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The Effect of Oregon Circuit Training and Fartlek Training on the VO2Max Level of Soedirman Expedition VII Athletes

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Abstrak

Penelitian ini bertujuan untuk mengetahui pengaruh Oregon Circuit Training dan Latihan Fartlek terhadap tingkat VO2max pada atlet Soedirman Expedition VII. Metode penelitian menggunakan pre-experimental dengan two group pretest posttest design. Populasi berjumlah 20 orang dan menggunakan teknik total sampling sehingga diperoleh 20 sampel. Instrumen Penelitian menggunakan Instrumen Multi Stage Fitness Test. Penelitian ini dilaksanakan pada Juni 2019 sampai dengan Oktober 2019. Teknik analisis data diperoleh dengan Uji T. Hasil penelitian menunjukkan bahwa terdapat pengaruh dari kedua jenis latihan terhadap peningkatan Vo2Max namun tidak ada perbedaan pengaruh yang signifikan diantara keduanya. Dengan kata lain, semakin sering latihan dilakukan maka semakin baik tingkat Vo2Max Atlet.

Abstract

The research was aimed at determining the influence of Oregon Circuit Training and Fartlek Exercises on the VO2max level of the Soedirman Expedition VII athletes. The research method used was pre-experimental method with two group pre-tests post-test design. The population were 20 people. The total sampling technique was administered to obtain 20 samples. The research instrument used Multi Stage Fitness Test. This study was conducted from June 2019 to October 2019. The data analysis process was conducted by using T-Test. Results showed that there are influences of both types of exercises on the increase of Vo2Max, but there is no significant influence difference between the two. In other words, the more often the exercise is done, the better the Vo2Max level of the athletes.

INTRODUCTION

In this era of globalization sport becomes very important as one in the effort to decline and prevention of stress levels, health enhancement, as well as maintenance efforts and maintain a balance of quality of life. Recreational sport is carried out as part of health and fitness recovery process. The definition of recreational sports is a sport performed at leisure with the aim of gaining health, fitness, attitude and mental refreshment that can regain the strength of both physical and mental, or to gain pleasure.

At this time, climbing the mountain has become one of the most popular sports in the world. It is evidenced by the number of tourists visiting the mountain and people participating in the sports altitude including climbing, trekking and various snow sports (skiing, snowboarding, etc.) Has experienced an increase in recent years (Davies et al., 2019). English translation.

Every year, more than 100 million tourists travel to high altitude areas around the world. More specifically, about 40 million mountaineers and skiers rose as high as 5,000 m in the Alps (Burtscher et al., 2001). In Africa every year, about 40,000 tourists climb the top of Kilimanjaro with a height of 5,800 m, and more than 4,000 climbers have tried to climb Mt. Aconcagua which is a height of 6,962 m (Sumann et al., 2015). There was a high increase number of climbers in Nepal between 1994 and 2000, amounting to 450%, along with a seven-fold increase in climbers who attempted to rise to some of the most difficult and challenging Himalayan peaks above 8000 m. From 1995 Up to 2006, more than 30,000 climbers are trying to reach the world's highest peak, Mount Everest (Windsor et al., 2009).

But on the other hand, climbing a mountain is a vigorously adventurous sport and requires skill, intelligence, strength and high fighting power. Climbing Mountains (mountaineering) is also included in the heavy sports category based on its intensity and energy needs. So not infrequently many problems that often occur when climbing one of them is a physical problem, the expedition participants must have a good physical of each component of physical condition. Preparation of well-done physical exercises will result in satisfactory achievement. Physical exercise also trains participants

to adapt to the mountain. In principle, physical exercise preparation is important in the expedition because a good exercise determines the quality and ability to achieve optimal performance demands. The importance of the training preparation model as the foundation of maximum achievement, especially in the mountaineering that corresponds to the physical condition exercise standards itself, where in the open state an interference is very likely Happens, let alone the purpose of an adventure in the open nature climb it is for accomplishment purposes then physical exercise is very important.

