PREVALENCE OF UNDERWEIGHT AND WASTING AMONG 3-6 YEAR OLD CHILDREN IN EAST MIDNAPORE, WEST BENGAL, INDIA

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Background: A widely accepted assumption is that childhood experiences set the stage for lifetime experiences. Nutrition is one of the most important factors, which influences human growth. The monitoring of children’s nutritional status is a fundamental tool for the evaluation of their health conditions and a unique opportunity for obtaining objective measures for the health assessment of a population. One of the major health problems in many developing countries including India is widespread prevalence of under nutrition among pre-school children. In India, approximately 60 million children are underweight (ACC/SCN, 2004). The Integrated Child Development Service (ICDS) program, which now covers almost all development blocks in India, is potentially well-poised to address some of the underlying causes of present undernutrition.

Objectives: Keeping this in mind, the present study investigates the prevalence of two important conventional nutritional indicators, i.e., underweight and wasting among the ICDS preschool children of Potashpur-II Block, East Midnapore District, West Bengal, India.

Materials and Methods: This cross-sectional survey was conducted in nine villages of Argool Gram Panchayat at ten ICDS centers. A sample of 225 (110 boys and 115 girls) subjects (aged 3-6 years) was selected randomly from each center. Their weight and height were measured, following the standard method (Lohman et al., 1988). The prevalence of underweight and wasting among the children was evaluated following the conventional method.

Results: The prevalence of underweight (Table 2) among the studied children was 42.7% (sex combined). It was found to be much higher (44.5%) among the boys than among the girls (40.9%). There was no significant sex difference ($\chi^2 = 0.31, df=1; p < 0.05$) in underweight. The overall rate of wasting was 12%. Among boys (ages combined) it was 12.7%, and among the girls (ages combined), it was 11.3%. There was no significant sex difference ($\chi^2 = 0.11, df = 1; p < 0.05$) among the studied children in this regard. The overall situation of undernutrition based on the underweight

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in the area was not far behind the scenario of West Bengal as well as India as a whole. Considering the severity of undernutrition based on WHO classification, the prevalence was found to be high (10-14%).

**Conclusion:** From the present study it was observed that the nutritional status, as measured by underweight and wasting, of the 3-6 year old ICDS children was not satisfactory in spite of the food supplementation programme run by the Government.

**INTRODUCTION**

A widely accepted assumption is that childhood experiences set the stage for lifetime experiences. Childhood is seen as foundational for individual development, both physiologically and psychologically, and is taken to define socio-economic potential. Thus, the capabilities that adults enjoy are conditional on their experiences as children (Sen, 1999). Nutrition is one of the most important factors, which influences human growth. In a growing human being, the multiplication of cells and/or adequate supply of energy, amino acid, water lipids, vitamins and minerals are derived from the food intake. Growth and nutrition are, therefore, closely correlated (Ramachandran, 2007). People require approximately 48 essential nutrients, which are defined as those that people cannot produce naturally from simpler elements, and if eliminated from the diet of an otherwise healthy, well-fed individual, result in growth failure. To define the types and amount of essential nutrients, nutritionists rely on experimentation with non-human animals, on the study of normal humans, on the analysis of naturally occurring malnutrition, and on the response to nutrient supplementation of people suffering from malnutrition.

Adequacy of total quantity of food consumed is a major determinant of growth. Among populations that live in conditions of food shortage, growth delays occur and children are shorter and lighter, compared to populations having access to adequate or over-abundant supply of food. Any major deviation in the nutrient intake either in quality or in quantity can also affect the growth and life span of an individual in a number of ways, particularly in the later years (Gopalan et al., 1989). Essentially, linear growth tracks reference standards until approximately six months of age, at which point, growth faltering is detectable and continuous until two or three years of age. The second year of life is often the growth nadir, although this can vary. If conditions are not to serve there may be a catch up period when children begin to track reference standards again by the age of three or four years (Martorella et al., 1994).

The assessment of nutritional status of population has attracted the attention of not only the nutritionists and other biological scientists, but also the economists and other social scientists with a view to understand the health and socio-economic status of the population (Osmani, 1992). Monitoring children’s nutritional status is a fundamental tool for the evaluation of their health conditions and a unique opportunity for obtaining objective measures for the health assessment of a population (Mason et
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...al., 1984). In the early years of life, evaluation of growth is considered the measurement that best defines health and nutritional condition (Waterlow et al. 1977; Jordon, 1984; World Health Organization, 1986). Even small changes in nutritional and health status, either due to nutritional deficiencies or recurrent infection have clear impact on child growth. Due to its simplicity and low cost, anthropometric evaluation gives a reliable estimation of undernutrition (Marins and Almeida, 2002). Thus, anthropometric examination is an almost mandatory tool in any research on health and nutritional condition in childhood, and the study of nutritional status is of great importance for understanding the social well-being of a population (Marins and Almeida, 2002). According to an analysis of six longitudinal studies on the association between severity of weight for age deficits and mortality rates, 54 percent deaths of children below five years in developing countries were accompanied by underweight (WHO, 1995).

