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## **A comparative study of anthropometric measurements, body composition and cardiovascular efficiency of handball and basket-ball players**

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### **Abstract**

Anthropometry is the science of measuring the human body and its parts. It is used as an aid to the study of human evolution and variation. The purpose of the study is to compare the anthropometric measurements, body composition and cardiovascular efficiency of Handball and Basket-Ball players. The main sources of data for the present study are the physical education students of Rabindranath Tagore University Bhopal for the age group of subjects was 18 to 28 years. The level of significance was set up at 0.05.

**Keywords:** Body composition, anthropometric measurement, cardiovascular efficiency, handball, basketball

### **Introduction**

Life itself is Physical Education. Presently it is in the process of transformation. Concentrated efforts are now being made to bring physical education into the main stream of education. In the process there are problems and solution, embarrassments and insights, and finally confusion and adjustment.

### **Body Composition**

#### **Measuring body composition**

Body composition (particularly body fat percentage) can be measured in several ways. The most common method is by using gun calipers to measure the thickness of subcutaneous fat in multiple places on the body. This includes the abdominal area, the subscapular region, arms, buttocks and thighs. These measurements are then used to estimate total body fat with a margin of error of approximately four percentage k points. A technique for measuring body composition has been developed using the same principles as under water weighing. The technique uses air, as opposed to water and is known as air displacement plethysmography (ADP). Subjects enter a sealed chamber that measures their body volume through the displacement of air in the chamber. Body volume is combined with body weight (mass) in order to determine body density. The technique then estimates the percentage of body fat and lean body mass (LBM) through known equations (for the density of fat and fat free mass). Body composition measurement with Dual energy X-ray absorptiometry (DEXA) is used increasingly for a variety of clinical and research applications. Total body or estimated total body scans using DEXA give accurate and precise measurements of BMD and body composition, including bone mineral content (BMC), bone mineral density (BMD), lean tissue mass, fat tissue mass, and fractional contribution of fat. These measurements are extremely reproducible, making them excellent for monitoring pharmaceutical therapy, nutritional or exercise intervention, sports training &/or other body composition altering programs. They are also fast, simple, non-invasive, and expose the subject to a level of x-rays less than that of a cross-country flight. DEXA exams provide both total body and up to 14 regional (trunk, individual arms & legs, android, ganoids, etc.) results. (Kiebzak GM 2000)  
Body Composition is also estimated using cross-sectional imaging methods like magnetic resonance imaging (MRI) and computed tomography (CT).

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Since MRI and CT give the most precise body composition measures to-date, many pharmaceutical companies are very interested in this new procedure to estimate body composition measures before and after drug therapy especially in drugs that might change body composition. Ultrasound has also been used to measure subcutaneous fat thickness, and by using multiple points a measurement of body composition can be made. Ultrasound has the advantage of being able to also directly measure muscle thickness and quantify intramuscular fat.

### Anthropometry

Anthropometry is the science of measuring the human body and its parts. It is used as an aid to the study of human evolution and variation.

### Body Composition

Body composition is the preparation of the lean mass and depot fat and it is one of the most important morphological factor characterizing human organism. (Donald K. Mathews)

### Cardiovascular Efficiency

Cardiovascular efficiency is the ability to continue or persist in strenuous tasks involving large muscle group for a longer period of time.

### Statement of problem

The purpose of the study undertaken is to find out the relationship of selected anthropometric measurements, body composition and cardiovascular efficiency of Handball and Basket Ball Players. Hence the statement of the problem is:

“A comparative study of anthropometric measurements, body composition and cardiovascular efficiency of Handball and Basket-ball players”

### Purpose of the study

The purpose of the study is to compare the anthropometric measurements, body composition and cardiovascular efficiency of Handball and Basket-Ball players.

### Hypothesis

According to the available literature in this field it was hypothesized that the Basket -ball players would find superior to the Handball players in every aspect of this study, i.e., Anthropometric measurements, body composition, and cardiovascular efficiency.

### Criterion measures

The criterion measures for testing the hypothesis in the study will numerical scores obtained from the anthropometric measurement, body composition and Cardio-Vascular efficiency test.

