

A Study On Cardiovascular Endurance Differences Among University Football, Handball, And Volleyball Players Of Andhra Pradesh

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ABSTRACT

The present study aimed to analyze cardiovascular endurance differences among university-level football, handball, and volleyball players of Andhra Pradesh. A total of 300 male players (100 each from football, handball, and volleyball), who had participated in inter-university tournaments during the academic year 2011–12, were randomly selected from five universities of Andhra Pradesh. Cardiovascular endurance was measured using the Cooper 12-Minute Run/Walk Test, and the results were analyzed using ANOVA followed by Scheffe's Post Hoc Test. The mean cardiovascular endurance scores were 2717.000 meters for football players, 2574.000 meters for handball players, and 2449.000 meters for volleyball players, with corresponding standard deviations of 119.600, 120.496, and 118.913 respectively. The obtained *F*-ratio of 125.60 exceeded the critical value of 3.03 at the 0.05 level of significance, confirming significant differences among the groups. Post Hoc analysis further revealed that football players had significantly greater endurance than both handball and volleyball players, while handball players also outperformed volleyball players. The findings highlight that football training strongly develops aerobic capacity, while handball and volleyball players may require supplementary endurance training.

Keywords: Cardiovascular endurance, Football players, Handball players and Volleyball players

INTRODUCTION

Cardiovascular endurance, also known as aerobic capacity, is a key component of physical fitness that reflects the efficiency of the heart, lungs, and circulatory system in supplying oxygen to working muscles during prolonged activity. It plays a crucial role in enhancing stamina, delaying fatigue, and sustaining optimal performance across various sports disciplines. In competitive environments, athletes with superior cardiovascular endurance are better equipped to maintain intensity, recover quickly between efforts, and perform consistently throughout matches. Thus, cardiovascular endurance is considered one of the most critical determinants of athletic success.

The demands of cardiovascular endurance vary depending on the nature of the sport. Football is an endurance-based game characterized by long periods of running, intermittent sprints, and constant positional adjustments, all of which place heavy demands on aerobic fitness. Handball requires repeated

bursts of high-intensity activity, involving quick offensive and defensive transitions, where cardiovascular endurance supports recovery and sustained play. Volleyball, while primarily anaerobic due to its reliance on short rallies, powerful jumps, and explosive movements, also requires a significant level of cardiovascular endurance for prolonged matches, especially during extended rallies and tournaments. These differences highlight the importance of comparing endurance capacities among athletes of different team sports.

At the university level, players in Andhra Pradesh undergo systematic training and regularly participate in inter-university and state-level tournaments, making them an ideal group for scientific study. Their performance not only reflects individual talent but also indicates the quality of training methodologies adopted by their institutions. Comparative studies on cardiovascular endurance among Football, Handball, and Volleyball players can provide insights into sport-specific physiological adaptations, help identify strengths and weaknesses, and guide coaches in tailoring conditioning programs to meet the unique demands of each game.

Although several studies have examined physical fitness parameters in athletes, there is limited research specifically addressing cardiovascular endurance differences among university-level players in Andhra Pradesh. Considering the increasing competitiveness of university sports, there is a need to scientifically analyze endurance capacities across major team games. Therefore, the present study aims to investigate and compare cardiovascular endurance among Football, Handball, and Volleyball players, with the objective of identifying significant differences and contributing to the development of effective training strategies for enhancing player performance.

EXPERIMENTAL DESIGN

The purpose of the present study is to A Study on Cardiovascular Endurance Differences Among University Football, Handball, and Volleyball Players of Andhra Pradesh. To achieve the purpose of the study, one hundred male players were selected at random from each category of Football, Handball and Volleyball players, a total of 300 players in Andhra Pradesh state, India, who had their credit in participating inter university tournaments during the academic year 2011-12 in their respective games. The subjects were selected from the following universities in Andhra Pradesh namely, 1. Sri. Venkateshwara University, Tirupathi 2. Srikirshnadevaraya University, Ananthapur. 3. Osmaniya University, Hyderaad, 4. Acharya Nagarjuna University, Guntur and 5. Andhra University, Visakhapatnam.

The researcher explained the purpose and the significance of the study to all the selected players before conducting the tests to ensure maximum cooperation from the subjects. All the subjects agreed voluntarily to cooperate 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. Though no special techniques were used to motivate the subjects to put in their best effort, the subjects were very enthusiastic and cooperative throughout the research work. They were free to

withdraw as respondents in case they feel any difficulty or discomfort during the test. The researcher has taken sufficient care and caution in the counseling the sample respondents about the utility of physical fitness for a healthy body and also the purpose of study. Because of this, no dropouts as respondents and all the selected subjects voluntarily cooperated well throughout the period of test.

