

**ORIGINAL ARTICLE**

**THE DIFFERENCE BETWEEN THE EFFECTS OF CONTINUOUS  
RUNNING AND INTERVAL RUNNING TRAINING METHODS ON  
MAXIMUM OXYGEN VOLUME (O<sub>2</sub>) OF FOOTBALL ATHLETES  
AT EDUCATION CENTERS AND STUDENT TRAINING (PPLP)  
ACEH PROVINCE**

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**Abstract:** The increase in aerobic exercise is influenced by cardiovascular performance, so to improve aerobic exercise it is necessary to increase the VO<sub>2</sub> Max value. The purpose of this study is to prove the differences in the effect of continuous running and interval running exercises on VO<sub>2</sub> Max in soccer athletes in PPLP Aceh Province. This study used analytic experimental with pre-test and post-test design. The study was conducted at the Harapan Bangsa Stadium in Banda City with a sample of 52 soccer athletes. Data analysis using Independent Sample T-Test. The result is there was an overall difference between continuous running practice and interval running for VO<sub>2</sub> max PPLP soccer athletes in Aceh Province. The average VO<sub>2</sub> max with the continuous running method exercise is 61.9 better than the running interval is 54.9. Sig value (2-tailed) VO<sub>2</sub> max data is 0.001 This means that there was a difference between continuous running and interval running exercises. From these results, it can be concluded that to improve the VO<sub>2</sub> max of a professional soccer athlete, training with the continuous running method is recommended compared to the interval running training method.

**Keywords:** Continuous running, Interval running, and VO<sub>2</sub> Max

**INTRODUCTION**

Exercise is very beneficial for health because it can improve the physical condition of athletes and support performance so that they can achieve achievements. Declining performance of an athlete is one of them caused by fatigue that arises due to the inability of aerobic endurance compared to anaerobic.<sup>1</sup> Aerobic endurance dominates in sports that require energy for a long

time such as rowing and soccer. Whereas anaerobic endurance uses energy in a short time for example in sprint running and weight lifting.<sup>2</sup>

Football is a sport that requires a lot of energy or requires a high VO<sub>2</sub>max. So an athlete needs the availability of energy and endurance.<sup>3</sup> Demands of energy in large quantities will be produced through an aerobic system that requires oxygen with maximum

capacity or VO<sub>2</sub>max. High and low VO<sub>2</sub>max athletes affect the physical condition. Someone who has high VO<sub>2</sub>max can perform endurance activities well and perform recovery (recovery) faster than low VO<sub>2</sub>max.<sup>4</sup>

The advantage of an athlete lies in the ability to provide oxygen according to their needs. Athletes who are well fitness have higher VO<sub>2</sub>max values and can do stronger activities than athletes who have low endurance, so the VO<sub>2</sub>max element in sports is one of the determining factors.<sup>5</sup> To increase VO<sub>2</sub>max, physical exercise must be done. Increased VO<sub>2</sub>max should be by an aerobic exercise program because with aerobic exercise there is already a burden that increases the work of the heart and lungs. High and low VO<sub>2</sub>max the players are very influential on the physical condition or physical fitness of the player.

Training methods that can be used are interval running and continuous training methods. The running interval method is a training method interspersed with intervals in the form of periods of rest. While the continuous running method is a training run with a specified speed and distance without resting time until the entire distance traveled.<sup>2</sup> Education Centers and Student Training (PPLP) Aceh Province prepares professional soccer athletes to face the Indonesian PPLP National Championship competition, where training to improve physical endurance is the main thing that really needs to be improved, besides training tactics and game strategies. They exercise 3 times a week or 3 hours for each exercise where 10-15 minutes warm-up, 20-30 minutes

running around the soccer field, 20-30 minutes combination training (sit-ups, push-ups, squats and speedrunning), 90 minutes practice and compete for about 5-10 minutes each training session. But this has not been able to increase the athlete's physical endurance (VO<sub>2</sub> max).

## METHODS

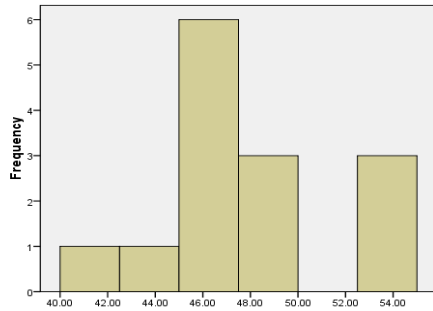
This research is an experimental analytic study with pre-test and post-test group design designs. Analysis of the data used is the Independent Sample T-Test. To measure VO<sub>2</sub>max measured by using the Multistage fitness test (MFT) method and the help of a stopwatch to measure training time. The sample in this study was 52 soccer athletes with criteria of 15-20 years who had practiced professional soccer for 2 (two) years. Data were analyzed using the SPSS version 20.0 program with the Independent Sample T-Test. The normality of pretest data in the Kolmogorov-Smirnov test.

## RESULTS

Based on the results of statistical analysis and the values of figures 1 and 2 obtained sig. (2-tailed) VO<sub>2</sub>max pretest data is 0.895 which means more than  $\alpha / 2 = 0.025$ , so H<sub>0</sub> is accepted. Besides that, the t-count = 0.133 lies between -2.06 and 2.06 (table = 2.06). This means that there is no significant difference between the average VO<sub>2</sub>max pretest continuous running method with the average VO<sub>2</sub>max pretest interval running method.

