



A Comparative Study of Growth and Nutritional Status between Tribal and Non-tribal Girls of Tripura

Shilpi Saha¹ and Samir Kumar Sil²

*Department of Human Physiology, Tripura University (A Central University),
Suryamaninagar 799 022, Tripura, India*

E-mail: ¹<shilpisaha_07@yahoo.com>, ²<s_k_sil@yahoo.com>

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ABSTRACT The present cross-sectional study was carried out to evaluate physical growth, percentage of fat mass and the nutritional status of 1403 school going Chakma tribal and non-tribal Bengali girls (703 Chakma tribal and 700 Bengali girls) aged 6 to 18 years from Dhalai, North, Unokoti, Gomoti and South District of Tripura. Physical growth was assessed by using four standard anthropometric measurements like height, weight, triceps and subscapular skinfolds. The stratified multistage cluster random sampling method was employed for selecting the subject from different schools of rural areas of Tripura. The nutritional status in terms of stunting (Height < 3rd percentile), thinness (BMI < 5th percentile) and overweight (BMI > 85th percentile) were measured by the classification of World Health Organization, using the WHO growth reference data of 2007. The present study revealed that 16.14 percent non-tribal and 15.64 percent tribal children were stunted. The overall prevalence of thinness was 11.29 percent for non-tribal and 3.70 percent for tribal, while 0.71 percent non-tribal and 1.85 percent tribal girls were overweight. Chakma tribal girls have greater percentage of fat mass than the non-tribal Bengali girls in the order of 2.13 percent and 2.08 percent respectively which is found to be statistically significant. This study revealed that both underweight and overweight coexisted among the tribal and non-tribal girls of Tripura, although the prevalence of overweight was not so high. Prevalence of undernutrition of the present study population may be attributed due to low socio-economic status, improper dietary intake, uneducated parents, gender discrimination and large family size etc.

INTRODUCTION

Growth is an increase in the entire size of the body or the size achieved by specific parts of the body (Malina et al. 1990). The physical growth of children provides an excellent measure of their health and nutrition while the average values of their weights and heights reflect the state of a nation's public health and the average nutritional status of its citizens (Tanner 1966). The process of human growth (both pre-natal and post natal) is influenced by the interaction of endogenous factors like genetics, hormones and exogenous factors such as nutrition, disease, environment and physical activity etc. Growth is influenced by the gene through the control of the production of different enzymes needed for all the chemical reactions that are

necessary for building up and maturation of various cells and systems (Rona 1981). All of these interacting factors "are influenced by the [ecological] environment they are embedded in and by changes in this environment" (Curtis et al. 2005). Malnutrition leads to ill health and reduces physical growth and mental retardation causing loss of productivity and imposes a barrier to socio-economic and national development. Adequate and proper nutrition is the chief requirement from the very beginning of life and at every stage.

There are several indicators or different measurements for evaluation of nutritional status which can be divided into direct and indirect methods. Dietary assessment at state level done by food balance sheet and at household level it has done by Recall method, weighing method and duplicate portion analysis method. At individual level 24 hour recall method, food frequency questionnaire, duplicate portion analysis and weighing methods are usually applicable. Among all types of measurements, anthropometry is a direct indicator for assessing nutritional status. Characteristics of anthropometric mea-

Address for correspondence:

Smt. Shilpi Saha
Department of Human Physiology,
Tripura University (A Central University),
Suryamaninagar 799 022, Tripura, India
E-mail: shilpisaha_07@yahoo.com

surements of individuals and populations are simple and strong predictor of future and present ill health, functional impairment, morbidity and mortality. Anthropometry uses measurements of the physical dimensions and the gross composition of the body and also provides information on chronic protein and energy imbalances.

In India, malnutrition is caused by multiple factors. The immediate causes are diseases and inadequate intake of food. The underlying causes of undernutrition include the incapability of households to grow and/or purchase sufficient food for their needs; poor maternal and child-care practices, including inadequate breastfeeding and complementary feeding for infants and young children and inadequate provision of food for adolescent girls, pregnant and lactating women.

