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Ethnic-Specific Prevalence of Thinness among Bengalee Youths of Midnapore, West Bengal, India.

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ABSTRACT

There exists high prevalence of Under-nutrition in rural and tribal Indian youths. The present study estimates the prevalence of thinness and overweight among rural school children and adolescents in Midnapore. Weights, heights and mid-upper arm circumference (MUAC) were measured in a sample of 360 children and adolescents (180 boys, 180 girls) 6–16 years of age, in rural Midnapore, West Bengal in 2014. The body mass index (BMI) was computed. Nutritional status (underweight/thinness and overweight**)** was classified and evaluated relative to age and sex-specific internationally accepted thinness and overweight criteria. Significant age difference in mean weight, height, MUAC and BMI were observed. Significant ethnicity difference in mean weight (t= 2.012; p< 0.05) and MUAC (t= 2.469; < 0.01) were observed among boys. Negative significance of sex was observed in MUAC (t= -2.516; p< 0.01) in Muslims. Overall prevalence of Under-nutrition/thinness was 71.6 % in girls and 67.2 % in boys. Age and sex specific prevalence of thinness showed that 10 year old boys (85.7 %) and 12 year old girls (94.0 %) had the highest level of thinness. Significant age differences in nutritional status were observed for boys (x^2= 57.290; df= 40; p< 0.037) only. Significant religious differences in nutritional status were observed at age 6 years (x^2= 11.888, df= 4; sig. = 0.05) only.
Keywords: Thinness, Under-nutrition, weight, height, body mass index

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INTRODUCTION

The World Bank report says that the rate of malnutrition cases among children in India is almost five times more than in China, and twice than in Sub-Saharan Africa [1]. Nearly half of India's children- approximately 60 million - are underweight, 45% have stunted growth (too short for their age), 20% are wasted (too thin for their height, indicating acute malnutrition), 75% are anemic, and 57% are deficient in Vitamin A. According to the report by the Ministry of Statistics and Programme Implementation - Children in India 2012 - 48 per cent children under the age of five are stunted (too short for their age), which indicates that half of the country's children are chronically malnourished. The prevalence of underweight children in India is among the highest in the world, and is nearly double that of Sub-Saharan Africa with dire consequences for mobility, mortality, productivity and economic growth [1]. The 2011 Global Hunger Index (GHI) Report ranked India 15th, amongst leading countries with hunger situation [2]. Despite India's 50 % increase in GDP since 1991 [3], more than one third of the world's malnourished children live in India [4]. Deficiencies in nutrition inflict long-term damage to both individuals and society. Compared with their better-fed peers, nutrition-deficient individuals are more likely to have infectious diseases such as pneumonia and tuberculosis, which lead to a higher mortality rate. In addition, nutrition-deficient individuals are less productive at work. Low productivity not only gives them low pay that traps them in a vicious circle of under-nutrition, [5] but also brings inefficiency to the society, especially in India where labour is a major input factor for economic production [6]. The aim of the present study was to evaluate and describe the different grades of thinness using age and sex specific cut off points based on body mass index (BMI) among Bengalee speaking youths of two religious groups using international cut off points [7, 8].

MATERIALS AND METHODS

The present cross-sectional study was conducted in Midnapore at Paschim Midnapore. The study areas are located in the bordering region of Odisha and Paschim Midnapore of West Bengal, India. Midnapore is the southernmost district of the state of West Bengal in India. The population of Midnapore is diverse. The Bengalee castes are predominant in the district. Midnapore, the district head quarter in Paschim Midnapore district is situated about 130 kilometers (approximately) from Kolkata, the provincial capital of West Bengal. This study was carried out during January and February in 2014. Altogether 360 youths (180 boys and 180girls) aged 6 to 16 years were measured. Data were collected after obtaining the necessary approval from the village authorities and consents were taken from each youth. Parents of the youths were informed about the purpose of our study before the commencement of measurement. Ethical clearance was obtained from the necessary authorities prior to the commencement of the study, as a part of the research work of one of the authors (SP). Information on age, religion and gender were collected using a pre-tested questionnaire by house-to- house visit following interview and examination. Weight (kg), height (cm) and mid-upper arm (MUAC) (cm) measurements were taken on each subject by one of the author (SP) following the standard techniques [9]. Body mass index (BMI) was computed following an internationally accepted standard equation as weight in kg divided by square of height in meter. Nutritional status was evaluated using the age- and sex- specific cut-off points of BMI as described by [7, 8]. Grades III, II, and I of thinness refer to severe, moderate, and mild Under-nutrition. Technical errors of measurements (TEM) were found to be within reference values [10] and thus not incorporated in the statistical analyses. Independent sample t-test, One-way ANOVA (F-test), chi-square (x^2) was performed to test for age, sex and difference due to religion in means of weight, height, MUAC and BMI. All statistical analyses were undertaken using the SPSS 16.00 Statistical Package. Weight, height and MUAC measurements were recorded to the nearest 0.5 kg, 0.1 cm and 0.1 cm respectively. Statistical significance was set at $p < 0.05$.