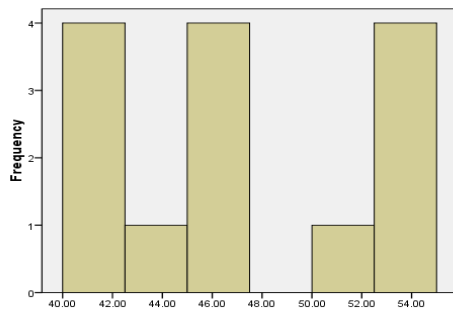
**Differential test in the Average VO2 Pre-Test max**

*a. Continuous Running*



**Figure 1. Differential Test in Mean Pre-Test VO2 Max Continuous Running**

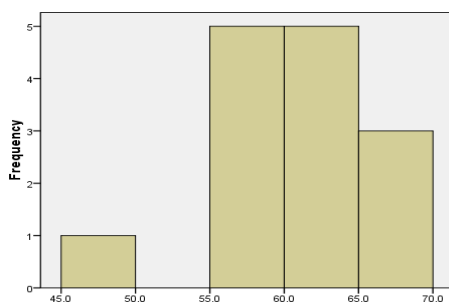
*b. Interval Running*



**Figure 2. Differential Test in Average Pre-test VO2 Max Interval Running**

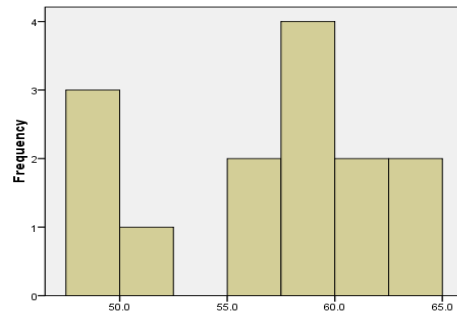
**Differential Test in Average VO2 Post-Test Max**

*a. Continuous Running*



**Figure 3. Differential Test in Mean Post-Test VO2 Max Continuous Running**

*b. Interval Running*



**Figure 4. Differential Test in Mean Post-Test VO2 Max Interval Running**

Based on the results of statistical analysis and the values in figures 3 and 4 the sig values were obtained. (2-tailed) Vo2max data is 0.001 which means less than  $\alpha / 2 = 0.025$ . Besides tcount = 3.582, it is not located between -2.06 and 2.06 (table = 2.06). This shows that there is an overall difference between continuous running and interval running training for VO2 max soccer PPLP Aceh Province.

Based on the average VO2max results from the two physical exercises, it shows that physical training with the continuous running method is better than physical training with the interval running method to increase the VO2max of the athletes. This is because the average VO2max with continuous running method training is 61.9 better than the average VO2max with interval running method training is 54.9.

**DISCUSSION**

From the analysis of VO2max scores of Aceh PPLP soccer athletes before treatment with the Continuous

Running and Interval Running methods showed that there was no significant difference between the average VO<sub>2</sub>max pretest continuous running method with the average VO<sub>2</sub>max pretest interval running method.

After being treated with the method of continuous running and interval running on Aceh PPLP soccer athletes in both groups, then each group was given a final test (posttest) to determine the difference in VO<sub>2</sub>max and cholesterol in athletes after treatment. To find out whether VO<sub>2</sub>max and cholesterol of the two groups after treatment were different or not, a statistical analysis test was carried out which included tests of normality, homogeneity of variance, and average differences.

The average VO<sub>2</sub> max results of the two physical exercises showed that physical training with the continuous running method is better than physical training with the interval running method to increase the VO<sub>2</sub> max of the athletes. This is because the average VO<sub>2</sub> max with continuous running method training is 61.9 better than the average VO<sub>2</sub>max with interval running method training is 54.9.

According to Sukadiyanto, training is a process of perfecting the ability to exercise containing theoretical and practical material, using methods and rules, so those goals can be achieved on time.<sup>6,7</sup>

Aerobic exercise is a term used based on predominant energy systems used in certain physical activities.<sup>8</sup> In aerobic exercise, the oxygen system is the main energy source. This aerobic exercise stimulates the work of the heart,

blood vessels, and lungs. Aerobic exercise is an exercise that must be done at a certain speed, and at a certain time. The exact speed varies greatly, but the intensity must be sufficient to stimulate the anaerobic threshold for physiological adaptation to occur.<sup>9</sup> Aerobic training usually lasts a long time, whereas training that takes place quickly usually uses the anaerobic system.

VO<sub>2</sub>max is the result of maximal cardiac output and maximal O<sub>2</sub> extraction by tissue, and both increase with exercise. The changes that occur in skeletal muscle with exercise are an increase in the number of mitochondria and enzymes that play a role in oxidative metabolism. An increase in the number of capillaries with better blood distribution to muscle fibers. The final effect is more complete O<sub>2</sub> extraction and consequently, for the same workload, the increase in lactate formation is lower. Increased blood flow to the muscles becomes lower and because of this, heart rate and cardiac output are less increased than untrained people.<sup>10</sup>

According to Sovndal and Murphy, the maximum oxygen volume is "the maximum amount of oxygen obtained by the body when spending maximum energy in training, when the body converts food into energy, the more oxygen consumed the more energy or the speed produced".<sup>11</sup>

## CONCLUSION

The results showed that there was an overall difference between continuous running and interval running exercises to increase

VO<sub>2</sub>max among PPLP soccer athletes in Aceh Province.

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