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A comparative study of anthropometric variables among tribal inhabitants of North Bengal in India

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Abstract

This study was carried out to know the relationship of Anthropometric variables among tribal inhabitants of North Bengal in India. For the present study two hundred and forty male ranging between 17 to 23 years from four different Tribes of Dooars, namely Bhutia, Mech, Rabha and Toto were selected as subjects. The subjects were selected randomly from the whole population of four different tribes. To find out the relation and relationship of selected anthropometric variables the mean and standard deviation were calculated. To find out the relationship least significance difference post hoc test were applied at 0.05 level. However, the relationship of height, weight, upper arm length, fore arm length, upper leg length, fore leg length and foot length was only found to be significant at 0.05 level.

Keywords: Anthropometric, North Bengal

Introduction

Indian tribal people play a key part in constructing the cultural heritage of India. They occupy a major part in the history of India as they are considered as the true habitants of India. The tribal people are scattered in different parts of India and they form a considerable number of the population of India. The traditional and cultural distinction of each tribal community has made them distinguishable from each other and their cultural and traditional heritage add colour and variation to the Indian culture as a whole and form a compact culture. Indian tribal people reside in approximately fifteen percent of the country's area. They primarily live in various ecological and geo-climatic conditions ranging from plains, forests, hills and inaccessible areas that perhaps lie dotted in the panoramic Indian terrain. Dooars in Jalpaiguri is a land of diverse ethnic communities, being a home to different tribal communities and immigrant people from neighboring states and countries; Dooars has a number of distinct languages and Dialects. This is also home to aborigines. Their ethnic identity, linguistic plurality, physical variations, food habits, rituals, mores, lineage, ethos all have drawn researchers, both at the national and international levels. Their origin, socio-cultural traits and religious beliefs are documented by anthropologists.

Material and Method

Participant: This study was carried out to compare the anthropometric variables among tribal inhabitants of North Bengal in India. For the present study two hundred and forty male age ranging between 17 to 23 years from four different Tribes of North Bengal, namely Bhutia, Mech, Rabha and Toto were selected as subjects. The subjects were selected randomly from the whole population of four different tribes.

Measurement of anthropometric variables: Height: Measured by using anthropometry rod and recorded upto 1/10th of centimeter. Weight: Measured by the using digital weighing machine and recorded to the nearest half of a kilogram. Upper arm length, Fore arm length, Upper leg length, Lower leg length and Foot length was measured by using Anthrometer and recorded up to 1/10th of centimeter.

Analysis and interpretation of data the statistical analysis and interpretation of data pertaining to the score of anthropometric variables have been presented below. One way analysis of variance was used to find out whether there are significant differences among the tribes of

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Bhutia, Mech, Rabha, Toto on selected Body composition variables Whether F value was found to be significant, LSD test was used as post-hoc test to determine which of the

pointed mean different significantly. The level of significance was set at 0.05.

Table 1: Height (cm): Mean and SD of Anthropometric variables of Tribal inhabitants of North Bengal in India

Tribe	N	Mean (cm)	SD	Std. Error	95% Confidence Interval for Mean		Min.	Max.
					Lower Bound	Upper Bound		
Bhutia	60	162.88	6.18	.79	161.28	164.47	150.10	177.00
Mech	60	168.00	4.71	.60	166.78	169.22	153.00	176.00
Rabha	60	167.12	5.65	.72	165.66	168.58	154.00	180.00
Toto	60	169.64	5.59	.72	168.19	171.08	152.00	180.00
Total	240	166.91	6.06	.39	166.14	167.68	150.10	180.00

The table 1 reveals the mean and standard deviations of the four tribes in selected anthropometric variables are as follows: Height: Bhutia (M, 162.88; SD, 6.18), Mech (M, 168.00; SD, 4.71), Rabha (M, 167.12; SD, 5.65) and Toto (M, 169.64; SD, 5.59) respectively.

among the tribal groups of North Bengal on Height. Since the obtained F-ratio is significant on Height among the four groups. So LSD Post Hoc test was applied to study the significance difference between the paired means of the various groups on Height and the results are presented in table-3.

