Assessment of Nutritional Status of Munda Children in Purulia District of West Bengal, India

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Abstract

The study on growth, development and nutritional status of school aged children in a community can provide good information about the health status of that community.

Objective: The present study was undertaken to assess the nutritional status of 5-9 years aged Munda children of Purulia district of West Bengal, India.

Methodology: Height and weight of 259 Munda children aged 5-9 years were measured from randomly selected schools. Socio-economic status was measured using updated Kuppu swami scale. Nutritional status was assessed from height-for-age and weight-for-age growth curves using WHO reference. Prevalence of under nutrition was determined by Z-scores of height-for-age and weight-for-age using the WHO reference data. Hemoglobin concentration and nutritional deficiency symptoms of each child were also examined.

Results: Growth curves of height-for-age and weight-for-age of Munda children remained around 5th percentile and between 1st and 3rd percentile values of WHO reference, respectively. The prevalence of stunting and underweight (Z-score <-2) was similar in both boys (19.57% stunting and 66.35% underweight) and girls (24.1% stunting and 63.4% underweight). About 6.6% boys and 17.86% girls were anemic.

Conclusion: Present study reveals that a high prevalence of under nutrition, a mild anemia and a considerable percentage of nutritional deficiency symptoms exists in Munda children.

Keywords: Munda; Nutritional status; Stunting; Underweight; Anemia

Introduction

Munda is one of the largest primitive tribes of India, live in remote places of eastern part such as Jharkhand, Odisha and West Bengal of India. In West Bengal, they are considered as third largest tribe and spread over in vast areas of Purba and Paschim Medinipur, Bankura and Purulia [1]. This tribe is characterized by poverty, illiteracy, and nutritional problems. Many developmental works have been undertaken by different government agencies to improve their nutritional as well as socio-economic status. But little is known about the results of these development programs on the health status of this community. The nutritional status generally indicates the social and economic development of the community. Nutritional anthropometry is one of the simple tools for measuring the nutritional status. The nutritional status of Munda children was also assessed in Mayurbhanj of Odisha by using anthropometric measurements and reported that more than 30% of Munda children suffered from under nutrition [2]. Earlier, Bisai, et al. [3] conducted a pilot study on Munda preschool children (aged 1-5 years) and reported that about 61.5%, 38.5% and 55.4% Munda children were found to be stunted, underweight and wasted, respectively. These reports indicated that the under nutrition might prevail in Munda community.

It has already been well-established that researchers have considered school aged children group for the assessment of the nutritional status of the community because school aged children are the vulnerable section of any community [4]. Furthermore, the study on growth, development and nutritional status of school aged children in a community can provide good information about the health status of that community. The nutritional status of Munda children has not been assessed sufficiently and, especially in Purulia district, it has not been reported in recent time. So, the present study was undertaken to assess the nutritional status of 5-9 years aged Munda children of Purulia district of West Bengal, India.

Methods

Study Population

The present study was carried out in rural primary schools, located at remote areas of Barabazar Block Circle in Purulia District, West Bengal. A total of 259 (127 boys and 132 girls) Munda children aged 5-9 years were examined in this cross-sectional study. Subjects were recruited by announcement and data were collected after obtaining informed consent from children, parents and/or school authorities. Children with disability, any systemic disease or with major surgical operations that could influence their measurements were excluded from participating in the study. The protocol and procedures employed were in accordance with the human ethical guidelines of Helsinki Declaration [5].

Socio-Economic Status

Socio-economic status (SES) of Munda children was measured using the updated Kuppusswami scale [6]. The scale is based on monthly family income, parental education and parental occupation. A structured questionnaire was used to collect information on socioeconomic characteristics of subjects' families from their parents and/or school authorities.

Anthropometrics

The anthropometric measurements like height and weight of each subject of each age group were measured using standard technique [7].

Measurement of Nutritional Status

The chronic under nutrition such as stunting and the acute under nutrition such as underweight were assessed by Z-score using the age-specific reference values of height-for-age weight-for-age of World Health Organization [8]. The grade of under nutrition was assessed according to the classification of World Health Organization [9]. Children with a Z-score between -1 and -1.99 of any indices were considered to be mild undernourished, children with a Z-score between -2 and -2.99 of any indices were considered to be moderate undernourished and children with a Z-score below -3 were considered to be severely undernourished.

