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Comparison of aerobic and anaerobic efficiency between handball and basketball players

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Abstract

Background: The Basketball and handball games are considered among the fastest games, which possess the high aerobic and anaerobic efficiencies. In the training of handball and basketball, these factors are emphasized to improve as well as to achieve the high skill performance too.

Objective: The objective of this study was to investigate the significant differences of aerobic and anaerobic efficiency between the handball and basketball players.

Hypothesis: It was hypothesized that there might be significant differences of aerobic and anaerobic efficiency between handball and basketball players.

Methods: Twenty (20) players from each handball and basketball games between 18 to 25 years of age participated at least Inter-varsity level purposively selected. The data pertaining to this study were collected by administering Cooper's 12 minutes Run/Walk test for aerobic efficiency and RAST test for anaerobic efficiency. To determine the significant difference between handball and basketball players independent t-test was employed and tested at 0.05 level of confidence.

Results: Significant difference was found between the two games in case of aerobic efficiency as the obtained $t=3.64 > t=2.025$ (tabulated) at 0.05 level of confidence. However, no significant difference was found between the two games in case of anaerobic efficiency as the obtained $t=1.27 < t=2.025$ at 0.05 level of confidence.

Conclusion: Among the handball and basketball players there was the significant difference in case of aerobic efficiency, whereas, no significant difference was found on anaerobic efficiency between handball and basketball players.

Keywords: Handball, basketball, aerobic and anaerobic

1. Introduction

In the sports world, physical fitness is the primary necessity for men and women to entertain the best performance. Sports performance solely depends on the different fitness parameters like strength, endurance, speed, flexibility and coordinative abilities. Above the performance limited fitness parameters, aerobic and anaerobic efficiency is to be considering among of the most important factors to give an optimum performance by the players. By the nature and structure of handball and basketball games, similar or comparable type of physical and physiological fitness efficiencies might be existed. These two games require the high qualities of speed, muscular strength, muscular endurance, cardio-respiratory endurance, flexibility, explosive strength, speed, agility, kinaesthetic ability, reaction time etc. In the training of handball and basketball, these factors are emphasized to improve as well as to achieve the high skill performance too. Even though, it is predicted by the structure and nature of the games that there may be similarities or significant differences in terms of physical and physiological fitness among these games. The aerobic efficiency (VO_2max), which is the maximum amount of oxygen consumed during maximal exercise during activities that use the large muscle groups, highly required in the handball and basketball games to maintain the high tempo of performance throughout the game duration. The anaerobic efficiency (max. power) is also indispensable to produce high intensive agile movements, jumps, turns, explosive burst running etc., which are used the total quantum of energy that combined amount of output from the ATP (adenosine-tri-phosphate), PC (phospho-creatine) and lactic acid systems. Under such conditions, both the aerobic and anaerobic efficiencies are required for maximum output. Therefore, the aerobic and anaerobic capacities contribute the critical values as the dominant performance factor between handball and basketball games.

2. Objective of the Study

The objective of this study was to investigate the significant differences of aerobic and anaerobic efficiency between the handball and basketball players.

3. Hypothesis

It was hypothesized that there might be significant differences of aerobic and anaerobic efficiency between handball and basketball players.

4. Methodology

4.1 Selection of Subjects

Forty (40) male players between the 18 to 25 years of age, twenty (20) of each from handball and basketball games were purposively selected from the Manipur University and other affiliated colleges. The level of participation of the players was at least Inter-varsity and above.

4.2 Data Collection and Analysis

The data pertaining to this study were collected by administering Cooper’s 12 minutes Run/Work and RAST (Running-based Anaerobic Sprint Test) tests for aerobic and anaerobic capacities respectively. The descriptive and independent t- test statistical techniques were applied to find out the significant difference of achieved aerobic and anaerobic capacities between the handball and basketball players. The level of significance was set at 0.05 to test the hypothesis.

5. Results

The mean (M), standard deviation (SD) and independent t-test for aerobic efficiency of handball and basketball players are shown in table-1.

