Assessment of undernutrition among Santal children of Bolpur-Sriniketan block of Birbhum District, West Bengal, India

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Abstract

Present cross sectional study was undertaken to assess the nutritional status of 348 pre-primary and primary school going Santal children aged 4 to 10 years which includes 186 boys and 162 girls of Bolpur-Sriniketan Block, Birbhum, West Bengal. Anthropometric measurements of height and weight were measured using standard procedure. The analyses reveals that the mean value of height of boys is slightly greater than that of the girls but the mean value of both weight and BMI of girls are slightly greater than those of the boys. The differences in height, weight and BMI between boys and girls were not statistically significant. The age group wise distribution of undernutrition of both boys and girls were identified by calculating age specific z-scores values. On the basis of both weight for age and BMI for age, the percentage of severe and moderate underweight is higher among the boys than the girls. On the basis of height for age, the percentage of severe stunting is higher among the boys than the girls but the percentage of moderate stunting is higher among the girls than the boys. The study concludes that the boys are more affected by undernutrition in the form of underweight and stunting than girls.

Keywords: Anthropometry, Birbhum, children, Santal, undernutrition, West Bengal.

Introduction

The health and nutritional status of children is an index of national investment in the development of its future manpower. The long term consequences of malnutrition on a child-turned-adult are issues of deep concern. Under-nutrition impairs the child's immune system and weakens the defences against other diseases.

Whereas over-nutrition contributes to childhood obesity and leads to the early onset of hypertension, Diabetes mellitus, coronary heart diseases, orthopaedic disorder and other respiratory diseases (Karak et al., 2017). School age is the active phase of childhood growth. Poor nutritional status in children leads to high

absenteeism and early school dropouts thereby affecting the literacy rate of the country apart from affecting health status of the children. On the other hand, increasing lifestyle changes in urban areas has led to the emergence of over-nutrition and childhood obesity (Caroline et al., 2014). Many Researchers have attempted to assess the nutritional status of the children in West Bengal. Most of the studies show the notable prevalence of undernutrition among their studied children. Present study is an attempt to investigate if the undernutrition has its similar prevalence or there is a different scenario in the nutritional status among the studied Santal children of Birbhum district.

Materials and Methods

The present study focuses on assessing the undernutrition among 348 pre-primary and primary school going children (186 boys, 162 girls) of a Santal community of Bolpur-Sriniketan Block, Birbhum by calculating age specific Z scores. Anthropometric measurements of height and weight were measured to the nearest 0.1 cm using Martin's Anthropometer and 0.5 kg using conventional Weighing scale respectively. All the statistical analysis was done using SPSS 16.0 (Statistical Package for Social Sciences) and the z scores were calculated using WHO Anthro+ software. The children were classified into 4 categories- Severe Malnutrition, Moderate Malnutrition, Normal, and Overweight based on Weight for Age (Underweight), Height for Age (Stunting) and BMI for Age (Thinness). The children were divided in to 4 age groups- 4.0.-5.9 years, 6.0-7.9 years, 8.0-9.9 years and 10.0+ years.

Results

Table 1 shows the descriptive statistics of the anthropometric variables of the Santal children (186 boys and 16 girls) under study. Though the mean height of girls is less but both the mean weight and BMI of girls are more than those of the boys. Table 2 shows the age group wise descriptive

statistics of the anthropometric variables of the Santal children under study. In 4.0-5.9 age group, mean weight of girls are more than that of the boys and the mean height of girls is less than that of the boys. But in case of BMI, the girls have higher mean than that of the boys. In case of 6.0-7.9 age group, mean weight, height and BMI of girls are higher than those of the boys. In case of girls of 8.0-9.9 age group, the mean weight, height and BMI of girls are less than those of the boys. In case of boys of 10.0+ age group, the mean weight of boys and girls are equal, mean height of girls are less than that of the boys and the mean BMI of girls are higher than that of the boys.