RESULT ON CARDIOVASCULAR ENDURANCE

TABLE-I

**ANALYSIS OF VARIANCE FOR THE DATA ON CARDIOVASCULAR ENDURANCE
COMPONENT OF PHYSICAL FITNESS AMONG FOOTBALL, HANDBALL AND
VOLLEYBALL PLAYERS**

(Scores in Meters)

Test	Players of Different Disciplines			Source of Variance	Sum of Squares	df	Mean Squares	F Ratio
	Football I	Handball	Volleyball II					
Mean Scores	2717.000	2574.000	2449.000	Between Groups	3596600.00	2	1798300.00	125.60*
Standard Deviation	119.600	120.496	118.913	Within Groups	4253400.00	297	14321.212	

* Significant at 0.05 level of confidence, Table 'F Ratio' =3.03

The table-I shows the Cardiovascular Endurance (in meters) among football, handball and volleyball university players are 2717.000, 2574.000 and 2449.000 respectively and the standard deviation are 119.600, 120.496 and 118.913 respectively. The table also shows that the obtained 'F' ratio of 125.60 for cardiovascular endurance is greater than the table value of 3.03 for df '2 and 297' required for significance at 0.05 level of confidence.

The results of the study indicated that "there is a significant difference in the Cardiovascular Endurance component of Physical Fitness variable among university players of different disciplines (football, handball and volleyball games). To determine the significant difference in the Cardiovascular Endurance

among the three paired means, the 'Scheffe's test was applied as Post hoc analysis and the results are presented in Table-II

TABLE-II

**SCHEFFE'S POST HOC TEST FOR SIGNIFICANT DIFFERENCE IN THE
CARDIOVASCULAR ENDURANCE MEAN SCORES (IN METERS) AMONG
FOOTBALL, HANDBALL AND VOLLEYBALL PLAYERS**

Players of Different Disciplines			Mean Difference and Sig. Level	Critical Difference
Football	Handball	Volleyball		
2717.000	2574.000	×	143.000*	41.667
×	2574.000	2449.000	125.000*	
2717.000	×	2449.000	268.000*	

*Significant at 0.05 level of confidence.

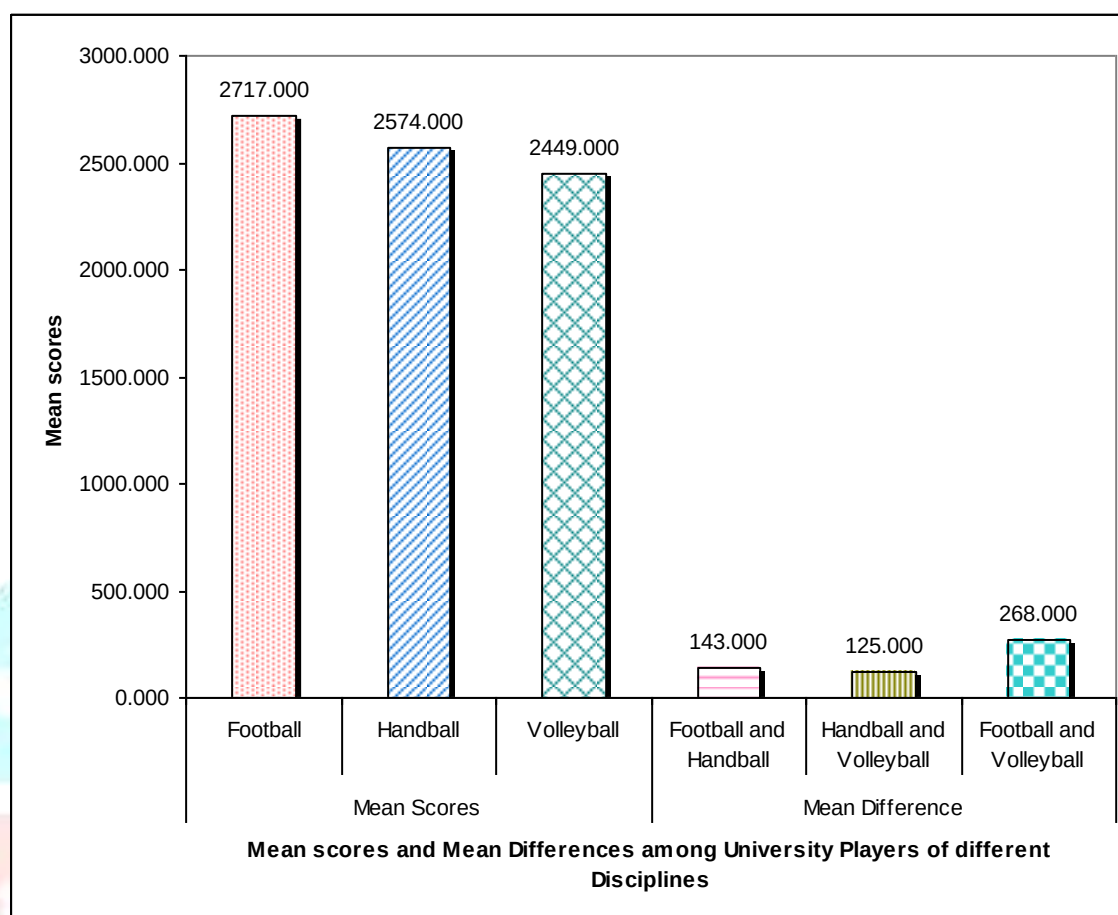
Table-II shows significant paired mean differences on Cardiovascular Endurance between football & handball players; handball & volleyball players and football & volleyball players and the values are 143.000, 125.000 and 268.000 respectively which are greater than the critical difference value 41.667 at 0.05 level of confidence. It concludes that "there is a significant difference exists in Cardiovascular Endurance between football & handball players; handball & volleyball players and football & volleyball players.

