

Effect of Circuit Training and Fartlek Training on Cardiorespiratory Endurance Football School Athletes

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Abstract--- This research aims to obtain a picture of the effect of circuit training and fartlek training on cardiorespiratory endurance. This research used quasi-experimental, with a research design using a pretest and post-test two group design. Prior and after to treatment, the VO₂ max of the two sample groups was measured using the Cooper Test. This was done to get a comparison between the two treatments. The results of his research are as follows: The result of Paired Sample T-test in Group I was $p=0.000$ ($p<0.05$), and Group II was $p=0.000$ ($p<0.05$). It suggests that both treatments had an effect on the improvement of cardiorespiratory endurance in both groups. The result of Probability test used Independent Sample T-test was $p=0.10$ ($p>0.05$). It suggests that there was no difference effect of circuit training and fartlek training on cardiorespiratory endurance improvement football school athletes. There was no different effect of circuit training and fartlek training on cardiorespiratory endurance improvement football school athletes.

Keywords: Circuit Training, Fartlek Training, Cardiorespiratory Endurance

I. INTRODUCTION

Currently, football is one of the sports that is in demand and favored by almost everyone on earth. Football can also be enjoyed by all ages and levels of society. Modern football is now developing and influencing various aspects of human life. At a time when modern football was developing, Indonesia also had the desire to show its existence in the world of local and international football. Then how can we form a quality national team to answer the high hopes of the Indonesian people whose loyalty cannot be doubted? (Prawira & Tribinuka, 2016).

The rise of football school in various regions in Indonesia proves that the community has a high concern for early childhood soccer coaching. The increase in the number of football school in terms of the quantity of coaching is quite encouraging so that it will be easier to find children who have special talents to be nurtured to become

reliable players. Although the football school is quite encouraging, it has not been followed by a well-programmed and integrated coaching pattern, as evidenced by the absence of a guidance/curriculum as a reference in coaching at football school, infrastructure, including the evaluation system after the coaching program is implemented (Irianto, 2016).

Sports coaching at the club or school level generally starts from an early age between the ages of 6-12 years. Its existence as a coaching layer that plays a role in perpetuating the regeneration process is very important, especially because clubs and schools are the initial centers for fostering early age athletes and make it one of the most basic strategies in an effort to improve sports achievement (Purnama, 2013).

Football is a sport that not only requires mastery of techniques, tactics and mental abilities but also requires good cardiorespiratory endurance to carry out all activities in the game of football. This is because the sport of football takes 90 minutes plus injury time (added time). Therefore, players are required to have good cardiorespiratory endurance, so that when competing in a match they can achieve maximum performance.

According to Suharjana and Arif Purwandito (2009) cardiorespiratory is a measure of the heart's ability to pump oxygen-rich blood to other parts of the body and the ability to adjust and recover from physical activity. Cardiorespiratory endurance is the endurance of the heart lung. Lungs are organs that function to provide the gases needed by the body and return the residual gases to the atmosphere which are useless for the body. While the heart is a very vital organ, especially as a pump of blood throughout the body (Lismadiana, 2012: 110).

To produce good and correct technical abilities, of course, it needs to be supported by high physical abilities so that learning will be easier. In physical training, of course you must pay attention to the methods, forms and principles of training.

There are many methods and forms of physical training and techniques that the coach can apply to his foster children. Physical training usually uses the following training methods: circuit training, block sets, plyometrics and so on. Technical training can also be given, for example, with the drill method, either alone, by friends or coaches, as well as in team game exercises (Permana & Suharyana, 2013).

Several ways can be done by trying other exercises, namely a combination of aerobic and anaerobic exercises such as fartlek training. Based on observations made by researchers, people who do fartlek exercises feel a challenge because those who usually jog with slow and continuous rhythms try other alternatives to fartlek training by combining sprint-walking-jogging (Kurnia & Kushartanti, 2013).

The principle of fartlek training is running with various variations. This means that you can set the desired running speed while doing the exercise according to your wishes and also according to the condition/ability of the athlete. For example, training can be started by running slowly, then continued with sprinting at short distances intensively (Sukadiyanto, 2010: 116).

From this explanation, it is very understandable why football players must have good cardiorespiratory endurance. The result of the match is very much determined by the quality of the game shown by each player. When players are on the field, players often experience fatigue, resulting in loss of concentration and wrong decisions that result in defeat in a match.

This study aims to analyze the difference in the effect of circuit training and fartlek on the cardiorespiratory endurance of football school athletes.