Table 3 shows age group wise nutritional status of the Santal children under study based on Weight for age. In case of 4.0-5.9 age group, prevalence of severe and moderate underweight is more in boys than the girls. In case of 6.0-7.9 age group, prevalence of severe underweight is more in boys and moderate underweight is more in girls. In case of 8.0-9.9 age group, prevalence of severe underweight is more in girls and moderate underweight is more in boys. In case of 10.0+ age group, moderately underweight is more prevalent in boys than the girls. Table 4 shows age group wise nutritional status of the Santal children under study based on Height for age. In case of 4.0-5.9, age group, prevalence of both severe and moderate stunting are more in boys than the girls. In case of 6.0-7.9 age group, prevalence of severe and moderate stunting are more in boys and girls respectively. In case of 8.0-9.9 age group, prevalence of both severe and moderate stunting are more in girls than the boys. In case of 10.0+ age group, prevalence of both severe and moderate stunting are more in boys than the girls. Table 5 shows age group wise nutritional status of the Santal children under study based on BMI for age. In case of age group 4.0-5.9, prevalence of severe thinness is more in boys and moderate thinness is more in girls. In case of age group 6.0-7.9 and 8.0-9.9, prevalence of both severe and

Table 1. Descriptive Statistics of the Anthropometric Variables of the studied children.

	Overall (n=348)			Boys(n=186)			Girls(n= 162)		
	Height	Weight	BMI	Height	Weight	BMI	Height	Weight	BMI
Mean	114.02	18.63	14.11	114.03	18.46	14.02	114.01	18.82	14.21
Standard Deviation (+/-)	12.50	4.73	1.71	12.81	4.64	1.64	12.17	4.83	1.78

Table 2. Age group wise Descriptive Statistics of the Anthropometric Variables of the Santal children under study.

Age group (in Years)	Mean									SD(+/-)								
	Weight			Height			BMI			Weight			Height			BMI		
	Boys	Girls	Over all	Boys	Girls	Over all	Boys	Girls	Over all	Boys	Girls	Over all	Boys	Girls	Over all	Boys	Girls	Over all
4.0-5.9	13.95	14.33	14.11	99.78	98.22	99.41	14.00	14.61	14.26	2.54	2.54	2.53	8.32	7.55	7.96	1.63	1.79	1.72
6.0-7.9	17.41	17.70	17.54	112.11	112.86	112.45	13.85	13.88	13.86	2.96	2.69	2.83	7.71	6.54	7.18	1.88	1.59	1.74
8.0-9.9	20.81	20.58	20.69	120.73	119.63	120.17	14.13	14.00	14.06	4.31	5.00	4.65	9.03	9.82	9.41	1.62	1.87	1.75
10.0+	23.48	23.48	23.48	128.56	125.53	127.17	14.20	14.70	14.43	2.44	3.96	3.19	5.74	7.71	6.82	1.19	1.81	1.51

Table 3. Age group wise assessment of nutritional status of the children under study based on Weight for Age.

Age Groups (in years)	Severe Malnutrition		Moderate Malnutrition		Normal		Overweight	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
4.0-5.9	17 (35.41)	08 (22.22)	23 (47.92)	09 (25.00)	08 (16.67)	19 (52.78)	00 (0.00)	00 (0.00)
6.0-7.9	15 (26.79)	05 (10.64)	17 (30.35)	15 (31.92)	24 (42.86)	26 (55.31)	00 (0.00)	01 (2.12)
8.0-9.9	16 (31.37)	24 (45.28)	17 (33.33)	09 (16.99)	18 (35.29)	19 (35.85)	00 (0.00)	01 (1.89)
10.0+	02 (6.45)	02 (7.70)	10 (32.25)	09 (34.62)	19 (61.29)	15 (57.70)	00 (0.00)	00 (0.00)

Table 4. Age group wise assessment of nutritional status of the children under study based on Height for Age.

Age Groups (in years)	Severe Malnutrition		Moderate Malnutrition		Normal		Overweight	
	Boys	**Girls**	**Boys**	**Girls**	**Boys**	**Girls**	**Boys**	**Girls**
4.0-5.9	23 (47.92)	11 (30.55)	11 (22.92)	05 (13.89)	14 (29.16)	20 (55.56)	00 (0.00)	00 (0.00)
6.0-7.9	11 (19.64)	04 (8.52)	14 (25.00)	14 (29.79)	31 (55.35)	29 (61.71)	00 (0.00)	00 (0.00)
8.0-9.9	10 (19.61)	12 (22.65)	21 (41.17)	25 (47.16)	20 (39.21)	16 (30.18)	00 (0.00)	00 (0.00)
10.0+	02 (6.45)	01 (3.84)	02 (6.45)	09 (34.62)	27 (87.09)	16 (61.54)	00 (0.00)	00 (0.00)

Table 5. Age group wise assessment of nutritional status of the children under study based on BMI for Age.

