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## Comparison of selected anthropometric variables between tribal and non-tribal school players of Himachal Pradesh

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### Abstract

The present study has been conducted on 300 players with an aim to find out the difference in selected anthropometric characteristics between tribal (n=150) and non-tribal (n=150) senior secondary school players of Himachal Pradesh. Tribal sample were taken from the two tribal districts i.e. Lahaul- Spiti and Kinnaur and two tribal tehsil i.e. Bharmour and Pangi of Chamba district in Himachal Pradesh. Non-tribal sample were taken from the three districts i.e. Hamirpur, Bilaspur and Una of Himachal Pradesh. Each player was tested for various anthropometric measurements necessary for estimation of body weight, height, chest circumference, upper arm circumference, forearm circumference, thigh circumference and calf circumference of tribal and non-tribal players. To analyze the difference in selected anthropometric characteristics of two groups of tribal and non-tribal players were determined through 't' test. From the findings, it has been found that non-tribal senior secondary school players possessed significantly upper arm circumference, forearm circumference and calf circumference and depicted somewhat higher mean value for height. The tribal senior secondary school players possessed significantly higher chest circumference and depicted somewhat higher mean value in weight and thigh circumference.

**Keywords:** Circumference

### 1. Introduction

The term anthropometry refers to measurement of human body in terms of the dimensions of bone, muscle, and adipose (fat) tissue. Measures of subcutaneous adipose tissue are important because individuals with large values are reported to be at increased risks for hypertension, adult-onset diabetes mellitus, cardiovascular disease, gallstones, arthritis, and other disease, and forms of cancer.

Today, anthropometry plays an important role in industrial design, clothing design, ergonomics and architecture where statistical data about the distribution of body dimensions in the population are used to optimize products. Changes in life styles, nutrition and ethnic composition of populations lead to changes in the distribution of body dimensions (e.g., the obesity epidemic), and require regular updating of anthropometric data collections.

Anthropometry is not merely an ensemble of techniques and measurements, but it is a powerful method for description and analysis of body size, shape, form and proportions. It has been extensively used to quantify and analyse human growth and as such it has become an important specialization not only in anthropology and human biology but also of sports sciences, nutrition, medical sciences, aerospace engineering, operational designing, psychology and numerous other sciences. For classification as well as for comparison of certain measurement such as the ratio of height weight, length of the limbs depth and width and the circumference of different parts of the body have an important role in the field of sports performance.

In physical education coaches and scientists have long realized that the performance of an individual is greatly influenced by such factors as height, weight and body structure. The performance diagnosis can only be done through definite knowledge and the understanding of physical characteristics and their relationship of the complex movement mechanism.

The Knowledge of this science equips us with the techniques of various body measurements

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which ultimately deal with the assessment of human physique, body composition, physical growth, maturation and gross functions of the human body. The inter-relationship between each of these above mentioned variables with the success in sports can be regarded as a proven fact today (Cureton, 1951; Sargent, 1887; Tanner, 1964) [1]. Various researches suggest that suitable physique plays a predominant role for success in sports (Cureton, 1951 and Hirata, 1966 & 1979; de Garay *et al.* 1974; Kemper, 1985; Mathur *et al.* 1985) [1, 3, 2, 5, 6]. The investigator in the underline study would like to assess and compare the anthropometric variables between tribal and non-tribal senior secondary school players of Himachal Pradesh.

**1.1 Objectives of the study**

The following objectives have been laid down for the present study:

To study and find out the difference in anthropometric characteristics of Senior secondary school male players of tribal and non-tribal areas of Himachal Pradesh in respect of their anthropometric characteristics i.e.: (a) General body measurements: body weight and stature/height (b) Circumferences: chest circumference, upper -arm circumference, forearm Circumference, thigh circumference and calf circumference.

**1.2 Hypotheses**

It is hypothesize that there would be no significant difference between senior secondary school tribal and non-tribal male players in respect of their anthropometric characteristics i.e.:(a) General Body Measurements: body weight and stature / height.

(b) Circumferences: chest circumference, upper-arm circumference, forearm circumference, thigh circumference and calf circumference.

**2. Methods and Materials**

To achieve the purpose of the present study 300 players i.e. tribal (n=150) and non-tribal (n=150) were selected randomly from the six district of Himachal Pradesh i.e. tribal (Kinnaur, Lahaul & Spiti and two tribal tehsil i.e. Bharmour & Pangi of Chamba district) and non-tribal (Hamirpur, Bilaspur and Una) are used as subjects in this study. Age group ranged from 18 to 25 Years. Each players was tested for various anthropometric measurements necessary for estimation of body weight, height, chest circumference, upper arm circumference, fore arm circumference, thigh and calf circumference. Weighing scale, anthropometric rod and measuring tape were used for the measurements. To test the significance of mean difference between tribal and non-tribal male players, statistical technique of ‘t’ test was applied.