The ethno-linguistic composition of the population of India is highly diverse that are subdivided into numerous sub groups, castes and tribes. India has a variety of tribal communities that constitute about 8.6 percent of total population (Census of India 2011), probably the largest tribal community population in the world. Although, a number of regional studies are available on growth and nutritional status among various populations of India, but limited studies have been carried out from North-eastern part of India (Gaur and Singh 1995; Khongsdier and Mukherjee 2003; Khongsdier 2005; Singh and Sengupta 2007; Bhasin et al. 2008; Sil et al. 2011; Marken and Varte 2012; Longkumer 2013; Saha et al. 2017). However, information on the Chakma tribal and non-tribal Bengali children of Tripura is extremely scanty and there is no published literature on anthropometric characteristics and nutritional status. In this study, the comparative analysis of growth pattern and nutritional status between tribal and non-tribal girls of Tripura was assessed.

MATERIAL AND METHODS

A cross-sectional study was carried out among the Chakma tribal and non-tribal Bengali girls aged 6 to 18 years of class one to class twelve in Dhalai, North, Unokoti, Gomoti and South district of Tripura. A sample of 700 tribal and 703 non-tribal school girls was selected by cluster random sampling procedure. Mothers of the girls were included as respondents. A pre-tested questionnaire was developed which in-

cluded some baseline information of the parents and the children in regards to nutrition. The age of every student was recorded from school registrar and their birth certificate. All the data were collected after getting the consent from their parents and school authorities. Decimal age calendar was used to determine the student's decimal age by subtracting the date of birth from the date of data collected. The subjects in various age groups were classified by following the same principle. Other general information regarding their socio-economic condition was also recorded. According to modified Kuppuswamy scale the socio-economic status of all the children were low (Mishra and Singh 2003). Height was measured by an anthropometer rod (GPM Swiss made) with the head held in the Frankfort horizontal plane and recorded to the nearest 0.1cm. Weight of the subject, wearing minimum clothing and with bare feet, was taken in the early morning (empty stomach) using a portable weighing machine (Libra) to the nearest 0.5 kg. Body Mass Index (BMI) was calculated by dividing body weight with standing height (kg/m^2). Skinfold thickness was measured using the Holtain skinfold caliper with a constant spring pressure of 10g mm^{-2} on the right side of the body. Average of the three reading in single location was accepted.

The intra-observer technical error of measurement (TEM) was calculated to determine the accuracy of the measurements by the standard procedure of Ulijaszek and Kerr (1999). The TEM was calculated using the following equation:

$\text{TEM} = \sqrt{(\sum D^2/2n)}$, [D= difference between the measurements, n=number of individuals].

Double measurements from the same number of subjects ($n=10$) had been taken by the same measurer (myself) with six hours of difference. The corresponding calculated values of intra observer showed that, all the measurements were within the normal range of errors reported in literatures (Malina et al. 1987; Frisancho 1990; Ulijaszek and Kerr 1999).

According to the World Health Organization (WHO 1995) classification, each of the student were classified into three levels of malnutrition that is, stunting, thinness and overweight by applying WHO growth reference data for 5-19 years (WHO 2007).

Three biological parameters of the adolescent growth spurt, viz. mean age at maximum increment, mean peak velocity and mean final

size have been estimated by fitting Preece-Baines growth model 1 (Preece and Baines 1978) to the cross-sectional mean of height and weight.

RESULTS

Table 1 shows that 87.77 percent fathers are educated in tribal children family and 84.57 percent are educated in non-tribal family. 14.08 percent and 10.14 percent fathers are engaged in Govt. or private job in tribal and non-tribal family respectively. Data also showed that the per capita monthly expenditure of tribal family is high in comparison with non-tribal family.

Table 1: Socio-economic characteristics of Chakma tribal and non-tribal Bengali girls.

