

## Anthropometric Assessment Of Malnutrition Among Adolescent Tribal (Tripuri) And Bengalee Boys In Agartala, Tripura.

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### Abstract:

Five hundred and sixty Tripuri and Bengali adolescent boys, ages 12 to 18, participated in a cross-sectional investigation of their nutritional condition. The nutritional status was evaluated by measuring parameters including height, skinfold thickness, and underweight against World Health Organization growth reference values. Traditional techniques, including measurements of individuals' mid-upper arm circumference (MUAC) and body mass index (BMI) were used to evaluate their nutritional status. Subjects were selected from both community (Tripuri and Bengali) using a cluster random sampling technique. Adolescent Tripuri and Bengalee boys have significantly higher rates of short stature (68.22%) and underweight (73.56%) than those of overweight (26.89%) and average weight (19.14%). The risk of malnutrition decreases for children as and when the socioeconomic status (SES) of the family increases. The results of this research show that adolescents' nutrition must be addressed, especially regarding boys' anthropometric indices and the high prevalence of malnourished youngsters.

**Keywords:** *Adolescents boys, BMI, MUAC, SES, Nutritional Status*

### Introduction

Tripuri (tribal) and Bengalee boys between the ages of 12 and 18 were surveyed in Agartala, the capital city of Tripura. The World Health Organization's growth reference data was used to analyze nutritional status, including stunting, wasting, and obesity. In future studies, more individuals of varying ages would provide a complete picture of the population's health condition and growth patterns.<sup>1</sup>

Regarding the total number of indigenous peoples, India likely leads the pack. It is common knowledge that India's indigenous peoples are economically and socially at risk. The tribal people of India are widely acknowledged to be at the bottom of the socioeconomic ladder. The anthropometric and nutritional state of many Indian tribal communities is poorly understood. The Tripuris, who speak the Kokborok language, made up 17.0 percent of the state's total population and 54.7 percent of the scheduled tribal population. This study used body mass index (BMI) to evaluate the nutritional condition of adolescent members of the Tripuri and the Bengalee boys. In general, 8.61% of Indians are members of tribal groups. However, in Tripura, the Bengalee make up more than 68% of the population, while the

indigenous population (scheduled tribe) accounts for roughly 31%.<sup>2</sup> Tripura is home to 3,671,032 people as per the 2011 census, making up about 0.3% of the total population of India. Adolescents' nutritional status has to be enhanced, as shown by the widespread prevalence of undernourishment and poor values of anthropometric indices. Both industrialized and developing nations have a crisis with childhood obesity and malnutrition.<sup>3</sup> Malnutrition is a severe public health problem in developing countries.<sup>4</sup> Though the proportion of wasted and stunted children was higher in rural regions, urban children fared better across the board.<sup>5</sup>

Despite several government initiatives and programmes, malnutrition among teenagers in India remains significant. Roughly 24.8% of Indian teenagers are considered to be thin, whereas 7.5% are considered to be underweight.<sup>6</sup>

Tribes in Tripura can be traced back to the Mongols. Tribal boys in Tripura had significantly lower mean height and weight than Bengalee boys. The study's results provide valuable information for tribal boys living in urban areas of Tripura.<sup>7</sup>

Adolescents' intellectual ability is influenced by parental socioeconomic level, and head circumference (HC) attained in early life.<sup>8</sup> In industrialized nations with upper-middle socioeconomic strata, children and adolescents' blood pressure correlates with many parameters, including weight, height, and sitting height.<sup>9</sup>

Over half of Tripura's nineteen recognized tribes are Tripuri, accounting for around sixteen percent of the state's population. Adolescent males (12-18) from the Tripuri (tribal) population in rural and urban West Tripura region were assessed on their height, weight, and general health to determine body mass index (BMI).<sup>10</sup>

Conventional techniques, including body mass index and MUAC were used to evaluate the nutritional health of the research subjects. The validity of the Composite Score was investigated by comparing it to established metrics like the body mass index (BMI) and the mid-upper arm circumference (MUAC) classification. Undernutrition is a significant health issue in third-world nations. Hence it's essential to know the community's nutritional condition. According to reports, undernourishment and illnesses in impoverished countries are often caused by a lack of money, clean water, and medical treatment.

