

## **A study on selected Physiological variables of Handball, Volleyball and Football players.**

Mr.P.MadhusudhanaBabu

Lecturer in Physical Education, Rayalaseema College of Physical Education,  
Proddatur, Andhra Pradesh, India.

### **Introduction**

---

Sports and games in modern times have taken a definite shape in comparison with the immature and unscientific plays of ancient times. Today sports are becoming professional players are earning a lot through games and sports. Sports in recent times are mainly of a competitive nature through their procreative values cannot be underestimated or denied. Despite the fighting attitude between the competitors, sports bring the different nations closer and establish brotherhood and friendship between the people of different countries.

The present study is considered with various physiological variables, so as to compile the physiological characteristics of various game players. The following physiological variables were taken into consideration: Resting Heart Rate, Breath Holding Time and Blood Pressure (Diastolic and systolic). The physiological aspect of human being is to increase the ability of body to intake the oxygen in sufficient quantities to the muscle cell. It can do in several ways by increasing the rate of breathing, by increasing the depth of breathing, by increasing of rate at which oxygen is taken from the air in the lungs into the blood also increasing the amount of haemoglobin available for oxygen transport and increasing the rate of blood flow with increasing the rate at which oxygen is unloaded from the blood at the muscle cell.

In the field of sports and games where individual has to perform complex motor task, on integrated functioning of physical and physiological variables is of permanent importance. The ability of a sportsman to perform a task effectively and efficiency is an interaction between one's physical and mental capabilities. Both physical and mental facilities of the individual are so closely linked to each other that along with mental task one has to cope up with demand of physical task and vice-versa

### **Purpose of the study:**

The purpose of the study was to compare the selected physiological variables among selected university level Football, Handball and Volleyball players of Andhra Pradesh.

### **Review of Related Literature:**

**Kumar & Gladkykirubakar(2013)** compared the physiological variables of fast bowlers and batsman in cricket at Inter University and Inter College levels of participation. The study administered on 30 Cricket players in the age group 18-25 years of different University belonging to AMET University, Madras University, Anna University and Hindustan University on the stratified random sampling basis. Physiological variables as blood pressure (diastolic and systolic), pulse rate, and respiratory rate measured. As per results of the physiological variables, the players of Group-I ( Inter-University level) were found better in blood pressure diastolic, pulse rate and respiratory rate from the players of Group-II (Inter-college level cricket players) . This significant difference was found at .05 levels of confidence and on 99 degree of freedom and also on .01 levels. The inter college and inter university level cricket players have better mean value in all the physiological variable such as blood pressure (diastolic), pulse rate and respiratory rate. The statistically insignificant difference was found in the blood pressure systolic between the two groups of cricket players. The mean difference of two groups of Cricket players in blood pressure systolic and found the difference insignificant. The mean value difference between the two groups was 1.00. The standard error denoted as  $SE = .52$ . The value of t-test was found 1.92, which is insignificant to the tabulated value 't' 5 (.99 = 1.99). The difference between the two groups was very less, which indicates that they were almost of equal status in blood pressure (systolic).

**Nikolaidis & Ingebrigtsen (2013)** examined possible discriminant physical and physiological characteristics between elite male Handball players from elite teams with different league rankings. Players from three teams (A, B and C), which competed in the first league of the Greek championship during the season 2011-2012 participated in the study. Team A finished first, B came second and C came eighth out of eleven clubs. Teams A and B also participated in European Cups, and team A won the European Challenge Cup. The

players (n=44) were examined for anthropometric characteristics and performed a series of physical fitness tests. Players from teams A and B were taller (6.2 cm (0.7;11.7), mean difference (95% CI) and 9.2 cm (4.0;14.5), respectively), and had a higher amount of fat free mass (6.4 kg (1.1;11.8) and 5.4 kg (0.2;10.5)) compared to those of team C. Players from team A performed better than players from team C in the squat jump (5.5 cm (1.0;10.0)), the counter movement jump without (5.5 cm (0.4;10.6)) and with arm swing (6.0 cm (0.7;11.3)) and in the 30 s Bosco test (5.7 W.kg<sup>-1</sup> (1.2;10.2)). Also, players from team A outperformed team B in mean power during the Wingate anaerobic test (WAnT, 0.5 W.kg<sup>-1</sup>(0;0.9)) and in the Bosco test (7.8 W.kg<sup>-1</sup> (3.4;12.2)). Overall, players from the best ranked team performed better than the lowest ranked team on WAnT, vertical jumps and the Bosco test. Stepwise discriminant analysis showed that stature and mean power during the Bosco test were the most important characteristics in TH players, accounting for 54.6% of the variance in team ranking. These findings indicate the contribution of particular physical fitness components (stature, fat free mass and anaerobic power) to excellence in TH. In addition, the use of the Bosco test as an assessment tool in talent identification and physical fitness monitoring in this sport is further recommended.