RESULTS

Table 1: Age specific descriptive statistics for weight (kg), height (cm), MUAC (cm) and BMI (kg/m^2) of studied Bengalee children

Age (Years)	Boys (Mean ± SD)				Girls (Mean ± SD)			
	Weight (Kg)	Height (Cm)	MUAC (Cm)	BMI (Kg/m^2)	Weight (Kg)	Height (Cm)	MUAC (Cm)	BMI (Kg/m^2)
6	16.01 ± 2.44	107.16 ± 8.63	14.25 ± 1.16	13.97 ± 1.68	15.24 ± 2.77	108.11 ± 7.27	14.06 ± 1.23	12.98 ± 1.33
7	18.26 ±2.46	116.44 ±5.79	15.36 ±1.70	13.44 ±1.29	17.70 ±3.73	114.15 ±8.20	14.79 ±1.41	13.53 ±2.17
8	18.17 ±2.42	118.47 ±7.65	14.66 ±0.93	13.06 ±2.21	17.04 ±1.76	116.44 ±4.60	14.49 ±1.71	12.60 ±1.53
9	19.37 ±2.42	122.05 ±4.31	15.13 ±0.56	13.04 ±1.87	19.57 ±2.81	121.58 ±5.40	15.39 ±1.19	13.22 ±1.55
10	22.15 ±3.34	128.93 ±7.05	15.71 ±1.42	13.33 ±1.77	22.46 ±3.58	129.31 ±6.36	16.40 ±1.33	13.39 ±1.72
11	26.51 ±4.41	132.37 ±10.03	17.26 ±1.24	15.07 ±1.51	21.56 ±2.46	128.53 ±9.19	16.39 ±1.24	13.12 ±1.64
12	26.91 ±5.04	134.75 ±8.96	16.52 ±1.24	14.73 ±1.77	26.84 ±4.67	142.40 ±5.99	17.42 ±1.54	13.16 ±1.54
13	33.62 ±5.95	144.28 ±9.24	18.77 ±2.10	16.02 ±1.43	33.59 ±5.50	147.36 ±8.85	18.87 ±1.75	15.38 ±1.27
14	36.35 ±6.67	148.38 ±6.92	19.75 ±3.21	16.55 ±3.10	38.02 ±4.84	148.25 ±5.53	20.58 ±0.92	17.27 ±1.68
15	37.17 ±8.31	150.64 ±9.05	19.89 ±2.29	16.29 ±3.33	39.29 ±5.73	150.74 ±4.43	20.48 ±2.23	17.29 ±2.37
16	41.55 ±8.43	156.02 ±10.99	21.93 ±1.76	16.90 ±2.37	42.09 ±6.98	150.36 ±5.09	21.80 ±2.47	18.59 ±2.68
Overall	24.67 ±9.01	128.75 ±16.56	16.53 ±2.66	14.42 ±2.30	24.99 ±10.05	129.47 ±16.66	16.85 ±2.98	14.30 ±2.64
F-Test	52.735***	61.253***	31.250***	7.753***	88.212***	101.945***	45.390***	20.356***

Where; *** Significance at <0.001

Table 1 shows the age and sex specific means and standard deviations of weight (Kg), height (Cm), MUAC (Cm) and BMI (Kg/m^2) of studied Bengalee youths of West Bengal, India. It is clear from the table that overall girls were heavier than boys except for ages (6, 7, 8, 11, 12 and 13) in years. It is also clear from the table that girls were taller than boys except for ages 7, 8, 9, 11, 14 and 16 years. This table also showed that the mean MUAC of girls were greater than boys except for ages 6, 7, 8, 11, 16 and overall, in years. It is clear from the table that the mean BMI of boys were greater than girls except for ages 6, 8, 11, 12, 13, and overall in years. There were significant age differences in weight, height, MUAC and BMI (p< 0.001) of the studied youths.