One of the major health problems in many developing countries including India is the widespread prevalence of undernutrition among pre-school children. In India, approximately 60 million children are underweight (ACC/SCN, 2004). In 1998-99, 47 percent of children below three years were either underweight or severely underweight, and a further 26 percent were mildly underweight such that, in total, underweight afflicted almost three-quarters of Indian children. These figures are almost the highest in the world, and nearly double that of sub-Saharan Africa (UNICEF, 2003; WHO, 2000; UNICEF, 2004). The scourge of undernutrition is even more acute among rural children. Recent studies worldwide (Commey et al., 1985; Abolfotouchet al., 1996; Monyekiet al., 1999; Kossamannet al., 2000b and 2000b; Martin-Prevelet al., 2000; Tejas et al., 2001) have investigated the nutritional status of pre-school children among various ethnic groups. However, there are only a limited number of studies from India (George et al., 2000; Rao et al., 2000) which have dealt with undernutrition among rural pre-school children. Moreover studies from West Bengal are few and thus, information on nutritional status of pre-school children of Bengalee ethnicity is scanty.

The global community is designated to use the prevalence of underweight children by 2015 as a key indicator of progress towards the Millennium Development Goal (MDG) of eradicating extreme poverty and hunger. However, it appears that economic growth alone, though impressive, will not reduce malnutrition sufficiently to meet the MDG nutrition target. If this is to be achieved, difficult choices about how to scale up and form existing nutrition programs or introduce new ones have to be made by the Government of India and other agencies involved in nutrition. The Integrated Child Development Service (ICDS) program, which now covers almost all development blocks in India, is potentially well-poised to address some of the underlying causes of present undernutrition. The program adopts a multi-sectoral approach to children’s well-being, incorporating health, education and nutrition interventions, and is implemented through a network of ‘anganwari’ centres at the community level. The
anganwari workers and their helpers provide eight key services to children below 6 years and their mothers, including supplementary feeding, immunization, health check-ups and referrals, health and nutrition education to women, micronutrient supplementation, health referrals and pre-school education for the 3-6-year olds (Gragnolati et al., 2006).

Keeping these in mind, the present study investigates the prevalence of two important conventional nutritional indicators, i.e., underweight and wasting among the ICDS pre-school children of Patashpur-II Block, East Midnapore District, West Bengal, India.

MATERIALS AND METHODS

Area of Study
The area of study included different ICDS Centres of Argoal Gram Panchayat at Patashpur-II Block in East Midnapore District, West Bengal, India. This is a rural area and the villages are remote, 110km away from Kolkata. The majority of the inhabitants are Hindus (84.4%). The anthropometric data presented in the current study was collected in March 2008.

Nutritional Supplement
The ICDS authorities are allocated Rs.0.80 (80 paise) per head per day by the Government of India for providing nutritional supplements to children. This financial assistance ensures that each child is given 40gm of rice and 17gm lentil per day, and an egg per week. Since no improvement in the rate of child malnutrition has been observed during the last ten years, the Government of India is going to restructure its program for nutritional intervention for children up to age of 6 years. The Prime Minister of India had, in a letter to the Women and Child Development (WCD) Ministry, expressed concern over the poor implementation of the ICDS program, pointing out that it had failed to curb child malnutrition. Therefore, the WCD Ministry has recommended that the amount spent on supplementary nutrition for children between 6 months to 72 months should be increased from Rs.2 to Rs.4, while severely malnourished children in the same age group should be allotted Rs.6 per child per day instead of the present allotment of Rs. 2.70 (Times of India, 08.08.2008).

The Participants
This cross-sectional survey was conducted in nine villages of Argoal Gram Panchayat at ten ICDS centers. The subjects (aged 3-6 years) were selected randomly from each centre. The total sample was 226. However, one boy was excluded because he was just below 3 years. Thus, the final sample size was 225 pre-school children (110 boys and
115 girls). Although the sample consisted of Hindus and Muslims, it was considered as a homogeneous group because biologically both were of same origin (Hindu & Muslim) % the Bengalee ethnic group. Most of the families of the participants depended on agriculture, either in the form of cultivation or as agricultural labourers, for their livelihood.

Personal Information
For each subject, a questionnaire containing questions regarding age, sex, parity, ethnicity, religion and fathers’ and mothers’ occupation was completed with help of ICDS workers and parents.