**Rai (2013)** determined to study the physiological characteristics of national Volleyball players. Study was conducted on twenty Volleyball spikers from various regions of railways which participated in National railways Volleyball Championship. Twenty spikers from different teams were selected for the present study. The age of the subjects ranged from 18 to 25 years. Based on literary evidence and scholar's own understanding the following variables were selected for the purpose of this study: Physiological Variables Resting heart rate, Resting respiratory rate, Vital Capacity, Total body fat percentage, Lean body weight. Pulpatory method (Pulse rate count) was used to measure the Resting Heart Rate. Score was recorded in numbers of pulse per minute. Resting respiratory rate was measured by manual method over a period of one minute. Weight was recorded nearest to half a kilogram. Height was recorded to the nearest centimeter. Total Body fat percentage was measured by skinfold caliper and with help of Slown Weir Nomogram Technique score was recorded in percentage. To characterize Volleyball players by their selected

physiological variables to standard human performance measures, descriptive statistics was used.

### **Sample of the study:**

- To achieve the purpose of the study, one hundred male players were selected at randomly from each category of Football, Handball and Volleyball games, a total of 300 university players in Andhra Pradesh State, India, who had their credit in participating interuniversity tournaments during the academic years 2010-11 and 2011-12 in their respective games.
- In Andhra Pradesh, players who had represented in the academic years 2009-10 and 2010-11 namely Acharya Nagarjuna University Guntur, Andhra University Vishakapatnam, Osmania University Hyderabad, Sri Krishnadevaraya University Ananthapur and Sri Venkateswara University Tirupatnam were chosen as the subjects.
- The subject's age ranged between 18 to 25 years.

### **Methods and Materials:**

The researcher explained the purpose and the significance of the study to all the selected subjects before conducting the tests to ensure maximum cooperation from the subjects. All the subjects agreed voluntarily to co-operate in the testing procedures explained to them and to put in their test efforts in the interest of the scientific research and in order to enhance their own performance and achievement standards.

Physiological parameters are one of the most important factors that determine the performance level of an individual. Sports performance depends largely on physical fitness factors. Sports activity is a physical activity which is not possible without these abilities. Fitness factors are most important for predicting performance of the players along with physiological parameters. Natural ability is the promise of potential but fundamentals are the foundations of excellence.

### **Physiological Variables**

1. Resting Heart Rate

2. Breath Holding Time
3. Blood Pressure (systolic and diastolic)

As per the available literatures, the following standardized tests were used to collect relevant data on the selected dependent variables

<b>Sl. No.</b>	<b>Criterion Variables</b>	<b>Test Items</b>	<b>Unit of Measurement</b>
1	Resting Heart rate	Radial Pulse method	Beats/Minute
2	Breath Holding time	Manual Method	Seconds
3	Blood Pressure	Bio Monitor	Mm/Hg.

#### **Statistical Analysis:**

The continuous variables selected for this study were Resting heart rate, Breath holding time and Blood pressure (systolic and diastolic). All the subjects were tested on the selected dependent variables.

The obtained data from the three groups were statistically analyzed with One-way Analysis of Variance (ANOVA). Whenever the F-ratio for means was found to be significant, the Scheffe'S test was applied as post-hoc test to determine the paired mean differences. The level of confidence was fixed at 0.05 level for all the cases to find out the significance.

