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Comparative assessment of nutritional status among children of three tribal populations of Rangamati District, Bangladesh

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Abstract

Bangladesh is a densely populated country of South East Asia that has a rich tribal presence. There are about 58 tribal groups living in different parts of the country. It has 1.2 million tribal people, which is just above one percent of the total population. This paper deals with the assessment of nutritional status through anthropometric indices in children of three tribal populations of Bilaichari Union at Rangamati District. The survey covered a random sample of 210 children among three tribal groups (Tanchangya, Marma, Chakma).This study deals with the assessment of nutritional status through BMI for aged, Weight for age and Height for age among tribal children. Majority of them were thin and lean with medium to short stature. BMI was found among male Chakma (16.94kg/m^2) and Tanchangya female (17.13kg/m^2) of 11-12 age range. The well nourished children among Marma Tanchangya and Chakma were 27.9%, 40.7% and 31.4%. The 1st degree malnourished among three groups was 34%, 29.8% and 36.2%. The 2nd degree malnourished among those three tribal groups was 46.7%.23.3% and 30%. It also revealed that Tanchanga children were better nourished and the Marma children were more 2nd degree malnourished. By analysis of all statically analysis it is clearly seen that, out of 3 tribal groups Tanchangya group are healthier than others but compare to ideal nutritional status none of this tribal groups are well nourished.

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Introduction

Children are important assets of a country because they can play an essential role to provide the human potential required for its development and after all they will be tomorrow's youth. For proper development of children, nutrition plays a crucial factor in the early years of life. Under-nutrition is mainly responsible for dietary inadequacy in relation to children's needs (National Institute of Nutrition, 2003). It is a vital cause with more than half of all child deaths all over the World (Pelletier *et al,* 1995) and is highly prevalent in low and middle income countries. The highest rate of under- nutrition in the world is seen in Asia (WHO, 1999). Here one in two children is malnourished. According to WHO (1998) in South Asia 17% of children, under 5 years of age are wasted (weight for height) and 60% are stunted (height for age). Worldwide 160 million children are underweight (weight for age) with over half of these being in South Asia.

Malnutrition has an adverse effect on physical growth, motor development, capacity to use intellectual endowment, emotional unfolding and personality development (Bhasin and Jain, 2007). Inadequate dietary intake and disease are immediate causes of malnutrition and they underpin one another synergistically (Scrimshaw *et al*., 1968). Poor and insufficient nutrition may lead to malnutrition, morbidity and mortality among children. Malnourished children are more likely to grow into malnourished adults who face sharp risks of disease and death (Sommerfelt, 1998). The worldwide burden of malnutrition and infectious disease is massive, particularly amongst children (Bhasin and Jain 2007). Basic causes of under-nutrition and infections in developing countries are scarcity, poor hygienic surroundings and little access to preventive health care (Mitra, 1985; WHO, 1990).

Human being originates from a unique root. But racial discrimination makes distance from its existence in today's world. Bangladesh has also brought this concept in question at this moment and nowadays the tribal issue is considered a very important issue to focus on. Although we introduce ourselves as uniform national entity, a substantial part of the total population could not unite to a single point. There are many problems of the tribal peoples in our country that needs instantaneous attention and early solution. Knowledge of the nutritional status of a population is necessary as under-nutrition is one of the major health problems in developing countries. Nutritional status of children can be evaluated under three broad headings, namely, clinical, biochemical and anthropometric. For practical purposes, anthropometry is the most useful parameter for assessing the nutritional status of children (WHO, 1986). Based on interrelationships between height, weight and age i.e. weight for age, height for age and weight for height, can be categorized for different forms of Protein-Energy Malnutrition (PEM) i.e. 'normal', 'wasted', 'stunted' (Gomez *et al,*1956). In Bangladesh most of the tribal people have their own geographically isolated life style and are considered as underprivileged. However, information on tribal communities specially (Tanchangya, Marma, Chakma) is extremely scanty and there is no data available on BMI distribution and BMI based nutritional status of these tribal children of Rangamati District of Bangladesh. Considering all these things & to get inside of this serious problem our study was conducted to report about the nutritional status among three tribal groups in Bilaichari Union of Rangamati district, Bangladesh It is obvious that such information that we defined would be indispensable to way out their problems.