**3. Results**

**Table 1:** t-value for tribal and non-tribal male players with respect to their mean score on body weight component of anthropometric variable Not significant at 0.05 level of confidence

Group	Variable	N	Mean	S.D	M.D	S.E.M	df	t
Tribal	Body weight	150	52.32	6.035	.167	.493	298	.190
Non-Tribal		150	52.15	8.918		.728		

Table value of ‘t’ at 0.05 level =1.97 for df 298

Table value of ‘t’ at 0.01 level =2.59 for df 298

As per table No.1 the mean value of body weight of senior secondary school tribal male players is 52.32, the mean value of senior secondary school non-tribal male players is 52.15. The mean difference is .167 and S.D of tribal male players is 6.035 and non-tribal male players is 8.918 respectively. The calculated ‘t’ value came out to be .190, which is statistically insignificant at 0.05 level of significance.

This indicated that tribal and non-tribal senior secondary school male players are more or less the same on the variable of ‘body weight’. Hence the formulated hypothesis that “there would be no significant difference between tribal and non-tribal senior secondary school male players in the variable of body weight” null hypothesis stand accepted.

**Table 2:** t-value for tribal and non-tribal male players with respect to their mean score on stature/height component of anthropometric variable. Not significant at 0.05 level of confidence

Group	Variable	N	Mean	S.D	M.D	S.E.M	df	t
Tribal	Stature/ Height	150	165.55	6.181	1.133	.505	298	1.475
Non-Tribal		150	166.69	7.105		.580		

As per table No.2 the mean value of stature/height of senior secondary school tribal male players is 165.55 the mean value of senior secondary school non-tribal male players is 166.69. The mean difference is 1.133 and S.D of tribal male players is 6.181 and non-tribal male players is 7.105 respectively. The calculated ‘t’-value came out to be 1.474, which is statistically insignificant at 0.05 level of significance.

This indicated that tribal and non-tribal senior secondary school male players are more or less the same on the variable of ‘stature/height’. Hence the formulated hypothesis that “there would be no significant difference between tribal and non-tribal senior secondary school male players in the variable of stature/height” null hypothesis stand accepted.

**Table 3:** t-value for tribal and non-tribal male players with respect to their mean score on Chest Circumference component of anthropometric variable

Group	Variable	N	Mean	S.D	M.D	S.E.M	df	t
Tribal	Chest Circumference	150	80.27	3.966	1.620	.324	298	2.293*
Non-Tribal		150	78.65	7.689		.628		

\*Significant at 0.05 level of confidence.

As per table No.3 the mean value of chest circumference of senior secondary school tribal male players is 80.27, the mean value of senior secondary school non-tribal male players is 78.65. The mean difference is 1.620 and S.D of tribal male players is 3.966 and non-tribal male players is 7.689 respectively. The calculated 't'-value came out to be 2.293, which is statistically significant at 0.05 level of significance.

This indicated that tribal and non-tribal senior secondary school male players differ significantly in the variable of 'chest circumference'. Hence the formulated hypothesis that "there would be no significant difference between tribal and non-tribal senior secondary school male players in the variable of chest circumference" null hypothesis stand rejected.

**Table 4:** t-value for tribal and non-tribal male players with respect to their mean score on Upper Arm Circumference component of anthropometric variable.

Group	Variable	N	Mean	S.D	M.D	S.E.M	df	t
Tribal	Upper arm Circumference	150	23.18	1.424	.987	.116	298	3.535**
Non-Tribal		150	24.17	3.108		.254		

\*\*Significant at 0.01 level of confidence.

As per table No.4 the mean value of upper arm circumference of senior secondary school tribal male players is 23.18, the mean value of senior secondary school non-tribal male players is 24.17. The mean difference is .9 87 and S.D of tribal male players is 1.424 and non-tribal male players is 3.108 respectively. The calculated 't'-value came out to be 3.535, which is statistically significant at 0.01 level of significance.

This indicated that tribal and non-tribal senior secondary school male players differ significantly in the variable of 'upper arm circumference'. Hence the formulated hypothesis that "there would be no significant difference between tribal and non-tribal senior secondary school male players in the variable of upper arm circumference" null hypothesis stand rejected.