II. METHODS

This type of research is quasi-experimental, with a research design using a pretest and post-test two group design. The sampling technique in this study used total sampling. This design is used to determine the effect of circuit training and fartlek training on the cardiorespiratory endurance of football school athletes. In this study, 2 treatment groups were used, namely the first group (circuit training) and the second group (fartlek training). Prior to treatment, the VO₂ max of the two sample groups was measured using the Cooper Test. Then after receiving treatment 3 times a week for 4 weeks, the VO₂ max of the two sample groups was measured again using the Cooper Test. This was done to get a comparison between the two treatments.

The operational definition in this study is a measurement of cardiorespiratory endurance as measured by the Cooper Test by running without stopping for 12 minutes, in all research samples.

Measurement of the Cooper Test was carried out in the treatment group before and after giving circuit training and fartlek training. Circuit training can be done to increase cardiorespiratory endurance because circuit training has a very high intensity. The exercise for doing circuit training is for 4 weeks in 12 meetings with an intensity of 3 times a week with the duration of each movement is 30 seconds plus heating and cooling each 10 minutes so the total duration is approximately 30 minutes 3 times reps. On the other hand, fartlek training can also be used to increase cardiorespiratory endurance because it combines sprint-walking-jogging. The exercise for doing fartlek training is for 4 weeks in 12 meetings with an intensity of 3 meetings a week with the intensity of each movement being carried out for 10 minutes plus cooling and heating for 10 minutes each so the total duration is approximately 1 hour.

The population in this study were athletes in the male football school in the 14 year age group with a total of 26 respondents. Of the total population, all 26 samples will be taken. As for the sampling technique used in this study using total sampling technique. With a total sample of 26 people divided into 2 sample groups, namely 13 groups with circuit training treatment and 13 people in group 2 with fartlek training treatment in increasing cardiorespiratory endurance in football school athletes.

III. RESULTS AND DISCUSSION

The sample in this study were 26 athletes from the Putra Welahan Football School in the 14 year age group, which were divided into 2 treatment groups by means of the respondent taking the paper with the numbers 1 and 2 mixed into one, if the respondent received a paper that reads the number 1 then the respondent was included in group 1, whereas if the respondent received a paper with the number 2 on it, the respondent was included in group 2. Group 1 was given circuit training while group 2 was given fartlek training.

This research was conducted for 4 weeks starting February 4, 2020 to March 3, 2020. The frequency of training was 3 times a week for 12 meetings. The place of research was conducted in Bogor Field, Welahan-Gotri Highway, Kalipucang Wetan, Welahan District, Jepara Regency.

This study aims to determine the effect of circuit training and fartlek training on the cardiorespiratory endurance of football school athletes. Cardiorespiratory endurance data is obtained from VO₂ max results data measured by the Copper Test by running for 12 minutes after which the respondent calculates the distance traveled. Measurements were made before conducting the circuit training and fartlek training treatment and after being given the treatment for 12 times, the VO₂ max measurement was carried out

again using the Copper Test for 12 minutes running.

The characteristics of the respondents in this study include age and body mass index. Based on this research, a description of the characteristics of the respondents is obtained as follows:

Table 1. Age Distribution

Age (Years)	Treatment Group			
	Circuit Training		Fartlek Training	
	N	%	N	%
13	11	84.6	3	23.1
14	2	15.4	10	76.9
Total	13	100	13	100

Table 2. BMI distribution

Body Mass Index (BMI)	Treatment Group			
	Circuit Training		Fartlek Training	
	N	%	N	%
20-22.9	11	84.6	10	76.9
23-24.9	1	7.7	3	23.1
25-29.9	1	7.7	0	0
Total	13	100	13	100

Table 3. Distribution of VO2 Max Measurement Value for Circuit Training Group

VO2 Max Value	Mean ± SD	Difference
Pretest	37.185 ± 1.5088	2.662 ± 0.8827
Post-test	39.846 ± 2.1543	

Table 4. Distribution of VO2 Max Measurement Values for Fartlek Training Group

VO2 Max Value	Mean ± SD	Difference
Pretest	37.838 ± 1.4672	2.985 ± 0.7967
Post-test	40.823 ± 2.1064	

Table 5. Data Normality Test

Data Group	Normality with the Shapiro-Wilk-test			
	Treatment Group I (Circuit Training)		Treatment Group II (Fartlek Training)	
	Statistics	p	Statistics	p
Pretest	0.909	0.179	0.909	0.178
Post-test	0.939	0.440	0.918	0.234

Table 6. Data Homogeneity Test for Groups I and II

Measurement Value of VO2 Max TG I and TG II	Value <i>p</i>
Before	0.930
After	0.300