## **Materials and methods:**

### ***Study Area and Samples-***

Most of the participants came from economically disadvantaged backgrounds. Two communities i.e., Tripuri and Bengalee of the state of Tripura were explicitly chosen for this analysis. Information on the socioeconomic status of the individuals was gathered via the use of self-administered questionnaires.

### ***Data Collection-***

A simple random sample approach was used to choose participants from each age bracket. For the purpose of verifying age, we have accepted either a school record or a birth certificate. In total, seven age brackets are represented in the sample (ages 12 to 18). Adolescents are chosen from each age bracket (Bengalee 40 & Tribal 40). A total of 560 people were selected for the data gathering.

The current research used a revised version of Kuppuswamy's scale, which was shown to be valid in determining the socioeconomic status of these boys across two communities of Tripura. Undernutrition was determined by measuring the participants' height, weight, BMI, MUAC, BF%, and total skin fold thickness. The body mass index (BMI) was determined by measuring the subject's weight and height and using the formula proposed by Bray in 1978. Body Mass Index = Weight (in kilos)/ height (m<sup>2</sup>). The left upper arm's MUAC was measured midway between the acromion process and the end of the olecranon using a clear soft metallic tape. Nutritional status was assessed using NHANES-I percentile values as a proxy for the World Health Organization's suggested cutoff thresholds for anthropometric parameters. Undernutrition was determined by a body mass index (BMI) of less than 18.5.

#### Data Analysis-

Routine statistical analysis was performed using SPSS software. We calculated average and standard deviation (SD) values for age, height, weight, body mass index, middle upper arm circumference, and body fat percentage. Subjects' nutritional status was classified using percentages. The boys physical characteristics were compared using Fischer's LSD test. Statistical significance was set at  $p < 0.05$ .

