

# Thinness among the Rural Primary School Children of Bali Gram Panchayat, Arambag, Hooghly District, West Bengal, India

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**Abstract:** *Background:* Primary school age is a dynamic period of physical growth and mental development of the child. Research indicates that nutritional deficiencies and poor health in primary school age children are among the causes of low school enrolment, high absenteeism, early dropout and poor classroom performance. Chronic undernutrition is linked to slower cognitive development and serious health impairments later in life that reduce the quality of life. The thinness (low BMI for age) may be one of the tool to measure the level of undernutrition.

*Objective:* The objective of the present study was to assess the different grades of thinness by using age and sex specific cut off values based on body mass index (BMI).

*Materials and Methods:* The present cross-sectional study was conducted at Bali-Gram Panchayat, Arambagh, West Bengal, India. The data were collected from 618 rural Bengalee primary school children comprising of both boys (304) and girls (314) within the age group 5-11 years. The measurements (height in cm. and weight in kg) were taken following standard methods. Thinness was evaluated using the age and sex specific cut-off points of BMI.

*Results:* The overall (age combined) prevalence of thinness among the boys was slightly higher (83.2%) in comparison to the prevalence of thinness among the girls (81.5%). The prevalence of thinness was higher in case of lower age group children among both boys and girls and it gradually decreases with the increase of age. The rate of grade III thinness (30.5%) was greater among the girls than others while among the boys it was higher in grade I (32.9%) category. It indicates the severity of thinness was much more among the girls than the boys. Although there was no significant sex difference between the two sexes.

*Conclusion:* The prevalence of undernutrition as measured by thinness was significantly higher than the national level scenario. In spite of the Mid Day Meal scheme which is running for more than 20 years, the result is dissatisfactory. The competent authority should look into the matter seriously for better nutritional and health condition of the children.

**Keywords:** Rural, Primary school children, BMI, thinness, undernutrition, India.

## INTRODUCTION

Undernutrition in childhood was and is one of the reasons behind the high child mortality rate in developing countries. It is also highly detrimental for health in those children who survive to adulthood [1]. The enhanced survival may be simply adding to the pool of undernourished children causing severe handicaps to future human resources. Chronic undernutrition is linked to slower cognitive development and serious health impairments later in life that reduce the quality of life [2]. The majority of deaths (89%) associated with malnutrition occur in children who are malnourished [1]. India has adopted a multi-dimensional strategy to combat these problems and to improve the nutritional status of the population [3]. The nutritional status of the people is increasingly being recognized world over as an important indicator of development of a country. The strength of a nation in future will be determined by how healthy and educated its people are. Prompting optimum development of the child is the responsibility of every one [4]. Primary

school age is a dynamic period of physical growth and mental development of the child. Research indicates that nutritional deficiencies and poor health in primary school age children are among the causes of low school enrolment, high absenteeism, early dropout and poor classroom performance [5].

According to World Health Organization, the ultimate intention of the Nutritional Assessment is to improve human health [5]. A healthy child will become a healthy adult. A healthy adult will be the backbone of the society as well as the country. Body Mass Index (BMI) has been widely used for assessing nutritional status of adults [6] and thinness in adolescents and more recently in children aged 0–5 years [7]. Recently international cut off points for thinness (low BMI for age) has been established and graded as severe (III), moderate (II) and mild (I) similar to the chronic energy deficiency (CED) for adults [8].

Considering the above, the aim of the present study was to assess the different grades of thinness by using age and sex specific cut off values based on body mass index (BMI).