Table 7. Hypothesis I Test of Circuit Training Treatment Group

Treatment Group	N	Mean ± SD	Paired Sampel T-test <i>p</i>
Pretest	13	37.105 ± 1.5000	0.000
Post-test	13	39.846 ± 2.1543	

Table 8. Hypothesis II Test For Fartlek Training Treatment Group

Treatment Group	N	Mean ± SD	Paired Sampel T-test <i>p</i>
Pretest	13	37.838 ± 1.4672	0.000
Post-test	13	40.823 ± 2.1064	

Table 9. Results of Measurement Data Normality VO2 Max

Post-test scores of TG I and TG II	Shapiro-wilk-test
	p
TG I	0.4 40
TG II	0.2 34

Based on the measurement results of VO2 max using the Copper Test, it can be seen that the mean pretest value is 37.185 ± 1.5088 and the mean post-test value is 39.846 ± 2.1543 . Changes in the mean VO2 max value before and after the Circuit Training treatment showed an increase in the VO2 max value. This indicates an increase in the VO2 max value of athletes from the Putra Welahan Football School in the 14 year age group, with an average increase of 2,662.

In this study, not all got good results after being treated. These results can be seen from several VO2 max measurements before and after treatment, only a difference of 1. This can be influenced by several things, such as age and BMI. Because the factors that affect the physical fitness of an individual include age, gender, genetics, Body Mass Index (BMI) status and physical activity, but for the physical fitness level of an athlete the most influential are age and Body Mass Index status (Bryantara O.F., 2016). Meanwhile, according to Jayusfani R. et al (2015), the higher the body mass index (BMI), the lower the cardiorespiratory endurance.

The results of the hypothesis I test in the Circuit Training Treatment Group on the measurement of VO2 max using the Paired Sample T-test show, in the Circuit Training Treatment Group the value of $p = 000$ is obtained. Because the p value is <0.05 , H_a is accepted and H_o is rejected, which means there is an influence giving circuit training to increase cardiorespiratory endurance. Based on the results of research that has been carried out with a sample of 13 people, it is found that circuit training has an effect on increasing cardiorespiratory endurance which can be seen by knowing the VO2 max value and is related to several factors that influence including gender, age and BMI.

The results of hypothesis testing II in the Fartlek Training Treatment Group on VO2 max measurement using Paired Sample T-test showed that in the Fartlek Training Treatment Group the value of $p = 000$ was obtained. Because the p value <0.05 , H_a was accepted and H_o was rejected, which means that fartlek training in increasing cardiorespiratory endurance. Based on the results of research that has been conducted with a sample of 13 people, it is found that fartlek training has an effect on increasing cardiorespiratory endurance which can be seen by knowing the VO2 max value.

Based on the results of Hypothesis III Test, it shows that the probability value (p value) is 0.10. This means that the probability value is greater than 0.05 ($p > 0.05$) from the above statement, so H_o is accepted and H_a is rejected. So it can be concluded from the results of hypothesis testing III states that there is no difference in the effect of providing circuit training and fartlek training on increasing cardiorespiratory endurance, so that the third hypothesis in this study is rejected. In this study, the results show that providing circuit training can increase VO2 max, while providing fartlek training can also increase VO2 max. So it can be concluded that providing circuit training and fartlek training is equally good in increasing cardiorespiratory endurance (VO2 max). This can happen because both types of exercise are aerobic exercises that can increase the load gradually and continuously and use the energy that comes from burning oxygen and requires oxygen.

There was an increase in cardiorespiratory endurance in circuit training and fartlek training, this increase was obtained after measuring VO2 max using the Paired Sample T-test although the results obtained were not significant. The distribution data of the VO2 max increase value after intervention in the circuit training group obtained a mean value of 39,846 and the fartlek training group obtained a mean value of 40,823. Meanwhile, the difference in effect test results stated that there was no difference in the effect of providing circuit training and fartlek training on increasing cardiorespiratory endurance. There is no difference in the effect of providing circuit training and fartlek training on increasing cardiorespiratory endurance due to various reasons, one of which is because there are still many uncontrollable factors such as genetic factors, gender and body composition.

IV. CONCLUSION

Based on the results of research and discussion of the Effect of Circuit Training and Fartlek Training on Cardiorespiratory Endurance of Football School Athletes, it can be concluded that there is an effect of providing circuit training on increasing cardiorespiratory endurance, there is an effect of giving fartlek training on increasing cardiorespiratory endurance and there is no difference in the effect of giving circuit training and fartlek training to increase cardiorespiratory endurance.

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