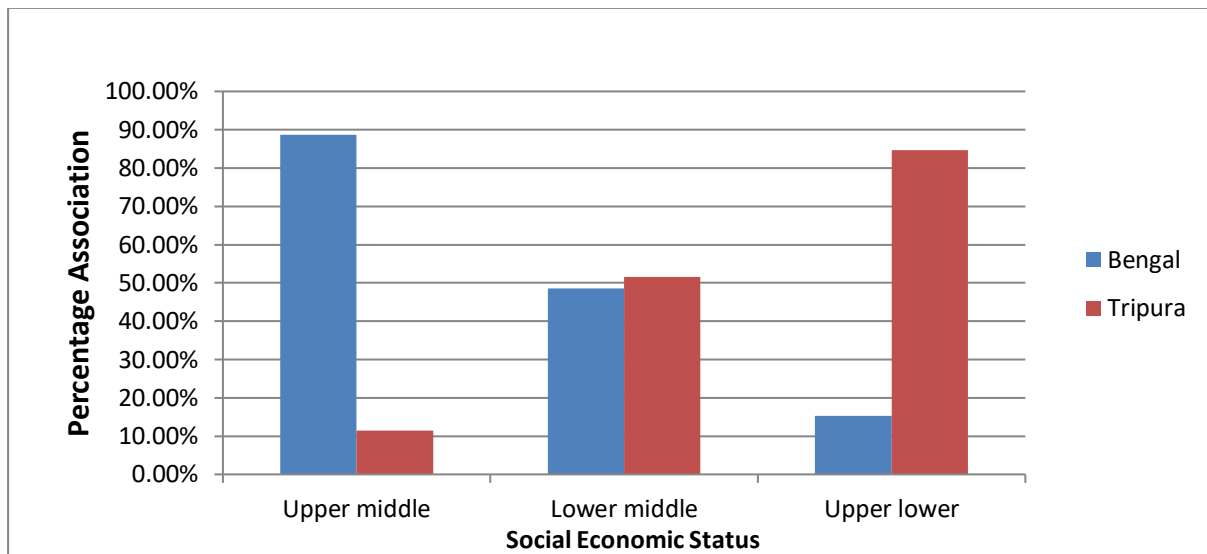
#### Results-

Results indicated that almost two-thirds of the participants were from low-income households. As far as body mass index (BMI) for age is concerned, 76.2% were determined to be malnourished, 13.6% were classified as moderately thin, 20.6% were classified as mildly thin, and just 23.8% were classified as average weight.

Bengalee boys dominated the upper-middle class (88.6%) and Tripuris accounted for 51.5% of the lower middle class.

**Table 1. Socioeconomic Status of Between Bengalee And Tripuri community**

Social economic status	Total	Bengal/ Tripura		Chi Square	p-value
		Bengal	Tripura		
Upper middle	70	62 (88.6%)	8 (11.4%)	70.541	0.000
Lower middle	431	209 (48.5%)	222 (51.5%)		
Upper lower	59	9 (15.3%)	50 (84.7%)		



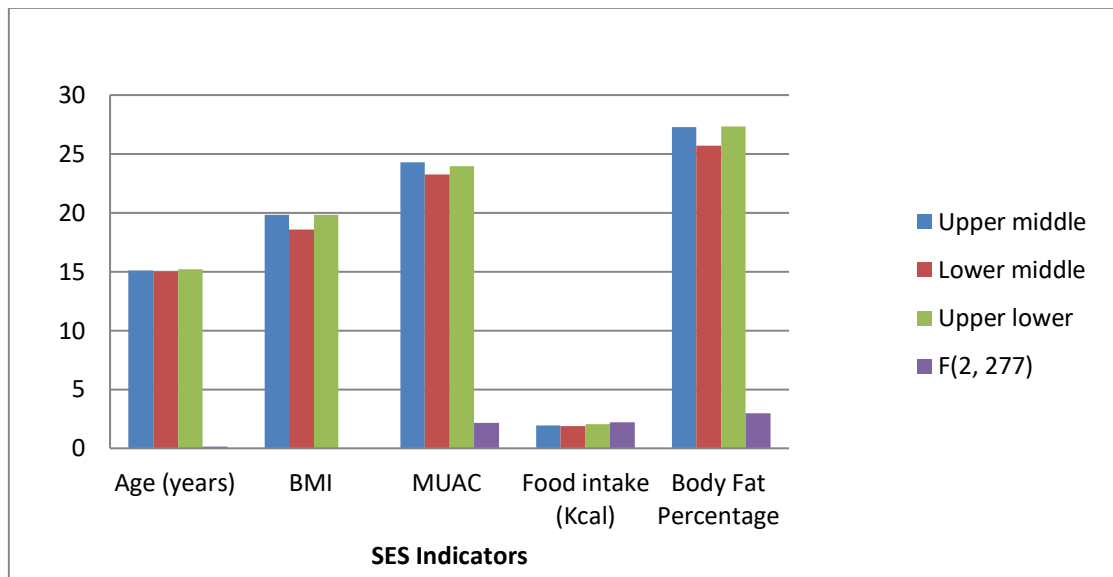
**Fig.1 Socioeconomic Status- Bengalee vs Tripuri**

A statistically significant correlation exists between BMI and socioeconomic class (3.097,  $p > 0.05$ ). Neither age (0.155,  $p > 0.05$ ) nor MUAC (2.141,  $p > 0.05$ ) nor body fat percentage (2.951,  $p > 0.05$ ) are significantly associated with a respondent's socioeconomic position.

