The International Journal of Social Sciences and Humanities Invention 6(03): 5341-5346, 2019
DOI: 10.18535/ijsshi/v6i3.01 **ICV 2015: 45.28**
ISSN: 2349-2031

Research Article

The Difference of Cardiovascular Endurance between Soccer Players and Handball Players

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Abstract: The purpose of this study was to investigate the difference of cardiovascular endurance between secondary school soccer players and handball players. The study adopted ex-post facto design. The subjects were selected among soccer and handball players at one of the secondary schools. A total of 60 subjects were selected, 30 soccer players and 30 handball players. All subjects aged between 13 and 15 years old. The test used to test cardiovascular endurance was 12 minute Cooper Run Test. T-test was used to determine whether there is a significant difference between the cardiovascular endurance of the soccer players and handball players. The results of the study showed that there was no significant difference t(-1.65)=58, P>0.05 between soccer players (M = 2235; SD = 180.44) and handball players (M = 2307.83; SD = 160.19). Although there was no significant difference, the players from both teams still have good cardiovascular endurance fitness.

Introduction

Cardiovascular endurance is the ability of the heart, lungs and blood flow systems to supply oxygen and nutrients in the blood to the body muscles to produce energy for a person to carry out any physical activity (Mac, LeMouse). A person with high cardiovascular endurance is able to carry out physical activity continuously over a long period of time without feeling tired and fatigued and is likely to have no health problems such as heart disease and high blood pressure.

According to Prentice (1997), cardiovascular endurance refers to one's ability to continue physical activity that requires oxygen for training of power activities without any lethargy. Meanwhile, Heyward (1991) states that the increase of cardiovascular endurance can lower an athlete's rest pulse rate. This will contribute to a stronger heart, more efficient body blood circulation and increased lung capacity for optimum usage capacity. It also supplies sufficient oxygen to the muscles and can prevent or slow down the lethargy process.

To obtain cardiovascular endurance, one should undergo a series of continuous and systematic training over a certain period of time under the supervision of a skilled person in sports. In school, Physical Education teachers and sports coaches are the people who have the expertise in conducting training to increase cardiovascular endurance (Diane, 2017). Sports coaches for all games including soccer and handball games will certainly conduct training sessions to enhance the cardiovascular endurance of their players.

Both soccer and handball games are team sports but the number of players is different. For soccer, the number of players required in a game is 11, whereas the number of players in a handball game is 5. The amount of time allocated for the match in both games is also different. For soccer, the time allocated for a match is 45 + 45, the first half 45 minutes and the second half is 45 minutes too while in handball game, the time allocated is 30 + 30, which is 30 minutes in the first half and the second half is 30 minutes too. In terms of match patterns, soccer games require skillful foot movement to run and control the ball (How To Play Soccer, n.d.) while handball requires foot and hand movements to control the ball (How to Play Handball, n.d.). In addition, in terms of skills, soccer games require foot skills in dribbling and controlling the ball. In contrast, handball games require hand to dribble and control the ball. If observed, these two games involve running activities to score the ball. Since the games involve running in a relatively long period of time, which is between 30 to 45 minutes, the players for both teams will definitely need good cardiovascular endurance. Therefore, the researcher intended to study the level of cardiovascular endurance among soccer and handball players. Do the players from both types of games have high levels of cardiovascular endurance and differ from one another? To test the cardiovascular endurance, the researcher used the 12-minutes Cooper Run Test (Cooper 12 Minutes Run Test, n.d.).

Research Objectives

a. To identify the cardiovascular endurance levels of soccer players and handball players.
b. To see if there is a significant difference of cardiovascular endurance between soccer players and handball players.

Hypothesis

There is no difference of cardiovascular endurance between football players and handball players.

Research Methodology

The design of this study used Post-Experiment method. The data and information obtained were used to clarify the conditions studied accurately. In other words, it explained whether there is a difference of cardiovascular endurance

between soccer players and handball players. The subjects were selected using intact sampling in one of the secondary schools. The number of subjects was 60, i.e. 30 soccer players and 30 handball players. The subjects were between 13 to 15 years old and have undergone training before joining tournament. To measure cardiovascular endurance, the researcher used the 12-minutes Cooper Run test. This Cooper Run test had the reliability of r = 0.94 and the validity of 0.64 - 0.90 (Cooper, 1968). In analyzing research data, the researcher used descriptive and inferential statistics. Descriptive statistics such as percentage, mean and standard deviation were calculated while the inferential statistics included t-test.