Physical condition is the initial provision and as the basic basis to follow exercise exercises in achieving a achievement. Physical condition is the foundation and barometer of achievement of the performance and capability of the body or fitness component required by an athlete (Reza Agus Hariyanto I Ketut Yoda, 2018)

English translation. Cardiovascular endurance is often referred to by the term Vo2max (Smirmaul et al., 2013). There are several factors that can affect the level of VO2Max including age, gender, fitness and exercise (P.O & U.G, 2016), in line with the opinion to get a good Vo2max quality, many exercise methods that can be applied such as circuit training methods and Fartlek training. Circuit training is one of the efficient exercises in enhancing physical abilities that include strength, aerobic and anaerobic endurance, flexibility and coordination in one training session. (Kumarassan & Saravanan, 2016).

To increase VO2Max The training program should be done carefully, systematically, orderly and constantly increasing, following the principles and methods of accurate exercise in order to achieve the expected objectives. Thus, an alternative training that can be used and applied to increase VO2 Max is circuit training. Circuit Training is a training system that can improve the overall fitness of the body, namely the power elements, durability, strength, agility, speed, and components of other physical conditions.

Circuit training is an exercise model combining strength, power, speed and endurance exercises anaerobic or endurance Aerobic. Circuit exercises can be said to influence the athlete's stamina quality in the short term. This is because the circuit exercises include almost all components of the physical condition per-

formed with high tempo simultaneously in a relatively short period of time (Yudiana, 2015).

The selection of the training loads in the training circuit should be adjusted to the general purpose of Circuit training that is to be achieved. Circuit training carried out in a designated area has several posts, for example 8 posts. Each post, implementation should be done in the form of certain exercises. Activities in each post are development for all physical fitness components (Ilissaputra & Suharjana, 2016).

The term "circuit training" describes the way a workout is structured rather than the type of exercise performed. It typically consists of a series of exercises or stations completed in succession with minimal rest in between. Circuit routines allow the athlete or coach to create an endless number of workouts and add variety to routine training programs (Night, S Balasingh, 2018).

Fartlek training or speed play was created by Gotta Roamer of Sweden. The definition of Fartlek is an endurance exercise system which means it is to build, restore or maintain a person's body condition so that it is very good for all sports branches especially sports that require endurance. Fartlek training combines aerobic demands with continuous movement with speed intervals, the method of Fartlek training is a very enjoyable exercise and aims to increase the strength and capacity of aerobic athletes (Jones, 2016).

There have been some previous studies discussing the related circuit training and Fartlek training, including: based on research from (Prakoso & Sugiyanto, 2017) It was stated that the average calculation for the circuit training method of 33,640 showed that the circuit training had an effect on increasing the capacity of VO2Max extracurricular basketball women in SMA Stella Duce 1 and SMA Stella Duce 2 Yogyakarta.

The results of the study findings that a 12-week training program have significantly increased of positive improvement on Vital capacity and VO2 max in women badminton players. There was a significant increased on Vital capacity and VO2max due to circuit training (Gokulkrishnan, 2018). This was an expected outcome for the members of the RB Circuit Training protocol, as resistance based training is known for its results in improving muscular strength and endurance (Monaco, 2018). Some of the above studies have al-

ready discussed the related circuit training and interval training but no one has associated with Vo2Max capability in mountain climbing athletes, so this research needs to be done given the differences in characteristics

METHODS

The design of the research used in this research is "two group pretests and posttest Design", in this design there are two groups that are divided with ordinal pairing techniques, then given a pretests to know the initial state is there a difference from Experimental group to be researched. A good pretests result if the value of the experiment group does not differ significantly (Sugiyono, 2016).

The population used was all of Sudirman VII's expedition athletes numbering 20 people, With an average age of 19-21 years, with male gender, the average weight of the sample is 56.2 Kg and the average body height is 165.3 cm. The sampling technique used is a total sampling. The design ordinal pairing is used to divide into two groups, the test results are taken from most to least, then divided and inserted into group A and group B then paired with A-B-A-B formula, so that Divided into two equally average groups. Group A was given the exercise method of the Oregon Circuit Training, and group B was given a training treatment of Fartlek Training method.