Table 2: ANOVA of Anthropometric variables (Height in cm.) of Tribal inhabitants of North Bengal in India

	Sum of Squares	df	Mean Square	F
Between Groups	1496.76	3	498.92	16.13
Within Groups	7298.17	236	30.92	
Total	8794.93	239		

*Significant at 0.05 Level. with df 3 and 239 are 2.64

The following obtained 'F' value's for Height was 16.13. As the obtained 'F' values is greater than the table value of 2.64 with df 3 and 239 required for significance at 0.05 levels. The result of the study shows that there is significant difference

Table 3: Paired Mean Difference of Bhutia, Mech, Rabha and Toto tribal inhabitants of North Bengal on Height in cm

Bhutia	Mech	Rabha	Toto	Mean Difference	Critical Difference
162.88	168.00			-5.125*	1.97
162.88		167.12		-4.24*	
162.88			169.64	-6.76*	
	168.00	167.12		0.88	
	168.00		167.12	-1.64	
		167.12	167.12	-2.54*	

*The mean difference is significant at 0.05 level

Table 4: Weight (kg.): Mean and SD of Anthropometric variables of Tribal inhabitants of North Bengal in India

Tribe	N	Mean (kg)	SD	Std. Error	95% Confidence Interval for Mean		Min.	Max.
					Lower Bound	Upper Bound		
Bhutia	60	162.88	6.18	.79	161.28	164.47	150.10	177.00
Mech	60	168.00	4.71	.60	166.78	169.22	153.00	176.00
Rabha	60	167.12	5.65	.72	165.66	168.58	154.00	180.00
Toto	60	169.64	5.59	.72	168.19	171.08	152.00	180.00
Total	240	166.91	6.06	.39	166.14	167.68	150.10	180.00

The table 4 reveals the mean and standard deviations of the four tribes in selected anthropometric variables (Weight) are as follows: Weight: Bhutia (M, 55.57; SD, 5.20), Mech (M, 61.17; SD, 20.79), Rabha (M, 56.21; SD, 6.40) and Toto (M, 59.33; SD, 6.30) respectively.

result of the study shows significant among the tribal groups of North Bengal on Weight. Since the obtained F-ratio is significant on Weight among the four groups. So LSD Post Hoc test was applied to study the significance difference between the paired means of the various groups on Weight and the results are presented in table-6.

Table 5: ANOVA of Anthropometric variables (Weight in kg.) of Tribal inhabitants of North Bengal in India

	Sum of Squares	df	Mean Square	F
Between Groups	1256.17	3	418.72	3.099
Within Groups	31886.19	236	135.11	
Total	33142.36	239		

*Significant at 0.05 Level. With df 3 and 239 are 2.64

The following obtained 'F' value's for Weight was 3.099. As the obtained 'F' values is greater than the table value of 2.64 with df 3 and 239 required for significance at 0.05 levels. The

Table 6: Paired Mean Difference of Bhutia, Mech, Rabha and Toto tribal inhabitants of North Bengal on Weight in kg

Bhutia	Mech	Rabha	Toto	Mean Difference	Critical Difference
55.57	61.17			-5.60*	4.16
55.57		56.21		-0.64	
55.57			59.33	-3.76	
	61.17	56.21		4.96*	
	61.17		59.33	-1.84	
		56.21	59.33	-3.12	

*The mean difference is significant at 0.05 level

Table 7: Upper Arm Length (cm.): Mean and SD of Anthropometric variables of Tribal inhabitants of North Bengal

Tribe	N	Mean (cm)	SD	Std. Error	95% Confidence Interval for Mean		Min.	Max.
					Lower Bound	Upper Bound		
Bhutia	60	34.4617	4.68181	.60442	33.2522	35.6711	28.50	51.60
Mech	60	34.4783	8.31474	1.07343	32.3304	36.6263	27.50	78.00
Rabha	60	30.9483	3.97511	.51318	29.9215	31.9752	23.00	46.10

Toto	60	34.6617	4.83277	.62391	33.4132	35.9101	27.50	51.60
Total	240	33.6375	5.87972	.37953	32.8898	34.3852	23.00	78.00

The table 7 reveals the mean and standard deviation of the four tribes in selected anthropometric variables (Upper Arm Length) are as follows: Upper Arm Length: Bhutia (M, 34.46; SD, 4.68), Mech (M, 34.47; SD, 8.31), Rabha (M, 30.94; SD, 3.97) and Toto (M, 34.66; SD, 4.83) respectively.

Table 8: ANOVA of Anthropometric variables (Upper Arm Length in cm.) of Tribal inhabitants of North Bengal

	Sum of Squares	df	Mean Square	F
Between Groups	580.007	3	193.336	5.939
Within Groups	7682.475	236	32.553	
Total	8262.483	239		

*Significant at 0.05 Level. With df 3 and 239 are 2.64

The following obtained 'F' value's for Upper Arm Length was 5.939. As the obtained 'F' values is greater than the table value of 2.64 with df 3 and 239 required for significance at 0.05 levels. The result of the study shows significant among

the tribal groups of North Bengal on Upper Arm Length. Since the obtained F-ratio is significant on Upper arm length among the four groups. So LSD Post Hoc test was applied to study the significance difference between the paired means of the various groups on Upper arm length and the results are presented in table-9.

