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A study on BMI and selected anthropometric measures of santal boys

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Abstract

The purpose of the study was to find out and compare the BMI and Selected anthropometric variables between tribal and general school going subjects. Total 416 boys (208 = Tribal community and rest 208 = General community) were selected as subjects by the random sampling technique. The age of the subjects was ranged from 13 years to 16 years and divided into four groups like Gr- A: 13 years, Gr- B: 14 years, Gr- C: 15 years and Gr- D: 16 years. So, the four-age group were named as TA, TB, TC & TD for Tribal boys and GA, GB, GC & GD for General boys. The subjects' Body Weight, Height, BMI, Arm Girth, Forearm Girth, Thigh girth Mid-Thigh Girth and Calf girth were considered as criterion measure. The measuring procedure for anthropometric variables were done by the guidelines of ISAK, 2006. The mean and standard deviation (S.D.) were calculated for the analysis of the data as descriptive statistics. Statistical significance of two group i.e. Tribal boys and General boys in respective age group, mean difference was tested by Independent – Sample T. Test. All the statistics were calculated by using SPSS version 25.

Keywords: Tribal boys, BMI, anthropometric measures

1. Introduction

In modern age health hazards has assumed the dimension of major social problem. In the age of science and technology man is very much dependent on machine. As a result, various kinds of problems related to health has been issued out on account of the decrease of physical labour which hinders the making of well-being society. Body Mass Index (BMI) is the one of the main process through which we can easily know the appropriate weight of a person according to his height. By means of BMI we can determine the different categories of a person such as underweight, normal weight, overweight or obese and we can take the necessary preventive measures. Adolf Quetelet, a scientist of Belgium, invented the index of BMI. For this reason, it is called Quetelet Index. This index can be calculated by following formula:

$$\text{BMI} = (\text{Persons Body Weight in Kilogram} / \text{Persons Height square in Meter})$$

The BMI of a person depends upon the ingredients of the composition of body muscle, fat, bone, blood and serum etc. The weight of a person may mainly increase or decrease either with muscle and bone or fat. The weight of a person does not increase so much only with muscle or bone and this is under control. But it is well to remember that the increase of the weight of a person due to fat cannot be controlled. Under such circumstances the obesity is found.

A researcher himself being a tribal has realised these problems in the school going Santal boys. For this reason, he has made a humble attempt on a study of Santal boys entitled as "A study on BMI and Selected Anthropometric Measures of Santal Boys".

The social impact of the study helps the entire learners along with the society of teenagers to lead their life in a satisfactory manner both physically and mentally. They will be vibrant with the vitality of life. This study will give fillip to their habit of taking balance diet and regular physical exercise. It will make the all-round development of the learners. Ultimately, they will emerge as true citizen of a country. Only then this attempt will be a success.

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1.1 Purpose of the Study

The purpose of the study was

- I. To find out the Body Weight, Height, BMI, and Arm Girth, Forearm Girth, Thigh Girth, Mid-Thigh Girth, and Calf Girth as anthropometric variables of various age group of schools going tribal boys.
- II. To find out the Body Weight, Height, BMI, and Arm Girth, Forearm Girth, Thigh Girth, Mid-Thigh Girth, and Calf Girth as anthropometric variables of various age group of schools going general boys.
- III. To compare the Body Weight, Height, BMI, and Arm Girth, Forearm Girth, Thigh Girth, Mid-Thigh Girth, and Calf Girth as anthropometric variables of various age group of schools going tribal boys and general boys.

2. Material and Method

2.1 Subjects of the Study

In the present study total 416 school going boys out of which 208 were from Tribal community and rest 208 were from General community selected as subjects by the random sampling technique. The age of the subjects were ranged from 13 years to 16 years which grouped like Gr- A: 13 years, Gr-B: 14 years, Gr- C: 15 years and Gr- D: 16 years. So the four age group were named as TA, TB, TC & TD for Tribal boys and GA, GB, GC & GD for General boys respectively.

