

## Nutritional Status of the Low Socioeconomic Psychologically Healthy Adolescent: A Study from Rural Areas of Paschim Medinipur District, India

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### Abstract

*Background:* Adolescent period is the critical period of growth and development. Undernutrition during adolescence can impair growth and development and result in long term health consequence. *Aims:* To study the nutritional status of early adolescents its association with sexual dimorphism. *Methods:* This cross-sectional community based study has conducted among 355 adolescent (189 boys; 166 girls) aged 11-14 years of the rural areas of Paschim Medinipur district, West Bengal, India. Anthropometric measurements including height, weight, midupper arm circumference were taken following standard technique. Body mass index (BMI) was calculated to determine the nutritional status using international BMI cut-off point for children and adolescence from 2 to 18 years of age. Statistical package SPSS is employed for one way ANOVA and Student- 't' test of the data. *Results:* The mean BMI for girls ( $16.71 \pm 3.02$  kg/m<sup>2</sup>) were higher than boys ( $15.97 \pm 2.26$  kg/m<sup>2</sup>) with  $t=2.631$  ( $P=0.009$ ). There is a significant age difference ( $P<0.001$ ) existed for weight, height and MUAC. The prevalence of thinness and overweight was 51.83% and 4.51% respectively. The prevalence of thinness was greater among the boys (52.91%) than the girls (50.60%). *Conclusion:* The present study indicates high prevalence of thinness among adolescent in the area of study. A comprehensive strategy should be implemented in disadvantaged groups to prevent adolescent undernourishment.

**Keywords:** Health; Rural; Sexual Dimorphism; Thinness.

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### Introduction

Adolescence is the period of life spanning the ages between 10-19 years [1]. Approximately twenty per cent of world's population is constituted by adolescents out of whom about eighty percent are residing in developing countries [2]. Adolescence is a transitional period between childhood and adulthood [3] and these are the formative years in the life of an individual when major physical,

psychological and behavioral changes take place [4]. Early adolescence is a period of rapid growth and maturation in human development [5]. With the profound growth of this period there is an increased demand for energy, protein, minerals and vitamins [6]. So, proper nutritional care of adolescents is utmost important for maintaining normal growth which helps in entering healthy adult life.

During the phase of rapid growth the adolescents are at a high risk of developing malnutrition [7].

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Undernutrition among adolescents is a serious public health problem internationally, especially in developing countries [8]. Poor nutrition among adolescents resulting in short stature and low lean body mass is associated with many concurrent and future adverse health outcomes [9]. Nutritional deficiencies have far-reaching consequences, especially for adolescent girls. If their nutritional needs are not met, they are likely to give birth to undernourished children, thus transmitting under-nutrition to future generations [10].

Adolescent health and nutrition are the essential component of a country's overall human development. These are important issues which have not received the attention. Hence an attempt was made to assess the nutritional status of early adolescents residing at rural areas of Paschim Medinipur District and to evaluate its association with sexual dimorphism.

## Materials and Methods

### *Study Location and Participants*

The study is undertaken in the rural area of Paschim Medinipur district (West Bengal), India. The study population consists of 355 adolescents (189 boys and 166 girls) aged between 11 and 14 years. The participants were chosen by systematic random sampling.

### *Ethical Consideration*

The current research topic has been approved by the local institutional board of ethics within which the work is undertaken. Permission from the local administrative/ school authority was collected prior to study.

### *Study Design*

The study is designed as a community based cross-sectional type which was conducted from June 2015 to September 2015. The socioeconomic status of the adolescent's family was assessed by Kuppuswami's socioeconomic status [11].

### *Anthropometric Measurement*

The questionnaire is based on demographic information, anthropometric data and personal hygiene. Each of the adolescents was identified by name, age and sex. The date of birth was obtained from the birth certificates in order to ensure the quality

of data. The anthropometric measurements including the height, weight and midupper arm circumference (MUAC) of the participants were measured using standard techniques [12]. The height and weight measurements were recorded to the nearest 0.1 cm and 0.5 kg respectively. Body mass index (BMI) was computed by using the following standard formula:  $BMI = \text{Weight (kg)} / \text{height}^2(\text{m}^2)$  [13]. Nutritional status was evaluated using internationally recognized age and sex specific BMI cut-off points [14,15].