Examination of Nutritional Deficiency Symptoms

The nutritional deficiency symptoms of Munda children were examined by a trained physician based on certain physical signs [10,11].

Measurement of Hemoglobin (Hb) Concentration

Hemoglobin concentration of each child was determined by Cyanmethaemoglobin method [12].

Statistical Analyses

Mean and standard error of mean values of anthropometric parameters for each age and sex groups were computed. Student's t-test was performed to compare the mean values between the sexes. Pearson's correlation coefficient was used to evaluate the relationship between anthropometric variables and socioeconomic factors. Statistical analyses were performed using the statistical package for social science (SPSS software, Version 20.0).

Results

Socioeconomic Status

About 79.93% (70.53% boys and 80.31% girls) and 16.61% (15.75% boys and 17.43% girls) Munda children were found in Upper lower (score 5-10) and lower (score <5) socioeconomic category respectively (Table 1).

Socioeconomic Class	Boys (%)	Girls (%)	Total (%)
Upper	-	-	-
Upper middle	-	-	-
Lower middle	3 (2.37)	-	3 (1.16)
Upper lower	101 (79.53)	106 (80.31)	207 (79.93)
Lower	23 (15.75)	26 (17.43)	49 (16.61)
Total	127 (100)	132 (100)	259 (100)

Table 1: Distribution of Munda Children in different socioeconomic classes according to updated Kuppusswami scale [6].

Height

The mean heights of Munda boys (Figure 1) and girls (Figure 2) were plotted with the reference height-for-age values of WHO and it has been found that the mean height for boys remained between 5th and 15th percentile values of reference, whereas mean height for girls remained around 5th percentile value of reference. There was no significant difference in height between Munda boys and girls (Figure 3). However, Munda boys and girls are found to be taller than Bharia and Sugalis children but shorter than Santal children (only for boys).
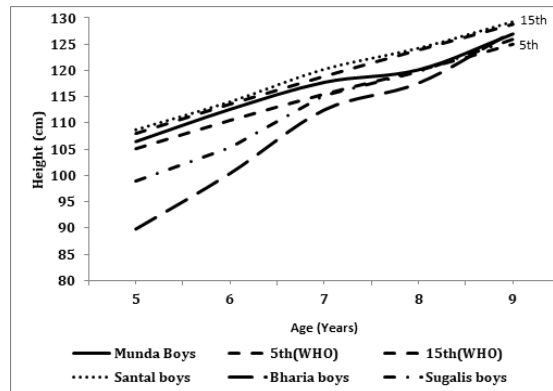

Figure 1: Comparison of mean height of Munda boys with percentile values of WHO standard and mean values of other tribal children.
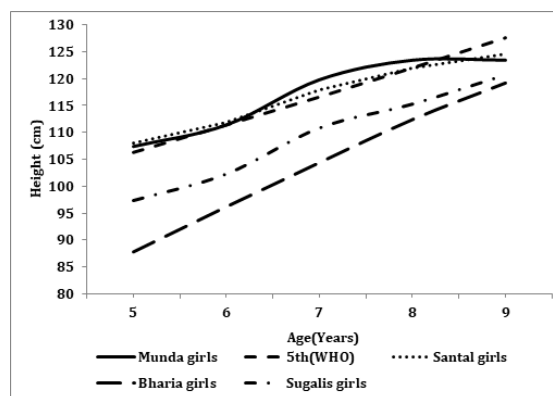

Figure 2: Comparison of mean height of Munda girls with percentile values of WHO standard and mean values of other tribal children.
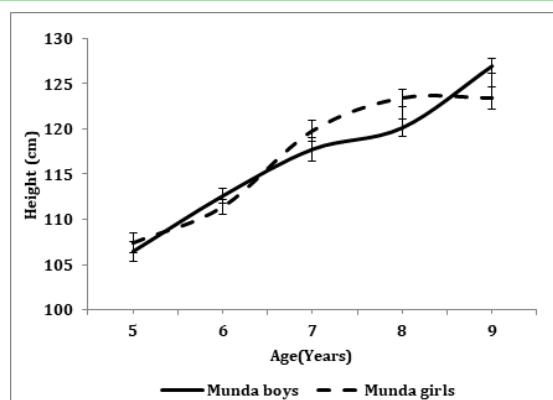

Figure 3: Mean height (cm) of Munda boys and girls according to their age groups.