2.2 Measuring Criteria

As the measures of criteria the Body Weight, Height, BMI, Arm Girth, Forearm Girth, Thigh girth Mid-Thigh Girth and Calf girth of the subjects were considered. Body weight was taken by standard weighing scale (Libra Company) in Kilogram (Kg). Height was measures by Stadiometer (Krupps Company) in meter (mt). BMI was calculated by weight in kg divided by meter square of height and the Girth of Arm, Forearm, Thigh, Mid-Thigh and Calf was measured by anthropometric tape (Cescorf Company) in centimetre (cm.). The measuring procedure were done by the guidelines of ISAK, 2006.

2.3 Statistical Analysis

For statistical calculation, the mean and standard deviation (S.D.) were calculated for the analysis of the data as descriptive statistics. Statistical significance of two group i.e. Tribal boys and General boys in respective age group, mean difference was tested by Independent – Sample T. Test. All the statistics were calculated by using SPSS version 25. For compering the significance of two mean, mean difference, the level of significance was set as 0.05 level of confidence where the degree of freedom was 102.

3. Result and Discussion

Table 1: Age-wise comparison of means of Body Weight in between TB and GB

Age (Year)	Group	Mean & SD (kg)	SED	t value
13	TB	40.83 ± 3.00	0.64	1.115
	GB	40.12 ± 3.50		
14	TB	43.98 ± 5.02	1.03	0.750
	GB	43.21±5.44		
15	TB	50.72 ± 5.22	1.09	-0.106
	GB	50.84 ± 5.86		
16	TB	53.09 ± 4.18	0.90	-0.268
	GB	53.33 ± 4.93		

* To be significant at 0.05 level of confidence the t value>= 1.983.

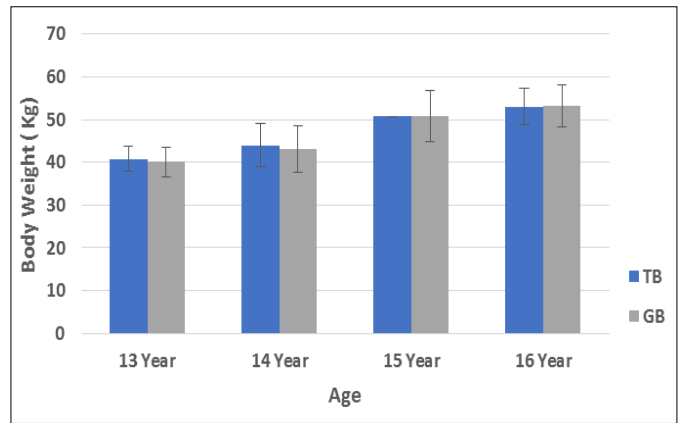


Fig 1: Age-wise comparison of means of Body Weight in between TB and GB

Table 2: Age-wise comparison of means of Height in between TB and GB

Age (Year)	Group	Mean & SD (mt)	SED	t value
13	TB	1.57 ± 0.05	0.0505	0
	GB	1.57 ± 0.05		
14	TB	1.57 ± 0.06	0.0772	-0.6602
	GB	1.58 ± 0.09		
15	TB	1.61 ± 0.05	0.0505	-1.01
	GB	1.62 ± 0.05		
16	TB	1.62 ± 0.04	0.0404	0
	GB	1.62 ± 0.04		