Table 9: Paired Mean Difference of Bhutia, Mech, Rabha and Toto tribal inhabitants of North Bengal in India on Upper Arm Length in cm

Bhutia	Mech	Rabha	Toto	Mean Difference	Critical Difference
34.46	34.48			0.02	2.04
34.46		30.95		3.51*	
34.46			34.66	0.20	
	34.48	30.95		3.53*	
	34.48		34.66	-0.18	
		30.95	34.66	-3.71*	

*The mean difference is significant at 0.05 level

Table 10: Fore Arm Length (cm.): Mean and SD of Anthropometric variables of Tribal inhabitants of North Bengal

Tribe	N	Mean (cm)	SD	Std. Error	95% Confidence Interval for Mean		Min.	Max.
					Lower Bound	Upper Bound		
Bhutia	60	25.4000	2.59576	.33511	24.7294	26.0706	10.50	30.00
Mech	60	27.0133	4.05176	.52308	25.9667	28.0600	22.50	47.00
Rabha	60	25.4150	2.57016	.33181	24.7511	26.0789	10.50	30.00
Toto	60	26.5348	2.99279	.38637	25.7617	27.3080	22.50	45.00
Total	240	26.0908	3.17103	.20469	25.6876	26.4940	10.50	47.00

The table 10 reveals the mean and standard deviation of the four tribes in selected anthropometric variables (Fore Arm Length) are as follows: Fore Arm: Bhutia (M,25.4 ; SD,2.59), Mech (M,27.01 ; SD, 4.05), Rabha (M, 25.41; SD, 2.57) and Toto (M, 26.53; SD, 2.99) respectively.

Table 11: Analysis of Variance of Anthropometric variables (Fore Arm Length in cm.) of Tribal inhabitants of North Bengal in India

	Sum of Squares	df	Mean Square	F
Between Groups	118.929	3	39.643	4.096
Within Groups	2284.315	236	9.679	
Total	2403.244	239		

*Significant at 0.05 Level. with df 3 and 239 are 2.64

The following obtained 'F' value's for Fore Arm Length was 4.096. As the obtained 'F' values is greater than the table value of 2.64 with df 3 and 239 required for significance at 0.05 levels. The result of the study shows insignificant among

the tribal groups of North Bengal on fore arm length. Since the obtained F-ratio is significant on Fore Arm Length among the four groups. So LSD Post Hoc test was applied to study the significance difference between the paired means of the various groups on Fore Arm Length and the results are presented in table-12.

Table 12: Paired Mean Difference of Bhutia, Mech, Rabha and Toto tribal inhabitants of North Bengal in India on Fore Arm Length in cm

Bhutia	Mech	Rabha	Toto	Mean Difference	Critical Difference
25.40	27.01			-1.61*	1.11
25.40		25.41		-0.01	
25.40			26.53	-1.13*	
	27.01	25.41		1.59*	
	27.01		26.53	-0.44	
		25.41	26.53	-1.12*	

*The mean difference is significant at 0.05 level

Table 13: Upper Leg Length (cm): Mean and SD of Anthropometric variables of Tribal inhabitants of North Bengal in India

Tribe	N	Mean (cm)	SD	Std. Error	95% Confidence Interval for Mean		Min.	Max.
					Lower Bound	Upper Bound		
Bhutia	60	44.6050	2.07033	.26728	44.0702	45.1398	41.10	48.90
Mech	60	45.5317	4.23562	.54682	44.4375	46.6258	17.90	49.60
Rabha	60	45.3867	2.52469	.32594	44.7345	46.0389	41.10	49.90
Toto	60	45.9583	2.25639	.29130	45.3754	46.5412	41.50	49.90
Total	240	45.3704	2.92536	.18883	44.9984	45.7424	17.90	49.90

The table 13 further reveals the mean and standard deviation of the four tribes in selected anthropometric variables (Upper Leg Length) are as follows: Upper Leg Length: Bhutia

(M,44.60; SD, 2.07), Mech (M, 45.53 ; SD, 4.23), Rabha (M, 45.38; SD, 2.52) and Toto (M, 45.95 ; SD, 2.25) respectively.