Weight

It has been found that mean weight of boys (Figure 4) and girls (Figure 5), at earlier age groups (5-6 years), remained around 3rd percentile value but, with advancement of ages (8-9 years), it remained around 1st percentile values of WHO reference There was no significant difference (except 9 years) in weight between Munda boys and girls (Figure 6). However, mean weight of Munda boys and girls are found to be heavier than Sugalis children (except 9 years for both boys and girls) but lower than Santal and Bharia children (except 5 years for boys and 5-6 years for girls).
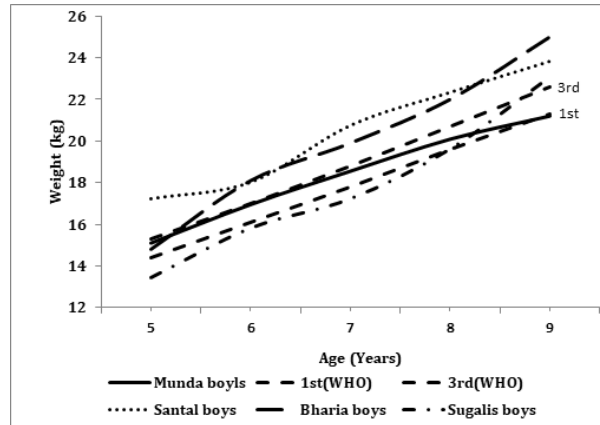

Figure 4: Comparison of mean weight of Munda boys with percentile values of WHO standard and mean values of other tribal children.
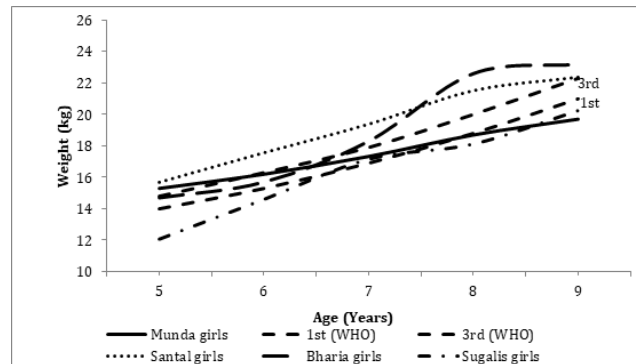

Figure 5: Comparison of mean weight of Munda girls with percentile values of WHO standard and mean values of other tribal children.
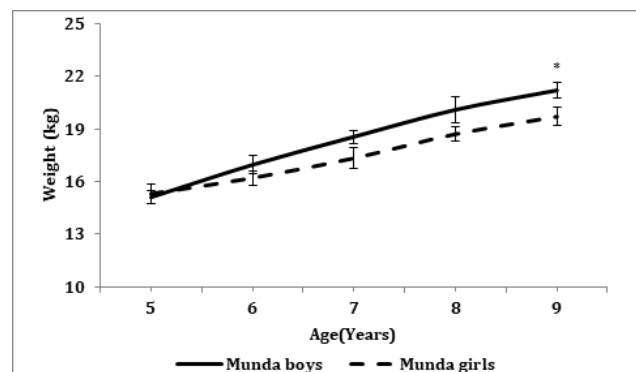

Figure 6: Mean weight (kg) of Munda boys and girls according to their age groups.

Nutritional Status

According to the Z-score values of height-for-age and weight-for-age, Munda children have been distributed in table 2. About 83.8% boys and 82.3% girls were found to be stunted whereas 90.7% boys and 93.75% girls were found to be underweight. Prevalence of severe stunting and severe underweight was higher in girls (7.14% stunted and 27.7% underweight) than that of boys (1.87% stunted and 14.95% underweight).

