



Effect of Bio Energy Power Exercise on VO₂max and Heart Rate

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ABSTRACT

The purpose of this study was to determine the effect of bio energy power exercise on vo₂max and heart rate, this study used a quantitative approach, the type of quasi-experimental research, the subjects are taken in this study were male students who took futsal extracurricular activities aged 10-12 years, to find out Vo₂max using the 1600 meter run test and to determine the heart rate score using the Harvard test, data analysis is in the form of descriptive analysis and simple regression. The results showed that the use of bio energy power training did not provide a significant change in VO₂max and did not provide a significant increase in the heart rate score with the length of the study for 5 meetings, but there was an increase in the VO₂max value in the first week to the last week which means that the increase was not significant, and there was a gradual increase in the heart rate score starting from exercise in the first week to the last week, which means an increase although not significant.

Keywords: Bio Energy; Power; Vo₂max; Heart Rate.

INTRODUCTION

Futsal is one of the branches. a group sport that is popular in all circles, almost all people like futsal, modern futsal games require players to move and control the ball so that they can create greater goal opportunities (Irawan & Fitranto, 2020). Modern futsal games are carried out with a fast tempo, it makes players keep moving so they need good physical endurance, so aerobic endurance is one of the components of physical conditions that must be possessed by every player in futsal games, aerobic endurance is the quality of the body's ability to doing aerobic work, which involves the need for oxygen (O₂) continuously

without having significant fatigue (Budiwanto, 2012), aerobic endurance is the athlete's ability to cope with the training load in a period of more than 3 minutes continuously, Anaerobic endurance is the athlete's ability in 10-120 seconds while a lactic anaerobic endurance is the athlete's ability to overcome the training load with maximum intensity with a duration of less than 10 seconds. The volume of oxygen that enters the body is a good indicator to determine the capacity of the lungs and heart (Nabi, Rafiq, & Qayoom, 2015) VO₂max is the maximum amount of oxygen that can be consumed during physical activity or as an indicator of a person's aerobic capacity which includes the ability of the heart and lungs and the amount of energy produced (Sözen & Akyildiz, 2018).

There are various kinds of exercises to increase VO₂ max, including small-sided games, fartlek, circuit training, and high-intensity interval training. Many studies have been carried out to increase VO₂max using small side game, fartlek, circuit training, and high-intensity interval training (Apriliyanto, 2019; Budi, 2015; Festiawan, Suharjana, Priyambada, & Febrianta, 2020), but research to increase endurance with using Bio Energy Power (BEP) has never been done. BEP is a combination of breathing and movement exercises specifically designed based on a medical theory to generate/optimizing the body's ability to treat oneself both physically and psychologically which the medical world calls Autotherapy (Milkajoah, 2020). The working mechanism of BEP is to optimize the performance of cells and organs, increase the flexibility of blood vessels, increase white blood cells, improve the quality of oxygen-rich blood, increase metabolism and endurance (Hardjono, 2020) so BEP is a breathing exercise and exercise to optimize performance. organs to increase endurance, research on breathing exercises using Harness exercises with a hypoxic pattern has a significant increasing impact on the dynamic functions of aerobic, lactic anaerobic and a lactate anaerobic (Hermanu, Sidik, & Komarudin, 2009), while research conducted by (Santoso, Mardianto, & Supriyadi, 2016) that basic motion exercises and breathing exercises for Pencak silat Putih dove can significantly improve physical fitness.

METHOD

This study uses a quantitative approach, namely data using numbers or numerics that are analyzed by statistical processes and presented in the form of tables, graphs, or charts (Arikunto, 2014; Winarno, 2013). The data used uses a ratio scale, namely, the data has an absolute value of zero and the interval between numbers shows the same distance

(Winarno, 2013). The analysis used is descriptive quantitative that is, the type of analysis that describes the characteristics of the subject and presents the data and analyzes the data in the form of numbers to provide an orderly, concise and clear picture (Winarno, 2013). This study uses a quantitative approach by using descriptive analysis and using ratio data, this type of research is quasi-experimental research. The subjects taken in this study were male students who took part in futsal extracurricular activities aged 10-12 years at SD Negeri I Pehserut, Sukomoro District consisting of 12 male students. The instruments used in collecting data in this study include VO2max measured using a 1600 meter running test and heart rate scores measured using the Harvard test (Fenanlampir & Faruq, 2015), Data analysis using regression tests to see and predict the increase in VO2max values and heart rate scores, a simple regression test is carried out if the researcher wants to know the relationship between the independent variable and one dependent variable and can be used to predict the increase in the dependent variable if the independent variable is known (Ananda & Fadhli, 2018).

