



## Effects of Circuit Training with High Intensity and Low Intensity on Anaerobic Endurance in Basketball Players

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### **Abstract**

High-intensity and low-intensity circuit training exercises can result in increased physical fitness for basketball players. The purpose of this study in general is to obtain the implications of high-intensity and low-intensity Circuit Training for increasing anaerobic endurance. This research is an experimental design with randomized controlled group pretest and posttest design. This study used a population of 60 people, with the number of sample group treatment I was 20 people given high intensity circuit training, the treatment group II was 20 people given circuit training with low intensity and a control group of 20 people. The test used is the RAST test to measure anaerobic endurance. The conclusion of this research is the Circuit Training program with high intensity and low intensity has a significant effect on anaerobic endurance. High intensity circuit training is more effective than low intensity Circuit Training and the control group for anaerobic endurance.

**Keywords:** *High and Low Intensity Circuit Training; Anaerobic Endurance*

### **Introduction**

Basketball is a sporting activity that is rapidly developing recently. The basketball game is very popular and is popular in the community (Prabowo, 2015: 18). Basketball has spread throughout the region (Yunida, 2017: 126). In basketball the game requires aerobic and anaerobic energy systems (Gantois, 2017: 910). Basketball is a sport that is influenced by aerobic and anaerobic metabolism (Araujo, 2014: 137).

Coaching the achievements of a basketball player requires various exercises. The elements of physical condition namely heart endurance, breathing, blood circulation, muscular endurance, strength, accuracy, speed, agility, reaction, balance, coordination, flexibility and explosive power are the components required in the basketball game. Physical ability is needed to support body movements and form skilled movements (Subroto, 2015: 100). Anaerobic endurance is an element of physical condition that gives a very important role in sports, especially the game of basketball.

The basketball game involves various abilities of the body's organs, namely the heart, blood circulation and breathing. Basketball is considered a high-intensity sport that requires anaerobic metabolism (Araujo, 2014: 137). Anaerobic endurance provides large amounts of energy but only for a short time. The basketball energy system uses an anaerobic-based aerobic system (Akilan, 2015: 7). Maximum aerobic capacity (VO2Max) is the ability of the heart, lungs and blood vessels to function optimally. Physical fitness is now considered as an important health marker (Vega, 2013: 153). Increasing anaerobic endurance in a training program must be able to be done carefully, systematically and always increase by following the principles and methods of training that are accurate in order to achieve the specified program in increasing the maximum aerobic capacity (VO2Max) and anaerobic. There are several training models to improve physical conditions including circuit training.

Physical training methods that can be used to improve anaerobic endurance are circuit training with high intensity and low intensity. The circuit training method is an exercise program that consists of various stations and at each station a player performs a predetermined type of training. The circuit training method is an effective method for developing strength and endurance (Sil, 2015: 379). Circuit training training is designed to develop cardiovascular, respiratory endurance, flexibility and muscular endurance (Kumar, 2013: 13). According to Sil (2015: 379) circuit training training is an effective method for developing strength and endurance. Hanggoro (2015: 1) Circuit training training is more effective than interval training. Utilization of good training methods will help the trainers to help determine effective methods to improve the expected physical condition (Sudirman, 2018: 78).

Circuit training method in this case uses high intensity and low intensity, Paoli (2013: 6) high intensity circuit training has advantages over body composition and blood lipids while low intensity has advantages in decreasing blood pressure and cholesterol. Recovery optimization is in line with the importance of physiological conditioning which is not only done during the training period. The circuit training method is a combination method that combines several exercises so that it can improve physical quality (Miller, 2014).

Based on the description above, researchers are interested in conducting research on "The effect of high-intensity and low-intensity circuit training methods on anaerobic endurance in West Lombok basketball players".

### **Methodology**

Based on the objectives and research problems, namely how much influence the training has on increasing anaerobic endurance between high intensity circuit training and low intensity circuit training. Thus, the research strategy used was an experimental method, using a Randomized Controlled Group Pretest-posttest Design.

**Table: Randomized Controlled group Pretest-posttest Design**

Group	Initial Test	Treatment	Final Test
Group 1 (one)	T1 Group 1	X1	T2 Group 1
Group 2 (two)	T1 Group 2	X2	T2 Group 2
Group 3 (three)	T1 Group 3	-	T2 Group 3

T1: Pre-test for anaerobic endurance

T2: Final test (Posttest) of anaerobic endurance

X1: Group 1 training: high intensity circuit training

X2: Group Training 2: low intensity circuit training

The population used in this study was basketball players in West Lombok. The population that has been used is 60 people. To determine the number of samples suitable for the treatment group, a sampling technique is needed. In this study the sampling technique used was random sampling. The sample will be divided into 3 groups. Placement of samples in each group is done by randomly drawn. Each group contains 20 people.