**Table 2: SES and prevalence of undernutrition in adolescents Bengalee boys**

	Upper middle	Lower middle	Upper lower	F(2, 277)
Age (years)	15.1±2.22	14.97±1.92	15.22±2.59	0.155
Body Mass Index	19.84±3.73	18.56±3.71	19.84±4.16	3.097*
MUAC (cm)	24.27±3.36	23.24±3.55	23.94±3.77	2.141
Food intake	1942.1±302.27	1880.43±290.07	2044.44±282.23	2.205
Body Fat Percentage	27.28±4.69	25.72±4.65	27.31±5.42	2.951

\* $p < 0.05$



**Fig.2 SES and prevalence of undernutrition in adolescents Bengalee boys**

**Table. 3 SES and prevalence of undernutrition in adolescents Tripuri boys**

	Upper middle	Lower middle	Upper lower	F(2,277)
Age (years)	15.38±1.92	15.1±2.02	14.48±1.9	2.138
Body Mass Index	18.29±1.78	18.05±2.41	17.06±2.21	3.724*
MUAC (cm)	21.56±1.94	22.45±3.09	21.59±2.85	1.896
Food intake	2131.25±358.51	2108.65±431.68	2046.2±496.81	0.430
Body Fat Percentage	25.48±2.47	25.13±3.17	23.8±2.99	3.858*



**Fig.3 SES and prevalence of undernutrition in adolescents Tripuri boys**

**Comparison of the growth and physical development according to age-**

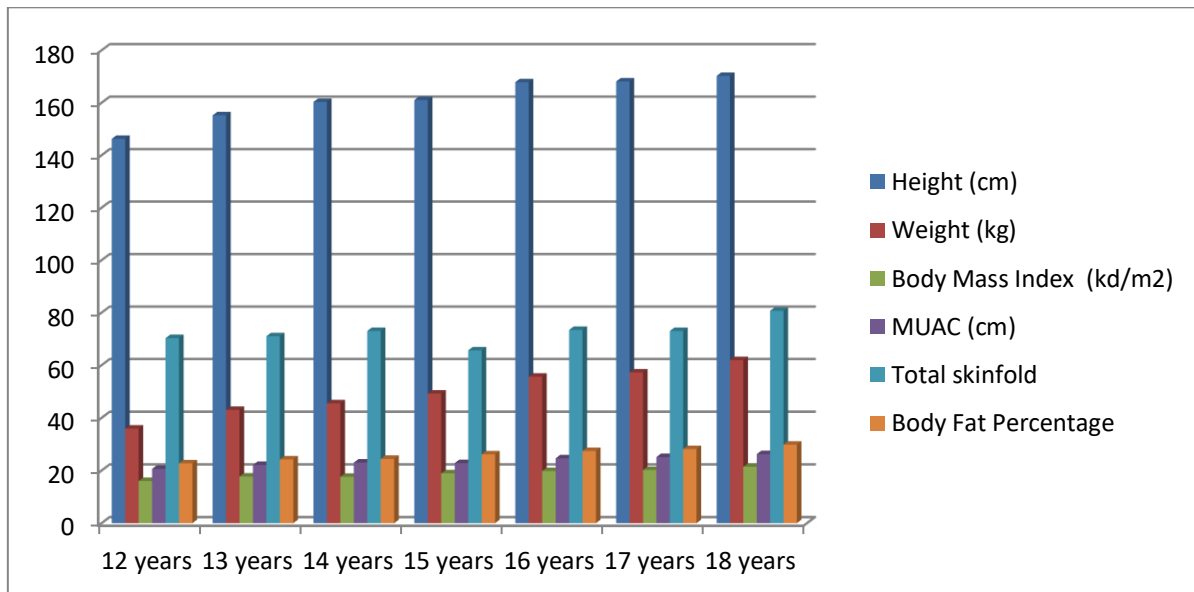
Height (44.988,  $p>0.05$ ), weight (29.898,  $p>0.05$ ), body mass index (9.541,  $p>0.05$ ), mid-upper arm circumference (MUAC) (15.370,  $p>0.05$ ), and body fat % (14.741,  $p>0.05$ ) all vary significantly with age, while total skinfold thickness (1.509,  $p>0.05$ ) does not.