Socio-economic attributes	Chakma tribal girls f (percent)	Bengali girls f (percent)
<i>Fathers' Education</i>		
Illiterate (no schooling)	86 (12.23)	108 (15.43)
Primary	211 (30.0)	227 (32.43)
Madhyamik	295 (41.96)	265 (37.86)
Higher secondary	82 (11.66)	78 (11.14)
Graduate and above	29 (4.13)	22 (3.14)
<i>Fathers' Occupation</i>		
Govt. or Private job	99 (14.08)	71 (10.14)
Business	140 (19.91)	111 (15.86)
Manual worker	325 (46.23)	358 (51.14)
Farmer	123 (17.50)	152 (21.71)
Unemployed	16 (2.28)	8 (1.14)
<i>Per Capita Monthly Expenditure (Indian Rupees)</i>		
1001-2000	372 (52.92)	389 (55.58)
1001-2000	372 (52.92)	389 (55.58)
2001-3000	221 (31.44)	201 (28.71)
30001-5000	35 (4.98)	22 (3.14)
>5000	18 (2.56)	10 (1.43)

Among the study population moderate and sufficient duration of consumption of various types of fishes by the tribal families were higher than non-tribal families. But minimum duration of fish intake were 17.5 percent more in non-

tribal families and families with no intake of fishes were almost similar among the two types of families. In both tribal and non-tribal families duration of meat consumption was very low which were 84 percent and 71.5 percent respectively. It also assumed that meat consumption in tribal families' comparatively more than non-tribal (Table 2).

In comparison with Bengali girls the mean weight of Chakma girls has considerably increased at all ages except the age of 13 years (Table 3). Mean values of body weight of two communities are compared with International and National reference. The following figures shows that the Chakma and Bengali girls show similar growth pattern (body weight) but below the Indian Council of Medical Research (ICMR 1989), WHO growth reference (WHO 2007) and IAP growth reference (Khadilkar et al. 2015). However, at late adolescence period (16-18 years) the mean body weights of Chakma girls are well above with IAP reference (Fig. 1).

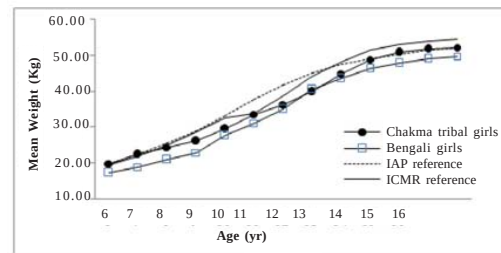


Fig. 1. Mean weight of tribal and non tribal girls in relation to the reference data

Mean values of standing height of two community are compared with International and National reference. The figures given show that the growth pattern (standing height) of the Chakma and Bengali girls are similar but below the Indian Council of Medical Research (ICMR 1989), WHO growth reference (WHO 2007) and IAP growth reference (Khadilkar et al. 2015). However, at ear-

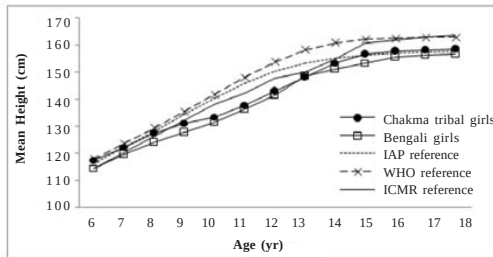
Table 2: Distribution of the families by the duration of fish and meat consumption in a week

Food items	Duration of food consumption per week							
	No		Minimum		Moderate		Sufficient	
	Tribal (%)	Non tribal (%)	Tribal (%)	Non tribal (%)	Tribal (%)	Non tribal (%)	Tribal (%)	Non tribal (%)
Fish	6.8	4.1	50.2	67.7	30.3	20.3	12.4	7.8
Meat	8.7	15.1	84.0	71.5	6.3	13.4	2.0	0.0

Table 3: Statistical constants of weight and height between school-going Chakma tribal and non-tribal Bengali girls of Tripura.