### Anthropometric measurement

- 1. Body Weight:** It has been measured by weighing machine.
- 2. Standing height:** It has been measured with movable anthropometer.
- 3. Sitting height:** It has been measured with movable anthropometer.
- 4. Lower extremity length:** It have been measured with anthropometer.
- 5. Lower Leg Length:** It have been measured with anthropometer.
- 6. Foot Length:** It have been measured with small sliding caliper.
- 7. Hand Length:** It have been measured with small sliding caliper.
- 8. Hand Breadth:** It have been measured with small sliding caliper.
- 9. Wrist breadth:** It have been measured with small sliding caliper.
- 10. Upper Arm Girth:** It have been measured with still tape of 0.7 cm. wide.
- 11. Fore Arm:** It have been measured with still tape of 0.7 cm wide.
- 12. Wrist Girth:** It have been measured with still tape of 0.7 cm wide.
- 13. Calf Girth:** It have been measured with still tape of 0.7 cm wide.

### Body Composition

The weights of each subject have been taken with lever tape Laboratory anthropometric weighing machine.

### Measurement description of finding body fat

To obtain the percentage of fat for each subject, skinfold thickness measurement in mm have been taken at three selected sites on the body namely, biceps, triceps, sub scapular.

### Statistical procedures employed.

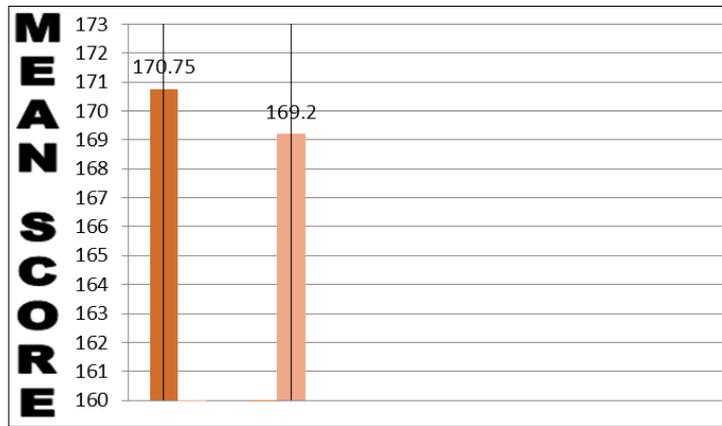
For the comparison of Handball and Basket-Ball players in anthropometric measurement, body composition and cardiovascular efficiency, the ‘t’ test employed on the ratio of 0.05 level of significance.

### Analysis and interpretation of data

The measurements were taken in different variables as per the method of study. The data was shown in the Appendix. The level of significance was set up at 0.05 which is appropriate for a research scholar of Master Degree level. The 0.05 indicated that there are chances of 0.5 errors in each 100 samples. To know the difference in the selected variables the Fleishmann’s’ test for independent sample was used. For the accurate and error free analysis of the data. The data was analyzed and analysis tables were formed with Bar Graphs, which are presented in the following tables and figures.

**Table 1:** Summary of The ‘T’ Test of Standing Height

Group	Basket Ball Group	Handball
Number of the student	20	20
Mean	170.75	169.2
Standard deviation	5.427755182	5.337060101
Standard error		1.702127
Mean difference		1.550003
Obtained ‘t’		0.910627
Level of significance	0.05	
Tabulated ‘t’		2.025

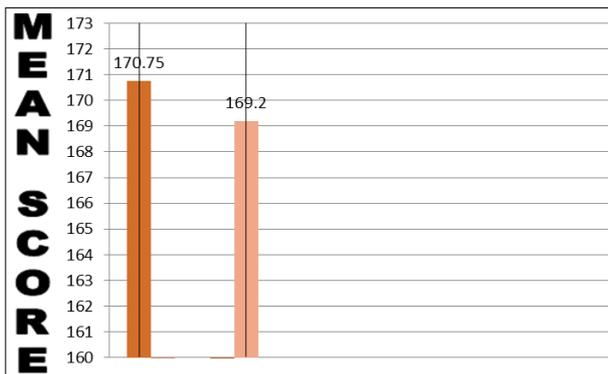


Heights are shown in nearest CM

**Fig 1:** Figure showing mean body weight of basket -ball and handball players

**Table 2:** Summary of the ‘t’ test of body composition

Group	Basket Ball Group	Handball
Number of the student	20	20
Mean	18.15	20.45
Standard deviation	2.033275812	2.781044862
Standard error		0.770338
Mean difference		-2.300001
Obtained ‘t’		-2.985703
Level of significance	0.05	
Tabulated ‘t’		2.025