### *Psychological Assessment*

The Diagnostic and Statistical Manual of Mental Disorders, fourth edition, text revision [DSM-IV TR] criteria and Mini Mental State Examination [MMSE] were used for the assessment of the psychological status [16-18].

### *Inclusion Criteria*

Only the competent, consistent and psychologically healthy adolescents aged 11 years to 14 years and belonging to low socioeconomic group were included in this study. The subjects who were suffering from significant health complication viz. diabetes, hypertension and chronic infectious diseases were not included in the study.

### *Statistical Analysis*

The statistical analyses were done by using the SPSS for Windows statistical software package (SPSS Inc., Chicago, IL, USA, 2001). Normally distributed data were tested by Kolmogorov-Smirnov test. One-way ANOVA analysis (F value) was undertaken to test for age differences in mean height, weight and BMI. Student's 't' tests were done to find the sexual dimorphism in the anthropometric variable. P value < 0.05 is considered statistically significant.

## Results

The mean age of the boys and girls were  $12.64 \pm 1.08$  years and  $12.67 \pm 1.04$  years respectively and there were no statistically significant differences between the sexes. The age specific means and standard deviations of the anthropometric parameters (viz. weight, height, BMI, MUAC) of the boys and girls are presented in Table 1. There was a positive and linear increasing trend ( $P < 0.001$ ) in mean height, weight and MUAC for both the boys and girls between 11 and 14 years of age. But in case of BMI only the age

Table 1: Age and sex wise distribution of the anthropometric parameters

	N	Girls				Boys				
		Weight	Height	BMI	MUAC	N	Weight	Height	BMI	MUAC
11	28	31.07±8.58	138.93±6.27	15.98±3.64	14.73±1.78***	35	30.30±4.94	139.68±7.26	15.50±2.11	18.01±2.26
12	42	35.07±9.40*	143.76±6.68	16.79±3.39*	20.39±16.98	50	31.67±6.88	143.55±7.99	15.28±2.47	18.31±2.55
13	52	37.32±6.99	149.11±6.04	16.72±2.55	17.49±3.33***	52	37.69±8.06	152.09±9.89	16.14±2.32	19.49±2.29
14	44	38.55±6.94	149.99±5.35***	17.10±2.72	19.42±3.49	52	40.82±7.43	155.32±9.29	16.78±1.82	20.42±2.74
Age combined	166	36.02±8.26	146.27±7.29*	16.71±3.02**	18.27±9.09	189	35.59±8.21	148.42±10.66	15.97±2.26	19.16±2.64
F		5.804	25.331	0.789	2.616		22.593	30.314	4.633	9.190
P		0.001	0.001	0.502	0.053		0.001	0.001	0.004	0.001

Sexual dimorphism was analyzed by t test and statistically significance at \*P<0.05; \*\*P<0.01; \*\*\*P<0.001 level

