

# The Effectiveness of “Small, Medium and Big Games” Training on Cardiovascular Endurance among University Football Players

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## Abstract

This study was conducted to investigate the effectiveness of “Small, Medium and Big Games” training on cardiovascular endurance among football players. 30 university football players were divided into 2 groups (treatment group, N = 15; control group, N = 15). Participants underwent Yoyo Intermittent Recovery test before and after six weeks of training intervention. Results showed that the treatment group scored significantly greater level of cardiovascular endurance compared to the control group. Future studies are needed on the volume, frequency and intensity to be applied in the “Small, Medium and Big Games” training.

**Keywords:** “Small, Medium and Big Games” Training, Cardiovascular Endurance, Yoyo Intermittent Recovery Test, Football, University

## Introduction

Cardiovascular endurance is one of the most important basic health fitness components in football (Svensson & Drust, 2005). According to Svensson and Drust (2005), football players must be excellent in some aspects of physical fitness including cardiovascular endurance in order for them to adapt to the physical and physiological stresses of football training. Wisloff, Ellingsen and Kemi (2009) stated that physiological responses are affected by certain training components such as intensity, duration, recovery, repetition and peak.

Among the test that can be used to measure cardiovascular endurance is Yo-Yo Intermittent Recovery test. This test was described as one of the most specific test to measure cardiovascular endurance (Krustrup, et al., 2003). Yo-Yo Intermittent Recovery test consists of multiple runs repeatedly with increasing speed, intermittently with a 10-seconds interval of active rest and performed until completion (Krustrup et al., 2003).

Football Federation Australia (FFA) (2010) has introduced “Small, Medium and Big Games” training to be applied for the purpose of improving the fitness aspect of football players without ignoring other aspects such as technical and tactical in football. “Small, Medium and Big Games” training consisted of Model 1 (Big Game) in weeks 1 and 2, Model 2 (Middle Game) in weeks 3 and 4 and Model 3 (Small Game) in weeks 5 & 6.

Despite the findings from previous studies that had shown the benefit of “Small, Medium and Big Games” training (Hill-Haas et al., 2011; Owen et al., 2012; Krstrup et al., 2010), research on the effectiveness of this kind of training are lacking on the university populations. It is important for the coaches to know the effective training methods to be conducted as several previous research has shown different kinds of training would affect acute responses and chronic adaptations to the body which are vital to performance (Salleh et al., 2017). Thus, the aim of this study was to determine the effectiveness of the “Small, Medium and Big Games” training on the cardiovascular endurance among university football players.

## Methodology

### Participants

Thirty university football players were recruited for this study. Participants were divided into two groups (treatment group, N = 15; control group, N = 15). Participants were free from injury, and had signed an informed consent before the starting of data collection.

### Yo-Yo Intermittent Recovery test

Yo-Yo Intermittent Recovery test were conducted to measure cardiovascular endurance before and after six weeks of training intervention. The test started with each participant stood behind the starting line and had an assistant (recorder) to record every level that they passed. Participants were required to make 20 meter shuttle run according to a 'bleep' signal from the audio tape. When the participants finished the 20 meter (2 X 20 meter) shuttle run, there was an active break of 10 seconds where participants need to walk or had a little jog for 5 meters (2 X 5 meter). Participants then returned to the starting line for another level until fatigue. If the participant reached to one end before the 'bleep' signal sounds, the participant need to stand behind the line until the signal sounds. The time between the 'bleep' signal keep decreasing at every level, so the speed of the run should be increased.

Table 1

*Yoyo Intermittent Recovery Test Level 1 Scoring (Bangsbo, 2008)*

Rating	Men		Women	
	Meter	Level	Meter	Level
Elite	> 2400	> 20.0	> 1600	> 17.5
Very Good	2000 - 2400	18.7 - 20.0	1280 - 1600	16.5 - 17.5
Good	1520 - 2000	17.3 - 18.7	1000 - 1280	15.6 - 16.5
Moderate	1000 - 1520	15.6 - 17.3	680 - 1000	14.6 - 15.6
Weak	520 – 1000	14.2 - 15.6	320 - 680	13.1 - 14.6
Very Weak	< 520	< 14.2	< 320	< 13.1

### Small, Medium and Big Games Training

#### 2.3.1 Big Game (8,9,10,11 Side)

- ¾ to 1 football field (depending on the number of players).
- Duration of game: 10 minutes x 2 repetitions (2 minutes break between games).