Table 1: Descriptive and independent ‘t’ test for aerobic efficiency (vo2max)

Groups	M	SD	MD	SE	t
Handball	54.30	1.56	2.15	0.59	3.64*
Basketball	56.45	2.14			

*Significant at 0.05 level of confidence, where, $t_{0.05(38)}=2.025$, and $N=20+20=40$

Table-1 reveals that the means and standard deviations (M±SD) of aerobic efficiency for handball and basketball players were 54.30±1.56 and 56.45±2.14 respectively. The obtained critical value of independent ‘t’ = 3.64* was found greater than tabulated ‘t’ = 2.025. Therefore, it is shown that there was the significant difference between the handball and basketball players in case of aerobic efficiency (VO2max). The means difference of aerobic efficiency between handball and basketball players is graphically represented in figure -1.

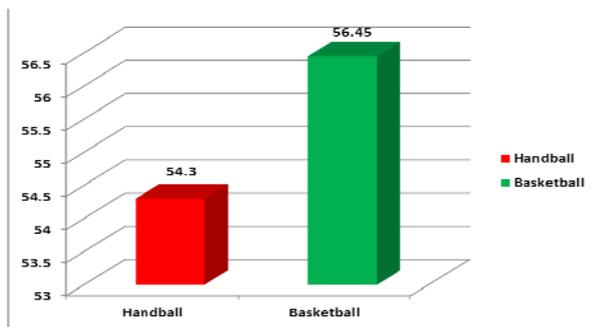


Fig 1: Means Difference of Aerobic Efficiency between Handball and Basketball Players

The mean (M), standard deviation (SD) and independent t-test for anaerobic efficiency of handball and basketball players are shown in table-2.

Table 2: Descriptive and independent ‘t’ test for anaerobic efficiency

Groups	M	SD	MD	SE	t
Handball	479.25	16.21	20.6	8.21	1.27@
Basketball	499.85	20.68			

@Insignificant at 0.05 level of confidence, where, $t_{0.05(38)}=2.025$, and $N=20+20=40$

Table-2 reveals that the means and standard deviations (M±SD) of anaerobic efficiency for handball and basketball players were 479.25±16.21 and 499.85±20.68 respectively. The obtained critical value of independent ‘t’ = 1.27 was found lesser than tabulated ‘t’ = 2.025. Therefore, no significant difference was found between the handball and basketball players in case of anaerobic efficiency (max. power).

The means difference of anaerobic efficiency between handball and basketball players is graphically represented in figure 2.

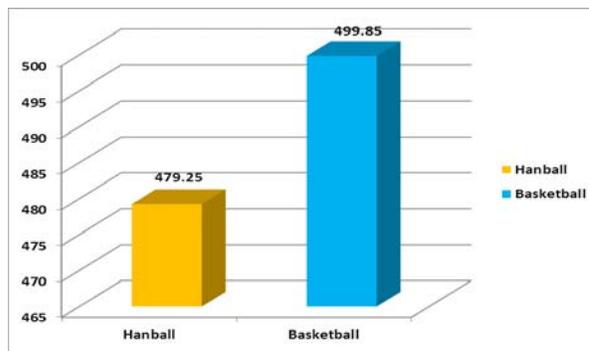


Fig 2: Means Difference of Anaerobic Efficiency between Handball and Basketball Players

6. Discussion

The means and standard deviations (M±SD) of aerobic efficiency (VO2max) for handball and basketball players were 54.30±1.56 and 56.45±2.14 respectively, and in case of anaerobic efficiency were 479.25±16.21 and 499.85±20.68 respectively. The obtained critical value of independent ‘t’ = 3.64 was found greater than tabulated ‘t’ = 2.025. Therefore, it is shown that there was the significant difference between the handball and basketball players in case of aerobic efficiency. Further, the means and standard deviations (M±SD) of the obtained critical value of independent ‘t’ = 1.27 was found lesser than tabulated ‘t’ = 2.025. Therefore, no significant difference was found between the handball and basketball players in case of anaerobic efficiency (max. power).

The results of the ‘t’ test statistical analysis revealed that there was the significant difference between handball and basketball players in case of aerobic efficiency (VO2max), however, no significant difference in case of the anaerobic efficiency (max. power). Hence, the research hypothesis stated earlier is accepted in case of aerobic efficiency (VO2max), and rejected for the anaerobic efficiency (max. power).

7. Conclusions

The present study had been concluded that both handball and basketball games are considered fastest among the other team games and to maintain the high intensive tempo in nature, the aerobic and anaerobic efficiencies are pivotal of high performance.

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