The study was conducted 8 weeks, with a frequency of 24 meetings held 3 times a week. The anaerobic endurance measurement instrument for the limbs uses the RAST TEST. In accordance with the hypothesis and the type of research used in this study, the statistical analysis used to determine the effect of high-intensity and low-intensity Circuit Training training on anaerobic endurance improvement in basketball players, using Analysis of Variance (Anova) hypothesis rejection decision on  $\alpha = 0.05$ . with a significance level of 5%.

### ***Result and Discussion***

Effects of Circuit Training with high intensity and on anaerobic endurance:

1. Based on the results of calculations using the T-Test in the Paired Samples Test table, the result of  $t_{count}$  is 15,590 with a significance level (P) 0.00. Because the level of significance (P) is smaller than alpha ( $0.00 < 0.05$ ). It can be concluded that the treatment of circuit training with high intensity can increase anaerobic endurance.
2. Based on the results of calculations using the T-Test in the Paired Samples Test table, the result of the  $t_{count}$  is 12,762 with a significance level (P) 0.00. Because the level of significance (P) is smaller than alpha ( $0.00 < 0.05$ ). It can be concluded that the treatment of Circuit Training with low intensity can increase anaerobic endurance.
3. The difference in anaerobic endurance improvement between the high intensity circuit training group and low intensity circuit training with the control group was 2.57067 and the significance (P) was 0.00, meaning that there were significant differences between the two study groups. The difference explains that high-intensity circuit training treatment programs are more effective than low intensity circuit training in increasing anaerobic endurance.

Hypothesis testing results about the effect of circuit training on maximal aerobic capacity (VO2Max) and anaerobic endurance show that the group given high intensity circuit training showed better results than the low intensity circuit training group. This can be seen from the average gain score of the anaerobic endurance of the high intensity circuit training group, which is 12.53, the low intensity circuit training group, is 8.98.

At the time of rest two metabolic processes that occur are the re-formation of PC (phosphocreatine) and the operation of a buffer system in active muscles that have a role in restoring muscle pH and lactate transport. The process requires a different time ie faster PC synthesis (21-60 seconds) (Widiyanto 2012: 42). Sukadiyanto (2011: 28) states that "the shorter the recovery time is given, the higher the intensity is vice versa if the longer the recovery time is given the lower the intensity". The results of Meckel, Machnal and Eliakim's research (2009: 6) rest periods show different physiological implications. High-intensity circuit training exercises are more effective (Sissom, 2017: 14). Bellar (2015: 315) high-intensity training is increasingly popular in the United States. Miller (2014: 1) high-intensity circuit training can improve biochemical, physical and body composition characteristics.

Circuit training is a training system that can simultaneously improve the overall fitness of the body, namely the elements of power, endurance, strength, agility, speed, etc. of physical components. Kumar research results (2013: 13) circuit training training is an important exercise of physical training programs in schools. Vega (2013: 153).

An effective circuit training program to improve muscle and cardiovascular endurance in school children. Circuit training with aerobic and anaerobic training has a synergistic effect on cardiovascular and strength (Benito, 2016: 9). Babu and Kumar (2013: 406) circuit training exercises can significantly increase sprint. Haliq (2015: 171) circuit training method is a way to improve physical fitness in general and covers all physical aspects and fitness of the heart and blood vessels.

Having a good and anaerobic endurance is an important element that must be possessed by basketball players. Characteristics of basketball games is that when playing basketball there are many explosive movement elements that require anaerobic endurance. Efforts to develop anaerobic endurance, especially with the use of circuit training training methods, a trainer must pay attention to the training load and intensity.

## **Conclusion**

Based on the results of research and discussion, this study can be concluded that the method of circuit training with high intensity and low intensity can increase anaerobic endurance. The high intensity circuit training method is better than the low intensity and control of anaerobic endurance improvement. By observing the conclusions above, it can be suggested that the coaches in an effort to improve the ability of athletes, both physical and technical should create and arrange training programs objectively and can consider using circuit training with high intensity because it is relatively faster in improving the physical condition of basketball players.

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