Age (years)	N	Chakma tribal girls		N	Bengali girls	
		Weight (Mean±SD)	Height (Mean±SD)		Weight (Mean±SD)	Height (Mean±SD)
6	55	19.85±2.32	117.58±6.04	55	17.32±2.12	114.66±5.58
7	54	22.50±2.34	122.40±5.69	55	18.93±1.87	119.78±5.35
8	51	24.38±2.86	127.46±5.14	54	20.85±1.99	124.18±5.51
9	52	26.16±3.18	131.33±6.23	54	22.93±2.57	127.76±5.63
10	53	29.44±4.84	133.62±5.04	52	27.53±4.21	131.63±4.98
11	51	33.57±5.23	138.01±6.29	55	31.14±4.82	136.24±4.89
12	50	36.36±5.43	142.95±6.43	53	34.90±5.96	141.75±6.25
13	54	39.75±5.90	148.21±7.06	51	40.43±5.08	148.57±5.57
14	54	44.86±5.75	153.63±6.38	52	43.56±5.57	151.24±5.42
15	59	48.76±4.33	156.82±5.03	57	46.22±5.49	153.63±4.79
16	60	50.82±4.29	157.78±5.64	53	47.75±5.44	155.54±4.73
17	50	51.74±5.78	158.35±6.50	57	48.86±5.24	156.43±4.62
18	60	52.12±4.71	158.65±5.17	52	49.73±4.59	156.81±4.28

ly (6-8 years) and late adolescence period (15-18 years) the mean standing height of Chakma girls are well above than the IAP reference and ICMR reference respectively (Fig. 2).

**Fig. 1. Mean standing height of tribal and non tribal girls in relation to the reference data**

Mean age at maximum increment for body weight is found to be 1.39 years earlier and mean final body weight is 2.4 kg lighter in the Bengali girls when compared with the Chakma girls (Table 4). Mean age at maximum increment for standing height is found to be 0.82 years earlier and mean final standing height is 1.9 cm shorter in the Bengali girls when compared with the Chakma girls (Table 5).

Percentage of body fat mass is assessed in pre-pubertal and pubertal girls for the two study populations derived from the summation of triceps and subscapular skinfold thickness (Slaughter et al. 1988). The results show that for both pre-pubertal and pubertal ages, Chakma girls have greater percentage of fat mass than the Bengali girls in the order of 2.13 percent and

Table 4: Average biological parameters (mean) of the adolescent growth spurt of body weight in study populations estimated from Preece-Baines growth model 1

Model parameters	Chakma girls Mean (SE)	Bengali girls Mean (SE)
h0	52.87 (0.66)	50.47 (0.59)
h1	43.28 (0.80)	35.31 (1.89)
theta	13.61 (0.23)	11.93 (0.45)
s0	0.07 (0.01)	0.02 (0.01)
s1	0.83 (0.12)	0.5821 (0.07)
Biological parameters		
Mean age at take-off (year)	7.73 (1.11)	6.35 (2.57)
Mean age at peak velocity(kg/year)	13.04 (0.06)	11.65 (0.05)
Mean final body weight (kg)	52.87 (0.44)	50.47 (0.35)

Table 5: Average biological parameters (mean) of the adolescent growth spurt of standing height in study populations estimated from Preece-Baines growth model 1

Model parameters	Chakma girls Mean (SE)	Bengali girls Mean (SE)
h0	158.5 (0.29)	156.6 (0.48)
h1	150.5 (0.34)	146.8 (0.85)
Theta	13.38 (0.10)	12.89 (0.21)
s0	0.13 (0.01)	0.11 (0.01)
s1	1.29 (0.12)	0.95 (0.13)
Biological parameters		
Mean age at take-off (yr.)	9.83 (0.07)	8.52 (0.42)
Mean age at peak velocity (cm./yr.)	12.94 (0.02)	12.12 (0.08)
Mean final standing height (cm.)	158.5 (0.08)	156.6 (0.23)

2.08 percent respectively which is found to be statistically significant (Table 6). Percentage of body fat mass increased 11.33 percent in Chakma girls and 11.38 percent among Bengali girls during pre-pubertal to pubertal maturation.