Table 1. Age-based fitness norms

No	Status	18-25 year
1	Very fit	>60
2	Fit	52-60
3	Above average	47-51
4	Average	42-46
5	Below average	37-41
6	Not fit	30-36
7	Very not fit	<30

The instrument used by researchers in this study was the Multi stage Fitness Test (MFT) method, to determine the Vo2Max level of the Sudirman VII expedition. The calculation of VO2 Max using the MFT (Multistage Fitness test) test can be seen in the following table 1. The data in this study include: A prerequi-

site test that includes data effectiveness test and data homogenization test, followed by a hypothesis test using paired t-test and independent t-test.

RESULT

This research was conducted 4 times a week at the University of General Sudirman, Purwokerto. The practice process is 16 times the meeting. Variables bound to this research IE levels level Vo2Max athletes. The Data obtained after Multistage Fitness Test (MFT) test can be seen in the table below:

Table 2. Data of research results

Descriptive Statistics				
DATA	Minimum	Maximum	Mean	Std. Deviation
Pretest Group Oregon Circuit Training	40	49	42	2,126
Posttest Group Oregon Circuit Training	52	63	58,5	2,248
Pretest Group Fartlek	38	48	43	1,938
Posttest Group Fartlek	52	64	60,5	2,816

The results of the statistical analysis obtained by the value of Minimum= 40, maximum value= 49, mean of the Oregon Circuit Training Group is pre-test = 42 and post-test= 58.5, while average (mean) fartlek Group is pre-test= 43 and post-test= 60.5, then the standard deviation of Oregon Circuit Training Group is pretest= 2,126 and posttest = 2,248, while the standard deviation of fartlek Group is pretest = 1,938 and posttest = 2,816.

Table 3. Results of pretest Vo2Max level

No	Category	Value	Frequency	Percentage
1	Very fit	>60	0	0%
2	Fit	52-60	0	0%
3	Above average	47-51	7	35%
4	Average	42-46	10	50%
5	Below average	37-41	3	15%
6	Not fit	30-36	0	0%
7	Very notfit	<30	0	0%
Amount			20	100%

From table 3, showed that the category is very fit frequency of 0 People with a percentage 0%, then the fit category as much as 0 People with a percentage

0%, next the category above the average there are 7 People with a percentage of 35%, the average category there 10 People with a percentage of 50%, the category below the average there are 3 People with a percentage of 15%. Category not fit There are 0 People with a percentage 0%, and the category below is very not fit 0 People with a percentage 0%.

Table 4. Results of posttest Vo2Max level

No	Category	Value	Frequency	Percentage
1	Very fit	>60	4	20%
2	Fit	52-60	16	80%
3	Above average	47-51	0	0%
4	Average	42-46	0	0%
5	Below average	37-41	0	0%
6	Not fit	30-36	0	0%
7	Very disfit	<30	0	0%
Amount			20	100%

From the table 4 , showed that the category is very fit frequency of 4 People with a percentage 20%, then the fit category as much as 16 People with a percentage 80%, next the category above the average there are 0 People with a percentage of 0%, the average category there 0 People with a percentage of 0%, the category below the average there are 0 People with a percentage of 0%. Category not fit There are 0 People with a percentage 0%, and the category below is very not fit 0 People with a percentage 0%. Based on this indicates that the ability of athletes after being given a training program (treatment) has a difference in the Vo2Max test result, that more increased than the total result of increased percentage before the exercise (treatment).