Materials and methods

In the present study, data were collected on 210 individuals (Chakma=70, Marma=70 and Tanchangya = 70) aged 5-12 to assess their nutritional status. Anthropometric data were collected following standard techniques (Martin and Saller, 1956). Samples were collected from the place of residence and schools. For the purpose of analysis, the subjects were classified into yearly intervals. A well structured questionnaire was developed to obtain relevant information on anthropometric, demographic and socioeconomic condition of the

studied subject. All questions were designed, pretested, modified and resettled to obtain and record information easily. Anthropometric measurements (i.e. height and weight) were performed according to the standard procedures (Lohman *et. al,* 1988). The weight was measured by using digital scale to the nearest 0.1 kg and height was measured using anthropometer to the nearest of 0.1cm, respectively. BMI was computed using the following standard equation: BMI = Weight (kg) / height (m^2). Based on the interrelationships of height, weight and age: height for age and weight for age has been calculated and accordingly their nutritional status has been determined. Nutritional status such as thinness (Cole *et al.*, 2007) and overweight (Lohman *et al.,* 1988.) was evaluated following the recently published international BMI cut-off points (Marques-Vidal *et al.*, 2008; Jeemon *et a.l*, 2009.). Data were analyzed by using SPSS Version 14.0

Table 1. Age and sex distribution of the studied children.

Age range year	Marma		Tanchangya		Chakma	
	Boys	Girls	Boys	Girls	Boys	Girls
5-6 year	8	7	5	4	12	5
7-8 year	9	6	4	4	7	6
9-10 year	12	9	18	12	6	6
11-12 year	11	8	13	10	15	13
Total	40	30	40	30	40	30
Grand Total	70		70		70	

Table 2 . Comparison of boys and Girls mean height among the Marma, Tanchangya and Chakma Tribal children.

Age range year	**Height (cm) ,(Mean ±SD)**						**p-values**
	Marma boys	Marma girls	Tanchangya boys	Tanchangya girls	Chakma boys	Chakma girls	
5-6 year	104.1±3.87	101.2±3.03	110.6±2.19	105.5±5.68	103.2±6.49	103.5±10.01	
7-8 year	108±3.5	105.5±4.76	119.4±7.68	116.5±4.79	119.5±5.12	118.5±7.09	
9-10 year	127.3±4.41	125.6±7.61	128.7±5.22	127.8±7.75	131.4±4.63	129.7±4.63	.052
11-12 year	139.3±4.07	138.5±4.75	138.8±8.57	137.6±4.97	141.25±9.38	139.8±2.8	

Data are presented as mean±SD (standard deviation). Analysis of data was done by two-way ANOVA. P values were calculated between the groups and within the groups. P > 0.1. Here 10% level of significance has been considered.

Results and discussion

Anthropometry is widely recognized as one of the useful techniques for nutritional assessment as it is highly sensitive to detect under-nutrition (National Institute of Nutrition 2005). These types of measurements are non-expensive, need minimal training and readings are reproducible.

The detail age and sex distribution of the studied children from three tribal groups are given in Table 1. A total of 210 children were studied. Among them 120(57.1%) were boys and 90(42.9%) were girls. Equal subject were taken from each tribal group.

Height may be considered as most representative characteristic of overall growth and development. Table 2 represents the mean height of boys and girls. Males of all tribal groups are taller than the females with few exceptions during preadolescent ages. Chakma girls were comparatively show better heights and among the other tribal groups.

Table 3. Comparison of boys and Girls mean weight among the Marma, Tanchangya and Chakma Tribal children.