Anthropometric Measurements
Anthropometric measurements (weight in kg and height in cm) were taken by one of the authors (AA) following standard methods (Lohman et al., 1998). The nutritional status of the participants was evaluated following the internationally accepted method: The National Centre for Health Statistics (NCSH) % two Z-score values as reference cut-off points (Hamill et al., 1979). Two Z-scores were calculated; WAZ = Weight-for-age Z-score, WHZ = Weight-for-height Z-score.

The following scheme was utilized to define undernutrition:
Underweight: WAZ < -2; Wasting: WHZ < -2

Statistical analyses were done with the help of computer package for social sciences (SPSS, version 7.5). The WHO classification (Table 1) was followed for assessing the severity of malnutrition by percentage prevalence ranges of the above-mentioned two indicators among children.

<table>
<thead>
<tr>
<th>Undernutrition</th>
<th>Low (%)</th>
<th>Medium (%)</th>
<th>High (%)</th>
<th>Very High (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>&lt; 10</td>
<td>10-19</td>
<td>20-30</td>
<td>≥ 30</td>
</tr>
<tr>
<td>Wasting</td>
<td>&lt; 5</td>
<td>5-9</td>
<td>10-14</td>
<td>≥ 15</td>
</tr>
</tbody>
</table>

RESULTS
Table 2 represents the mean and SD of weight-for-age (WAZ) Z-score and weight-for-height (WHZ) Z-score of the studied ICDS pre-school children. The overall (sex combined) mean WAZ score was -1.79 (0.9) % it was -1.80 among the boys and -1.79 among the girls. There was no specific increasing or decreasing trend of the mean WAZ in relation to the age of the children. The mean (overall) weight-for-height (WHZ) score was -1.2; it was -1.19 in case of the boys and -1.21 in case of the girls. Here also, no specific trend was observed with increasing age.
Table 2
Mean (S.D.) WAZ and WHZ Scores

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>WAZ Boys</th>
<th>WAZ Girls</th>
<th>WAZ Overall</th>
<th>WHZ Boys</th>
<th>WHZ Girls</th>
<th>WHZ Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>-1.78</td>
<td>-1.83</td>
<td>-1.8</td>
<td>-1.14</td>
<td>-1.12</td>
<td>-1.13</td>
</tr>
<tr>
<td></td>
<td>(0.86)</td>
<td>(1.05)</td>
<td>(1.0)</td>
<td>(0.90)</td>
<td>(0.81)</td>
<td>(0.8)</td>
</tr>
<tr>
<td>4</td>
<td>-1.85</td>
<td>-1.67</td>
<td>-1.76</td>
<td>-1.13</td>
<td>-1.11</td>
<td>-1.12</td>
</tr>
<tr>
<td></td>
<td>(0.87)</td>
<td>(0.90)</td>
<td>(0.9)</td>
<td>(0.90)</td>
<td>(0.70)</td>
<td>(0.8)</td>
</tr>
<tr>
<td>5</td>
<td>-1.68</td>
<td>-1.94</td>
<td>-1.81</td>
<td>-1.19</td>
<td>-1.29</td>
<td>-1.24</td>
</tr>
<tr>
<td></td>
<td>(0.65)</td>
<td>(0.90)</td>
<td>(1.8)</td>
<td>(0.50)</td>
<td>(0.83)</td>
<td>(0.65)</td>
</tr>
<tr>
<td>6</td>
<td>-1.91</td>
<td>-1.69</td>
<td>-1.8</td>
<td>-1.31</td>
<td>-1.31</td>
<td>-1.31</td>
</tr>
<tr>
<td></td>
<td>(1.02)</td>
<td>(0.96)</td>
<td>(1.0)</td>
<td>(0.90)</td>
<td>(0.64)</td>
<td>(0.77)</td>
</tr>
<tr>
<td>Total</td>
<td>-1.80</td>
<td>-1.78</td>
<td>-1.79</td>
<td>-1.19</td>
<td>-1.21</td>
<td>-1.2</td>
</tr>
<tr>
<td></td>
<td>(0.85)</td>
<td>(0.95)</td>
<td>(0.9)</td>
<td>(0.80)</td>
<td>(0.74)</td>
<td>(0.8)</td>
</tr>
</tbody>
</table>

Note: Standard Deviations are presented within the parentheses.

The prevalence of underweight (Table 3) among the studied children was 42.7% (boys and girls combined). It was found to be much higher among the boys (44.5%) than among the girls (40.9%). The highest rate (52.4%) of undernutrition was observed among boys aged 4 years but in case of the girls, the highest rate (50.9%) was at 3 years. There was no specific increasing or decreasing trend in the prevalence of underweight among the children of both the sexes. Also, there was no significant sex difference ($\chi^2 = 0.31$, df=1; p < 0.05).