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## MATERIALS AND METHODS

The present cross-sectional study was conducted at primary schools under Bali-Gram Panchayat, Arambag, situated approximately 100 Km. away from the capital of West Bengal, India. The data were collected from 618 rural Bengalee primary school children comprising of both boys (304) and girls (314) within the age group 5-11 years (Table 1). Information on a number of non-anthropometric variables such as – date of birth, age and sex, were collected directly from the school register. Most of the families to which the children belonged, depended upon agriculture or daily labour for their livelihood. From the schools, children were given a daily food supplementation, in the form Mid Day Meal, consisting of rice, pulses, vegetables, and egg on some days. The measurements (height in cm. and weight in kg) were taken following standard methods [9] by the author. The BMI was computed following internationally accepted standard equation as weight in kg divided by square of height in meter ( $w/h^2$ ). Nutritional status was evaluated using the age and sex specific cut-off points of BMI (Table 2) as described by

Cole and others [8]. Technical errors of measurements (TEM) were found to be within reference values [10] and thus not incorporated in statistical analyses. One way ANNOVA was done to test the impact of age on thinness. The  $\chi^2$  test ( $2 \times 2$  table) was done to test the significant level ( $p < 0.05$ ) for sex differences on thinness among the studied children, if any.

## RESULTS

Table 3 represents the prevalence of thinness (low BMI for age, grade I, II and III) of the children. The thinness was calculated with the help of the newly proposed cut off points by Cole *et al.* [8], (Table 2). The overall (age combined) prevalence of thinness among the boys was slightly higher (83.2%) in comparison to the prevalence of thinness among the girls (81.5%). The prevalence of thinness was higher in case of lower age group children among both boys and girls and it gradually decreases with the increase of age. Boys of the age groups 5 and 6 years were much severely undernourished (about 93%) than the girls of the same age groups (about 88% and 85% respectively).

**Table 1: Distribution of Primary School Children by Age and Sex**

Age groups in years	Sex		Total
	Boys	Girls	
5	15	17	32
6	47	47	94
7	58	71	129
8	73	78	151
9	68	58	126
10	39	32	71
11	4	11	15
Total	304	314	618

**Table 2: The BMI ( $Wt/Ht^2$ ) Cut-off Points for Thinness Grades III, II, and I for 5-11 Years Children as Proposed by Cole *et al.* (2007)**

Ages (years)	Boys			Girls		
	Grade III	Grade II	Grade I	Grade III	Grade II	Grade I
5	12.66	13.31	14.21	12.50	13.09	13.94
6	12.50	13.15	14.07	12.32	12.93	13.82
7	12.42	13.08	14.04	12.26	12.91	13.86
8	12.42	13.11	14.15	12.31	13.00	14.02
9	12.50	13.24	14.35	12.44	13.18	14.28
10	12.66	13.45	14.64	12.64	13.43	14.61
11	12.89	13.72	14.97	12.95	13.79	15.05

**Table 3: Prevalence of Thinness among the Studied Primary School Children**

Age (years)	Boys - Thinness					Girls - Thinness				
	Grade III	Grade II	Grade I	Total	Normal	Grade III	Grade II	Grade I	Total	Normal
5	7 (46.7)	3 (20.0)	4 (26.7)	14 (93.3)	1 (6.7)	9 (52.9)	5 (29.4)	1 (5.9)	15 (88.2)	2 (11.8)
6	12 (25.5)	21 (44.7)	11 (23.4)	44 (93.6)	3 (6.4)	23 (48.9)	7 (14.9)	10 (21.3)	40 (85.1)	7 (14.9)
7	16 (27.6)	13 (22.4)	18 (31.0)	47 (81.0)	11 (19.0)	22 (31.0)	22 (31.0)	18 (25.4)	62 (87.3)	9 (12.7)
8	16 (21.9)	16 (21.9)	32 (43.8)	64 (87.7)	9 (12.3)	17 (21.8)	28 (35.9)	21 (26.9)	66 (84.6)	12 (15.4)
9	12 (17.6)	16 (23.5)	24 (35.3)	52 (76.5)	16 (23.5)	15 (25.9)	12 (20.7)	16 (27.6)	43 (74.1)	15 (25.9)
10	8 (20.5)	10 (25.6)	11 (28.2)	29 (74.4)	10 (25.6)	5 (15.6)	15 (46.9)	3 (9.4)	23 (71.9)	9 (28.1)
11	2 (50.0)	1 (25.0)	-	3 (75.0)	1 (25.0)	5 (45.4)	2 (18.2)	-	7 (63.6)	4 (36.4)
Total	73 (24.0)	80 (26.3)	100 (32.9)	253 (83.2)	51 (16.8)	96 (30.5)	91 (29.0)	69 (22.0)	256 (81.5)	58 (18.5)

Percentages are given in the parentheses.