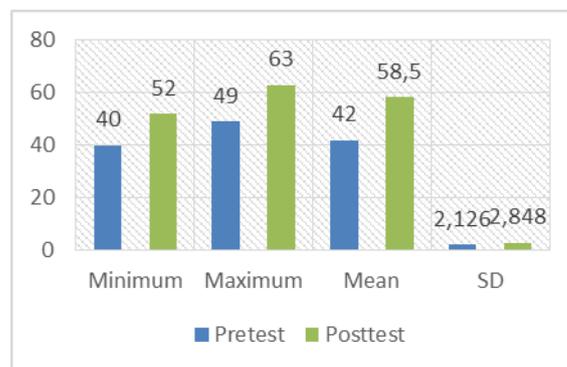


Figure 1. Oregon Circuit Training Group Research

The research results for the Oregon Circuit Training Group have a total of 20 samples gained the minimum value before training = 40 and after exercise = 52, the maximum value before exercise = 49 and after exercise = 63. Rrata (mean) before exercise = 42 and after exercise = 58.5. Then the standard deviation of the Oregon Circuit Training Group before exercise = 2,126 and after exercise = 2,848.

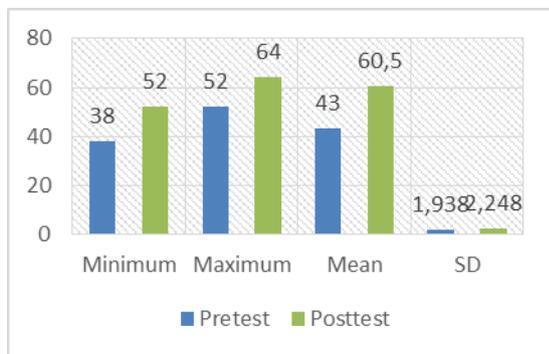


Figure 2. The Fartlek Group Research Results Data

Results of analysis research for variables skill playing futsal Futsal Group Fartlek has a number of samples as much as 10 People obtained the minimum value before the exercise = 38 and after exercise = 52, the maximum value before the exercise = 52 and after exercise = 64. mean before exercise = 43 and after exercise = 60.5. Then the standard deviation Fartlek Group before exercise = 1,938 and after exercise = 2,248.

The prerequisite test consists of test normality and homogeneity test. In this research test normality is conducted using the help of SPSS 24 with Shapiro Wilk, normal distribution data if the value of significance is greater than 0.05 or (sig. > 0.05), otherwise if the data is smaller than 0.05 or (Sig. < 0.05) Then the data is said to be abnormal. The normality test results: 1) Pretest Group Oregon Circuit Training (Sig = 0,871), Posttest Group Oregon Circuit Training (Sig = 0,659), 3) Pretest Group Fartlek (Sig = 0,469), 4) Posttest Group Fartlek (Sig = 0,674). It's shows that the value of Sig. from pretest and posttest group Fartlek and Oregon Circuit Training are all greater than 0.05 or Sig value > 0.05 then it can be concluded that the data is normal distribution. A test of homogeneity is a test conducted to know the similarities of the research population vari-

ant. Testing homogeneity done with the help of computer program SPSS. The decision making criteria is if the value of the sig > 0.05 or T count < T of the table, meaning the sample is homogeneity. The homogeneity test showed that pretest group oregon circuit training (Sig = 0,750), posttest group oregon circuit training (Sig = 0,762), pretest group fartlek (Sig = 0,699), 4), and posttest group fartlek (sig = 0,742). From the calculation of acquired significance table test homogeneity pretests and postest Group Fartlek and Oregon Circuit Training above both groups get the value of sig above 0.05 or sig. > 0.05 and the result signifies that variant of the sample is homogenous.

The data analysis technique used is the test-T with a significant 5% level. There are two types of test-T, namely different samples (Independent sample T-Test) and similar samples (dependent sample T-Test). This test is to determine the average difference between two populations/independent data groups.