Table 4 presents the prevalence of wasting among the pre-school children in Patashpur-II. The overall rate of wasting was 12%. Among boys (ages combined) it was 12.7% and among girls (ages combined) it was 11.3%. Age specific (boys and girls combined) prevalence of wasting was comparatively higher among children of the two extreme ages, i.e., 3 years (14%) and 6 years (15%). Such trend was same among the boys but not among the girls. There was no significant sex difference ($\chi^2 = 0.11$, df = 1; p < 0.05) among the studied children.

Table 3
Prevalence of Underweight

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Underweight (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boys</td>
</tr>
<tr>
<td>3</td>
<td>13 (41.9)</td>
</tr>
<tr>
<td>4</td>
<td>22 (52.4)</td>
</tr>
<tr>
<td>5</td>
<td>8 (30.8)</td>
</tr>
<tr>
<td>6</td>
<td>6 (54.5)</td>
</tr>
<tr>
<td>Total</td>
<td>49 (44.5)</td>
</tr>
</tbody>
</table>

Note: Percentages are given in the parentheses.
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### Table 4

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Wasting (%)</th>
<th></th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boys</td>
<td>Girls</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>5 (16.1)</td>
<td>3 (11.5)</td>
<td>8 (14.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>5 (11.9)</td>
<td>3 (7.1)</td>
<td>8 (9.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>2 (7.7)</td>
<td>6 (15.8)</td>
<td>8 (12.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>2 (18.2)</td>
<td>1 (11.1)</td>
<td>3 (15.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>14 (12.7)</td>
<td>13 (11.3)</td>
<td>27 (12.0)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note: Percentages are given in the parentheses.*

### DISCUSSIONS

The health of the people is the wealth of a country, and nutrition is one of the most important pre-requisite for good health. The nutritional status of the people is increasingly being recognized world over as an important indicator of development of a country. The future strength of a nation will be determined by how healthy and educated its people are. Prompting optimum development of the child is the responsibility of every individual (Lathia, 1997; cited in Shah and Patel, 2009). Children differ from adults because their nutritional intake must provide not only for the replacement of tissues but also for growth (Kaushik, 1997; cited in Shah and Patel, 2009).

The mean WAZ of both the sexes (boys: -1.80; girls: -1.79) indicated comparatively better nutritional situation than among the boys (-2.3) and the girls (-2.3) of ICDS pre-school children in Arambag, West Bengal, India (Mandal et al., 2008). In case of wasting too the situation was the same, i.e., the mean WHZ scores among the boys (-1.19) and girls (-1.21) were lesser than the above-mentioned same study. For boys it was -2.0 and for girls it was -1.9.

The overall prevalence (42.7%) of underweight was higher in the study area than the among the pre-school children of Chapra (31%), Nadia District, West Bengal (Bose et al., 2007), and children (Chatterjee and Saha, 2008) of the same age from Kolkata (36.4%); but was much lower than among the pre-school children (63.3%) of the ICDS centresin Bali Gram Panchayat, Arambag, Hooghly, (Mandalet al., 2008) and the children (63.7%) living in the slums of Midnapore town, West Bengal (Bisai et al., 2009). The prevalence of underweight (42.7%) among the children of the present study was more or less closer when compared to the rate of underweight (45.5%) from West Bengal as a whole (Bharatie et al., 2008). Bangladesh (UNICEF, 2007) showed a slightly higher rate (48%) while a slightly lower prevalence rate (38%) was observed in Pakistan (UNICEF, 2007). Although, the rate was very high based on WHO classification of severe undernutrition (WHO, 1995), the overall situation of undernutrition based on the prevalent underweight in the area was not far behind that in West Bengal as well as in India as a whole.
The rate of wasting in the present study was found to be 12%, which was higher than that of the ICDS children (9.4%) in Chapra (Bose et al., 2007). Prevalence of wasting, that is, low weight for height in the present study, was more or less the same compared to that of the neighbouring countries like Nepal, Pakistan and Bangladesh (UNICEF, 2007) % all have a rate of 13%. The situation of the pre-school children in West Bengal as a whole was similar to those reported from the neighbouring countries (13.5%; Bharati et al., 2008). A very high rate (50%) of wasting was observed among the ICDS children from Arambag (Mandal et al., 2008) and slum children (32.8%) from Madinapore town (Bisai et al., 2008). Based on WHO classification, the prevalence of undernutrition was considered high (10-14%).

From the present study it can be concluded that the nutritional status as measured by underweight and wasting among the 3-6 years old ICDS children was not satisfactory in spite of the food supplementation programme that is being run by the Government through the *anganwadi* centres.

**Acknowledgements**

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**References**


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