Age range year	Weight (Kg) ,(Mean±SD)						p-values
	Marma boys	Marma girls	Tanchangya boys	Tanchangya girls	Chakma boys	Chakma girls	
5-6 year	14±1.41	14.3±1.6	17.4±2.07	14±1.41	14.71±0.77	14.2±0.83	0.135
7-8 year	17.5±1.78	15.7±1.63	20.3±3.86	17.9±3.20	21.7±3.77	18.2±3.06	
9-10 year	25.8±3.02	26.2±2.68	27.5±2.17	26.8±3.99	28.67±1.63	26.7±3.61	
11-12 year	33.4±3.47	35.1±3.52	33.5±3.68	32.3±2.45	32.57±6.83	30.3±1.89	

Data are presented as mean±SD (standard deviation). Analysis of data was done by two-way ANOVA. P values were calculated between the groups and within the groups. P > 0.05.

Table 4. Comparison of boys and Girls Average BMI among the Marma ,Tanchangya and Chakma Tribal children.

Age range year	Avg.BMI ±SD (Marma)		Avg.BMI ±SD (Tanchangya)		Avg.BMI ±SD (Chakma)		p-values
	Boys	Girls	Boys	Girls	Boys	Girls	
5-6 year	13.54±1.26	14.05±0. 36	14.22±1.64	12.6±0.40	13.9±1.47	13.55±2.01	0.946
7-8 year	15.72±1.57	13.83±0.64	14.9±1.46	13.9±2.01	13.5±1.46	14.95±0.98	
9-10 year	15.9±1.05	16.63±2.51	16.18±0.93	16.53±1.55	16.32±1.55	16.1±1.13	
11-12 year	16.43±1.19	16.5±1.07	16.45±0.94	17.13±0.81	16.94±1.64	16.3±0.66	

Data are presented as mean±SD (standard deviation). Analysis of data was done by two-way ANOVA. P values were calculated between the groups and within the groups.

Table 3 focused the mean weights of boys and girls of the study group. This table revels that 5-12 years aged males are heavier than their female counterparts. At higher ages Chakma boys and girls become heavier than other two groups. The poorest weight status is seen in Marma girls.

Table 4 and Fig. 1 represents the comparison of BMI among Chakma, Marma and Tanchangya children. BMI is extensively used as a measure of fatness, or the nutritional status of populations in both developed and developing countries (Khongsdier, 2001). For 5 to 6 year age children BMI range is very low than other age groups. Most of the boys of this age group are not well nourished and they are suffering from under nutrition. Well nutrition level (16.43kg/m^2 -16.94kg/m^2) is seen among 11 to 12 years kids. On the whole Chakma boys are healthier than other two groups. Previous studies suggest that body fat composition varies considerably between ethnic groups (Norgan, 1994; Gallagher *et al.,* 2000).

Most of the female offspring of 5 to 6 year age group is not well nourished and they are suffering from under nutrition. 9 and 10 years aged female children have normal nutritional level. Well nutrition level is

also seen among 11 to 12 years female children. There is no significance difference of BMI among three groups of female kids.

Table 5. Comparison of boys and Girls Weight for Age among the Marma ,Tanchangya and Chakma Tribal children.

Category of Nutritional status	Weight for Age within Marma		Weight for Age within Tanchangya		Weight for Age within Chakma		P-values
	Boys	Girls	Boys	Girls	Boys	Girls	
Well Nourished (>1SD to + 2SD)	17(42.5%)	7(23.4%)	18(45.0%)	17(56.7%)	11(27.5%)	16(53.3%)	0.818
Mild Underweight (-1SD to -1.99SD)	20(50%)	12(40%)	19(47.5%)	9 (30.0%)	23(57.5%)	11(36.7%)	
Moderate Underweight (-2SD to -2.99SD)	3(7.5%)	11(36.6%)	3(7.5%)	3(10.0%)	6(15.0%)	3(10.0%)	
Severe Underweight (<-3SD)	0	0	0	1(3.3%)	0(0)	0(0)	

*Figures in the parentheses indicate the percentage

Analysis of data was done by two-way ANOVA. P values were calculated between the groups and within the groups.