Table 5. Test Results of Paired t-Test

Paired Sampled Test		
		Sig. (2-tailed)
Pair 1	Pretest Oregon Circuit Training Group	,002
	Posttest Oregon Circuit Training Group	
Pair 2	pretest Fartlek Group	,001
	postest Fartlek Group	

Table 6. Independent Samples Test

Independent Samples Test						
		F	Sig.	T	Df	Sig. (2-tailed)
Hasil posttest Tingkat Vo2Max	Equal variances assumed	0,27	0,77	-0,56	43,5	0,74
	Equal variances not assumed			-,564	42,6	,740

Based on the table 5, the results of Sig. (2-tailed) Oregon Circuit Training group that is 0.002 and the results of Sig. (2-tailed) fartlek training group is 0.001. With these results the two groups have a Sig. <0.05 and can be interpreted that there is a significant influence both Oregon Circuit Training and fartlek Training on the level of Vo2Max Soedirman Expedition VII Athlete.

From the table 6, the results of Sig. (2-tailed) the two groups is 0.740. With these results the two groups have a value of $0.740 > 0.05$ and it can be interpreted that there is no significant difference in effect between Oregon Circuit Training and Fartlek Training on the level of Vo2Max Athlete Sudirman Expedition VII.

Table 7. The Table Difference increment Vo2Max

Research variables	Mean Pretest	Mean Post-test	Difference	Percentage
Oregon Circuit Training Group	42	58,5	16,5	39,28%
Fartlek Group	43	60,5	17,5	40,69%

Table 7 shows the difference in the increase in futsal skills seen from the average difference of pretests and posttest in both groups. The difference of the Oregon Circuit Training was obtained from the average pretests of 42 and the average posttest of 58.5 had a difference of 16.5 and the percentage of its ascent amounted to 39,28%. While in Fartlek group the difference gained from the average pretests of 43 and posttest of 60.5 has a difference of 17.5 and the percentage of 40,69%. So it can be concluded that the group given training Fartlek greater increase Vo2Maxnya rate compared to the group Oregon Circuit Training.

DISCUSSION

This study aims to determine the effect of Oregon Circuit Training and Fartlek on the Vo2Max Level of Sudirman Expedition VII Athletes, then compare the differences in influence between the two. The research began with a pretest, after that the treatment was given during 14 meetings with the Fartlek Training and Oregon Circuit Training methods which had a balanced portion between the two exercises, and then conducted a posttest. This study uses a "Two Group pretest-posttest design" research design that is a research design that serves to determine the effect of each group before and after being treated and then compare the differences in influence of the results of the paired t-test, and each research group uses independent sample t-test, so that the difference can be known more accurately.

The results of the statistical analysis of the study for the Vo2Max Level variable oregon Circuit Training group has a sample of 10 people obtained the minimum value before practice = 40 and after exercise = 52, the maximum value before exercise = 49 and after exercise = 63. The average (mean) before practice = 42 and after practice = 58.5. From these data then tested by Paired t-test and obtained the results of t-test with Sig. (2-tailed) Oregon Circuit Training group pre-test and post-test is .002. So from these results it can be seen that the value of Sig. smaller than 0.05 or $0,000 < 0.05$, it means that the Oregon Circuit Training method has a significant influence on the level of Vo2Max Athlete Sudirman Expedition VII, and thus the research hypothesis is the effect of the oregon circuit training method on increasing maximal oxygen volume (VO2 Max)", be accepted.

Based on the result it can be concluded that the oregon Circuit Training approach is a form of exercise that can be used to increase VO2 Max, because in this circuit training will include trained elements, such as muscle strength, muscular endurance, flexibility, agility, balance, and heart-lung endurance. And circuit training becomes a series of exercises that can improve cardiovascular. Circuit training is an exercise program that is combined from several training items whose purpose in doing an exercise will not be tedious and more efficient in increasing VO2 Max and muscle endurance.