Nutritional categories (Z-Score)	Boys		Girls	
	Height For Age (%)	Weight For Age (%)	Height For Age (%)	Weight For Age (%)
+1 to 0.99	28(26.2)	10(9.3)	31(27.7)	7(6.25)
-1 to -1.99	58(54.2)	26(24.3)	54(48.2)	34(30.35)
-2 to -2.99	19(17.7)	55(51.40)	19(16.96)	40(35.7)
<-3	2(1.87)	16(14.95)	8(7.14)	31(27.7)
TOTAL	107(100)	107(100)	112(100)	112(100)

Table 2: Distribution of Munda children in different nutritional categories according to the Z-score values of height-for-age and weight-for-age.

Correlation Study

Both of the anthropometric parameters such as height-for-age z-score (HAZ) and weight-for-age z-score (WAZ) and hemoglobin concentration are significantly ($p < 0.05$) correlated to the socioeconomic factors (Table 3).

Parameters	Parental Education	Family income	Parental Occupation
Boys			
HAZ	0.77***	0.86***	0.67***
WAZ	0.69***	0.82***	0.71***
Hb conc	049**	041**	0.53**
Girls			
HAZ	0.81***	0.88***	0.61***
WAZ	0.72***	0.85***	0.61***
Hb conc	0.32*	0.47**	0.54**

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$

MUAC = Mid-upper arm circumference, UTC = Upper thigh circumference, MCC = Mid-calf circumference

Table 3: Correlation study between anthropometric parameters and socioeconomic factors in Santal boys and girls.

Hemoglobin Concentration

A small percentage of Munda children were observed in mild category of anemia at all age groups (except 6 and 7 years for boys). In total, about 5.6% Munda boys and 17.86% Munda girls have been found to be mild anemic (Figure 7).
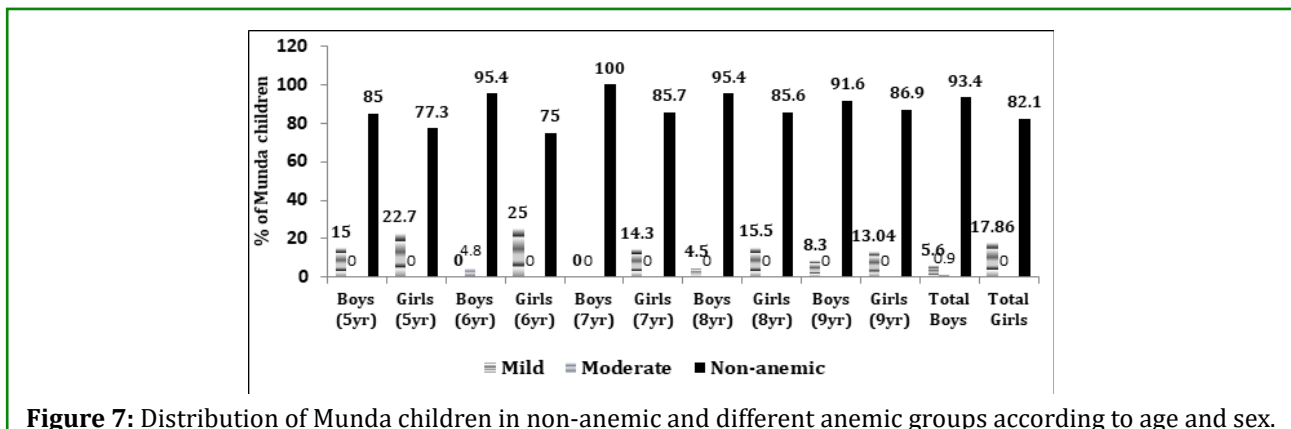

Figure 7: Distribution of Munda children in non-anemic and different anemic groups according to age and sex.

Clinical Status

A high prevalence of nutritional disorder has been found among the Munda children (Figure 8). The higher percentage of nutritional deficiency symptoms like angular stomatitis (13.6% boys and 14.3% girls), pale tongue (30.2% boys and 36.6% girls), chalky and pitted teeth (30.8% boys and 32.1% girls), dry & rough skin (31.4% boys and 30.3% girls), and dental caries marked (65.4% boys and 65.1% girls) are found in both boys and girls.