It may be concluded from the results that significant difference exists on Cardiovascular Endurance between football & handball players; handball & volleyball players and football & volleyball players. The Football players have greater cardiovascular endurance than Handball and Volleyball players.

The mean values on Cardiovascular Endurance of football, handball and volleyball players are graphically depicted in Fig.I

FIG.I

BAR DIAGRAM SHOWS THE COMPARISON OF CARDIOVASCULAR ENDURANCE MEAN SCORES AMONG UNIVERSITY PLAYERS OF DIFFERENT DISCIPLINES (FOOTBALL, HANDBALL AND VOLLEYBALL).



DISCUSSION OF RESULTS ON CARDIOVASCULAR ENDURANCE

The findings of this study revealed that there was a statistically significant difference in cardiovascular endurance among university football, handball, and volleyball players of Andhra Pradesh. Football players recorded the highest mean score (2717.000 meters), followed by handball players (2574.000 meters), while volleyball players showed comparatively lower endurance levels (2449.000 meters). The obtained *F*-ratio (125.60) was well above the critical value, confirming the existence of substantial inter-group differences. Post Hoc analysis further established that each pair of groups differed significantly, indicating sport-specific variations in cardiovascular endurance.

The superior cardiovascular endurance of football players may be attributed to the continuous nature of the sport, which demands sustained running, intermittent sprints, and frequent recovery over an extended period. These requirements closely align with the development of aerobic capacity, making footballers better adapted to prolonged physical activity. Handball players, while also engaging in repeated bursts of activity and fast transitions, demonstrated moderate cardiovascular endurance. This reflects the mixed aerobic-anaerobic demands of handball, where endurance plays a role but is supplemented by strength and agility-based requirements. Volleyball players, in contrast, rely primarily on short-duration explosive

efforts such as jumping, spiking, and blocking, which explains their comparatively lower cardiovascular endurance levels.

The present findings are consistent with earlier research in sports science, where football players have often been reported to possess superior aerobic fitness compared to players of other team sports (Singh & Gill, 1988; Singh S., 2011). Similarly, studies have shown that handball players occupy an intermediate position in terms of endurance, balancing both aerobic and anaerobic capacities (Seenimurugan & Jeyaveerapandian, 2011). Volleyball players, on the other hand, generally excel in power and agility-related parameters rather than endurance (Taware et al., 2013). Thus, the results of this study reaffirm the influence of sport-specific demands and training regimens on the cardiovascular fitness of athletes.

CONCLUSION

There was significant difference in the Cardiovascular Endurance among university players of different disciplines (football, handball and volleyball) ($F=125.60$; $P<0.05$). Further significant paired mean difference exists on Cardiovascular Endurance between football & handball players ($MD=143.000$); handball & volleyball players ($MD=125.000$) and football & volleyball players ($MD=268.000$). The football players have better endurance than handball and volleyball players.

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