

Prevalence of Undernutrition among Santal Tribal Preschool Children of Paschim Medinipur District, West Bengal, India

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Abstract

Introduction

To assess the overall nutritional status of Santal tribal preschool children of Paschim Medinipur district, West Bengal, India.

Methods and Materials

A cross sectional study was conducted from February 2012 to September, 2012 of a Santal community in the rural area of Paschim Medinipur district, West Bengal. The study children were selected multi stage cluster sampling method. The level of underweight, stunting and wasting was assessed using standard deviation (SD) classification as against National Center for Health Statistics (NCHS) reference standards.

Results

This study comprises of 299 (boys=153, girls=146) Santal preschool children age between 0-5 years to assess the prevalence of underweight, stunting and wasting. The overall prevalence of underweight was 65.2%, out of, 54.2% and 11.0% children are found to be moderate and severe underweight. It is found that the severe underweight was significantly higher among girls than boys (15.1% vs 7.2%, $p<0.05$). The girls had 2.3 fold greater risk of being severely underweight. Overall the prevalence of stunting was 54.2%. Among them, 31.4% and 22.7% children were experiencing moderate and severe stunting. Moreover, the overall prevalence of wasting was 20.1%, out of, 17.4% and 2.7% children were found to be moderate and severe wasting.

Conclusion

According to World Health Organization (WHO) classification for assessing severity of malnutrition, this study found very high rates of malnutrition in the form of underweight, stunting and wasting, indicating a critical situation. Therefore, respective authority should be undertaken an effective public health strategy to combat child malnutrition among socio-economically vulnerable communities in India and adjoining countries.

Keywords: Child, Santal, Stunting, Tribe, Underweight, Wasting.

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Introduction

Malnutrition is a disorder that results from the interaction between diet and infection. It commonly affects all age groups in a community, but infants and children are the most susceptible because of their high nutritional needs for physical growth and development (1). This situation is more prominent where people who experiencing rapid food insecurity and poverty especially in developing countries. Like India, where world's one third of the malnourished children reside. The majority of the malnourished children in India were belonging to lower socio-economic stratum. The tribal communities in India are considered to be socially and economically vulnerable community (2-7). Generally they are found in rural and inaccessible areas of the country.

Widely, three anthropometric indicators are used to assess nutritional status during childhood. These are underweight (low weight-for-age), stunting (low height-for-age), and wasting (low weight-for-height). Physical growth is generally used to assess adequate health, nutrition and development of an individual child, as well as to estimate overall health and nutritional status of a population (8).

The tribes of West Bengal comprise more than 5 % of the total population of the state. Santals are the largest tribal group of West Bengal has a total population of 2,280,540 (9). They constitute 51.8% of total tribal populations of West Bengal. Santals are one such tribe, whose mother tongue is Santali, belong to an Austro-Asiatic language group. They have their own script named 'Olchiki'. They are inhabitants of five eastern and northeastern provinces of India, namely Bihar, Jharkhand, Orissa, Tripura, and West Bengal. Although they reside in several districts of West Bengal, the majority of Santals is found in Paschim Medinipur

District. Among them, more than 90% reside in rural areas. Their traditional primary occupation has been settled cultivation. They also practiced hunting, gathering, and fishing. Now, however, their primary occupation is daily agricultural and manual labourer. Many of them are bilingual and can speak Bengali or Hindi (10).

The National Family Health Survey (NFHS-3) of India has reported that about 60% of tribal children under five years are underweight and 59% are stunted and 21% children are wasted (11,12). Many studies across the West Bengal have been conducted to know the nutritional status of under five children and also among various tribal communities (2-6, 13-15). However, there are still many communities left untouched, each of them has their own unique social cultural background. Out of the 38 scheduled tribes of West Bengal, Santal is a tribal community spread over almost all districts, living in and around forest fringe. There is no published literature available on nutritional status of preschool children belonging to a Santal community of Paschim Medinipur district. Therefore, the present study was carried out to assess the overall nutritional status of Santal preschool children in Paschim Medinipur district of West Bengal, India.

Methods and Materials

This cross sectional study was conducted from February 2012 to September, 2012 in the Santal tribal community of the rural area of Paschim Medinipur district, West Bengal, India (Figure.1). The study children were selected randomly from 20 clusters. For the present study we include 15 children from each cluster. The study population comprised of Santal tribal preschool children aged 0 to 5 years. All together

300 children were measured to assess the prevalence of underweight, stunting and wasting. Data on age, sex, height and weight were recorded on a pre-tested proforma by door to door visit following interview and examination. Child age was recorded as reported by parents and verified further with other senior members of the household. Parents were informed about the objectives of the study and their consent was obtained. The study protocol was approved by the institutional ethical committee prior to commencement of the study.