**Table 5:** t-value for tribal and non-tribal male players with respect to their mean score on Forearm Circumference component of anthropometric variable.

Group	Variable	N	Mean	S.D	M.D	S.E.M	df	t
Tribal	Forearm Circumference	150	22.65	1.405	.713	.115	298	3.171**
Non-Tribal		150	23.37	2.370		.193		

\*\*Significant at 0.01 level of confidence.

As per table No.5 the mean value of forearm circumference of senior secondary school tribal male players is 22.65, the mean value of senior secondary school non-tribal male players is 23.37. The mean difference is .713 and S.D of tribal male players is 1.405 and non-tribal male players is 2.370. The calculated 't'-value came out to be .3.171, which is statistically significant at 0.01 level of significance.

This indicated that tribal and non-tribal senior secondary school male players differ significantly in the variable of 'fore arm circumference'. Hence the formulated hypothesis that "there would be no significant difference between tribal and non-tribal senior secondary school male players in the variable of fore arm circumference" null hypothesis stand rejected.

**Table 6:** t-value for tribal and non-tribal male players with respect to their mean score on Thigh Circumference component of anthropometric variable.

Group	Variable	N	Mean	S.D	M.D	S.E.M	df	t
Tribal	Thigh Circumference	150	44.93	2.805	.553	.229	298	1.244
Non-Tribal		150	45.48	4.671		.381		

Not significant at 0.05 level of confidence.

As per table No.6 the mean value of thigh circumference of senior secondary school tribal male players is 44.93, the mean value of senior secondary school non-tribal male players is 45.48. The mean difference is .553 and S.D of tribal male players is 2.805 and non-tribal male players is 4.671. The calculated 't'-value came out to be 1.244, which is statistically insignificant at 0.05 level of significance.

This indicated that tribal and non-tribal senior secondary school male players are more or less the same on the variable of 'thigh circumference'. Hence the formulated hypothesis that "there would be no significant difference between tribal and non-tribal senior secondary school male players in the variable of thigh circumference" null hypothesis stand accepted.

**Table 7:** t-value for tribal and non-tribal male players with respect to their mean score on Calf Circumference component of anthropometric variable

Group	Variable	N	Mean	S.D	M.D	S.E.M	df	t
Tribal	Calf Circumference	150	29.77	1.578	.987	.129	298	4.215**
Non-Tribal		150	30.75	2.394		.195		

\*\*Significant at 0.01 level of confidence

As per table No.7 the mean value of calf circumference of senior secondary school tribal male players is 29.77, the mean value of senior secondary school non-tribal male players is 30.75. The mean difference is .987 and S.D of tribal male players is 1.578 and non-tribal male players is 2.394

respectively. The calculated 't'-value came out to be 4.215, which is statistically significant at 0.01 level of significance. This indicated that tribal and non-tribal senior secondary school male players differ significantly in the variable of 'calf circumference'. Hence the formulated hypothesis that "there

would be no significant difference between tribal and non-tribal senior secondary school male players in the variable of calf circumference” null hypothesis stand rejected.

#### 4. Discussion

It has been found that tribal male players possess greater body weight and lesser stature/height than non-tribal male players. There was insignificant difference established between tribal male players and non-tribal male players in general body measurement i.e. body weight and height. This indicates that tribal male players and non-tribal male players have approximate same development of body weight and stature/height.

It has been found that tribal male players possess greater value for chest circumference and lesser value for upper arm circumference, forearm, thigh and calf circumference than non-tribal male players. There was significant difference established between tribal male players and non-tribal male players in chest circumference, upper arm, forearm, and calf circumference. However there was no significant difference in thigh circumference. This indicates that non-tribal male players have greater circumference of upper arm, forearm and calf circumference and lesser circumference of chest than tribal male players, but possess near about same value for thigh circumference.

#### 5. Conclusions

1. Tribal and non-tribal senior secondary school male players do not differ significantly on the variable of body weight.
2. Tribal and non-tribal senior secondary school male players do not differ significantly on the variable of stature/height.
3. Tribal and non-tribal senior secondary school male players differ significantly in the variable of chest circumference.
4. Tribal and non-tribal senior secondary school male players differ significantly in the variable of upper arm circumference.
5. Tribal and non-tribal senior secondary school male players differ significantly in the variable of fore arm circumference.
6. Tribal and non-tribal senior secondary school male players do not differ significant on the variable of thigh circumference.
7. Tribal and non-tribal senior secondary school male players differ significantly in the variable of calf circumference.

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