Table 2: Sex- specific descriptive statistics and t-test of weight (kg), height (cm), MUAC (cm) and BMI (kg/m^2) of studied Bengalee children

Variables	Ethnicity	Boys			Girls			t
		N	Mean	Std. Deviation	N	Mean	Std. Deviation	
Weight in (Kg)	Hindu	76	26.24	10.49	69	23.91	10.12	1.359
	Muslim	104	23.53	7.60	111	25.67	10.00	-1.772
	t		2.012*			-1.142		
Height (Cm)	Hindu	76	131.22	18.20	69	127.80	16.66	1.178
	Muslim	104	126.94	15.08	111	130.51	16.65	-1.646
	t		1.724			-1.063		
MUAC (Cm)	Hindu	76	17.10	3.22	69	16.66	3.27	0.806
	Muslim	104	16.12	2.08	111	16.97	2.79	-2.516**
	t		2.469**			-0.671		
BMI (kg/m^2)	Hindu	76	14.62	2.67	69	14.04	2.70	1.295
	Muslim	104	14.27	1.98	111	14.46	2.60	-0.595
	t		1.006			-1.034		

Where; *Significance at <0.05; **.Significance at <0.01

Table 2 shows the sex and religion specific means, standard deviations and independent sample t-test of weight, height, MUAC and BMI of studied boys and girls. It was found that among boys significant religion difference were observed in weight (t=2.012; p=0.05) and MUAC (t=2.469; p=0.01). Negative significant sex difference is also observed in MUAC (t=-2.516; p=0.01) i.e., overall mean MUAC of girls were more than boys.

Table 3: Prevalence of Under-nutrition/thinness, normal and overweight by age and sex of studied Bengalee children

Age (Years)	Nutritional Status									
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
	Thinness-III		Thinness -II		Thinness -I		Normal		Overweight	
6	20.7	23.8	6.9	23.8	31.0	33.3	37.9	19.0	3.4	0
7	21.1	34.8	21.1	4.3	36.8	17.4	21.1	39.1	0	4.3
8	40.0	45.0	10.0	25.0	30.0	15.0	20.0	15.0	0	0
9	42.1	26.3	21.1	15.8	10.5	42.1	26.3	15.8	0	0
10	32.1	23.8	25.0	28.6	28.6	23.8	14.3	23.8	0	0
11	0	66.7	28.6	11.1	28.6	11.1	42.9	11.1	0	0
12	14.3	52.9	9.5	23.5	52.4	17.6	23.8	5.9	0	0
13	11.1	11.1	0	33.3	22.2	22.2	66.7	33.3	0	0
14	9.1	0	9.1	20.0	45.5	20.0	27.3	60.0	9.1	0
15	20.0	16.7	30.0	11.1	10.0	27.8	30.0	44.4	10.0	0
16	12.5	0	37.5	23.1	0	23.1	50.0	53.8	0	0
Overall	22.2	28.3	16.1	19.4	28.9	23.9	31.1	27.8	1.7	.6.0
Chi-square	x^2= 57.290; df=40; Sig.= 0.037 **(Boys)**					x^2= 54.570; df=40; Sig.= 0.062 **(Girls)**				

The prevalence of age and sex specific nutritional status (BMI based) categories is outlined in Table 3. Overall, among boys, 67.2 % of the subjects were in the thinness category. Among girls, the prevalence of thinness was 71.6 %. Age and sex specific prevalence of thinness among studied youths showed that 10 year old boys (85.7 %) and 11 year old girls (88.9 %) had the highest prevalence of thinness. Significant age differences in nutritional status were observed for boys (x^2= 57.290; df= 40; p< 0.037) only.

Table 4: Sex-combined and ethnic-specific prevalence of Under-nutrition/thinness, normal and overweight by age of studied Bengalee children