Table 6. Comparison of boys and Girls Height for Age among the Marma ,Tanchangya and Chakma Tribal children.

Category of Nutritional status	Height for Age within Marma		Height for Age within Tanchangya		Height for Age within Chakma		P-values
	Boys	Girls	Boys	Girls	Boys	Girls	
Well Nourished (>1SD to + 2SD)	21(52.5%)	10(33.3%)	24(60.0%)	13(42.5%)	15(37.5%)	19(63.3%)	0.819
Mild Stunted (-1SD to -1.99SD)	13(32.5%)	9(30%)	12(30%)	14(46.7%)	16(40%)	3(10.0%)	
Moderate Stunted (-2SD to -2.99SD)	4 (10%)	7(23.3%)	3(7.5%)	2(6.7%)	9(22.5%)	8(26.7%)	
Severe Stunted (<-3SD)	2(5.0%)	4(13.4%)	1(2.5%)	1(4.1%)	0(0%)	0(0%)	

*Figures in the parentheses indicate the percentage

Analysis of data was done by two-way ANOVA. P values were calculated between the groups and within the groups.

Weight for age is considered as an index of current nutritional status. The percentage prevalence of weight for age has been shown in table-5. The Chakma girls were better nourished among the other tribal groups. 42.5% Marma boys and 45% girls were well nourished according to weight for age z-score. 50% boys and 40% girls were mild underweighted. 7.5% boys and 36.6% girls were moderate underweighted. There were no severe underweight boys and girl in Marma groups. In case of

Tanchangya ,45 % boys and 56% girls were well nourished according to weight for age z-score. 47.5% boys and 30% girls were mild underweighted. 7.5% boys and 10 % girls were moderate underweighted. 3.3% Tanchangya girls were severe underweighted. There were no severe underweight boys in Tanchangya group. 57.5% Chakma boys and 53.3% girls were well nourished according to weight for age z-score. 27.5 % boys and 36.7% girls were mild underweighted. 15% boys and 10 % girls were moderate underweighted. There were no severe underweighted boys and girl in Chakma groups.

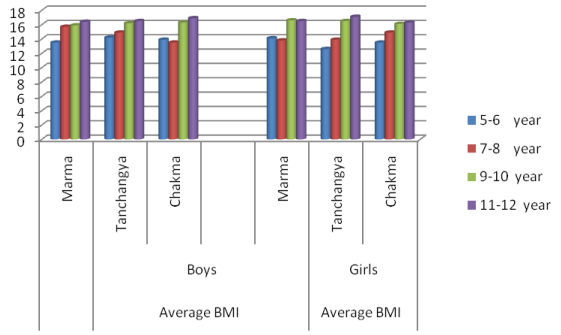

Fig. 1. BMI comparison chart (Boys and girls) in three tribal groups.

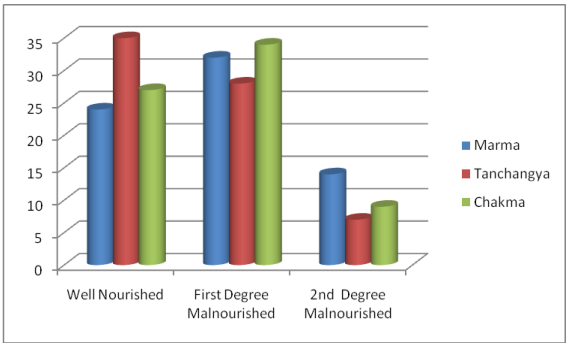

Fig. 2. Comparison of nutrational status among the Marma, Tanchangya and Chakma Tribal children

Table 6 shows a comparative picture of nutritional status according to height for age i.e. stunted between boys and girls in Marma, Tanchangya and Chakma communities. The Chakma girls were more well nourished among the other tribal groups .52.5% Marma boys and 33.3% girls were normal heighted and rest were stunted. In case of boys 32.5%, 10%, 5% were mild, moderate and severe stunted. On the other hand 30%, 23.3%, 13.4% girls were mild, moderate and severe stunted respectively.