Data on anthropometric measurements, such as height and weight of each subject, was measured following standard procedures (16), using digital weighing scale and anthropometric rod to the nearest 0.1 kg and 0.1 cm, respectively. The level of undernutrition was assessed using standard deviation (SD) classification based on weight-for-age (underweight) height-for-age (stunting) and weight-for-height (wasting). Children were considered as underweight, stunting and wasting z-score classification of weight-for-age, height-for-age and weight-for-height below -2.0 SD of the National Center for Health Statistics (NCHS) reference standards (17). Severe and moderate undernutrition was defined as z-scores < -3.0 and -3.0 to <-2.0, respectively.

We used the WHO criteria for assessing severity of malnutrition by percentage prevalence ranges of these three indicators among children (8). The minimum estimated sample size was calculated as 296, using the standard formula ($n = z^2 pq / d^2$) found elsewhere. The calculation $[(1.96^2 \times 26.1 \times 73.9) / (5^2)]$ was based on 26.1 % prevalence (p) of stunting among Lodha tribal children in Paschim Medinipur (2). Parametric statistics, unpaired student's t-test and one-way ANOVA were employed to assess age and sex differences in height and weight. Proportion test was performed to test for

differences in prevalence of underweight, stunting and wasting between sexes. Odds ratio (OR) and 95% confidence interval (CI) were also calculated following standard methods. The z-score was calculated using ENA for SMART software and all statistical analyses were performed using the MedCalc statistical software. A p-value <0.05 is considered as statistically significant.

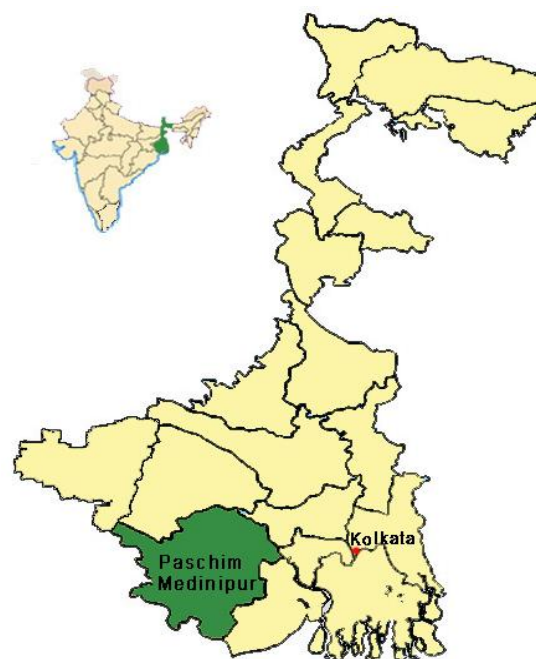


Fig.1: Study area

Results

A total of 299 (boys=153, girls=146) Santal children age between 0 to 5 years were included in the present analyses to evaluate the prevalence of underweight, stunting and wasting. One child excluded from the analysis due to missing value. Age and sex specific means of weight and height were analysed and presented in (Table.1). It was observed that the mean weight and height significantly increased with increasing age in both sexes. The mean weight and height was higher in boys than girls at all ages. To assess the undernutrition, z-score was calculated against the standard. The cumulative

distribution of weight-for-age (WAZ) height-for-age (HAZ) and weight-for-height (WHZ) z-scores are presented in (figures. 2-4). It is observed that more than 90% children's weight and height below the median value of NCHS standard. The overall mean z-score for WAZ, HAZ and

WHZ were -2.20 ± 0.82 , -2.10 ± 1.10 and -1.14 ± 1.00 , respectively. Imply that an average weight and height growth in respect of age of Santal children is moderately lower than the reference population.