Age Groups (in years)	Severe Malnutrition		Moderate Malnutrition		Normal		Overweight	
	Boys	**Girls**	**Boys**	**Girls**	**Boys**	**Girls**	**Boys**	**Girls**
4.0-5.9	05 (10.41)	02 (5.56)	05 (10.41)	04 (11.11)	38 (79.16)	29 (80.56)	00 (0.00)	01 (2.78)
6.0-7.9	10 (17.86)	02 (4.25)	09 (16.07)	05 (10.64)	37 (66.07)	40 (85.10)	00 (0.00)	00 (0.00)
8.0-9.9	04 (7.85)	03 (5.67)	13 (25.49)	09 (16.99)	34 (66.67)	41 (77.35)	00 (0.00)	00 (0.00)
10.0+	04 (12.91)	01 (3.85)	04 (12.91)	05 (19.23)	23 (74.19)	20 (76.93)	00 (0.00)	00 (0.00)

Table 6. Prevalence of Undernutrition among Children and Adolescence of West Bengal.

District	State	Age group (in years)	N	Underweight		
				Boys	**Girls**	**Overall**
West Midnapore	WB	2-6	410	44.5	43.9	13.7
West Midnapore	WB	1-14	165	35.3	33	33.9
West Midnapore	WB	11-18	1094	31	24.2	28.3
West Midnapore, Bankura & Purulia	WB	6-18	4450	29.7	24.5	27.9
Birbhum	WB	2-16	203	31.1	31	31.1
West Midnapore	WB	8-18	431	24.3	21.5	24.6
North 24 Parganas	WB	1-5	899	65.5	60.9	63.6
West Midnapore	WB	3-5	299	60.8	69.9	65.2
Purulia	WB	5-12	442	35.8	31.5	33.72
Nadia	WB	3- 5	533	26.5	35.1	31
West Midnapore	WB	10-15	2016	-	-	-
West Midnapore	WB	11-18	1094	-	-	-
Bankura	WB	6-14	454	-	-	-
East Midnapore	WB	5-10	569	-	-	-
North 24 Parganas & Howrah	WB	9-17	1153	-	-	-
North 24 Parganas	WB	11-14	559	-	-	-
West Midnapore	WB	9-20	930	-	-	-
West Midnapore	WB	10-12	1265	-	-	-
Birbhum	WB	2-16	203	-	-	-
Purulia	WB	7-18	421	-	-	-
Birbhum	WB	4-10	348	62.91	50	56.9

District	Stunting			Thinness			References
	Boys	Girls	Overall	Boys	Girls	Overall	
West Midnapore	44.9	41.5	16.3	-	-	-	Sinha et al., (2011)
West Midnapore	26.5	25.8	16.1	-	-	-	Bisai et al., (2008)
West Midnapore	27.4	28.4	27.8	-	-	-	Bisai et al (2011)
West Midnapore, Bankura & Purulia	23.2	22.8	23	-	-	-	Bose & Bisai, (2008)
Birbhum	40	55.3	47.8	-	-	-	Ghosh & Sarkar , (2013)
West Midnapore	22.3	25.2	23.2	-	-	-	Ganguli et al.,
North 24 Parganas	53.5	51.6	52.7	-	-	-	Bisai et al., (2010)
West Midnapore	49	59.6	54.2	-	-	-	Bisai, (2012)
Purulia	13.8	21.7	17.88	-	-	-	Chowdhury et al., (2006)
Nadia	23.7	24	23.9	-	-	-	Bose et al., (2007)
West Midnapore	-	-	-	51.7	44.9	36.5	Bose & Bisai., (2008)
West Midnapore	-	-	-	41.8	25.5	35.3	Bose & Bisai., (2008)
Bankura	-	-	-	27.8	19.4	23.1	Bose et al., (2009)
East Midnapore	-	-	-	62.9	61.6	62.2	Chakraborty & Bose, (2009)
North 24 Parganas & Howrah	-	-	-	28.4	16.9	21.8	Ghosh & Bandhopadhyay, (2009)
North 24 Parganas	-	-	-	41.1	30.6	36.5	Mukhopadhyay et al., (2005)
West Midnapore	-	-	-	37.6	19.4	28.6	Das & Bisai, (2009)
West Midnapore	-	-	-	43.6	31.4	37.6	Bisai et al., (2009)
Birbhum	-	-	-	29	30.1	29.6	Ghosh & Sarkar , (2013)
Purulia	-	-	-	38.3	44.6	41.3	Das & Bose, (2011)
Birbhum	50.54	50	29.02	29.03	16.66	24.42	Present study