Figure 8: Distribution of Munda children by different nutrient deficiency symptoms.
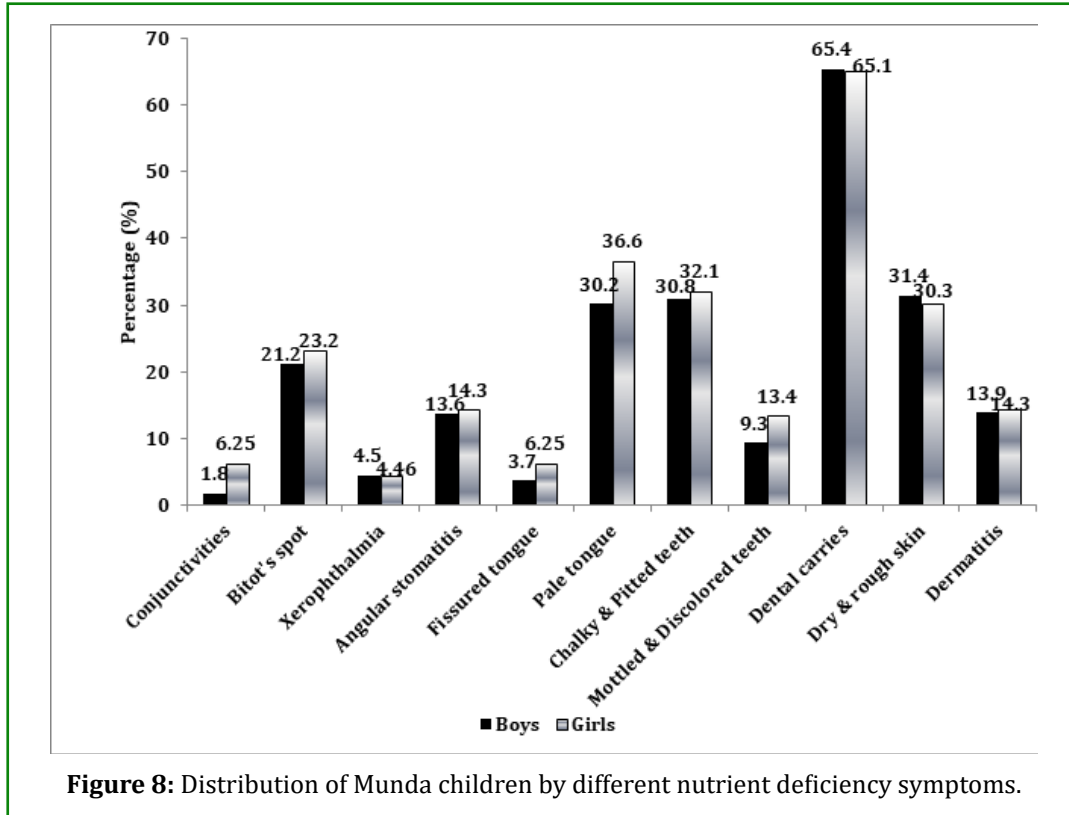
Discussion

The most commonly used anthropometric indices for assessing child growth are stunting and underweight [13]. Stunting and underweight are the results of chronic and acute under nutrition, respectively. There is a great variability in the prevalence of stunting and underweight in the children of different countries like Mexico [14], Tanzania [15], Malaysia [16], and South Ethiopia [17]. Even reports from different regions of India indicate the variability in stunting and underweight among children [18-20]. The variability of under nutrition in different regions may be due to socio-economic conditions, environmental factors, and ethnic differences [21]. The present study suggested that a higher percent of Munda children aged 5-9 years of surveyed region of Purulia district suffered from under nutrition. The age related growth curves analyses of height and weight indicated that under nutrition is prevailed in these children as the mean values of height (around 5th percentile) and weight (around 3rd percentile) of Munda children at different ages were placed at the lower level of the WHO standard.

Many authors considered that the location of age related growth curves of anthropometric parameters below 5th percentile of the reference as indicator of under nutrition in children [22]. In a different study, Reddy & Rao [23] assessed the nutritional status in Sugali children from the growth curve analyses of height and weight, and reported that Sugali children were suffering from under nutrition as the growth curves of height and weight of Sugali children were located below the 5th percentile values of NCHS reference.