In using analysis of variance, F ratio of 3.03 was needed for significant at 0.05 level with the degrees of freedom '2 and 297'. The present study, if the obtained value was equal and/or greater at 0.05 level, the null hypotheses were rejected and if obtained values were less than the required value at 0.05 level, the hypotheses were accepted to the effect that there exists no significant difference in the mean scores of the players under study. The following tables illustrate the statistical data

**TABLE-I**

**Analysis of variance for the data on resting heart rate among Football, Handball and Volleyball players (scores in beats per minute)**

Test	Players of Different Disciplines			Source of Variance	Sum of Squares	df	Mean Squares	F Ratio
	Football	Handball	Volleyball					
Mean Scores	60.560	64.940	66.320	Between Groups	1808.880	2	904.440	230.37*
Standard Deviation	1.540	2.103	2.233	Within Groups	1166.040	297	3.926	

\* Significant at 0.05 level of confidence,

The table value for significance at 0.05 level with df 2 and 297 is 3.03

**TABLE-I(A)**

**Scheffe's post hoc test for significant difference in the resting heart rate among Football, Handball and Volleyball players (Scores in beats per minute)**

Players of Different Disciplines			Mean Difference and Sig. Level	Confidence Interval
Football	Handball	Volleyball		
60.560	64.940	-	4.380*	0.690
-	64.940	66.320	1.380*	
60.560	-	66.320	5.760*	

\*Significant at 0.05 level of confidence.

**TABLE-II**

**Analysis of variance for the data on breath holding time among Football, Handball and Volleyball players (scores in seconds)**

Test	Players of Different Disciplines			Source of Variance	Sum of Squares	df	Mean Squares	F Ratio
	Football	Handball	Volleyball					
Mean Scores	34.920	33.000	30.420	Between Groups	1019.760	2	509.880	101.65*
Standard Deviation	1.993	2.127	2.559	Within Groups	1489.720	297	5.016	

\* *Significant at 0.05 level of confidence,*

The table value for significance at 0.05 level with df 2 and 297 is 3.03

**TABLE-II (A)**

**SCHEFFE'S POST HOC TEST FOR SIGNIFICANT DIFFERENCE IN THE BREATH HOLDING TIME AMONG FOOTBALL, HANDBALL AND VOLLEYBALL PLAYERS (Scores in seconds)**

Players of Different Disciplines			Mean Difference and Sig. Level	Confidence Interval
Football	Handball	Volleyball		
34.920	33.000	-	1.920*	0.780
-	33.000	30.420	2.580*	
34.920	-	30.420	4.500*	

\* *Significant at 0.05 level of confidence.*

**TABLE –III**

**ANALYSIS OF VARIANCE FOR THE DATA ON SYSTOLIC BLOOD PRESSURE AMONG FOOTBALL, HANDBALL AND VOLLEYBALL PLAYERS(Scores in mm/hg)**

Test	Players of Different Disciplines			Source of Variance	Sum of Squares	df	Mean Squares	F Ratio
	Football	Handball	Volleyball					
Mean Scores	110.920	119.910	114.130	Between Groups	4151.087	2	2075.543	446.42*
Standard Deviation	2.461	2.239	1.698	Within Groups	1380.860	297	4.649	

\* Significant at 0.05 level of confidence,

The table value for significant at 0.05 level with df 2 and 297 is 3.03

**TABLE-III(A)**

**SCHEFFE'S POST HOC TEST FOR SIGNIFICANT DIFFERENCE IN SYSTOLIC BLOOD PRESSURE AMONG FOOTBALL, HANDBALL AND VOLLEYBALL PLAYERS (Scores in mm/hg)**

Players of Different Disciplines			Mean Difference and Sig. Level	Confidence Interval
Football	Handball	Volleyball		
110.920	119.910	-	8.990*	0.751
-	119.910	114.130	5.780*	
110.920	-	114.130	3.210*	

\*Significant at 0.05 level of confidence.



**TABLE-IV**

**ANALYSIS OF VARIANCE FOR THE DATA ON DIASTOLIC BLOOD PRESSURE AMONG FOOTBALL, HANDBALL AND VOLLEYBALL PLAYERS(Scores in mm/hg)**

Test	Players of Different Disciplines			Source of Variance	Sum of Squares	df	Mean Squares	F Ratio
	Football	Handball	Volleyball					
Mean Scores	70.000	79.470	75.000	Between Groups	4488.727	2	2244.363	680.94*
Standard Deviation	2.108	1.772	1.518	Within Groups	978.910	297	3.296.000	

\* *Significant at 0.05 level of confidence,*

The table value for significant at 0.05 level with df 2 and 297 is 3.03

**TABLE-IV (A)**

**SCHEFFE'S POST HOC TEST FOR SIGNIFICANT DIFFERENCE IN DIASTOLIC BLOOD PRESSURE AMONG FOOTBALL, HANDBALL AND VOLLEYBALL PLAYERS(Scores in mm/hg)**

Players of Different Disciplines			Mean Difference and Sig. Level	Confidence Interval
Football	Handball	Volleyball		
70.000	79.470	-	9.470*	0.632
-	79.470	75.000	4.470*	
70.000	-	75.000	5.000*	

\* *Significant at 0.05 level of confidence.*

The results of the study showed that there was significant difference in the selected physiological variables among university players of Football, Handball and Volleyball games.