RESULTS AND DISCUSSION

The results of the descriptive analysis used to describe the observed objects by looking at the statistical results can be seen below:

Table 1.
Descriptive Data VO2max

	Initial conditions	Exercise weeks to ...				
		1	2	3	4	5
Minimum	15.42	15.88	16.68	17.61	18.33	19.13
Maximum	20.58	21.12	22.79	23.81	25.51	26.70
Amount	211.05	219.9	227.38	238.3	253.76	265
Average	17.58	18.33	18.95	19.86	21.45	22.08

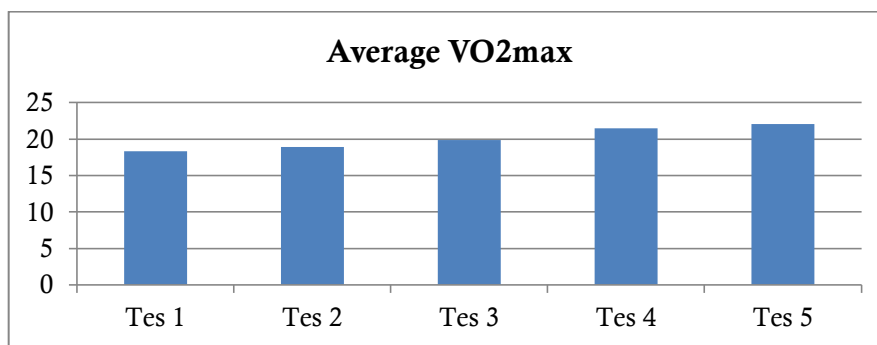


Figure 2.
 Average VO2max

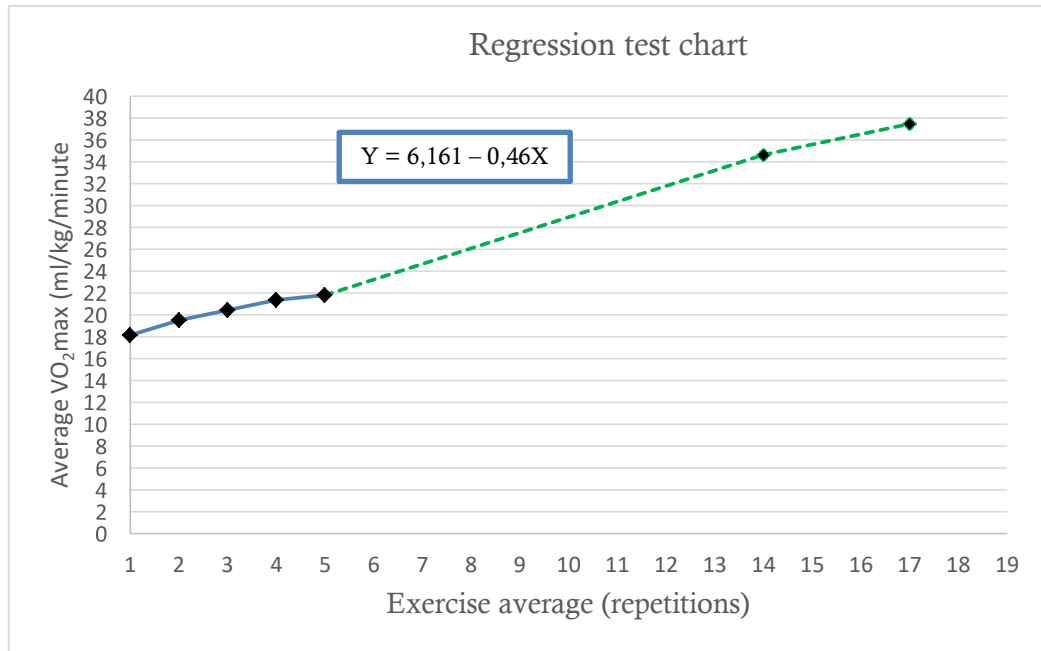


Figure 2.
Regression test chart

Table 2.
Descriptive data score heart rate

	Initial conditions	Exercise weeks to ...				
		1	2	3	4	5
Minimum	36.59	37	39.27	43	44.25	46
Maximum	42.37	46	47.47	50	50.51	51
Amount	467.57	495	511.49	541	551.83	570
Average	39.64	41.25	42.62	45.08	45.98	47.5

