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RESEARCH ARTICLE

The Effect of Jogging Exercise in the Field and Jogging with a Treadmill on Endurance (VO2Max) In 18-19 Year Old Students

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ABSTRACT

Endurance is an essential physical component in physical activity and physical fitness. Students' and athletes' endurance (VO2 Max) is vital to improving their abilities. Students can enhance their endurance through structured exercise, and jogging is the most accessible exercise. To determine the effect of jogging training in the field and jogging training with a treadmill on endurance (VO2Max) in 18-19 years old students. This research is comparative experimental research using a Two-group Pretest-Posttest Design. The sampling technique used purposive sampling with specific criteria. Data was collected using an endurance test (15-minute Balke test) carried out before and after the exercise provision, and the data was then analyzed with SPSS. The difference in endurance (VO2 Max) of the jogging exercise group with a treadmill obtained an average value of 7.80. In contrast, the difference in endurance (VO2 Max) of the jogging exercise group in the field obtained an average value of 10.85. The difference between the two groups is an average of 3.05, where the jogging exercise group in the field is higher than the jogging exercise group with a treadmill. However, the difference is insignificant because the P value is 0.104 > 0.05. 1) Jogging training with a treadmill affects endurance in Physical Education students aged 18-19 years at Universitas Megarezky Makassar, 2) Jogging in the field affects endurance in Physical Education students aged 18-19 years at Universitas Megarezky Makassar, 3) There is a difference in the effect of jogging with a treadmill and jogging in the field on endurance abilities in Physical Education students aged 18-19 years at Universitas Megarezky Makassar; this can be seen from the difference in average endurance between the two groups, where the jogging group in the field is higher than those using a treadmill. However, the difference is insignificant.

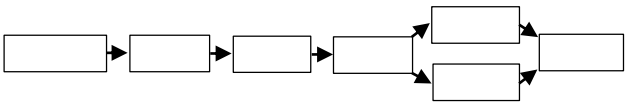
1. INTRODUCTION

Endurance is an important physical component in physical activity and fitness (1) In performance sports, endurance is the ability to resist fatigue due to prolonged muscle workload and recover quickly. Individuals with high endurance can perform activities longer and delay fatigue. Endurance plays a major role in improving performance in sports that emphasize endurance and determines general training readiness. Each type of endurance has a unique role, both in endurance sports (such as long-distance running) and team sports (such as soccer and basketball) (2). In general endurance is divided into 2, namely muscular endurance and cardiovascular endurance (cardiovascular endurance). This study will focus on improving cardiovascular endurance. Cardiovascular endurance, often called aerobic endurance, is the whole body's ability to sustain prolonged exercise involving relatively large muscle groups (3).

The generally accepted parameters for assessing cardiovascular endurance are: 1) Maximal oxygen uptake (VO2 max), 2) Lactate threshold (aerobic), 3) Maximal lactate steady state (anaerobic

threshold), and 4) Exercise economy. Maximal oxygen uptake (VO2max) is the maximum ability of a person's body to transport and use oxygen during exercise or physical activity. VO2max refers to the ability of the heart, lungs, and blood vessels to function optimally, both under resting conditions and during exercise, to absorb oxygen and distribute it to active tissues in the body for metabolic processes (4).

Individual endurance in students and athletes is important for improving their abilities. This improvement in endurance can be achieved through structured training, including by maintaining competitive ability through participation in competitions (5), preventing detraining due to low training loads, and avoiding overtraining syndrome and the risk of injury caused by high training loads (6).



Initial observations of Physical Education students at FKIP Universitas Megarezky Makassar revealed that many consider aerobic exercises, like jogging, to be easy, with some already incorporating it into their routines. However, initial test results showed that, in moderate VO2max conditions, improving VO2max requires careful supervision and tailored training. To enhance VO2 max, the training load must slightly exceed the threshold for stimulation, as too heavy a load can hinder adaptation. At the same time, more than too light a load may be needed to improve physical fitness effectively (7).

To increase VO2 max endurance, training needs to be done carefully, systematically, regularly, and gradually, following the principles and methods of proper training to achieve the expected goals. One effective alternative exercise to increase VO2 max is jogging, using a treadmill or running in the field.

MATERIALS AND METHODS

This research is a type of comparative experimental research, namely research model by giving 2 different treatments to the same object. Before a series of exercises are given, the research group is divided into 2, namely the group with jogging exercises in the field and the group with jogging using a treadmill based on the results of the pretest (with the 15-minute Balke Test), then see the effect of the treatment (exercise) given on endurance (VO2Max) in subject. The population in this study were 2nd semester students of Physical Education FKIP Universitas Megarezky Makassar. The sampling in this study used purposive sampling technique, namely sampling techniques with certain considerations (8). The sample obtained was 20 people and the characteristics of the sample are as follows:

a) Male Aged 18-19 years
b) 2nd-semester student of Physical Education FKIP Universitas Megarezky Makassar
c) Students who regularly do jogging exercises at least 3 times a week

Research design provides the path and direction of the research process. In this study, using the *Two Pretest-Posttest Group Design* is in line with (9) opinion, which states "The experimental research design among them is the Two Group Pretest-Posttest Design." The design can be described as follows:

Source: **(**Sugiyono, 2017)

MSOP : Matched Subject Ordinal Pairing

Pretest : Initial test

Group A : Jogging Exercise Group with Treadmill

Group B : Jogging Exercise Group in the Field

Posttest : Final test

RESULTS

Table 1 shows a summary of the results of descriptive analysis of data on the effect of jogging training in the field and jogging training with a treadmill on Physical Education students aged 18-19 years at Universitas Megarezky Makassar, the number of samples of each group is 10 students, with the following results:

Table 1: Descriptive statistic

	Min	**Max**	**Mean**	**Std. Deviation**
Group A (pre-test)	36.99	53.22	44.44	4.361
Group A (post-test)	45.42	59.96	52.25	5.671
Group B (pre-test)	38.61	54.27	45.27	4.560
Group B (post-test)	50.88	63.23	56.13	4.371
N	10			

Research data must meet specific requirements before conducting statistical analysis for hypothesis testing. A requirements test ensures that the data suits the intended analysis techniques. This typically includes normality testing (e.g., the *Shapiro-Wilk* test) and homogeneity testing to assess whether the data meets the necessary assumptions for valid statistical analysis.

