</td>
<td>29 (44%)</td>
</tr>
</tbody>
</table>

Chi square value = 18.76 df 4 P < 0.05 Significant

This study which was conducted in Government Primary schools is a preliminary step to assess the burden of underweight among primary school children who form a very vulnerable section of the population. Improvement in diet, as well as prevention and treatment of infections and infestations along with nutritional supplementation will definitely improve the nutritional status of the children from under-privileged sections of the society.

Further studies which are community based, exploring the socio-demographic factors and nutritional determinants of underweight among children will throw more light on this public health problem.

Conclusion

Under nutrition is an important public health problem in many developing countries including India. This problem has serious long term consequences for the child and adversely influences development of a nation. The problem of underweight is still high among Government Primary School children in Chennai. This high prevalence of underweight is in spite of a robust mid-day meal scheme and regular school health services in the state. To solve this problem a strong multidisciplinary action is to be implemented at school, community, state and national levels. Also, a thorough investigation of the implementation of mid-day meal scheme is necessary to identify loop holes.

End Note

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Conflict of Interests

None declared

References