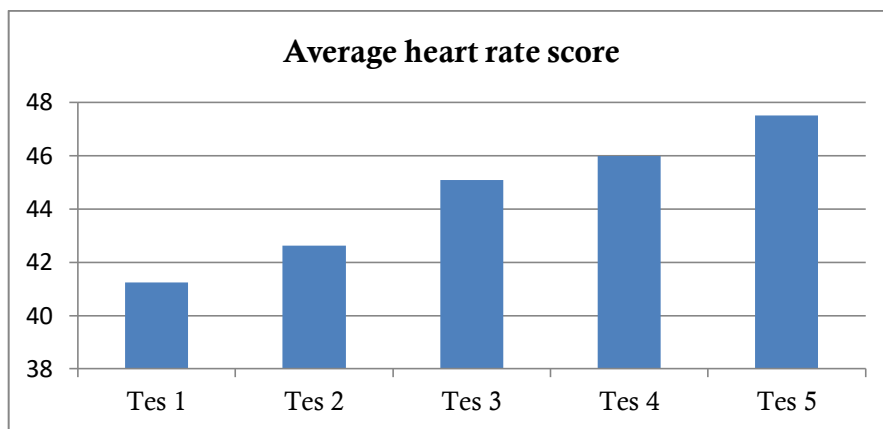


Figure 3.
Average Heart Rate Score

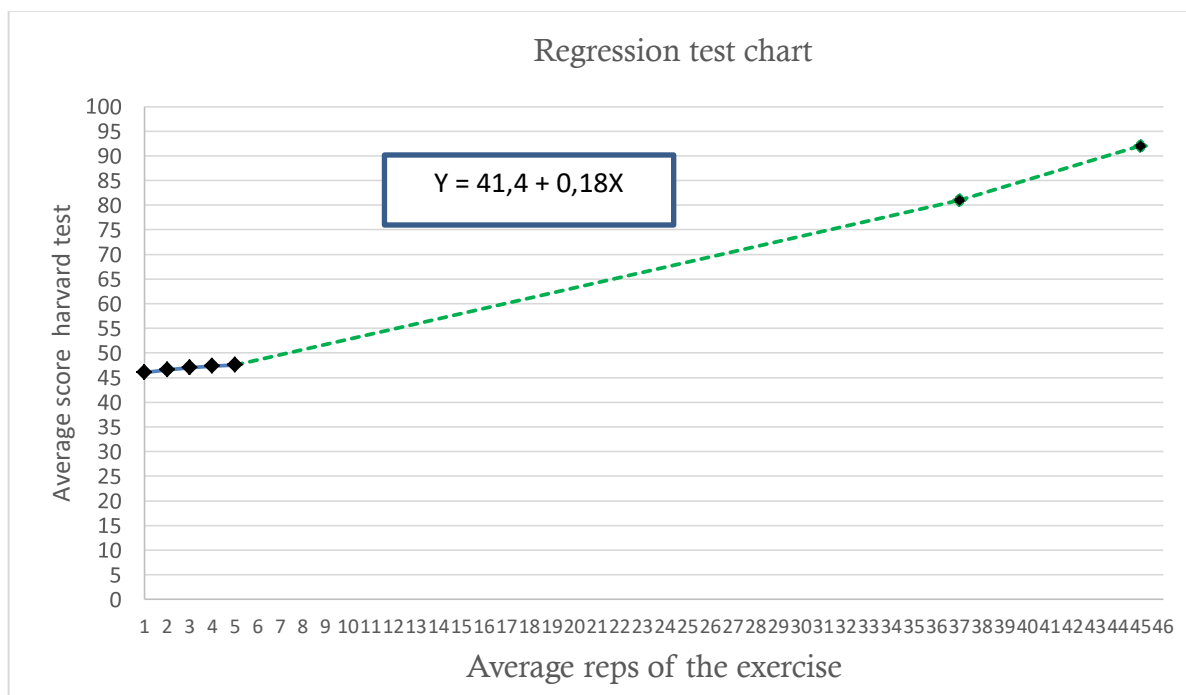


Figure 4.
Regression Test Graph

Based on table 1 and figure 1 the results of VO₂max are still in the category of less than once during 5 weeks of exercise. This can be seen in the initial conditions before the exercise the average VO₂max category was less than once after being given treatment and tested every week the average VO₂max obtained was still in the less category. However, Figure 1 also shows a tendency to increase the VO₂max score. An increase in the VO₂max score shows a positive thing that the longer the exercise will increase the VO₂max score in the body. Based on the regression test in Figure 2 that there is a gradual decrease in travel time starting from training in the first week to the last week. From the results of this study, the researchers assumed that to achieve the VO₂max category at a good level, the subject had to do 62 repetitions of BEP exercise for 14 weeks while to reach the VO₂max category at a very good level it took 17 weeks with 68 repetitions. Based on table 2 and Figure 3, the results of BEP training on heart rate scores are still in the bad category with 5 weeks of exercise. This can be seen in the initial conditions before training, the Harvard test category shows a heart rate score in poor condition, after being treated and tested every week the average heart rate score obtained by the Harvard test is still in the bad category. However, Figure 3 also shows a tendency to increase the Harvard test score which has an impact on increasing the heart rate score. The increase in

the Harvard test score shows a positive thing that the longer the exercise will increase the heart rate score. Based on the regression test above, there is a gradual increase in heart rate scores starting from exercise in the first week to the last week. Seeing this, the researcher assumed that to achieve a heart rate score in the good category, the average subject had to do 220 repetitions in 37 weeks, while to reach the very good category, 281 repetitions were needed in 45 weeks.