**Table. 4 Comparison of the growth and physical development according to age in Bengalee boys**

Age	N	Height (cm)	Weight (kg)	Body Mass Index (kg/m <sup>2</sup> )	MUAC (cm)	Total skinfold thickness (mm)	Body Fat Percentage
12 years	40	146.2±8.4	35.9±9.9	16.6±3.6	20.6±3.5	70.3±30.9	22.7±4.3
13 years	40	155.2±6.3	43±10.3	17.7±3.2	22.1±3.2	71±23.9	24.2±3.8
14 years	40	160.3±10.8	45.5±10.3	17.6±3.1	23±3.5	73±22.1	24.4±3.7

15 years	40	161±8.5	49.2±10.9	18.9±3.7	22.8±3.5	65.6±21.7	26.1±4.4
16 years	40	167.8±6.1	55.6±8.4	19.8±3.2	24.6±2.1	73.4±18.8	27.4±3.8
17 years	39	168.1±7.6	57.2±11.9	20.2±3.6	25.1±3	73±20.2	28.1±4.4
18 years	41	170.2±7.6	61.9±11.5	21.4±3.8	26.2±2.7	80.7±24.8	29.8±4.6
	280	F(6, 273)=44.988***	F(6, 273)=29.898***	F(6, 273)=9.541** *	F(6, 273)=15.370***	F(6, 273)=1.509	F(6, 273)=14.741***

\*\*\*p<0.001



**Fig. 4. Comparison of the growth and physical development according to age in Bengalee boys**

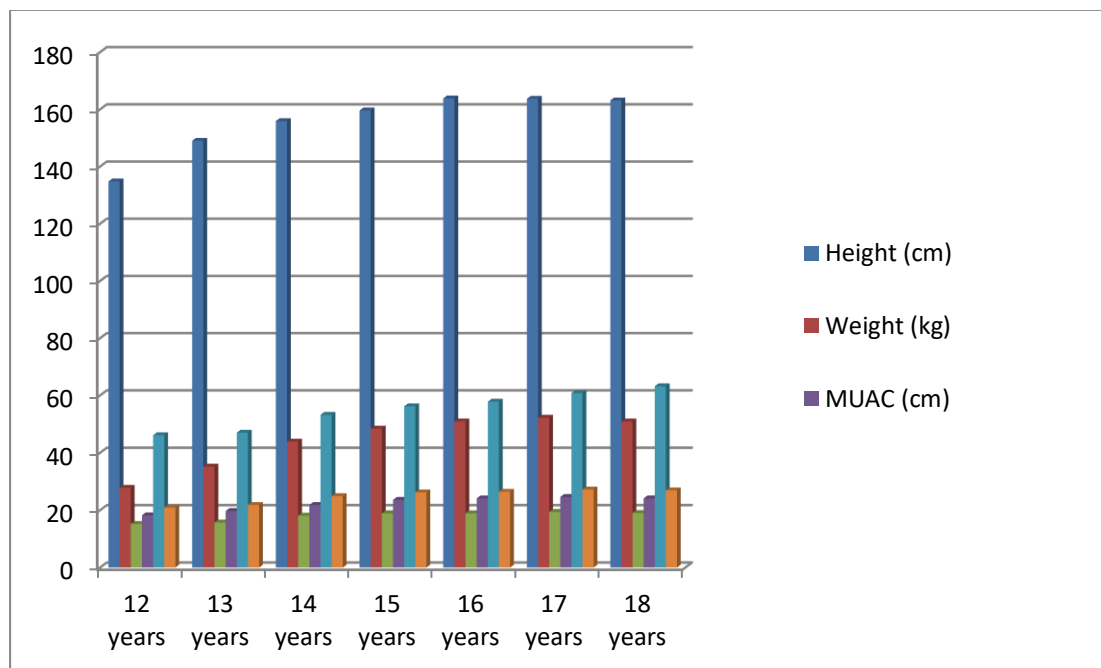
There is a large disparity in the ages at which adolescents in Tripura reach their full height and weight potential. There exist a significant height difference (68.222, p<0.05), weight (76.565, p<0.05), BMI (37.355, p<0.05), MUAC (63.084, p<0.05), total skinfold thickness (19.140, p<0.05) and body fat percentage (55.246, p<0.05) based on age.