Table 7 shows that the overall prevalence (all age combined) of stunting assessed by height for age <3rd percentile of WHO growth reference (WHO 2007), using WHO criteria (WHO 1995) is higher in Bengali girls (16.14%) than Chakma girls (15.64%). When the age wise prevalence of thinness is considered, the highest prevalence is observed to be 25.49 percent among 13 years old Bengali girls and 42 percent among 12 years old Chakma girls. The age wise lowest prevalence is observed to be 1.67 percent (18 years) among Chakma girls and 7.27 percent (6 years) among Bengali girls. The age specific prevalence of stunting between the two communities is statistically significant ($p < 0.05$) at age group 12 years.

Again, the overall prevalence of stunting, estimated by using the criteria height for age <-2 Z score (WHO 1995), is found to be higher in

Bengali girls (13.14%) than Chakma girls (12.8%). The overall prevalence of stunting assessed by height for age <3rd percentile of IAP growth reference (Khadilkar et al. 2015) using WHO criteria (WHO 1995) is higher in Bengali girls (5.29%) than Chakma girls (4.69%).

Table 8 shows that the overall prevalence (all age combined) of thinness assessed by BMI for age <5th percentile of WHO growth reference (WHO 2007), using WHO criteria (WHO 1995) is higher in Bengali girls (11.29%) than Chakma girls (3.7%). When the age wise prevalence of thinness is considered, the highest prevalence is observed to be 27.78 percent among 9 years old Bengali girls and 14.81 percent among 13 years old Chakma girls. The age wise lowest prevalence is observed to be 1.85 percent (7 years) among Chakma girls and 3.51 percent (17 years) among Bengali girls. Zero prevalence is observed at the age 15 to 17 years among Chakma girls and 15 and 18 years among Bengali girls. The age specific prevalence of thinness between the two communities is statistically significant ($p < 0.05$) at age group 7 and 9 years.

Table 6: Changes in percentage of body fat mass (Slaughter et al. 1988) of pre-pubertal and pubertal girls of two study population

Skinfold sites	Maturation stages	Chakma girls				Bengali girls				p-value
		N	Mean	SD	SE	N	Mean	SD	SE	
Triceps + Subscapular	Pre-pubertal	345	15.35	3.80	0.21	333	13.22	3.82	0.21	*
	Pubertal	358	26.68	7.18	0.38	367	24.60	6.23	0.33	*

* p value < 0.01

Table 7: Changes in age-specific prevalence of stunting in study populations using WHO growth reference (WHO 2007)

Age	Chakma girls			Bengali girls			Chi-square value	p-value
	N	Frequency	Percent	n	Frequency	Percent		
6	55	3	5.45	55	4	7.27	0.14	0.705
7	54	2	3.70	55	5	9.09	1.29	0.257
8	51	2	3.22	54	6	11.11	2.00	0.157
9	52	5	9.62	54	9	16.67	1.14	0.285
10	53	13	24.53	52	13	25.00	0	1.000
11	51	18	35.29	55	14	25.45	0.50	0.480
12	50	21	42.0	53	10	18.86	3.90	*
13	54	17	31.48	51	13	25.49	0.53	0.465
14	54	7	12.96	52	13	25.0	1.80	0.180
15	59	6	10.17	57	14	24.56	3.20	0.074
16	60	7	11.67	53	3	5.66	1.60	0.206
17	50	8	16.00	57	5	9.43	0.69	0.405
18	60	1	1.67	52	4	7.69	1.80	0.180
Total	703	110	15.64	700	113	16.14	0.04	0.841

* p value < 0.05

Table 8: Changes in age-specific prevalence of thinness in study populations using WHO growth reference (WHO 2007)