**Table 4: Comparison of the Prevalence of Thinness (by BMI) among the Children of Different Studies**

Studied children	Prevalence (%)	Reference
1. 6-14 yr, Bankura, W.B.	23.1	Biswas <i>et al.</i> , 2008
2. 5-10 yr, Purba Midnapur,	62.2	Chakraborty and Bose, 2009
3. 6-14 yr, Assam	53.9	Medhi <i>et al.</i> , 2007
4. 2-13 yr, Paschim Midnapur	67.2	Bisai <i>et al.</i> , 2010
5. 5-12 yr, Darjeeling, W.B.	69.4	Mondal and Sen, 2010
6. 5-11 yr, Bali-Gram Panchayat, Arambag, W.B.	82.4	Present study

Considering the gradation of the thinness, the rate of grade III (30.5%) was greater among the girls than others while among the boys it was higher in grade I (32.9%) category. It indicates the severity of thinness was much more among the girls than the boys. There was no significant sex difference between the two sexes.

Table 4 depicts the prevalence of thinness among the children of various studies including the present

one. It is evident from the table that, the highest rate (82.4%) of thinness is noticed among the children of Bali-Gram Panchayat followed by the children of Darjeeling District, W.B. (69.4%); [12], 67.2% among the children of Paschim Midnapur [13]. Assamese children showed comparatively lesser degree of thinness (53.9%); [14] than the present one. 6-14 year children of Bankura revealed the lowest prevalence (23.1%) of thinness [15].

**Table 5: Comparison of the Prevalence of Thinness (by BMI) among the Children of Present Study with that of the Previous Study in the Same Area**

Studied children	Prevalence (%)	Reference
1. 2-6 years (ICDS) children of Bali-Gram Panchayat, Arambag, W.B., India.	85.2	Mandal <i>et al.</i> , 2009 [11]
2. 5-11 years primary school children of Bali-Gram Panchayat, Arambag, W.B., India.	82.4	Present study

The children of the area are getting Mid Day Meal supplied through the school authorities which is comparatively better but not highly satisfactory. But when we compare the prevalence of thinness (Table 5) between the children of the present study and the ICDS children (11) of the same area, it is revealed that, no satisfactory improvement has been indicated, although, slight improvement in the rate of thinness is evident (82.5% in comparison to 85.2%).

## DISCUSSION

Any major deviation in the nutrient intake either in quality or in quantity from its requirement can also affect growth and life span in a number of ways, particularly in the later period/growth [16]. The underfed still outnumbered in the developing world among Asian, African and Latin American populations. In spite of the economic development in the region, undernutrition remains an important public problem in many Asian countries [17]. Despite the availability of surplus food grains in India and in South Asia, the region is still facing high levels of hunger [18]. Among the school children aged 5–10 years from Purba Midnapore District, West Bengal, the prevalence of thinness was 62.2% [19] which was much lower than the present one. Medhi and others [20] reported much better situation of nutritional condition among the 6–14 years school children of Dibrugarh district, Assam, India where the overall rate of thinness was 53.2%. A noteworthy point was that all the studies reported that both sexes had more-or-less similar rates of thinness [13]. There were several studies for assessing undernutrition based on thinness where reported lower prevalence of undernutrition than the present study.

The prevalence of undernutrition as measured by thinness was significantly higher than the national level scenario. In spite of the Mid Day Meal scheme which is running for more than 20 years, the result is dissatisfactory. Since the overwhelming majority of the Indian population inhabit rural areas where the rates of childhood undernutrition are very high, such studies should focus on rural primary school children. Valuable health and nutritional promotion programs can be formulated based on the findings of these researches with the ultimate objective of decreasing childhood undernutrition in the area as well as in other places of the country.

## CONFLICT OF INTEREST

None.

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