Table 2 shows a summary of the normality test results with Shapiro Wilk from the training data of jogging exercises in the field and jogging exercises with treadmills for 18-19-year-old Physical Education students at Universitas Megarezky Makassar. The results are P > 0.05, so the data follows a normal distribution.

Table 2: Normality test results from the training data of jogging exercises in the field and jogging exercises with treadmills for 18-19-year-old Physical Education students at Universitas Megarezky Makassar

	Shapiro-Wilk		
	Stat.	**df**	**Sig.**
Group A (Pretest)	.964	10	**0.828**
Group A (Posttest)	.879	10	**0.128**
Group B (Pretest)	.910	10	**0.279**
Group B (Posttest)	.934	10	**0.485**

After knowing that the data is normally distributed, it is necessary to conduct a homogeneity test to determine the similarity of the variances of the two groups. The results of the homogeneity test are shown in Table 3.

Table 3: Homogeneity test results from the training data of jogging exercises in the field and jogging exercises with treadmills for 18-19-year-old Physical Education students at Universitas Megarezky Makassar

	Levene Statistic	**df1**	**df2**	**Sig**
Based on Mean	1.867	1	18	0.189

Based on Table 3 above, the Levene statistic value is 1.867, and the significance value is 0.189 (P>0.05); it can be said that the data is homogeneous. After conducting the prerequisite analysis test, the hypothesis test is carried out to prove the research hypothesis through empirical data obtained through tests and measurements of the variables studied. This analysis uses SPSS statistical analysis with the *Paired Sample T-Test* (Table 4) and *One-Way ANOVA* tests (Table 5).

Table 4: Results of Paired Sample T-Test data on the effect of jogging training in the field and jogging training on a treadmill physical education students aged 18-19 years Universitas Megarezky Makassar

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Pretest Jogging exercises with treadmills - Posttest Jogging exercises with treadmills	**-7.80800**	4.30481	1.36130	-10.88747	-4.72853	-5.736	9	**0.000**
Pair 2	Pretest Jogging exercises in the field - Posttest Jogging exercises in the field	**-10.85500**	3.62184	1.14533	-13.44591	-8.26409	-9.478	9	**0.000**

The average value of the pre-test of the Group A was 44.44, while the post-test was 52.25. Therefore, the difference between the two was 7.80 (according to Table 4 above). The table also shows a P value of 0.000 < 0.05 and a t-count value = 5.736 > t-table = 1.883. Thus, jogging training with a treadmill affects endurance ability in Physical Education students aged 18-19 years Universitas Megarezky Makassar. Meanwhile, the average value of the pre-test of the Group B was 45.27, while the post-test was 56.13. Therefore, the difference between the two was 10.85 (according to Table 4 above). The table also shows a P value of 0.000 < 0.05 and a t-count value = 9.478 > t-table = 1.883. Thus, jogging training in the field affects endurance abilities in Physical Education students aged 18-19 years at Universitas Megarezky Makassar.

Table 5: Results of *One-Way Anova* data on the effect of jogging training in the field and jogging training on a treadmill Physical Education Students aged 18-19 years Universitas Megarezky Makassar

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	75.156	1	75.156	**2.931**	**0.104**
Within Groups	461.500	18	25.639		
Total	536.655	19			

Based on the previous table (table 4), the difference between the jogging group with a treadmill and the jogging group in the field amounted to an average of 3.05, where the jogging exercise group in the field was higher than the jogging group with a treadmill. However, the difference is insignificant because the value of f count = 2.931 < from f-table = 4.41 and P value 0.104 > 0.05.

DISCUSSION

Endurance is essential not only for athletes but also for students and society. Jogging on a field or treadmill is a common way to improve endurance. This study compares the effects of field and treadmill jogging, finding that field jogging led to higher endurance levels. The result of this study is supported by previous research; the study also showed that fartlek training on the field increased cardiorespiratory endurance more effectively than fartlek training on a treadmill (10).

CONCLUSION

The conclusions of this study are as follows:

- Jogging training with a treadmill affects endurance in Physical Education students aged 18-19 years at Universitas Megarezky Makassar.
- Jogging in the field affects endurance in Physical Education students aged 18-19 years at Universitas Megarezky Makassar.
- There is a difference in the effect of jogging with a treadmill and jogging in the field on endurance abilities in 18-19-year-old Physical Education students at Universitas Megarezky Makassar, where the jogging group in the field is higher than the jogging group using a treadmill. However, the difference is insignificant.

APPLICABLE REMARKS

Since jogging training with running in the field shows better results than jogging training with a treadmill, from the above opinion, it can be concluded that the outcome of endurance (VO2 Max), which shows promising results is influenced by not only the level of fitness but also the ability to adapt training and adaptation to the environment of the student.

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