Age	Chakma girls			Bengali girls			Chi-square value	p-value
	N	Frequency	Percent	n	Frequency	Percent		
6	55	2	3.64	55	8	14.55	3.60	0.058
7	54	1	1.85	55	14	25.45	11.27	*
8	51	2	3.92	54	6	11.11	2.00	0.157
9	52	3	5.77	54	15	27.78	8.00	*
10	53	2	3.77	52	8	15.38	3.60	0.058
11	51	1	1.96	55	6	10.91	3.58	0.059
12	50	2	4.0	53	8	15.09	3.60	0.058
13	54	8	14.81	51	3	5.88	2.28	0.132
14	54	3	5.56	52	5	9.62	0.50	0.480
15	59	0	0.00	57	0	0.00	-	-
16	60	0	0.00	53	4	7.55	-	-
17	50	0	0.00	57	2	3.51	-	-
18	60	2	3.33	52	0	0.00	-	-
Total	703	26	3.70	700	79	11.29	26.76	*

*p value<0.05

The overall prevalence of thinness assessed by BMI for age <5th percentile of IAP growth reference (Khadilkar et al. 2015) using WHO criteria (WHO 1995) is higher in Bengali girls (3.14%) than Chakma girls (0.14%). According to the BMI classification criteria proposed by Cole et al. (2007), the overall prevalence of thinness is observed 11.52 percent among Chakma girls and 26.71 percent among Bengali girls

Table 9 shows that the overall prevalence (all age combined) of overweight assessed by BMI for age>85th percentile of WHO growth reference (WHO 2007), using WHO criteria (WHO 1995) is higher in Chakma girls (1.85%) than Ben-

gali girls (0.71%). When the age wise prevalence of overweight is considered, the highest prevalence is observed 3.84 percent and 7.55 percent at the age of 10 years for the Chakma and Bengali girls respectively. At the age 9, 13 to 18 years all the Chakma girls are normal while 6 to 9 years, 13 to 15 years and 17, 18 years all the Bengali girls are normal. However, age specific prevalence of overweight between the girls of two populations is found to be statistically insignificant.

The overall prevalence of overweight assessed by BMI for age>23rd adult equivalent percentile of IAP growth reference using IAP criteria (Khadilkar et al. 2015) is lower in Bengali

Table 9: Changes in age-specific prevalence of overweight in study populations using WHO growth reference (WHO 2007)

Age	Chakma girls			Bengali girls			Chi-square value	p-value
	N	Frequency	Percent	n	Frequency	Percent		
6	55	1	1.82	55	0	0.0	-	-
7	54	1	1.85	55	0	0.0	-	-
8	51	1	1.96	54	0	0.0	-	-
9	52	0	0.0	54	0	0.0	-	-
10	53	4	7.55	52	2	3.84	0.67	0.414
11	51	3	5.88	55	1	1.82	1.00	0.317
12	50	3	6.00	53	1	1.89	1.00	0.317
13	54	0	0.0	51	0	0.0	-	-
14	54	0	0.0	52	0	0.0	-	-
15	59	0	0.0	57	0	0.0	-	-
16	60	0	0.0	53	1	1.89	-	-
17	50	0	0.0	57	0	0.0	-	-
18	60	0	0.0	52	0	0.0	-	-
Total	703	13	1.85	700	5	0.71	3.56	0.059

*p value<0.05

girls (2.14%) than Chakma girls (3.84%). Using IOTF classification (Cole et al. 2000) all ages combined prevalence of overweight (25 kg/m^2) is found to be 0.57 percent among Chakma girls and 0.85 percent among Bengali girls. The overall prevalence of obesity assessed by BMI for age $>27^{\text{th}}$ adult equivalent percentile of IAP growth reference using IAP criteria (Khadilkar et al. 2015) is found to be 0.28 percent only in the Chakma girls, which may be considered as negligible.

Using IOTF classification (Cole et al. 2000) no prevalence of obesity has been observed for both the comparing populations.

