

# Effect of Interval Exercise on Cardiovascular Endurance in Students

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**Abstract**—This study aims to find out the effect of interval training to the cardiovascular endurance in UNM FIK student. The population is students of FIK UNM year 2015. From the population, 30 samples were selected using random sampling. Data analysis techniques used in this research are data analysis, normal distribution test and paired T-test using SPSS 21 program. Based on the results of the descriptive analysis on VO<sub>2</sub>Max value of sample shows that for the pre-test the mean value is 29.61, while for the post-test mean value is 42.36. The results of the normal distribution data test show that for the pre-test data  $p = 0.38$  and for the post-test  $p = 0.20$ . With both  $p > 0.05$ , all data variables can be considered normally distributed. The results of the paired T-test shows the value of  $p = 0,000$  ( $P < 0.005$ ) indicating that there was a significant effect of interval training on cardiovascular endurance UNM FIK students.

**Keywords**—interval training, cardiovascular endurance, UNM FIK students

## I. INTRODUCTION

The component of physical fitness, biomotoric components described as a component of physical condition, is the basic ability of physical motion or activity of the human body. Physical condition is a very pivotal prerequisite in an effort to improve the performance of an athlete; it can even be said as a basic necessity that cannot be substituted. One important component that determines a person's success for achievement is physical fitness. Without good physical fitness, athletes and non-athletes will not be able to obtain achievements despite having good techniques and tactics. The fact shows that good physical fitness is related to the endurance of individuals [1].

Individual's physical fitness is influenced by maximum aerobic capacity (VO<sub>2</sub>Max). According to some sports experts, VO<sub>2</sub>Max is a body system that carries oxygen in the blood which pumped from the lungs to muscle tissue. Someone who often practices or exercises is likely to have good stamina which indicated by having a higher VO<sub>2</sub>Max value. One exercise that can be applied to increase VO<sub>2</sub>Max value is interval training [2].

Interval training can increase the value of VO<sub>2</sub>Max. However, this VO<sub>2</sub>Max value is not fixed on a certain value, but changes according to the level and intensity of physical activity. For example, long bed-rest will reduce VO<sub>2</sub>Max value between 15% - 25%, while doing intense physical activity regularly will increase VO<sub>2</sub>Max with almost the same value [3].

Based on the statement above there is a need to conduct research related to interval training with the purpose to increase "cardiovascular" endurance so that an individual can reach optimal physical conditions when exercising or conducting sports, whether before, or during the match. Therefore, the writer proposed research theme concerning the case above, namely "The Effect of Interval Exercises on Cardiovascular Endurance in UNM FIK Students."

## II. RESEARCH METHOD

### A. Research Variable

The research variable is basically everything in that is applied by researchers to be studied, so that information about it is obtained, then conclusions are drawn [4]. Suen & Ary [5] state that variables can be grouped according to various ways, for example, free variables and bound variables; active variables and attribute variables; and continuous variables and categorical variables.

The variables in this study are divided into two variables, which are the independent variable and the dependent variable. The two variables will be identified in this study as follows: 1) independent variables are: interval training and 2) dependent variables are cardiovascular endurance.

### B. Research Design

Research design according to McMillan & Schumacher [6] is a plan and structure of inquiry that is used to obtain empirical evidence in order to answer the research questions. In experimental research, research design is called experimental design. Experimental design is designed with a certain method to increase internal and external validity.

The research method used in this study is the pre-experimental method design with one group pre-test research design. The research design is a design of how research is carried out. The research design used in this study was one group pre-test post-test design. In this design, before the treatment is applied, the sample is given a pre-test (initial test), and at the end of the interval training, the sample is given a post-test [7].

### C. Population and Samples

The population is a generalization area consisting of objects/subjects that have certain qualities and characteristics set by researchers to be studied and the conclusions drawn based on those qualities and

characteristics [4]. The population used in this study were all students of the Faculty of Sports Sciences in UNM. In this study, the sample was selected using a purposive sampling technique, which consists of 30 FIK UNM students.

**D. Data Analysis**

Data analysis is a very important part of the research, because with the analysis of data, the hypothesis that is already established before can be tested for its validity in order to reach further conclusions. The analysis is using descriptive analysis and statistical analysis.

**III. RESULT AND DISCUSSION**

**A. Descriptive Analysis**

Descriptive data analysis is intended to get a general overview of the research data. Descriptive analysis was carried out for data on the effect of interval training on cardiovascular endurance in UNM FIK students. This data was taken before and after treatment, making it easier to interpret the results of the data analysis.