Age (Years)	Ethnicity	Nutritional Status					X^2
		Thinness -III	Thinness -II	Thinness -I	Normal	Overweight	
6	Hindu	42.9	19.0	19.0	19.0	0	11.888*; df= 4;
	Muslim	6.9	10.3	41.4	37.9	3.4	
7	Hindu	20.0	20.0	35.0	25.0	0	5.561; df= 4;
	Muslim	36.4	4.5	18.2	36.4	4.5	
8	Hindu	40.0	26.7	26.7	13.3	0	0.944; df=3
	Muslim	46.7	13.3	20.0	20.0	0	
9	Hindu	60.0	20.0	10.0	10.0	0	4.817; df= 3
	Muslim	25.0	17.9	32.1	25.0	0	
10	Hindu	40.0	15.0	30.0	15.0	0	3.600; df=3
	Muslim	20.7	34.5	24.1	20.7	0	
11	Hindu	40.0	0	20.0	40.0	0	2.036; df=3
	Muslim	36.4	27.3	18.2	18.2	0	
12	Hindu	37.5	12.5	25.0	25.0	0	3.033; df=3
	Muslim	27.3	18.2	45.5	9.1	0	
13	Hindu	0	9.1	18.2	72.7	0	3.252; df=3
	Muslim	18.8	12.5	25.0	43.8	0	
14	Hindu	11.1	22.2	22.2	33.3	11.1	4.278; df=4
	Muslim	0	8.3	41.7	50.0	0	
15	Hindu	20.0	10.0	20.0	40.0	10.0	2.395; df=4
	Muslim	16.7	22.2	22.2	38.9	0	
16	Hindu	0	25.0	12.5	62.5	0	0.955; df=3
	Muslim	7.7	30.8	15.4	46.2	0	
Age-combined		(Boys) X^2=4.231, df= 4; Sig.= 0.376			(Girls) X^2=4.634, df= 4; Sig.= 0. 327		

Table 4 shows the sex-combined and ethnicity specific prevalence of nutritional status among the studied youths. Overall prevalence of thinness in Hindu youths was higher (70.3 %) than Muslims (68.8 %). Age

specific prevalence of thinness is also presented in this table; it is clear from table that among Hindus the highest prevalence was observed in 8 years (93.4 %) and among Muslims the highest prevalence was observed in 12 years (91.0 %). There were no significant religious differences in nutritional status among boys and girls.

DISCUSSION

Anthropometry, specifically the BMI, which is considered as an index of overall adiposity and thinness both among youths and adults, is not stable in growing youths. There is steady increase in weight, height and BMI among the Indian youths [11]. The prevalence of Under-nutrition among youths in India varies widely across the districts and states and also across rural and urban areas [12]. Under-nutrition among youths is a serious public health problem internationally, especially in developing countries. A recent study [8] has stated that Under-nutrition is better assessed as thinness (low BMI for age) than as wasting (low weight for height). There were no suitable thinness cut-offs for 2-18 years age group prior to the cited [8] report. Modern cut-off points are suggested to support direct comparison of trends in youth's malnutrition worldwide. Based on the present study, the prevalence of thinness among Bengalee youths of Midnapore clearly indicated that the nutritional situation was very poor with 69.4 % (critical situation) of overall thinness. Girls were thinner (71.6 %) than boys (67.2 %).