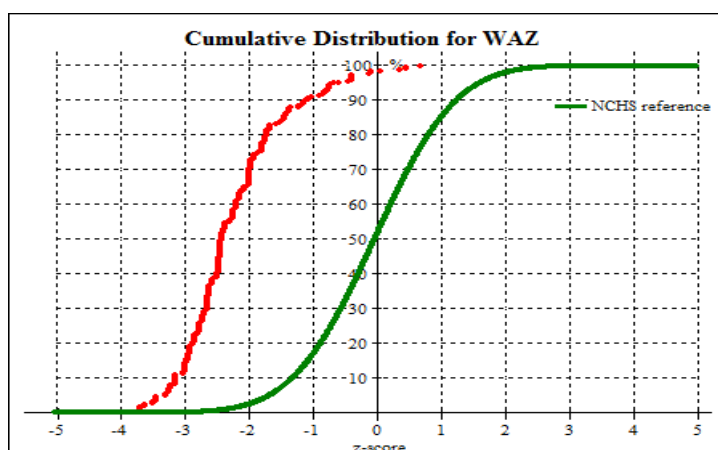


Fig.2: Distribution of weight-for-age z-scores in comparison with standard

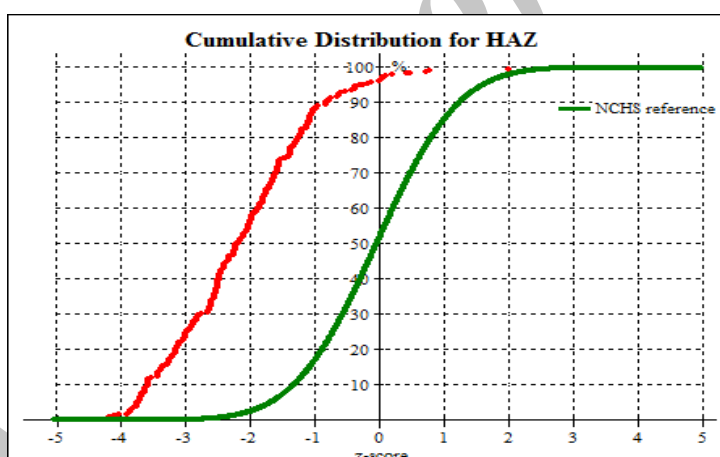


Fig.3: Distribution of height-for-age z-scores in comparison with standard

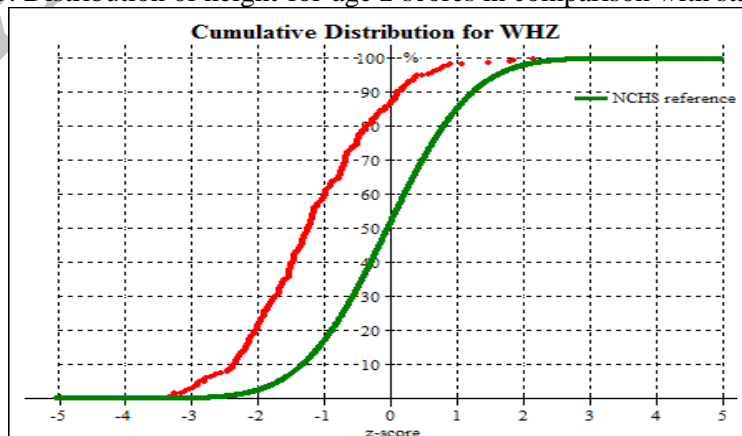


Fig.4: Distribution of weight-for-height z-scores in comparison with standard

The overall prevalence of underweight was 65.2%, out of 54.2% and 11.0% children are found to be moderate and severe underweight (Table.2). It is noteworthy to mention here that the severely underweight was significantly higher among girls than boys (15.1% vs 7.2%, $p<0.05$). They had 2.3 (OR=2.29, 95%CI: 1.07-4.91) fold greater risk of being severely underweight. The overall prevalence of stunting was 54.2% (Table.3). Among them, 31.4% and 22.7% children were experiencing moderate and severe stunting. The prevalence of stunting is higher in girls

(59.6%) than their boys (49.0%) counterpart. However, this difference is not statistically significant. The overall prevalence of wasting was 20.1% (Table.4). Among those wasting children, 17.4% and 2.7% were categorised as moderate and severe wasting. The prevalence of wasting was almost similar in both boys and girls. According to WHO (8) criteria for assessing severity of malnutrition, this study found very high rates of underweight, stunting and wasting ($\geq 30\%$, $\geq 40\%$ and $\geq 15\%$).

Table 1: Distribution of mean weight and height of Santal children

Age (year)	n		Weight (kg)		t-value	Height (cm)		t-value
	Boys	Girls	Boys	Girls		Boys	Girls	
0	16	19	6.3 (0.7)	6.1 (0.9)	0.723	64.6 (3.7)	63.0 (5.2)	1.030
1	15	17	7.9 (1.0)	7.5 (0.7)	1.323	72.2 (3.8)	71.0 (4.5)	0.674
2	28	27	9.9 (1.3)	9.0 (0.9)	2.975**	82.0 (4.2)	79.7 (3.1)	2.304*
3	26	34	11.3 (1.2)	10.9 (1.4)	1.165	87.7 (1.8)	86.9 (3.3)	1.114
4	39	23	12.8 (1.5)	11.8 (0.7)	3.003**	92.4 (3.9)	90.6 (3.3)	1.855
5	29	26	14.3 (1.6)	13.3 (1.8)	2.181*	98.9 (4.9)	96.5 (5.2)	4.845**
F-value			110.76***	109.70***		226.98***	202.10***	

Values are mean and standard deviation, Significant sex difference: * $p<0.05$, ** $p<0.01$, Significant age variation: *** $p<0.001$.