**Table 5. Comparison of the growth and physical development according to age in Tripuri boys**

Age	N	Height (cm)	Weight (kg)	Body Mass Index (kg/m <sup>2</sup> )	MUAC (cm)	Total skinfold thickness (mm)	Body Fat Percentage
12 years	40	134.8±9.6	27.8±5.9	15.2±1.6	18.2±0.9	46.1±4.5	20.9±2
13 years	40	149±9.5	35.2±6.4	15.7±1	19.7±1.8	47±4.3	21.8±1.3
14 years	40	155.9±10.1	43.9±7.3	18.1±2.6	21.8±2	53.2±11.2	24.9±3.1
15 years	40	159.6±6.3	48.4±7	18.9±2	23.6±2.4	56.2±5.9	26.2±2.4
16 years	40	163.8±5.2	50.9±6.4	18.9±1.8	24.1±1.8	57.8±9.3	26.4±2.2
17 years	40	163.7±5.6	52.2±5.3	19.4±0.7	24.6±0.3	60.8±8.2	27.2±0.8
18 years	40	163.1±9.1	50.9±8.5	19±2	24.1±3.2	63.2±16.5	26.9±2.4
	280	F(6, 273)=68.22 2***	F(6,273)=76.565***	F(6,273)=37.355***	F(6,273)=63.084***	F(6,273)=19.140***	F(6,273)=55.246** *

\*\*\*p&lt;0.001





**Fig.4 Comparison of the growth and physical development according to age in Tripuri boys**

## Discussions

Adolescence is a unique developmental period with its health and nutritional requirements and a broad range of adolescent anthropometric variations. Anthropometric evaluations are performed to offer a rough indication of the frequency and severity of malnutrition. Health and economic development initiatives may benefit from the data gathered. Adolescents' nutritional condition is poorly understood in Tripuri and Bengalee. Because anthropometric indices in typically fed adolescents alter with age and physical development, anthropometry is more challenging to apply in adolescents than in any other age group. A significant majority of the teenagers in this research were underweight. This might be because their parents come from poor socioeconomic backgrounds. In India, researchers found that participants had mild to severe malnutrition due to their parents' low per capita income. Recent studies in India have indicated that the average values of anthropometric indices among rural teenagers are comparable to those reported among adolescents aged 12-18.<sup>11</sup> It is not surprising that males, typically more significant in size from the time they were 12 to 18 years old, had higher values for most anthropometric indices in the current research. Several scholars found the same pattern in their research conducted in various locations throughout India and abroad.

This research focuses mainly on the nutritional status of teenage populations in Bengalee (48.5% of the sample) and Tripuri (51.5%) (Table 1). A previous study found that in rural Tripura, 33.3% of boys and 40.2% of girls in the age range of 16-18 years old had a body mass index (BMI) of less than 18.5.<sup>5</sup> The low nutritional state of adolescents may be a primary reason why initiatives throughout the years have failed to meet their goals. Malnutrition was much higher in Tripuri boys (51%) as compared to their Bengalee counterparts (48.5%).<sup>9</sup> Tripuri has a higher proportion of underweight teenage males

(76.56%) than Bengalee boys (29.89%) of similar ages. 68.18% of Tripuri and 44.98% of Bengali boys were stunted.