Table 14: Analysis of Variance of Anthropometric variables (Upper Leg Length in cm.) of Tribal inhabitants of North Bengal in India

	Sum of Squares	df	Mean Square	F
Between Groups	57.466	3	19.155	2.274
Within Groups	1987.833	236	8.423	
Total	2045.300	239		

*Significant at 0.05 Level. with df 3 and 239 are 2.64

Table 15: Fore Leg Length (cm.): Mean and SD of Anthropometric variables of Tribal inhabitants of North Bengal

Tribe	N	Mean (cm)	SD	Std. Error	95% Confidence Interval for Mean		Min.	Max.
					Lower Bound	Upper Bound		
Bhutia	60	34.4550	2.10741	.27206	33.9106	34.9994	31.10	38.90
Mech	60	35.9750	2.09095	.26994	35.4349	36.5151	32.20	39.40
Rabha	60	35.0350	2.36355	.30513	34.4244	35.6456	31.10	39.70
Toto	60	36.0550	2.34430	.30265	35.4494	36.6606	31.50	39.80
Total	240	35.3800	2.31503	.14943	35.0856	35.6744	31.10	39.80

The table 15 further reveals the mean and standard deviation of the four tribes in selected anthropometric variables (Fore Leg Length) are as follows: Fore Leg Length: Bhutia (M, 34.45; SD, 2.10), Mech (M, 35.97; SD, 2.09), Rabha (M, 35.03; SD, 2.36) and Toto (M, 36.05; SD, 2.34) respectively.

Table 16: Analysis of Variance of Anthropometric variables (Fore Leg Length in cm.) of Tribal inhabitants of North Bengal in India

	Sum of Squares	df	Mean Square	F
Between Groups	107.058	3	35.686	7.175
Within Groups	1173.826	236	4.974	
Total	1280.884	239		

*Significant at 0.05 Level. With df 3 and 239 are 2.64

The following obtained 'F' value's for Fore Leg Length was 7.175. As the obtained 'F' values is greater than the table value of 2.64 with df 3 and 239 required for significance at 0.05 levels. The result of the study shows significant among

the tribal groups of North Bengal on fore leg length. Since the obtained F-ratio is significant on Fore Leg Length among the four groups. So LSD Post Hoc test was applied to study the significance difference between the paired means of the various groups on Fore Leg Length and the results are presented in table-17.

Table 17: Paired Mean Difference of Bhutia, Mech, Rabha and Toto tribal inhabitants of North Bengal in India on Fore Leg Length in cm.

Bhutia	Mech	Rabha	Toto	Mean Difference	Critical Difference
34.45	35.97			-1.52*	0.80
34.45		35.03		-0.58	
34.45			36.05	-1.60*	
	35.97	35.03		0.94*	
	35.97		36.05	-0.08	
		35.03	36.05	-1.02*	

*The mean difference is significant at 0.05 level

Table 18: Foot Length (cm.): Mean and SD of Anthropometric variables of Tribal inhabitants of North Bengal in India

Tribe	N	Mean (cm)	SD	Std. Error	95% Confidence Interval for Mean		Min.	Max.
					Lower Bound	Upper Bound		
Bhutia	60	24.3267	1.37630	.17768	23.9711	24.6822	19.10	27.00
Mech	60	24.3950	1.24362	.16055	24.0737	24.7163	19.10	26.80
Rabha	60	24.6117	1.31344	.16956	24.2724	24.9510	21.50	27.00
Toto	60	24.2783	1.18194	.15259	23.9730	24.5837	21.50	27.00
Total	240	24.4029	1.27923	.08257	24.2403	24.5656	19.10	27.00

The table 18 reveals the mean and standard deviation of the four tribes in selected anthropometric variables (Foot Length) are as follows: Foot Length: Bhutia (M, 24.32; SD, 1.37), Mech (M, 24.39; SD, 1.24), Rabha (M, 24.61; SD, 1.31) and Toto (M, 24.27; SD, 1.18) respectively.

Table 19: ANOVA of Anthropometric variables (Foot Length in cm.) of Tribal inhabitants of North Bengal in India

	Sum of Squares	df	Mean Square	F
Between Groups	3.898	3	1.299	0.792
Within Groups	387.210	236	1.641	
Total	391.108	239		

*Significant at 0.05 Level. With df 3 and 239 are 2.64

The following obtained 'F' value's for Foot Length was 0.792. As the obtained 'F' values is smaller than the table value of 2.64 with df 3 and 239 required for significance at 0.05 levels. The result of the study shows insignificant among the tribal groups of North Bengal on foot length.