It also revealed that 60% Tanchangya boys and 42.5% girls were normal heighted and rest were stunted. The mild, moderate and severe stunted Tanchangya boys were 30%, 7.5% and 2.5% respectively. In case of girls it was 46.7%, 6.7% and 4.1% respectively. The boys had more normal height than girls. 37.5% Chakma boys and 63.3 % girls had normal height and rests were stunted. The mild and moderate stunted Chakma boys were 40%, 22.5% respectively. In case of Chakma girls it was 10%, 26.7% respectively. The girls had more normal height than boys.

Figure 2 revels the overall nutritional status the studied children. 27.9% Marma, 40.7% Tanchangya and 31.4% Chakma children were well nourished. 34% Marma, 29.8% Tanchangya and 36.2% Chakma were suffering from 1st degree malnourishment .Among these tribal groups 46.7% Marma.23.3% Tanchangya and 30% Chakma were 2nd degree malnourished. It also reveals that Tanchanga children were better nourished and the Marma children were more 2nd degree malnourished.

In this study the two-way analysis of variance (ANOVA) has been performed. From table 2, it has been found that at 10% level of significance the p-value is significant. That means there is a significant relationship between height and different age groups. That is as age plays an important role for increasing height. This result is very much logical in the context of general sense. Because it is expected that up to the certain age, as age increases then height also increases.

But from table 3, 4, 5 and from table 6 it has been found that there is no significant association between mean height of three tribal groups and four different age categories. Because all of the p-values are highly insignificant at 5% level of significance. This result is not logical in the context of general sense. That means in these three tribal groups the children has been considered as malnourished.

Referring back to table 3, it can be concluded that as age increases of tribal children but their weight is not increased. Even from table 4 showed that there is no significant association between average BMI of tribal children and their different age groups.

Referring back to table 5, it can be interpreted that weight has no significant influence on the nutritional categories. The same result has been found in table 6. That means height does not play a significant role regarding nutritional status of the tribal children.

So, we can summarize our result in such a way that the tribal children have been suffering from malnutrition and they have serious nutritional deficiency. This may be due to the fact that the tribal people have no adequate knowledge regarding nutrition and health. Moreover they are so poor. That is why they are far from the light of development as well from good health.

These results may, therefore, only be delegated of a small community and not representative of the country. To obtain a broader representation more studies among these three tribal groups from other districts of our country should be undertaken. Other information like dietary intake, morbidity and health studies should also be collected. Hence there is a need for successful execution of valuable health and nutritional endorsement programs among the studied populations for decreasing under nutrition and overall improvement of tribal populations in these areas with unique focus on children.

Conclusion

The present study is an attempt to assess the nutritional status of the tribal people in Rangamati District. Out of three tribal groups Tanchangya group are healthier than others but compare to ideal nutritional status none of this tribal groups are well nourished. From the viewpoint of low nutritional status, they require immediate interference as 50 to 70 percent of their population fall under chronic energy deficient grades. Performing the ANOVA, it can also be concluded that the tribal children are far from good and sound health. So, tribal children have been considered as malnourished.

Poor nutritional status or malnutrition cannot be overcome by 'simply' improving access to an adequate diet. This would only solve one or a part of the problem. Diseases and infections, poor maternal health and childcare practices may be as important a cause of malnutrition as inadequate food intake. Solutions are not found on one level only. Different levels need to improve at the same moment. In our country the socio-economic status of the tribal people are substantially lower than the general people. All the governmental and nongovernmental organizations working for the tribal people could take momentous steps to recover the above-mentioned status of the concerned community.

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