Arm circumference is often used as a proxy for overall body fat percentage and correlates with an increased risk of malnutrition and delayed sexual maturation. Puberty is associated with a shift in MUAC. The current research indicated that low MUAC was more prevalent in Bengalee boys (15.37%) than Tripuri boys (64.08%) (Tables 4 & 5). Teenagers in the Tripuri (55.24%) and Bengali (14.74%) populations have minimal body fat and muscular reserve, as seen by their abnormally small arm circumferences. This result is consistent with the results of other authors from prior research with adolescents in various regions of India and elsewhere. Adolescents' height and weight were correlated with their family's socioeconomic position. They seemed to be getting enough calories, but their protein consumption was low. The majority of people in this research come from working-class backgrounds since their parents are mainly manual laborers.

### Recommendations

Poor anthropometric values were discovered throughout this study, leading the researchers to infer that the nutritional status of these adolescents has to be improved.

### Conclusion

The adverse effect of undernutrition on health, development, and economic productivity is well established. It needs proper and accurate identification to get the idea of the severity to address the issue. Lastly, it is expected that scientific ventures will continue to develop such scores with the data of other population groups and it will provide a comprehensive understanding of this newly developed method. The current research found that the rates of poor nutrition were greater than those in some other developing nations and more particularly, higher than those in past studies of India. In order to raise the level of nutritional health, it is essential to put into place health services tailored to adolescents' needs, as the World Health Organization (WHO) suggests.

### References

1. Singh AP, Sekhon J. Anthropometric estimates of nutritional status of school going children of Sri Muktsar Sahib (Punjab) India. :11.
2. Bharati P, Itagi S, Megeri SN. Anthropometric Measurements of School Children of Raichur, (Karnataka). *Journal of Human Ecology*. 2005;18(3):177-179. doi:10.1080/09709274.2005.11905827
3. Venkaiah K, Damayanti K, Nayak M, Vijayaraghavan K. Diet and nutritional status of rural adolescents in India. *Eur J Clin Nutr*. 2002;56(11):1119-1125. doi:10.1038/sj.ejcn.1601457
4. Panda BK, Mog M, Dhillon P. Double burden of malnutrition among adolescents in India: Evidence from large scale surveys. :14.
5. Nath M, Gangopadhyay S. Anthropometric Assessment of Nutritional Status of Adolescent Tripuri Boys of Agartala. 5(3):4.

6. Sinha U, Nag SK. Growth Pattern of Urban Tribal Boys of Tripura. 2014;2(3):4.
7. Ghosh R, Bharati P. Nutritional Status of Adults among Munda and Pod Populations in a Peri-Urban Area of Kolkata City, India. *Asia Pac J Public Health*. 2006;18(2):12-20. doi:10.1177/10105395060180020301
8. Sil SK, Saha S, Roy S, Sarkar SR. Nutritional Status of Urban Tripuri Tribal Boys of Agartala, Tripura. *The Anthropologist*. 2012;14(2):167-169. doi:10.1080/09720073.2012.11891234
9. Uddin J, Begam S, Nag SK, Sil SK. Socioeconomic Status, Head Circumference and Intellectual Ability among Rural Adolescents of Unakoti District of Tripura, North-East India. 2015;3:17.
10. Roy S, Sreedhar A, Saha S. The Relationship Between Height Components and Bi-iliac/Bi-acromial Index with Blood Pressure Among Chakma Tribal Children of Tripura Aged 6-16 Years. *BS*. 2020;6(4):120. doi:10.11648/j.bs.20200604.17
11. Uddin MdJ, Nag SK, Sil SK. Anthropometric Assessment of Nutritional Status of Adolescents in Rural School of Unokoti District of Tripura, North-East India. *The Anthropologist*. 2015;19(1):277-284. doi:10.1080/09720073.2015.11891661