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## Comparison of resting pulse rate, expiratory peak flow and vital capacity of handball players

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### Abstract

**Aim:** The purpose of this study was to find out the difference of Resting Pulse Rate, Expiratory Peak Flow and Vital Capacity between Inter-College and Inter-University Handball Players.

**Subjects:** To obtain data, the investigators had selected Sixty four (N=64) male Inter-College and Inter-University level handball players to act as subjects. They were divided into two groups; Forty eight (N<sub>1</sub>=48) Inter-College level and Sixteen (N<sub>2</sub>=16) Inter-University level. All the subjects, after having been informed about the objective and protocol of the study, gave their consent and volunteered to participate in this study.

**Variables:** For the purpose of this investigation Resting Pulse Rate, Expiratory Peak Flow and Vital Capacity were measured.

**Statistical Analysis:** The Statistical Package for the Social Sciences (SPSS) version 14.0 was used for all analyses. The differences in the mean of each group for selected variable were tested for the significance of difference by an independent samples t-test. For testing the hypotheses, the level of significance was set at 0.05.

**Results:** Resting Pulse Rate:- The t-value is 3.89023. The p-value is .000124. The result is significant at  $p < .05$ ., Expiratory Peak Flow:- The t-value is 9.67928. The p-value is  $< .00001$ . The result is significant at  $p < .05$  and Vital Capacity:- The t-value is 3.39619. The p-value is .000599. The result is significant at  $p < .05$ .

**Keywords:** Resting pulse rate, expiratory peak flow, vital capacity, handball players, inter-college, inter-university

### 1. Introduction

The period 1960–1980 has been considered the era of sports and athletics [1]. The American College of Sports Medicine, a multidisciplinary professional organization of over 20,000 members, is an important scientific society for exercise physiologists, particularly those with an interest in clinical applications of the field to athletes and sportspersons [2]. Physical training is aimed primarily at increasing the individual's maximum physical capacity and performance [3]. Sport can be organized by age, sex, level of ambition, weight or other groupings [4]. Sport can also be spontaneous [5] and defined as a subset of exercises undertaken individually or as a part of a team, where participants have a defined goal. Polarization of physical activity may lead to increased risk of poor health despite meeting the recommendations for physical activity [6, 7, 8].

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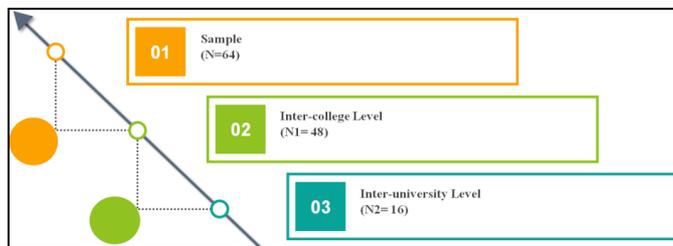
### 2. Material and Methods

#### 2.1. Subjects

To obtain data, the investigators had selected Sixty four (N=64) male Inter-College and Inter-University level Handball Players to act as subjects. They were divided into two groups; Forty eight (N<sub>1</sub>=48) Inter-College level and Sixteen (N<sub>2</sub>=16) Inter-University level.

All the subjects, after having been informed about the objective and protocol of the study, gave their consent and volunteered to participate in this study.

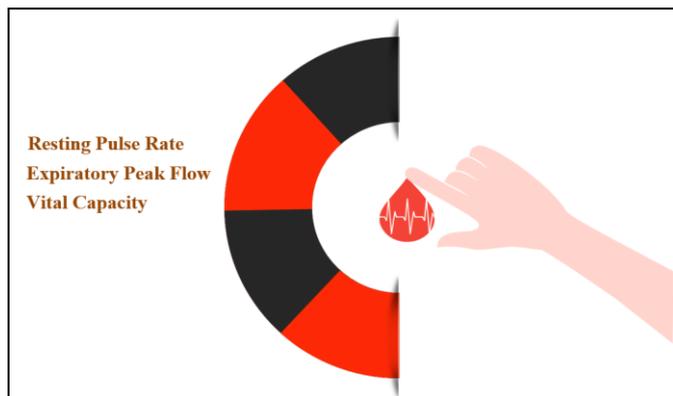
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**Fig 1:** Classification of subjects