#### 2.3.2 Medium Game (5,6 and 7 Side)

- ¼ to half football field (depending on the number of players)

- Duration of game: 4 minutes x 4 repetitions (2 minutes break between the games).

### 2.3.3 Small Game (3v3, 4v4 Including Goal Keeper)

- 30 x 20/40 x 30 field size
- Duration of game: 1 minute x 6 repetitions (3 minutes break between games).
- 2 sets (4 minutes break between sets).

## Statistical Analysis

Descriptive statistic was used to obtain physical characteristics data and mean score. Paired t-test was used to compare the cardiovascular endurance level between pre test and post test in each treatment and control group. Independent t-test was used to compare the cardiovascular endurance level between the treatment and control group. All analyses were conducted using the Statistical Package for Science Social (SPSS) version 22.0 software.

## Results

### Descriptive Statistics

In the pre-test, four of the participants from the treatment group achieved the "Weak" rating at Level 14.2-15.6 while 11 participants achieved "Medium" rating at Level 15.6-17.3. In the post-test, 12 players achieved the "Medium" rating while 3 players achieved the "Good" rating at Level 17.3-18.7. For the control group, 10 players received weak rating while the other 5 players got moderate rating in both the pre- and post-test.

### Inferential Statistics

Using paired t-test, treatment group managed to improve their fitness level in the post test ( $M = 1280.$ ,  $SD = 180.79$ ) compared to the pre-test ( $M = 1077.33$ ,  $SD = 193.88$ ),  $t(19) = 10.29$ ,  $p = 0.001$ . No significant differences were found in the control group in the pre-test ( $M = 872$ ,  $SD = 185.29$ ) and post-test ( $M = 866.67$ ,  $SD = 167.45$ ),  $t(14) = 0.28$ ,  $p = 0.78$ . Using independent t-test, result showed significant differences existed in the level of cardiovascular fitness between control group and treatment group,  $t(28) = 6.50$ ,  $p < 0.05$ .

## Discussion

The aim of this study were to examine the effectiveness of "Small, Medium and Big Games" training on cardiovascular endurance among university football players. Findings demonstrated the level of cardiovascular endurance were higher in the intervention group compared to control group.

According to Impellizzeri et al (2006), small game can be used as an effective training mode to improve the player's fitness and thus improve cardiovascular endurance performance in football. Training based on small game can also increase the enthusiasm and motivation of players to practice compared to interval training (Scanlan, Carpenter, Lobel, & Simons, 1993).

Katis and Kellis (2009) found that football players showed high intensity level when participating in small games. Through small scale games (SSG), players experience the same situation as competitive matches (Owen et al., 2004). The SSG method has become a popular method to develop aerobic fitness especially for football players (Impellizzeri et al., 2006). Research on small scale games still needs to be further expanded especially in Malaysia as

there are not many researches that study how SSG intensity can be manipulated to alter the stimulus of training (Hill-Haas et al., 2009).

The maximum increase in oxygen consumption will lead to improved performance of football players to a better level (Helgerud et al., 2001). That increase can be seen through the work intensity, the number of repeating and the speed level that the player achieves. Therefore, the “Small, Medium and Big Games” training groups can improve their cardiovascular endurance that later improve their performance during the game.

Research has focused on assessing player's physiological responses, tactical and technical when factors such as player quantity, field size, game rules, and coach encouragement have been modified in SSG (Dellal et al., 2011; Aguiar et al., 2013). Past researchers proved that by changing these factors the coach can manipulate physiological workloads and overall perceptions. Inconsistent design in the implementation of SSG, player fitness, age, ability, level of coaching ability and player background make it difficult for researchers to make accurate conclusions about the effect of each factors separately. Therefore, the management and implementation of SSG require more specific research in the future.

The findings showed that there were no significant change in the level of cardiovascular endurance to the players who did not follow the “Small, Medium and Big Games” training. Thus, these players need to have another session of cardiovascular endurance training.

### Conclusion

As shown in the result, the “Small, Medium and Big Games” training is an efficient way to not only improve participants’ skill and team play, but also improving cardiovascular endurance thus has caused a lot of time saved. Future studies are suggested to be conducted on examining and comparing volumes, frequency and intensity in the “Small, Medium and Big Games” training. It is important for coaches to keep alert on the research findings so that the training methods could be enhanced in order to improve football players’ performance to the optimum level (Karim & Nadzalan, 2017).

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