Table 2: Nutritional status of the rural adolescent boys and girls

Age (years)	Sex	N	Thinness			Over all thinness	Normal	Overweight
			III	II	I			
11	Girl	28	3 (10.71)	3 (10.71)	7 (25.00)	13 (46.43)	12 (42.86)	3 (10.71)
	Boy	35	2 (5.71)	3 (8.57)	12 (34.29)	17 (48.57)	16 (45.71)	2 (5.71)
12	Sex combined	63	5 (7.94)	6 (9.52)	19 (30.16)	30 (47.62)	28 (44.44)	5 (7.94)
	Girl	42	3 (7.14)	5 (11.90)	13 (30.95)	21 (50.00)	17 (40.48)	4 (9.52)
13	Boy	50	4 (8.00)	12 (24.00)	16 (32.00)	32 (64.00)	16 (32.00)	2 (4.00)
	Sex combined	92	7 (7.61)	17 (18.48)	29 (31.52)	53 (57.61)	33 (35.87)	6 (6.52)
14	Girl	52	5 (9.62)	9 (17.31)	9 (17.31)	23 (44.23)	28 (53.85)	1 (1.92)
	Boy	52	4 (7.69)	9 (17.31)	13 (25.00)	26 (50.00)	24 (46.15)	2 (3.85)
Age combined	Sex combined	104	9 (8.65)	18 (17.31)	22 (21.15)	49 (47.12)	52 (50.00)	3 (2.88)
	Girl	44	5 (11.36)	7 (15.91)	15 (34.09)	27 (61.36)	15 (34.09)	2 (4.55)
Age combined	Boy	52	3 (5.77)	3 (5.77)	19 (36.54)	25 (48.08)	26 (50.00)	1 (1.92)
	Sex combined	96	8 (8.33)	10 (10.42)	34 (35.42)	52 (54.17)	42 (43.75)	2 (2.08)
Age combined	Girl	166	16 (9.64)	24 (14.46)	44 (26.51)	84 (50.60)	72 (43.37)	10 (6.02)
	Boy	189	13 (6.88)	27 (14.29)	60 (31.75)	100 (52.91)	83 (43.92)	6 (3.17)
Age combined	Sex combined	355	29 (8.17)	51 (14.37)	104 (29.30)	184 (51.83)	155 (43.66)	16 (4.51)

wise difference was observed among the boys (F=4.633; P<0.01). Moreover, combining all ages, the mean BMI for girls (16.71±3.02 kg/m<sup>2</sup>) were higher than boys (15.97±2.26 kg/m<sup>2</sup>) at statistically significant level (t=2.631; P=0.009).

The overall (age and sex combined) prevalence of thinness and overweight was 51.83% and 4.51% respectively (Table 2). The prevalence of thinness was grater among the boys (52.91%) than the girls (50.60%) while the prevalence overweight was greater among the girls (6.02%) than the boys (3.17%). The highest prevalence of thinness was noticed at the age 12 years. Similarly overweight was highest at the age of 11 years.

### Discussion

Malnutrition that occurs during adolescence has important consequences for the future growth and development of the individual in developing countries [19]. Poor nutrition in adolescent girls poses critical health risks on future pregnancy and birth outcomes [20]. The inadequate nutritional status of the adolescence boys, resulting the poor brain and mental development with poor intelligent quotient (IQ) and low physical activity during adolescent and poor income generating member in the adulthood.

But the problem of undernutrition is prevalent among adolescent in almost all the states of India. In this context, the understanding of the nutritional status of adolescent boys and girls especially from the rural areas has immense importance for better development of future generation.

In the present study, prevalence of thinness was 50.60% among the girls which is higher than the previous study conducted among the rural Indian girls of Salboni, Paschim Medinipur district, West Bengal (48.3%) [21], Paschim Medinipur and Purulia districts of West Bengal (44.5%) [22], North 24 Pargana of West Bengal (37.8%) [23], Lucknow (11.4%) [24]. But some other studies carried out in North Tripura (52.98%) [25] and Garhkhal Village of Himachal Pradesh (79.5%) [26] showed the higher prevalence of thinness than present study.

The prevalence of thinness among the boys was 52.91% in the present study. It is higher than the recent study conducted among the boys of rural Darjeeling district of West Bengal (51.26%) [27].

In our previous study among the preschool children. We documented that the 43.77% of the children were underweight in the rural areas of Paschim Medinipur district [28] and 47.00% in the Kankabati grampanchayet, Paschim Medinipur [29]. The inadequacy of food [30], immunization facilities [31], healthcare facilities [27] may be the cause to further aggravate the situation resulting the high prevalence of undernutrition/thinness among these adolescent (more than half of the adolescent girls and boys). Government has taken several projects for the upliftment of these rural people.

### Conclusion

The present study indicates high prevalence of thinness among adolescent in the area of study. There is an urgent need to carry out people welfare/ school based/community based programme for the management of the undernutrition. A comprehensive strategy should be implemented in disadvantaged groups to prevent adolescent undernourishment. More in-depth studies are also needed to find out the proper causes of undernutrition. Nutrition education, through an improved school curriculum, could be employed to address adolescent undernutrition in the study area.

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