**2.2. Variables**

For the purpose of this investigation following Physiological Variables were measured:



**Fig 2:** Resting Pulse Rate Expiratory Peak Flow and Vital Capacity

**Resting Pulse Rate**

The Resting Pulse Rate was measured by finding the pulse of the body. This pulse rate can be measured at any point on the body where an artery’s pulsation is transmitted to the surface - often as it is compressed against an underlying structure like bone - by pressing it with the index and middle finger. The thumb should not be used for measuring another person’s heart rate, as its strong pulse may interfere with discriminating the site of pulsation or use stethoscope or electronic automatic machine for exact calculation of the beats. The beats per minute were usually recorded as score.

**Expiratory Peak Flow**

The Expiratory Peak Flow (PEF) was the maximum flow generated during expiration performed with maximal force and started after a full inspiration. The subject was made to stand up and it was ensured that the indicator was at the bottom of the meter (zero). The subject was then asked to take a deep breath in, filling the lungs completely and place the mouthpiece in the mouth; lightly bite with the teeth and close the lips on it. The subject was asked to keep the tongue away from the mouthpiece and blast the air out as hard and as fast as possible in a single blow. The best of three readings was used as the recorded value of the peak expiratory flow rate.

**Vital Capacity**

The Vital Capacity (VC) was the volume, measured at the mouth, between the position of full inspiration and expiration. It was the total amount of air that an individual can breathe in and out of their lungs in a single maximum breath. Vital capacity was measured by a spirometer. Spirometer was calibrated to record the true volume of air exhaled into or

through them. The accuracy of this calibration was checked with a calibration syringe to ensure that the spirometer continues to record volumes accurately. The subject was made to sit and breathe normally through the mouthpiece of spirometer. It was made sure the nose clips were on. Subjects filled their lung as much as possible. As soon as they had their lungs fully inflated, they blew all the air out as fast as they could. Then mouthpieces were removed. Nose clips were taken off. The best of 3 Forced Vital Capacity (FVC) manoeuvres were taken.

**2.3. Sampling**

Convenience sampling (also known as availability sampling) is a specific type of non-probability sampling method that relies on data collection from population members who are conveniently available to participate in study were utilized for the purpose of this study.

**3. Statistical Analysis**

The Statistical Package for the Social Sciences (SPSS) version 14.0 was used for all analyses. The differences in the mean of each group for selected variable were tested for the significance of difference by an independent samples t-test. For testing the hypotheses, the level of significance was set at 0.05.

**4. Results**

**Table 1:** Descriptive Analysis results between Inter-College and Inter-University level Handball Players with regards to " Resting Pulse Rate".

t-test for Equality of Means								
Level of Participation	n	$\sum X$	$\sum X^2$	SS	mean	df	t-value	p-value
Inter-College	48	3806	315772	13987.916	79.2917	47	623.89023	.000124
Inter-University	16	987	62133	1247.437	61.6875	15		

The t-value is 3.89023. The p-value is .000124. The result is significant at  $p < .05$ .

**Table 2:** Descriptive Analysis results between Inter-College and Inter-University level Handball Players with regards to " Expiratory Peak Flow".

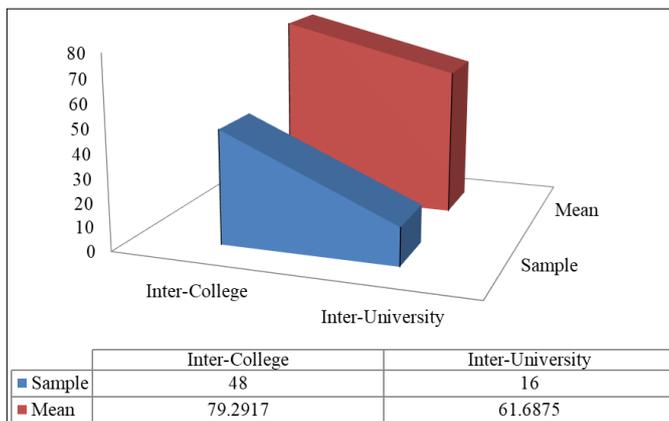
t-test for Equality of Means								
Level of Participation	n	$\sum X$	$\sum X^2$	SS	mean	df	t-value	p-value
Inter-College	48	12200	3485000	384166.666	254.166	47	9.67928	.00001
Inter-University	16	8122	4248916	125985.75	507.625	15		