Research Findings

Table 1 shows the achievement score obtained by all the subjects in the 12 minutes Cooper Run Test. The score showed that all soccer and handball players successfully performed the run well without being disturbed by emotional problems or health problems.

Table 1: Comparison of the achievement scores of soccer and handball players in 12-minutes Cooper Run Test.

Soccer Players		Handball Players	
Subject Code	Score (Meter)	Subject Code	Score (Meter)
Bs1	2535	Bb1	2375
Bs2	2335	Bb2	2620
Bs3	2280	Bb3	2155
Bs4	2120	Bb4	2460
Bs5	2430	Bb5	2280
Bs6	2355	Bb6	2140
Bs7	2540	Bb7	2260
Bs8	2160	Bb8	2490
Bs9	2180	Bb9	2470
Bs10	2520	Bb10	2280
Bs11	2375	Bb11	2260
Bs12	2175	Bb12	2220
Bs13	2240	Bb13	2490
Bs14	1960	Bb14	2290
Bs15	2170	Bb15	2380
Bs16	2340	Bb16	2430
Bs17	2070	Bb17	2375
Bs18	2340	Bb18	2220
Bs19	2300	Bb19	2180
Bs20	2115	Bb20	2075
Bs21	1940	Bb21	2225
Bs22	2140	Bb22	2160
Bs23	2330	Bb23	2170
Bs24	1875	Bb24	1920
Bs25	2090	Bb25	2335
Bs26	1950	Bb26	2525
Bs27	2310	Bb27	2540
Bs28	2485	Bb28	2470
Bs29	2280	Bb29	2310
Bs30	2110	Bb30	2130

Based on Table 1, the scores show that all soccer and handball players had successfully performed the run well without being disturbed by emotional problems or health problems. Based on the results from the 12 minutes Cooper Run Test, the researcher found that the highest achievement of the soccer players was 2540 and the lowest was 1875. Meanwhile, the highest achievement of the handball player was 2620 and the lowest was 1920. Figure 1 and 2 also show the achievement of soccer and handball players in the 12-minutes Cooper Run Test.

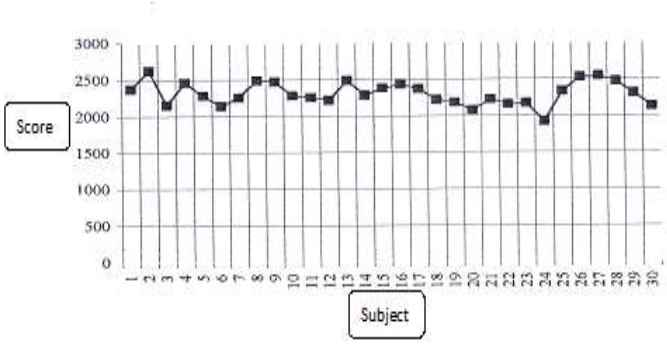

Figure 1: Achievement of soccer player

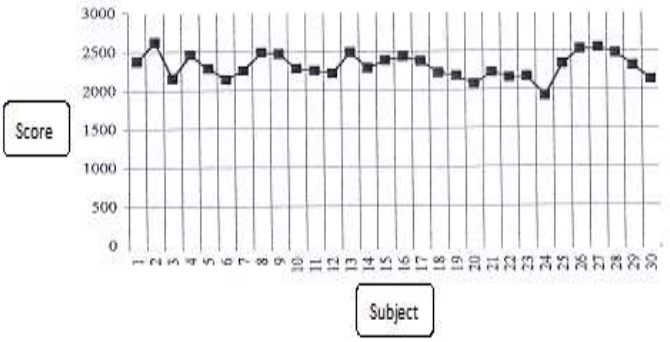

Figure 2: Achievement of handball player

There were mild differences between the mean for both types of games. For example, the mean score for soccer player was 2307.83 while the mean score for handball player was 2235.00. Based on the mean value, it is found that the mean score value of the soccer players was slightly higher than the mean score value of the handball players. Figure 3 below shows the difference between mean score values for both game players in the 12-minutes Cooper Run Test.