Aerobic exercise that is done regularly causes changes in the heart, increases muscle glycogen reserves, increases the concentration of oxidative enzymes in athletes, changes in the lungs, changes in muscle, changes in bone and changes in acclimatization to heat (Anggriawan, 2015). The heart will get bigger and stronger so that it has a large capacity and beats strongly, both these things will increase the efficiency of the heart with high work efficiency, so the heart does not need to beat too often (Anggriawan, 2015) increasing heart performance will increase metabolism and consume more oxygen (Anggriawan, 2015). Ghurri et al.), in this study researchers used subjects aged over 10 years because at the age of 10 years there was a higher increase in oxygen volume, starting to decrease slowly after 25 years of age (Laksana, Ugelta, & Jajat, 2019), Factors that influence an increase in VO₂max, namely the heart, lungs, blood vessels, oxygen circulation in the body, metabolism and mitochondria. All of the above organs are interconnected as support for metabolic processes in mitochondrial cells to produce ATP. Further research using a transmission electron microscope to measure mitochondria, the result is that aerobic exercise can increase mitochondria (Henstridge, 2014). research on breathing exercise using harness training with a hypoxic pattern has a significantly increasing impact on the dynamic function of aerobic, lactic anaerobic and a lactic anaerobic (Hermanu et al., 2009), based on the explanation and several studies above add to the strengthening of the researcher's assumption that to increase VO₂max for 17 weeks with 68 repetitions, as well as an increase in heart rate scores using BEP with 220 repetitions in 37 weeks while to reach the very good category it takes 281 repetitions in 45 weeks.

CONCLUSIONS AND SUGGESTIONS

This study concluded that the use of BEP exercise did not provide a significant change in VO₂max and did not significantly increase the heart rate score with the length of the study for 5 meetings, this can be seen from the results of the VO₂max test and the

heart rate score in the poor category during the test. from the beginning to the test as much as 5 times, but there was an increase in VO2max in the first week to the last week which meant an increase although it was not significant, and there was a gradual increase in heart rate score starting from exercise in the first week to the last week which meant an increase although not significant.

For further research, namely testing the BEP exercise with training for 17 weeks with 68 repetitions, as well as for increasing the heart rate score using BEP with 220 repetitions in 37 weeks while to achieve the very good category it takes 281 repetitions in 45 weeks.

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