The poor growth pattern of Munda children compared to WHO [8] standard data of height and weight may be supported by assessment of nutritional status according to z-score analyses. It indicates that the magnitude of under nutrition in Munda children seemed to be very high. A high prevalence of under nutrition has been reported in some tribal children of different states such as Gond tribe (68% children) of Madhya Pradesh [24], Saharia tribe (65% children) of Rajasthan [25], Mandal tribe (61% children) of Andhra Pradesh [26]. In West Bengal, the children of Oraon tribe (6-12 years of age) are getting less energy from

their food even after their enrolment in the mid-day meal programme at the local primary school [27]. As a result, 54% of the children are suffering from severe malnutrition. Similarly, more than 60% Santal children were found to be undernourished in Purulia district of West Bengal [28]. In the present study, the under nutrition among the Munda children (more than 70% children are stunted and more than 90% children are underweight) of Puruliya district is severe like other tribal children. It has been found that magnitude of under nutrition is not similar in height and weight for Munda children.

Frisancho [29] opined that the nutritional status of a subject measured by different anthropometric methods may be different and the nutritional status of a subject cannot be assessed by any single parameter. A subject identified as undernourished by one parameter may not be identified as undernourished by other parameters. However, when the results of under nutrition of the present study are compared with the study of Joshi et al. [2] on Munda community at Mayurbhanj district of Bihar, it has been found that the prevalence of under nutrition in the present study is much higher than the study of Bihar (32.56% Munda children are underweight). According to the Kuppuswami's scale [6], all children of the present study are found to be in lower and upper-lower socioeconomic group. Children of low SES have poor access to their resources and they lack the experiences of proper parental care, economic support, education, and social connections. Thus these children become prone to the risk for developmental problems. A positive association between nutritional indices (such as HAZ and WAZ) and socioeconomic factors in the present study describes that the poor nutritional status of Munda children is closely associated with their lower socioeconomic status. In developing countries, under nutrition is related to poverty, a marker of socioeconomic status [30]. There was a remarkable difference between boys and girls in percent of severe stunting (7.14% girl's vs 1.87% boys) and underweight (27.7% girls vs 14.95% boys). Therefore, the study showed that Munda girls are nutritionally affected more than boys. It supports the fact that girls are more vulnerable in this community like many other communities of India [31]. However, the overall percentage of under nutrition (HAZ and WAZ < -1) was found to be almost similar in both sexes (stunting: 73.8% boys vs 72.3% girls, underweight: 90.7% boys vs 93.75% girls).

There are several hematological and biochemical parameters which are used for determining the iron status as well as prevalence of iron-deficiency anemia for children. Hemoglobin concentration (Hb%) is widely measured as early indicator for describing different types of nutritional anemia [7,32]. In the present study, a mild category of anemia (5.6% for boys and 18.6% for girls) has been observed in Munda children, which is found to be lower than Santal children

(11%for boys and 22% for girls) [28], Kamar children (25% for boys and 33% for girls) [33] and Saharia children (13% for boys and 19% for girls) [25]. The prevalence of iron-deficiency anemia in the present study was not severe like that of other studies. In the present study, it has been observed that Hb concentration was significantly associated with socioeconomic factors suggesting that socioeconomic status is likely to be an important determinant of hemoglobin concentration and hence iron deficiency. Similar observation has been reported by other researchers in children of Morocco [34,35].

As the average monthly family income of this community is found to be below the poverty level, they do not have enough purchase capacity not only to procure expensive food items like protein rich foods (e.g. meat and fish) but also energy providing food items. Due to the prevalence of illiteracy and lack of proper awareness about the nutritive value of foods, impairment of nutrient consumption was found in this population and insufficiency of iron consumption is visible in this population. In addition, as the soils of the surveyed areas are relatively infertile, local productions of green leafy and other vegetables is low which may be another reason for low hemoglobin level.

The present study also revealed that the prevalence of nutritional deficiency symptoms in Munda children was associated with their under nutrition. The surveyed children are nutritionally neglected as it is evident from the deficiency of vitamin A, B-complex, C and D related disorders. The percentage of some symptoms like conjunctivitis, bitot's spot, dermatitis and angular stomatitis for Munda children was found to be higher than that of street children of Telengana state [36] and adolescents of Gujrat [37].

Acknowledgments

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