Figure 1 (a & b): Age specific comparison of mean weight (kg) of present studied youths with Indian reference (ICMR)
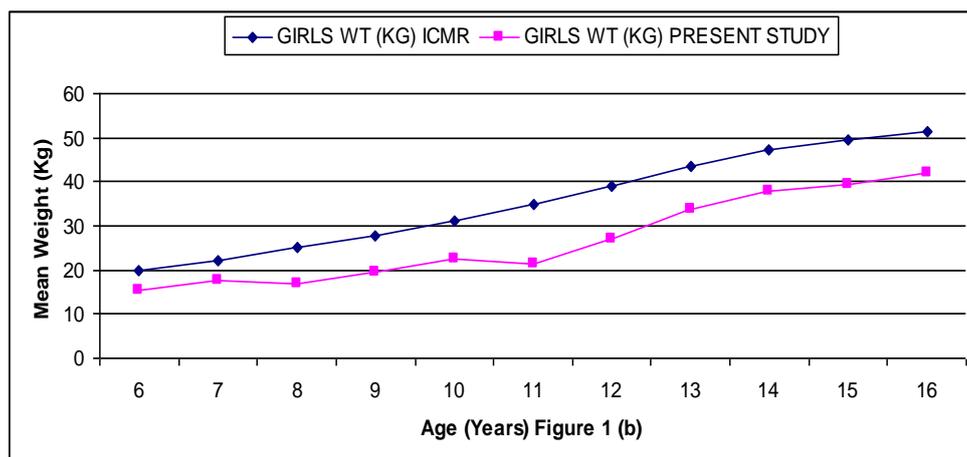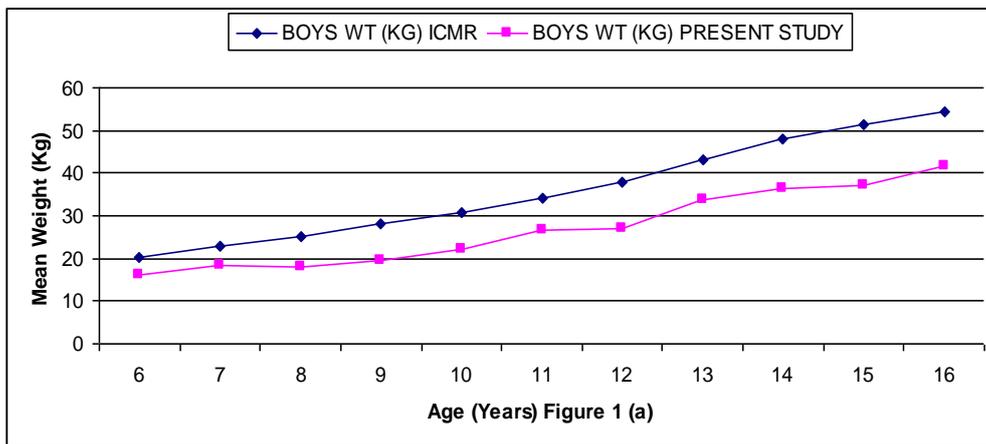
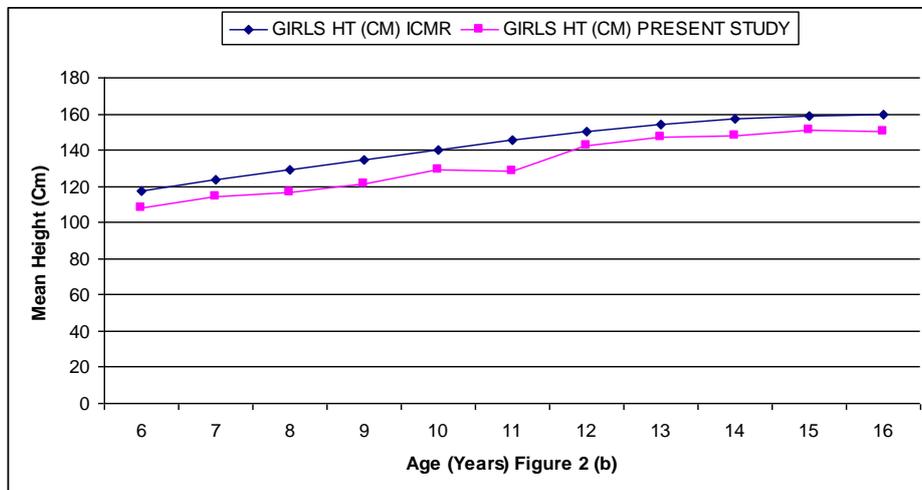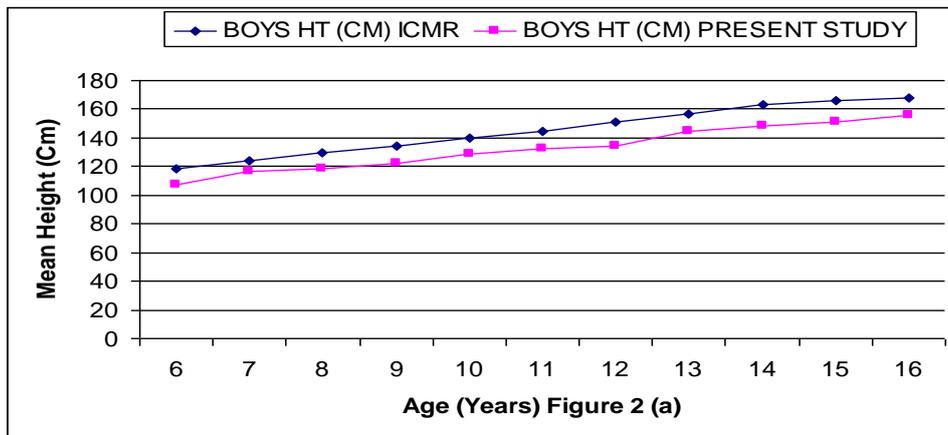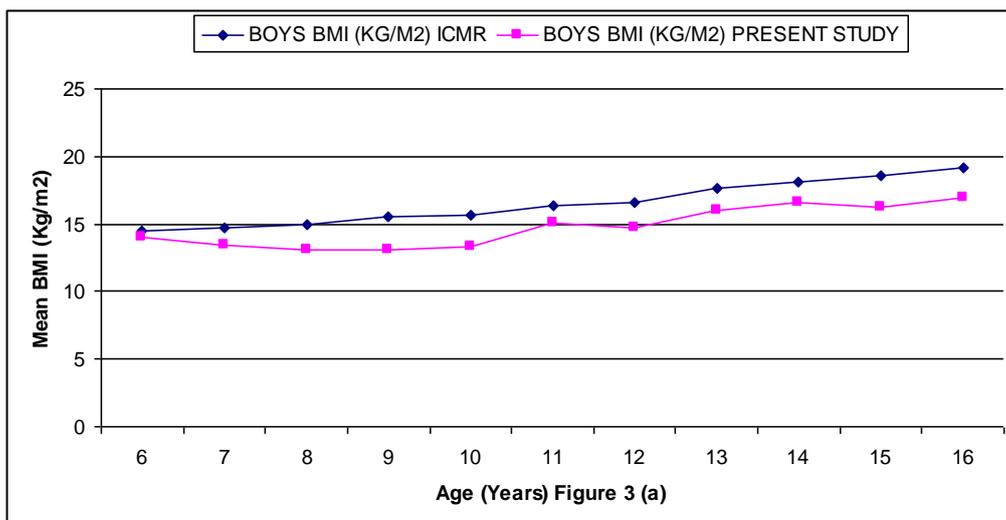**Figure 2 (a & b): Age specific comparison of mean height (cm) of present studied youths with Indian reference (ICMR)**
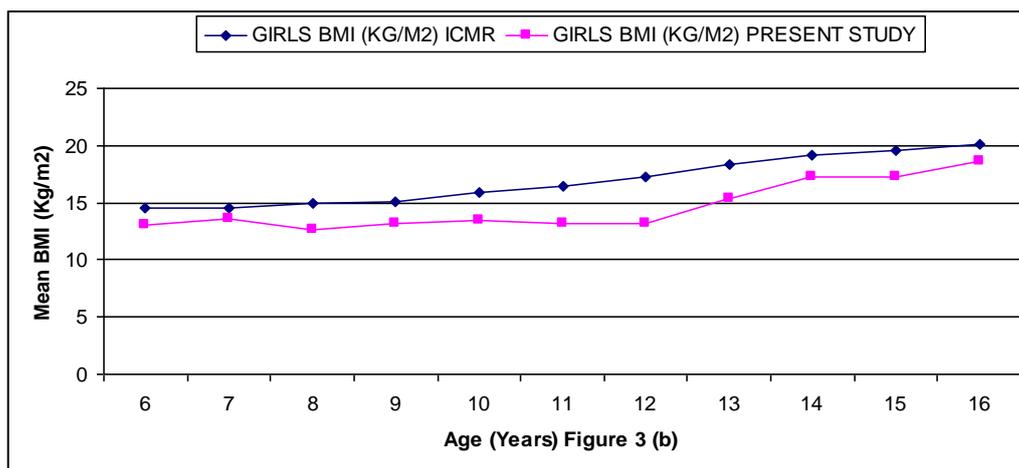