Discussion

Height was found significant in Bhutia because Bhutia tribe genetically belongs to mongoloid as well as their residential area comparatively higher than sea level, which means they are staying in high altitude as compare to Mech, Rabha and Toto. In height Toto were significantly taller than Rabha due to fore leg length was found significant. Insignificant results were noted in other tribes because more or less all the other tribal groups live at same altitude level. Weight was found significant between Mech - Bhutia and Mech - Rabha due to the fact that, the height of Mech tribe is significantly higher than of Bhutia and Rabha. Though BMI score was found insignificant but mean value of Mech tribe is found better than of Bhutia and Rabha. The present study findings were also in line with the studies conducted by Luo *et al.* (2009) [5], Dregval and Vaicaitiene (2006) [3], Adamo *et al.* (2011) [4], Pena Reyes *et al.* (2003) [6].

Upper arm length was found significantly better in Bhutia, Mech and Toto as compare to Rabha as because Toto tribes were better in height than of Rabha and Bhutia. Insignificant

results were noted among other tribes. Fore Arm Length was found significantly better in Mech than of Bhutia and Rabha as well as Toto- Bhutia and Toto Rabha. Toto tribe was significantly better than Bhutia and Rabha in height, therefore arm length is also longer than Bhutia and Rabha. The height of Mech tribe was better than Rabha as well as Bhutia, that's why Mech were significantly longer in arm length than Rabha followed by Bhutia. Fore Leg Length was found significantly longer between Toto-Bhutia and Toto-Rabha as well as Mech-Rabha and Mech-Bhutia. The height of the Toto was significantly better than Bhutia and Rabha Tribe; in this connection the fore leg length was significantly better than Bhutia and Rabha. In the parameter of fore leg length Mech tribe was significantly longer than Rabha and Bhutia. Height of the Mech tribes was found significant then of Bhutia, that's why leg length of Bhutia is longer. The mean value of height in Mech tribe is better than Rabha; in this regard it may indicate that fore leg length of Mech tribes is significantly better than of Rabha. Insignificant results were found between Toto-Mech and Rabha - Bhutia tribes. The above findings are in consonance with the studies conducted by Carter *et al.* (1984) [1]. Foot Length was found insignificant between Mech-Toto, Mech-Rabha, Toto-Rabha and Rabha-Bhutia. The above results also line with the studies conducted by Davis *et al.* (2007) [2].

Conclusion

On the basis of the result drawn with the mentioned methodology the following conclusions were sougged out:- Height was found significant between Bhutia & Mech, Bhutia & Rabha Bhutia & Toto and Rabha & Bhutia. Insignificance differences were found between Mech – Rabha and Mech – Toto. weight was found significant between Bhutia - Mech and Rabha – Mech. Whereas, no significance differences was found between Bhutia - Rabha Bhutia – Toto, Mech – Toto and Rabha Toto.

Further, significant differences were found in Upper arm length between Bhutia - Rabha, Mech – Rabha and Rabha - Toto. An insignificance difference was found between Bhutia – Mech, Bhutia – Toto and Mech – Toto. The result of the present study reveals that, there is a significant difference in Fore arm length between Bhutia - Mech, Bhutia – Toto, Rabha – Mech and Rabha - Toto. Whereas, insignificance differences were found between Bhutia – Rabha and Mech – Toto. Significant difference were found between Bhutia - Mech, Bhutia – Toto, Rabha – Mech and Rabha - Toto in Upper leg length. Whereas, no significance differences was found between Bhutia – Rabha and Mech – Toto. The conclusion of this research work may also aware the tribal individuals while performing or training any sports activity.

References

1. Carter JEL, Yuhasz MS. Skinfolds body composition of Olympic athletes Part II Medicine and sports Science, Karger: Basel, 1984, 22.
2. Davis MM, Gance-Cleveland B, Hassink S, Johnson R, Paradis G, Rosnicow K. Recommendations for prevention of childhood obesity. Online publication of Pediatrics. 2007; 120:5229-5253 doi: 10.1542/peds.2007-2329E
3. Dregval L, Vacaitiene R. Anthropometrical data and physical fitness of Lithuanian solders according to the socio demographic characteristics. Medicina (Kaunas, Lithuania). 2006; 42(1):57-63.
4. Adamo KB, Andrew WS, Vincent OO, Waudou JN, Boit

- M, Tremblay MS. Child obesity and fitness levels among Kenyan and Canadian children from urban and rural environment. Online Journal of International Journal of Pediatric Obesity. 2011; 6(2-22):e.225-32. doi: 10.3109/1747-7166.2011.543683.
5. Lou CJ, Brown M, Hope Molyneaux L *et al*, Hypovitaminosis D in Chinese type 2 diabetes: Lack of impact on clinical metabolic status and bio markers of cellular inflammation. Diabetes and vascular research. 2009; 6:194-199.
6. Pena Reyes ME, Tan SK *et al*. Urban rural contrasts in the physical fitness of school children in Oaxaca, Mexico. American Journal of human biology. 2003; 15(6):800-813.