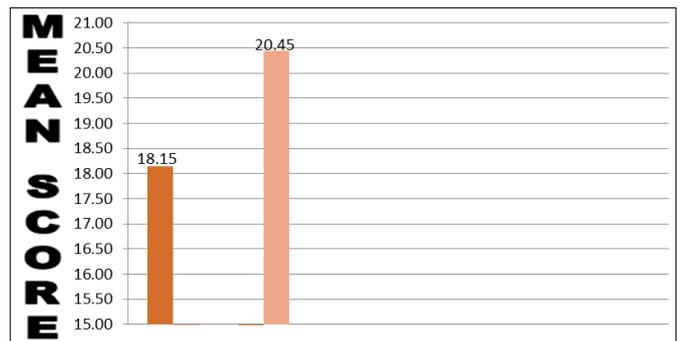


Heights are shown in nearest cm

**Fig 2:** Showing mean body weight of basket -ball and handball players

**Table 3:** Summary of the ‘t’ test of body composition

Group	Basket Ball Group	Handball
Number of the student	20	20
Mean	18.15	20.45
Standard deviation	2.033275812	2.781044862
Standard error		0.770338
Mean difference		-2.300001
Obtained ‘t’		-2.985703
Level of significance	0.05	
Tabulated ‘t’		2.025

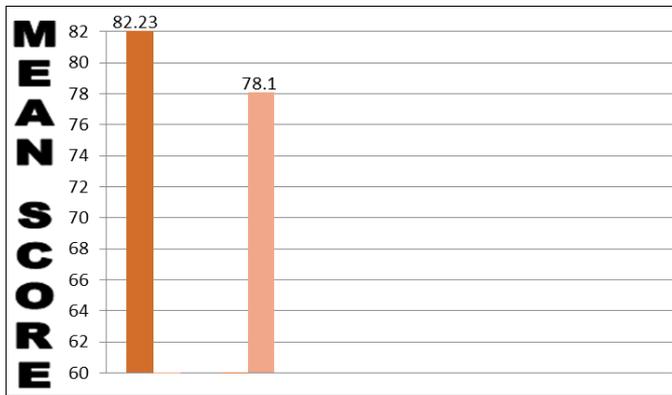


Body composition shown in nearest cm

**Fig 3:** Showing mean body composition of basket-ball and handball players

**Table 4:** Summary of the ‘t’ test of cardio vascular efficiency

	Basket Ball Group	Handball Group
Number of the student	20	20
Mean	82.23	78.1
Standard deviation	3.359683569	4.552616367
Standard error		1.265184
Mean difference		4.130005
Obtained ‘t’		3.264352
Level of significance	0.05	
Tabulated ‘t’		2.025



Cardio-vascular efficiency recovery in seconds

**Fig 4:** Showing mean cardio – vascular efficiency of basket -ball and handball players

### Discussion and research findings

The present studies were under taken with the view to find out the relationship between the selected Anthropometric measurement body composition and cardiovascular efficiency of HANDBALL and Hand ball players. The subjects were 40 in number 20 in each group namely HANDBALL and Basket Ball. All subjects and the student of Department of Physical Education Rabindranath Tagore University Bhopal, and University level playing ability. The data thus collected were tabulated for both the groups for all the variables the level of significance is 0.05 which was appropriate. To know the difference in the selected variables” test for independent samples was used.

### Conclusion

On the basis of finding, the following conclusions have been drawn:-

1. In Anthropometric measurements, standing height, weight, sitting height, and foot length, no significant differences was found but in was lower extremity length, lower leg length, hand length, upper arm girth, fore-arm girth, wrist girth, calf girth, hand breadth and wrist breadth the Basket ballers were found superior than volley-ballers.
2. In body composition Basket -ballers were found superior to volley-ballers.
3. In cardiovascular efficiency, Basket -ballers were found superior than volley-ballers.

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