**TABLE I. DESCRIPTIVE ANALYSIS STATISTICS ON THE EFFECT OF INTERVAL TRAINING ON CARDIOVASCULAR ENDURANCE IN UNM FIK STUDENTS**

	<b>Pre-test</b>	<b>Post-test</b>
N	30	30
Mean	29.61	42.36
Std. Deviation	6.26	5.92
Variance	39.29	35.06
Range	17.75	20.93
Minimum	21.45	32.17
Maximum	39.20	53.10
Sum	888.57	1270.86

From the table above can be obtained an overview of the initial data in the study as follows:

- 1) Pre-test data group: mean value 29.61, standard deviation 6.26, variance 39.29, range 17.75, minimum value 21.45, maximum value 39.20, sum 888.57
- 2) Post-test data group: mean value 42.36, standard deviation 5.92, variance 35.06, range 20.93, minimum value 32.17, maximum value 53.10, sum 1270.86

**B. Data Normal Distribution Test**

One of the assumptions that must be fulfilled so that parametric statistics can be used in further steps is that the data collected follows a normal distribution to determine whether the group of collected data fulfills this statistic analysis parameter, then the normal data distribution is carried out.

In this research, to determine whether the group of pre-test data and post-test data of experiment concerning the effect of interval training on cardiovascular endurance on UNM FIK students were normally distributed, a normal distribution test using Kolmogorov Smirnov Z test was used. The results of the normality test data can be seen in table 2.

Based on table 2, it can be obtained an illustration that the normality testing of data is as follows:

- 1) Measurement data for pre-test group, with  $asympt = 0.38$  ( $p > 0.05$ )
- 2) Measurement data for post-test group, with  $asympt = 0.20$  ( $p > 0.05$ )

From the results of the table above it can be concluded that all data follows a normal distribution.

**TABLE II. SUMMARY OF NORMAL DISTRIBUTION DATA TEST ON THE EFFECT OF INTERVAL TRAINING ON CARDIOVASCULAR ENDURANCE IN UNM FIK STUDENTS**

	<b>Pre_test</b>	<b>Post_test</b>
N	30	30
Absolute	0.14	0.10
Positive	0.07	0.10
Negative	-0.14	-0.96
Kolmogorov-Smirnov Z	0.14	0.10
Asymp. Sig. (2-tailed)	0.38	0.20

**C. Data analysis**

**TABLE III. THE EFFECT OF INTERVAL TRAINING TO THE CARDIOVASCULAR ENDURANCE ON UNM FIK STUDENTS**

<b>Variable</b>	<b>Difference</b>	<b>(p) Sig.(2 tailed)</b>	<b>Exp.</b>
Pre_tes – Post_test	12.75	0.00	Significant

From the results of paired T-test on the table above, the difference between pre and post interval training (pre-post-test) is 12.75 with a value of  $p = 0.00$ . which is lower than 0.05 ( $p < 0.05$ ). From this result, we can conclude that there is a significant difference between the pre-test and post-test. We can further elaborate that there is a significant effect of interval training to cardiovascular endurance.

Generally, exercise can be divided into two kinds: aerobic exercise and anaerobic exercise. Aerobic exercise is an exercise that demands oxygen without causing unpaid oxygen debt. Aerobics means using oxygen. According to Dinata [8], put two basic principles of aerobic exercise: (1) If the exercise program is limited to training for 12 to 20 minutes per day, then the exercise must be heavy enough to increase the heart rate frequency to 150 times per minute or more. (2 ) If the exercise is not heavy enough to produce a heart rate of 150 times per minute, the exercise must be continued for more than 20 minutes.

Exercise that continues for more than four minutes and is carried out with low intensity including can be included in aerobic exercise groups. So aerobic exercise is not only in the form of aerobic calisthenics but there many other types of sports that can be considered as aerobic exercises, such as basketball. Aerobic exercise is also often referred to as general endurance. Endurance is the limit of an individual's ability when performing exercises (activities) and if fatigue has shown, then that is the limit of an individual's ability to work.

Endurance is the body's ability to prolong activities including removing and increasing lactic acid. So endurance is the ability of a person to continuously perform an activity for a long time which involves efficient interactions from muscles, blood, heart, and lungs. When doing long-term exercise, endurance is required. Endurance training results have a tendency to decrease the heart rate per minute from

around 200 to around 185-190. This does not mean a decrease in heart capacity per minute, but rather an increase in the work efficiency of the heart so that trained sportsmen are able to complete heavy work with lower heart rate, in other words, the physical power is quite increased [9].

From the results of the discussion above, the value of  $p = 0.00$  is obtained. a  $p$ -value  $<0.05$ , it can be said that there is a significant difference between the two groups of data, with a difference of 12.75. this data shows that there is an effect of interval training in increasing  $VO_{2max}$ .

#### IV. CONCLUSION

Based on the results of the data and discussion of this study, it can be concluded that there is a significant effect of interval training to the cardiovascular endurance in UNM FIK students.

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