The t-value is 9.67928. The p-value is  $< .00001$ . The result is significant at  $p < .05$ .

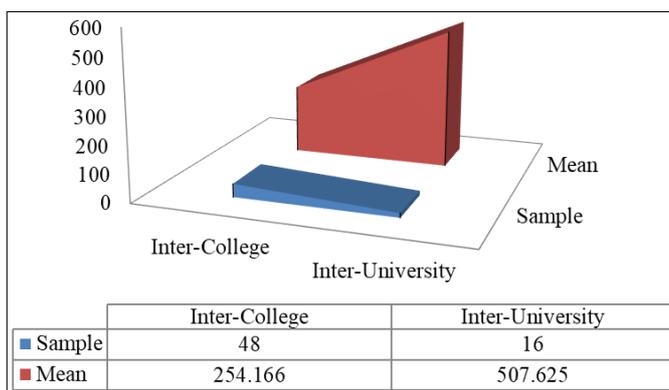
**Table 3:** Descriptive Analysis results between Inter-College and Inter-University level Handball Players with regards to " Vital Capacity".

t-test for Equality of Means								
Level of Participation	n	$\sum X$	$\sum X^2$	SS	mean	df	t-value	p-value
Inter-College	48	170.100	606.07	3.278	3.543	47	3.39619	.000599
Inter-University	16	52.599	173.88	0.957	3.287	15		

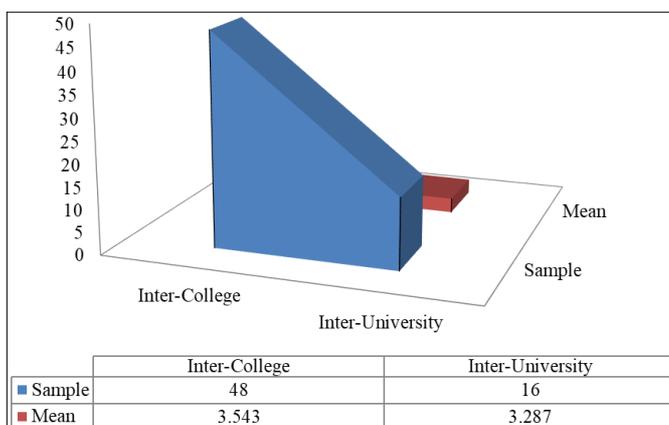
The t-value is 3.39619. The p-value is .000599. The result is significant at  $p < .05$ .



**Fig 3:** Graphical illustration of Descriptive Analysis (Mean) results between Inter-College and Inter-University level Handball Players with regards to " Resting Pulse Rate".



**Fig 4:** Graphical illustration of Descriptive Analysis (Mean) results between Inter-College and Inter-University level Handball Players with regards to " Expiratory Peak Flow".



**Fig 5:** Graphical illustration of Descriptive Analysis (Mean) results between Inter-College and Inter-University level Handball Players with regards to "Vital Capacity".

**5. Conclusions**

- **Resting Pulse Rate:** The t-value is 3.89023. The p-value is .000124. The result is significant at  $p < .05$ .
- **Expiratory Peak Flow:** The t-value is 9.67928. The p-value is  $< .00001$ . The result is significant at  $p < .05$ .
- **Vital Capacity:** The t-value is 3.39619. The p-value is .000599. The result is significant at  $p < .05$ .

**6. Acknowledgement**

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**7. Conflict of interests**

The authors declare that there is no conflict of interests.

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