*Significant at 0.05 level of confidence

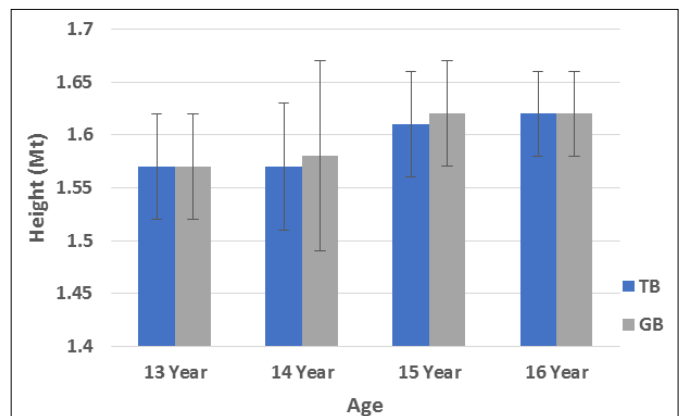


Fig 2: Age-wise comparison of Height in between TB and GB

Table 3: Age-wise comparison of BMI in between TB and GB

Age (Year)	Group	Mean & SD (kg/m2)	SED	t value
13	TB	16.65 ± 1.39	1.2746	1.6403
	GB	16.24 ± 1.12		
14	TB	17.81 ± 1.98	1.8541	1.4851
	GB	17.27 ± 1.68		
15	TB	19.59 ± 1.9	1.9593	0.4424
	GB	19.42 ± 1.98		
16	TB	20.34 ± 1.54	1.6644	0.0306
	GB	20.33 ± 1.75		

*Significant at 0.05 level of confidence

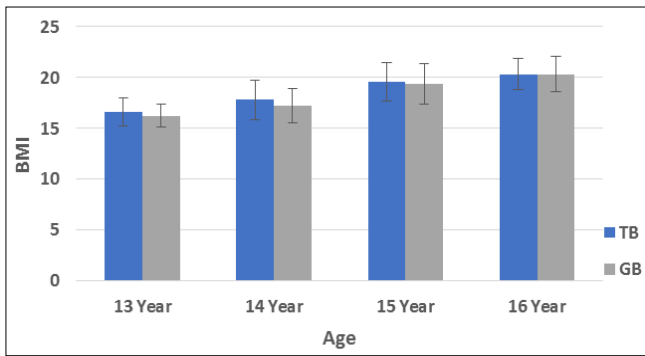


Fig 3: Age-wise comparison of BMI in between TB and GB

Table 4: Age-wise comparison of Arm Girth in between TB and GB

Age (Year)	Group	Mean & SD (cm)	SED	t value
13	TB	20.52 ± 1.52	0.26	0.183
	GB	20.50 ± 1.13		
14	TB	21.54 ± 1.67	0.31	2.080*
	GB	20.86 ± 1.48		
15	TB	23.13 ± 1.34	0.29	-0.366
	GB	23.24 ± 1.60		
16	TB	23.99 ± 1.27	0.29	0.503
	GB	23.85 ± 1.64		

*Significant at 0.05 level of confidence

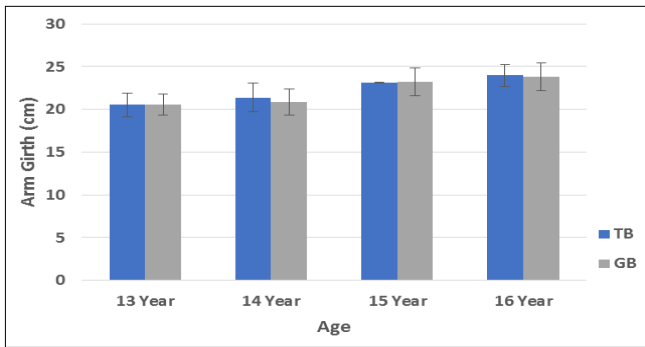


Fig 4: Age-wise comparison of Arm Girth in between TB and GB

Table 5: Age-wise comparison of Forearm Girth in between TB and GB

Age (Year)	Group	Mean & SD (cm)	SED	t value
13	TB	21.07 ± 1.42	0.25	-0.468
	GB	21.18 ± 1.07		
14	TB	21.69 ± 1.37	0.28	1.321
	GB	21.32 ± 1.52		
15	TB	23.56 ± 1.49	0.34	0.402
	GB	23.42 ± 1.90		
16	TB	24.22 ± 1.08	0.21	0.279
	GB	24.16 ± 1.03		