moderate stunting are more in boys than the girls. In case of 6.0-7.9 age group, prevalence of severe and moderate stunting are more in boys and girls respectively. In case of 8.0-9.9 age group, prevalence of both severe and moderate stunting are more in girls than the boys. In case of 10.0+ age group, prevalence of both severe and moderate stunting are more in boys than the girls. Table 5 shows age group wise nutritional status of the Santal children under study based on BMI for age. In case of age group 4.0-5.9, prevalence of severe thinness is more in boys and moderate thinness is more in girls. In case of age group 6.0-7.9 and 8.0-9.9, prevalence of both severe and

moderate thinness is more in boys. In case of age group 10.0+, prevalence of severe thinness is more in boys and moderate thinness is more in girls.

Table 6 shows the prevalence of undernutrition among the children and adolescents of West Bengal. In the present study the prevalence of undernutrition is higher among the boys (62.91%) than the girls (51.23%). Boys are more underweighed (62.91% boys, 50% girls) and stunted (50.54% boys, 50% girls). Similar result is found in the study of Sinha et al., (2011), Bisai et al (2008, 2010 and 2011), and Bose and Bisai (2008) in Bankura, West Midnapore and Purulia. Ghosh and Sarkar conducted a study in Birbhum where

boys were more underweighed than the girls but were less stunted than the girls. Similar result was found in a study of Ganguly et al., in West Midnapore and Chowdhury et al in Purulia. In the study of Bose et al conducted in Nadia in 2007, more girls were underweighed than the boys. But in the study of Bisai conducted in West Midnapore in 2012 where the prevalence of undernutrition was more in girls than the boys. The present study also reveals that the boys are thinner than the girls (29.03% boys, 19.13% girls). Similar results was found in the study of Bose and Bisai (2008), Bose et al., (2009), Chakraborty and Bose (2009), Ghosh and Bandhopadhyay (2009), Mukhopadhyay et al., (2005), Das and Bisai (2009) and Bisai et al., (2009). But in the study of Bose and Bisai (2008), Ghosh and Sarkar (2013) and Das and Sarkar (2011), girls are thinner than the Bose.

Discussion

The study reveals that total 56.90% children are undernourished. The boys (62.91%) are more affected by undernutrition than the girls (51.23%). 56.90% of all children is underweighed, 62.91% boys are underweighed and 50.00% girls are underweighed. 50.28% of all children is stunting, 50.54% boys are stunting and 50.00% girls are stunting. 24.42% of all children is thin, 29.03% boys are thin and 19.13% girls are thin. Thus the prevalence of severe and moderate malnutrition that is undernutrition is more among the boys than that of the girls on the basis of Weight for Age, Height for Age and BMI for age. It indicates that the girls are taller and heavier than the boys and the boys are thinner than the girls. From the investigation, it is imperative that effective health and nutritional intervention programme should be initiated by the government and non-government organizations for greater wellbeing of the studied tribal children. From the results of the studies mentioned in Table 6, it is shown that in most of the cases boys are more affected by undernutrition. In spite of that in many cases girls

are found to be more undernourished. It is also noticeable that similar studies conducted in the same district have variation in the prevalence of undernutrition i.e., in some places boys are more undernourished while in some places girls are more undernourished. Hence, before conducting nutritional interventional programme accurate examination of undernutrition should be undertaken in different places. Otherwise, the similar condition will remain even after taking initiative to overcome the present situation.

Acknowledgement

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