Analysis of the research results for the dependent variable of the study showed an increase in the mean value (mean) for each variable. From the description of the maximum oxygen volume variable data on the pre-test score of the fartlek group has an average value of 43 and an average post-test value of 60.5. That way the average value of this group increased by 17.5 or 40.69%. Based on the results of paired t-test with the help of the SPSS 22 program for the maximum oxygen volume variable between the gain score of the fartlek training group and the oregon circuit training group, a significance value of 0.001 was obtained at a significance level of 0.05. The significance value is smaller than the value (sig < 0.05), thus the research hypothesis has the effect of the method of fartlek training on increasing the maximum oxygen volume (VO2 Max)", accepted. Theoretically the results of this study can be explained as follows: endurance is one of the compo-

nents that must be had to support sports activities, especially endurance maximum oxygen volume (VO₂ Max) is a dominant factor in showing one's ability and maximum oxygen volume will give an idea of the magnitude of motor skills in one's aerobic process. Maximum oxygen volume (VO₂Max) has a dominant influence on a person's endurance that is the use and transport of oxygen. Maximum oxygen volume (VO₂ Max) is the maximum amount of oxygen that can be consumed during physical activity until fatigue occurs because the maximum oxygen volume can limit one's cardiovascular capacity.

Cardiovascular endurance is an activity that emphasizes the body's ability to do work in a rather long time, continuous, and in an aerobic state. An organized and directed training program that pays attention to the principles, intensity, systematics and frequency of training and will continuously lead to adjustments to the increasing physical condition. Training conducted regularly and systematically will increase the function of body organs so that these organs can work optimally as a supporter in carrying out physical activity.

Fartlek training in general will also have an effect on increasing blood volume and content of hemoglobin to carry oxygen, more red blood cells to carry hemoglobin, more blood plasma to carry red blood cells and of course more blood in total volume, Training also causes the heart muscle to get stronger. The increase in the strength of this muscle will cause the amount of blood that can be pumped by the heart in each beat will multiply. Likewise with the size of blood vessels will be enlarged due to the provision of training, with the increasing size of these blood vessels will cause blood that can be flowed through these blood vessels will also multiply. Likewise, oxygen carried by the blood also increases and the amount of hemoglobin will also increase.

Maximum oxygen volume (VO₂ Max) is influenced by the ability of the cardiorespiratory system to deliver blood to the tissues that are actively working with the ability of muscles to use oxygen carried by the blood. Efforts to increase the maximum oxygen volume (VO₂ Max) can be done through training that can improve one of these factors. An increase in the cardiovascular system and the muscular system will increase the capacity of VO₂ Max.

Then for the independent t test results are Sig. (2-tailed) Oregon Circuit Training group = 0.740 and the results of Sig. (2-tailed) Fartlek group = 0.740. With these results the two groups have a Sig. > 0.05 from the two treatment groups, and it can be interpreted that there is no significant difference in effect between the Fartlek training method and the Oregon Circuit Training on the Vo₂Max Level of the Sudirman Expedition Athlete.

That is because both exercises have the same effect on the Vo₂Max level of the Sudirman Expedition Athlete. The difference is in the mean difference (mean) of the two groups, namely the Oregon Circuit Training group getting pre-test results = 42 and post-test = 58.5, while the average (mean) of the Fartlek Training group is pre-test = 43 and post-test = 60.5. Based on these results the difference in influence can be compared in another way by looking at the difference in increase in the two groups, obtained by the Oregon Circuit Training group obtained from an average pretest of 42 and an average posttest of 58.5 having a difference of 16.5 with a percentage increase in 39.28%. Whereas in the Fartlek group the difference was obtained from the average pretest of 43 and posttest of 60.5 having a difference of 17.5 and the percentage of 40.69%. So it can be concluded that the group given the Fartlek training increase is greater than the Oregon Circuit Training group after each group is given training with the same portion.

CONCLUSION

Based on the results of research discussion can be concluded that there was an influence on the Oregon circuit training method to increase vo₂max capacity for Soedirman VII. There was an influence on the method of fartlek training on increasing the capacity of vo₂max athlete sudirman vii expedition. There was no significant difference in influence between the Oregon circuit training method and the fartlek training method on the increase of capacity vo₂max the athlete of sudirman vii expedition. With these results, showed that there is no difference influence between the two methods of practice, but if it is seen from the improvement, fartlek training shows better results compared to the Oregon circuit training.

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