*Significant at 0.05 level of confidence

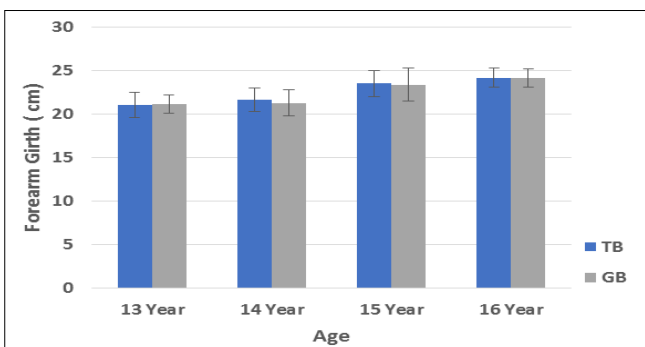


Fig 5: Age-wise comparison of Forearm Girth in between TB and GB

Table 6: Age-wise comparison of Thigh Girth in between TB and GB

Age (Year)	Group	Mean & SD (cm)	SED	t value
13	TB	42.95 ± 2.75	0.46	1.292
	GB	42.36 ± 1.87		
14	TB	44.37 ± 4.04	0.78	2.319*
	GB	42.55 ± 3.95		
15	TB	46.93 ± 3.44	0.73	0.290
	GB	46.72 ± 3.98		
16	TB	48.08 ± 2.73	0.57	-0.713
	GB	48.48 ± 3.04		

*Significant at 0.05 level of confidence

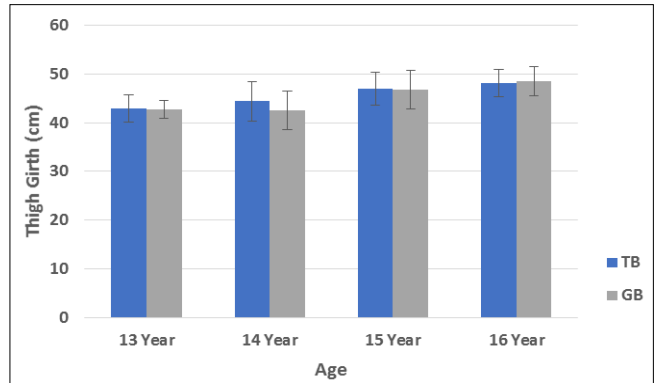


Fig 6: Age-wise comparison of Thigh Girth in between TB and GB

Table 7: Age-wise comparison of Mid-Thigh Girth in between TB and GB

Age (Year)	Group	Mean & SD (cm)	SED	t value
13	TB	40.10 ± 2.86	0.47	-0.184
	GB	40.18 ± 1.83		
14	TB	40.59 ± 4.23	0.70	0.314
	GB	40.37 ± 2.80		
15	TB	43.07 ± 3.28	0.74	0.287
	GB	42.86 ± 4.17		
16	TB	44.71 ± 2.92	0.61	0.126
	GB	44.63 ± 3.31		

*Significant at 0.05 level of confidence

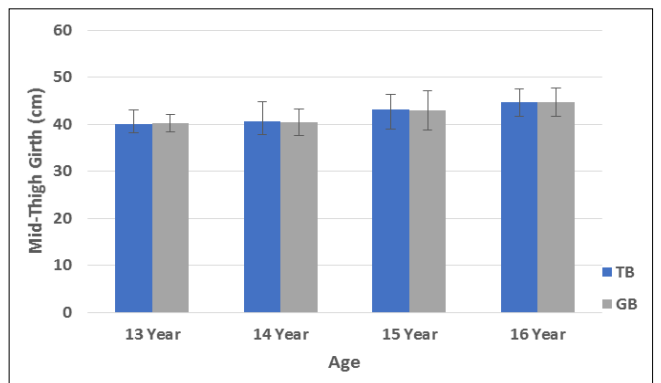


Fig 7: Age-wise comparison of Mid-Thigh Girth in between TB and GB

Table 8: Age-wise comparison of Calf Girth in between TB and GB

Age (Year)	Group	Mean & SD (cm)	SED	t value
13	TB	28.94 ± 1.52	0.26	0.183
	GB	28.89 ± 1.13		
14	TB	30.08 ± 1.92	0.37	2.747*
	GB	29.07 ± 1.83		
15	TB	31.17 ± 1.99	0.42	0.366
	GB	31.02 ± 2.29		
16	TB	32.47 ± 1.75	0.35	1.128
	GB	32.08 ± 1.81		