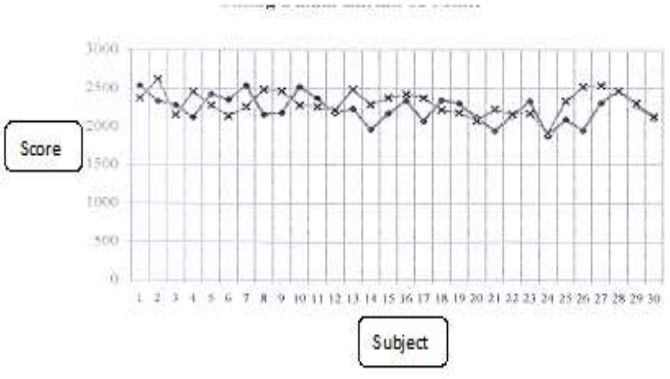

Figure 3: Difference between mean score values for both game players.

The Difference of Cardiovascular Endurance between Soccer Players and Handball Players

Table 2 below shows the result of the T-test analysis of cardiovascular endurance between soccer players and handball players.

Table 2: The Difference of Cardiovascular Endurance between Soccer Players and Handball Players

Subject	N	Mean	SD	T value	df	Sig.
Soccer Players	30	2235	180.44	-1.653	58	0.10
Handball Players	30	2307.83	160.19			

Based on Table 2, the mean value for soccer players was 2235 while the mean value for the handball players was 2307.83. The significant value obtained was 0.10, which is greater than the value of 0.05. This showed that there is no difference in cardiovascular endurance between soccer players and handball players. The result also indicates that the null hypothesis was accepted.

Discussion

Based on the 12-minutes Cooper Run Test, the scores recorded by the subjects of soccer players and handball players symbolize their cardiovascular endurance ability. The comparison of scores recorded for both subject groups showed that there is no significant difference in the 12-minutes Cooper Run Test scores between soccer players and handball players. There is no significant difference between the mean scores of the two subject groups due to several factors. Among them is, both selected subject groups have experience and have been exposed to various types of sports. Although the two selected subject groups consisted of subjects representing different types of sports and different levels of participation, the cultivation of cardiovascular endurance among the subjects was taken into account by every coach involved in conducting their training sessions.

Based on the study conducted by Corbin & Lindsay (1994), to achieve a good physical fitness level, one should perform physical exercise or activity for at least 60 minutes to 80 minutes a day with a frequency of three times a week. In addition, all selected subjects were subjects who are active in various types of sports and games and have represented schools in their respective primary and secondary schools where they are currently attending. This showed that the subjects have been routinely undergoing training that can increase cardiovascular endurance.

Apart from that, the selected subjects for this test have conducted their in-game training since the beginning of the year. The average length of time the subjects trained under the guidance of the coach was three times a week ie from 3.00 pm to 6.00 pm. The frequent and consistent training caused the subjects to have no cardiovascular endurance problems. Strict and effective measures were taken by their respective coaches and teachers to ensure the attendance of every player in every training session. The smooth training management resulted in no significant difference of cardiovascular endurance ability between the group of soccer players and handball players.

Apart from the above factors, psychological factor also plays a role in determining the success of the test. This is because if the subjects are in an uncomfortable or uncontrolled state of emotion, it may have an effect on their performance and may subsequently affect the results of the test scores. This was ensured by the researcher as when the subjects undergo the test, they were in good mood and wanted to compete with each other.

This situation has also contributed to no significant difference of the cardiovascular endurance ability between soccer players and handball players. The explanation is further reinforced and supported based on the study conducted by Prentice (1997), stating that increased cardiovascular endurance fitness levels was the result of self-involvement in continuous and systematic physical training. In addition, the principle of training that includes frequency, intensity, progression and training duration cannot be neglected in any training program. Systematic training is essential in training cardiovascular endurance fitness of an athlete or player.

Conclusion

The cardiovascular endurance of the soccer players and handball players were almost identical and there was only minimum difference in mean score. This statement is further reinforced by t-test results which showed that there is no significant difference between the level of cardiovascular endurance of soccer players and handball players.

Based on the research subject groups, there was difference in game types. However, The difference in game types did not affect or become a factor in determining cardiovascular endurance. This can be confirmed after the t-test analysis. The analysis showed that there was no significant difference of the cardiovascular endurance ability between the two subject groups who undergone the test. Therefore, game types is not a factor that can affect the player's cardiovascular endurance ability.

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