Figure 2 (a)

Figure 2 (b)

Figure 3 (a & b): Age specific comparison of mean BMI (kg/m^2) of present studied youths with Indian reference (ICMR)

Figure 3 (a)

Figure 3 (b)

Figures 1 (a) and (b) shows the age specific comparison of mean weights (kg) of Bengalee youths (boys and girls) aged 6-16 years of Midnapore, West Bengal with Indian reference [11] medians for all ages in both sexes. It is clear from the figures that Bengalee youths were lighter (both boys and girls) than the ICMR reference data. Figures 2 (a) and (b) shows the age specific comparison of mean heights (kg) of Bengalee youths (boys and girls) aged (6-16 years) of Midnapore, West Bengal with Indian reference [11] medians for all ages in both sexes. It is clear from the figures that Bengalee youths were smaller (both boys and girls) than the ICMR reference data. Figures 3 (a) and (b) show the age specific comparison of mean heights (kg) of Bengalee youths (boys and girls) aged (6-16 years) of Midnapore, West Bengal with Indian reference [11] medians for all ages in both sexes. Bengalee youths were more underweight (both boys and girls) than the ICMR reference data. The present study is limited with its small sample size from both communities. Very high rate of thinness among youths might have an impact on their overall health status.

CONCLUSION

The prevalence of CED was very high (critical situation) in present studied population, Intensive efforts should be made to improve the health status and nutrition status among them.

ACKNOWLEDGEMENT

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