*Significant at 0.05 level of confidence

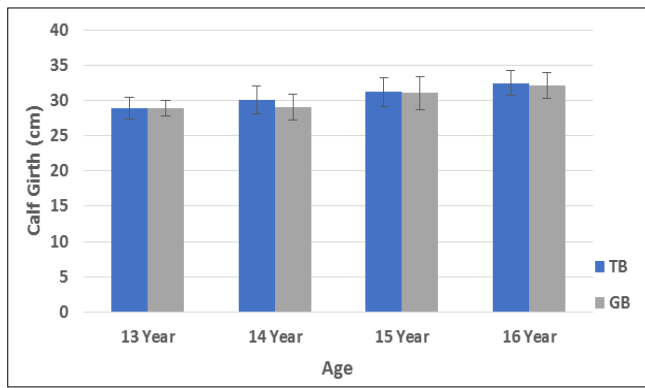


Fig 8: Age-wise comparison of Calf Girth in between TB and GB

3.1 Result & Discussion

In the table- 1 & 2 the graphical presentation showed that means of Body weight and Height increased gradually with the increment of age. The body weight and height of the subjects of the present study were better than the study conducted by Tripartly & Chakraborty (2013) [7] and Paul (2014) [5] but lower in comparison with the standard of ICMR (1990) of same age category except age 13 years. Probably the lower in body weight was due to the socio-economic condition and height due to the genetic as well as environmental factors of the subjects both for rural tribal and general boys.

As a result, the mean value of BMI in table- 3 showed poor index between the age group 13 years and 14 years for both tribal subject and general subjects which indicates the underweight of the subjects. But in the age group between 15 years and 16 years the BMI range was normal which indicates the normal weight and have balance within height and weight of the subjects. Similar study was done by Oyewale, Oja, Adibisi and Danborn (2010) [4] and their result was almost same with the present study.

In the Table- 4 when comparing Arm Girth of Tribal and General subjects only 14 years' age group were significantly differed which showed the Tribal was better than same age group of General Subjects and rest age group were not significant. Similar study has done by Chakraborty and Bharati (2008) [2] on Shabar Tribal and found Mid Upper Arm Circumference of 13 years to 16 years age group which were less than from the findings of the present study of the same age group of Santal Tribes.

In the Table- 5 the comparison of Forearm Girth between the tribal subjects and the general subjects has no significant difference at the same age group. The general trend in relation to the increment of girth with progression of age was observed both for Tribal and General Boys.

In the Table- 6 the increment of perimeter of the thigh at the marked point between the tribal subject and general subjects were almost same of all age group except 14 years age group. Whereas in comparison the Tribal subjects were significantly better in Thigh girth than their General counterpart.

In the Table- 7 the present study of Mid-Thigh girth showed no significant difference was observed among Tribal and General subjects at various age categories. The similar study conducted by Bhadra, Mukhopadhyay and Bose (2004) [1] of 13 and 14 years Bengali boys of North 24 Parganas of West Bengal which shows similar value of same age group of Bankura, Jhargram and Paschim Medinipur District

In the Table- 8 the present study shows that there was changes in Calf Girth due to developmental process so far age of the subject is concern. Only 14 years' Tribal age group was

significantly better than the corresponding age group of general subjects. As reported by Roy Sarkar and Sil (2015) the Calf Girth of 13 years to 16 years Bengali Boys of Tripura were similar of the subjects of the present study.

4. Conclusion

1. No significance difference was observed in Body weight in between tribal and general subjects from 13 – 16 years of age.
2. No significance difference was observed in Height in between tribal and general subjects from 13 – 16 years of age.
3. It was noticed from BMI score that tribal boys and general boys of 13 & 14 years age group were under weight and 15 & 16 years age group both for tribal and general boys were normal in BMI score.
4. There was no significant difference in arm girth between tribal and general boys except age group 14 years where tribal boys were superior than general boys.
5. No significant difference was observed in forearm girth between tribal and general boys of 13 to 16 years age group.
6. The thigh girth of 14 years tribal boys was superior than general boys of same age group.
7. No significant difference was observed in mid-thigh girth between tribal and general boys of 13 to 16 years age group.
8. Calf girth of 14 years tribal boys was superior than general boys of same age group.

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