DISCUSSION

The present cross-sectional study is a comparative analysis between two populations, living in a common boundary of Tripura. They are compared in respect to the different parameters related to the measures of physical growth, body composition and nutritional status. This study attempts to also evaluate the role of several socio-economic and environmental factors affecting these traits in these two comparing tribal and non-tribal populations.

In the measures of physical growth between the populations, the Chakma girls are found to be greater averages at the ages of early and late adolescent than the Bengali girls. Non-tribal Bengali girls show better growth performance at the adolescent period in comparison with the Chakma girls. For example, with respect to overall body size at most of the ages Chakma girls are taller than the Bengali girls. With respect to the measures of adolescent growth spurt of height and weight the Bengali girls, on an average, are ahead of reaching peak than the Chakma girls and thereby may be interpreted as they are growing at a faster rate than the Chakma tribal girls.

Present cross-sectional design showed that the prevalence of undernutrition in terms of stunting and thinness is more in Bengali girls than Chakma tribal girls. Prevalence of overweight is slightly higher in Chakma tribal girls than Bengali girls. From earlier papers it is established and widely accepted that in India a majority of children and adolescent of tribal community suffer from malnutrition (Khongsdier and Mukherjee 2003; Chakraborty et al. 2008; Thomas et al. 2013; Basu et al. 2014; Mondol 2014; Sukhdas et al. 2014). The recent investigation

showed that, the nutritional status of Chakma tribal girls is slightly worse or weak than the Tripuri and Sonowal Kachari children of Tripura (Sil et al. 2011) and Assam (Singh and Mondal 2013) respectively but is better than that of other tribal children of northeast India (Gaur and Singh 1995; Khongsdier and Mukherjee 2003; Singh and Sengupta 2007; Mondol 2014; Sukhdas et al. 2014). The overall (by pooling ages 6-18 years) prevalence of stunting among the two study populations are found to be lower than tribal adolescent in West Bengal (Bisai et al. 2011; Maiti et al. 2012), Garasia tribal children of Rajasthan (Mandot et al. 2009), Khasi tribal girls of Meghalaya (Agrahar-Murugkar 2005), Hmar tribal girls of Mizoram (Marken and Varte 2012) and rural Bengali girls of Darjeeling (Mondal and Sen 2010) and North-24 Parganas, West Bengal (Das et al. 2014). The overall prevalence of thinness among the two study populations are lower than Ao naga children of Nagaland (Longkumer 2013), tribal adolescent in West Bengal (Bisai and Mallick 2011), Sabar tribal adolescent girls of Orissa (Chakraborty et al. 2008), Sonowal Kachari girls of Assam (Singh and Mondal 2013), rural adolescent girls of North India (Malhotra and Passi 2007), urban slum girls of Nalgonda, Andhra Pradesh (Prashant and Shaw 2009) and Paschim Medinipur, West Bengal (Maiti et al. 2011). In comparison with the Indian Council of Medical Research (ICMR) standards (ICMR 1972) and WHO (WHO 2007), it was found that the growth pattern of Chakma children are similar but below the ICMR and WHO growth reference data. The probable causes of undernutrition in the Chakma tribal and non-tribal Bengali girls of Tripura may be their low socio-economic condition, low family income, inadequate diet, large family and ignorance about the nutritive value of food.

CONCLUSION

The present study has highlighted the growth pattern and prevalence of undernutrition in terms of stunting and thinness among Chakma tribal and non-tribal Bengali girls of Tripura, North East India. In respect to the different nutritional indicators the tribal and non-tribal girls of Tripura shows a significant difference for age in the prevalence of undernutrition. This study will provide a regional reference for growth and health status of different populations from this region and will also enable the concerned authorities

to formulate effective health promotion policies. Nutritional intervention is also necessary in Tripura to ameliorate the nutritional status among the Chakma tribal and non-tribal Bengali girls by supplementary balanced diet and micronutrient rich or protective foods.

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