### **Results and Discussion:**

1. There was significant difference in the Resting Heart Rate component of Physiological variable among university players of different disciplines (football, handball and volleyball) ( $F=230.37$ ;  $P<0.05$ ). Further significant paired mean differences on Resting Heart Rate between football & handball players (MD=4.380); handball & volleyball players (MD=1.380) and football & volleyball players (MD=5.760). The football players have better heart rate than handball and volleyball players.
2. There was significant difference in the Breath Holding Time component of Physiological variable among university players of different disciplines (football, handball and volleyball) ( $F=101.65$ ;  $P<0.05$ ). Further significant paired mean differences on Breath Holding Time between football & handball players (MD=1.920); handball & volleyball players (MD=2.580) and football & volleyball players (MD=4.500). The football players have better breath holding capacity than handball and volleyball players.
3. There was significant difference in the Systolic Blood Pressure component of Physiological variable among university players of different disciplines (football, handball and volleyball) ( $F=446.42$ ;  $P<0.05$ ). Further significant paired mean differences on Systolic Blood Pressure between football & handball players (MD=8.990); handball & volleyball players (MD=5.780) and football & volleyball players (MD=3.210). The handball players have high blood pressure than volleyball and football players.
4. There was significant difference in the Diastolic Blood Pressure component of Physiological variable among university players of different disciplines (football, handball and volleyball) ( $F=680.94$ ;  $P<0.05$ ). Further, significant paired mean differences on Diastolic Blood Pressure between football & handball players (MD=9.740); handball & volleyball players (MD=4.470), and football & volleyball players (MD=5.000). The handball players have low blood pressure than volleyball and football players.

It was hypothesized that “there would be significant difference among Football, Handball and Volleyball University players in their selected Physiological variables such as heart rate, breath holding time and systolic and diastolic blood pressure.”

The results of the study produced significant differences among University Players of different disciplines (Football, Handball and Volleyball) on selected Physiological variables. Hence, the researcher’s second hypotheses was accepted that “there was significant difference among Football, Handball and Volleyball University players in their selected Physiological Variables such as heart rate, breath holding time and systolic and diastolic blood pressure.” The Handball players have better blood pressure and Football players have better heart rate and breath holding time.

#### **Recommendations:**

1. It is recommended that the findings of the study may be used as a screening tool for selecting the players for various team sports.
2. It is suggested that further research to be designed to investigate the state, national players of various games as a subjects.
3. The players selected for this study were men; hence a similar study could be conducted on women players also.
4. The study may be repeated by adding some more factors of physical fitness, preferably anthropometric and psychological parameters.

#### **References:**

- Garrett, Henry. E. and Woodworth, R.S. “*Statistics in Psychology and Evaluation*”, VakilsFaffer and Simonx Pvt. Ltd., Ballard Estate, Bombay.P.277-295.
- Garry Egger, Niger Champion and Allen Bottton (2000).“ *The Fitness Leader’s Hanbook*”, (4<sup>th</sup> ed.), A&C Block Publishers Ltd., P.133.

- Kamlesh, M.L. and Sangaral, M.S. ***“Principle and History of Physical Education”***, Ludhiana: Prakash Brothers, 1981. P.15.
- Kirkendall, D.T., ***“Physiology of Soccer.”*** Exercise and Sport Sciences, edited by Garrett, W.E., 2000.P.12-35.
- Kothari C.K. ***“Research Methodology Methods of Techniques”***, WishwaPrakashan, New Delhi, 1996.P.12-30.
- Koul, Lokesh. ***“Methodology of Educational Research”***, Third revised Edition, Vikas Publishing Housing Pvt. Ltd.P.304-384.
- Lawrence, Morehouse E. and Augustine, Miller T. ***“Physiology of Exercise”*** (5th Ed), Saint Louis: The C.V. Mosby Company, 1976.P.120-139.