Table 2: Prevalence of underweight based on weight-for-age z-scores by sex

Underweight	All n = 299	Boys n = 153	Girls n = 146
Overall (<-2 z-score)	65.2 % (50.8 - 77.3)	60.8 % (49.1 - 71.4)	69.9 % (43.2 - 87.6)
Moderate (<-2 - ≥ -3 z-score)	54.2 % (40.6 - 67.2)	53.6 % (48.2 - 58.9)	54.8 % (30.3 - 77.2)
Severe* (<-3 z-score)	11.0 % (5.5 - 20.9)	7.2 % (2.7 - 17.7)	15.1 % (6.7 - 30.5)

Values in parenthesis are 95% confidence interval. * Significant sex difference: Chi-square=3.97, df=1, $p<0.05$.

Table 3: Prevalence of stunting based on height-for-age z-scores and by sex

Stunting	All n = 299	Boys n = 153	Girls n = 146
Overall (<-2 z-score)	54.2 % (36.6 - 70.8)	49.0 % (33.0 - 65.3)	59.6 % (38.4 - 77.7)
Moderate ($<-2 - \geq -3$ z-score)	31.4 % (22.4 - 42.1)	28.8 % (21.1 - 37.8)	34.2 % (22.4 - 48.5)
Severe (<-3 z-score)	22.7 % (8.4 - 48.6)	20.3 % (6.1 - 50.0)	25.3 % (10.0 - 51.0)

Values in parenthesis are 95% confidence interval

Table 4: Prevalence of acute malnutrition based on weight-for-height z-scores and by sex

Wasting	All n = 299	Boys n = 153	Girls n = 146
Overall (<-2 z-score)	20.1 % (11.5 - 32.6)	19.6 % (9.1 - 37.4)	20.5 % (14.4 - 28.4)
Moderate ($<-2 - \geq -3$ z-score)	17.4 % (9.9 - 28.8)	16.3 % (7.6 - 31.5)	18.5 % (12.4 - 26.7)
Severe (<-3 z-score)	2.7 % (0.9 - 8.0)	3.3 % (0.9 - 11.1)	2.1 % (0.3 - 11.4)

Values in parenthesis are 95% confidence interval

Discussion

Since, India has largest child development program in the world, yet progress on malnutrition is limited. Earlier reports have revealed that in recent years malnutrition among the children has increased (18). In India, the prevalence of underweight among tribal preschool children ranged from 37.4% to 93.9% (5). The prevalence of underweight in the present study (65.2%) was higher than that in West Bengal (11) and national (12) prevalent as assessed during 2005-2006. The prevalence of underweight among Santal preschool children was lower than the Kamar (19) and Saharia preschool children (20). Whereas, Bisai and his colleagues found the prevalence of underweight among Kora-Mudi (4), Munda and Oraon (6) and Lodha (2)

preschool children were 61.7%, 61.5%, and 47.3%, respectively.

Prevalence of stunting among tribal preschool children in India varies from 35.1% to 67.8% (5). The prevalence of stunting in the present study (54.2%) was similar to that of the national tribal population (12). The rate was higher in the present study than in tribal preschool children of Kora-Mudi (4), Munda & Oraon (6) and Lodha (2). The prevalence of stunting was lower in the present study than in the Saharia (20) and Kamar tribal children (19).

The overall prevalence of wasting among tribal preschool children in India ranged between 13.4% and 85.6% (5). The prevalence of wasting in the present study (20.1%) was similar to that in West Bengal

(9) and Lodha children (2). Whereas, the rate was lower than the Kora-Mudi (5), Munda & Oraon children (6).

Conclusion

The health and nutritional standards of studied children were found to be unsatisfactory. Girls were more prone to have undernutrition than boys. According to WHO (8) criteria for assessing severity of malnutrition, the rate of underweight, stunting and wasting were very high, indicating a critical situation. Therefore, respective authority should be undertaken an effective public health strategy to combat child malnutrition among socio-economically vulnerable communities in India and adjoining developing countries where the rate of malnutrition is very high.

Conflict of interests: None

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