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COMPARISON OF 800 METER AND 400 METER RUN EFFECTS ON THE INCREASE OF LACTIC ACID IN ATHLETIC ATHLETE

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Abstrak This study aimed to obtain information about the differences in the increase in lactic acid from the 800 meter and 400-meter running results. Lactic acid is the result of the rest of the energy-burning metabolism of anaerobic lactated. This condition occurs in the metabolism of the breakdown of carbohydrates into lactic acid is not perfect, which is one indicator of the onset of fatigue in the muscles. The method used is two group pre-test and post-test design method. With purposive sampling technique, samples using 20 people from the population amount to 85 people from athletic KOP members of Jakarta State University. The data analysis technique used is an at-independent test. The data analysis technique used is a statistical technique with t-test significant t-significant = 0,05 data analysis technique used is t-test analysis to compare with t-table significant level 5%. Between two meanings (SEmxmy) = 0,78 this becomes t arithmetic result = 3,564. Then the result of the calculation is tested with table on degrees of freedom (dk) = (n1 + n2) - 2 = (10 + 10) - 2 and trust level 0,05 t count 2,101 (t-arithmetic = 3,564 > t-table = 2,101). Run 800 meters greatly influence the increase of lactic acid than the run 400 meters group.

Key Words: Run 800 meters, Run 400 Meters, Lactic Acid, Athletic.

INTRODUCTION

Local muscular fatigue following physical exercise is caused by lactic acid production in the muscles and blood. This condition is related to the energy resynthesis mechanism (ATP) during the muscle contraction process in the FT (fast-twitch) muscle fibers, which play a more significant role in physical activity or high-intensity sports. As we know that FT muscle fibers experience fatigue faster than ST (slow-twitch) fibers because FT muscle fibers have a high anaerobic system ability with a low aerobic system. So that the rapid formation of muscle lactic acid occurs more quickly (S. Bakhri, 2015). Lactic acid is the result of the rest of the energy-burning metabolism of anaerobic lactated. This condition occurs in the metabolism of the breakdown of carbohydrates into lactic acid is not perfect, which is one indicator of the onset of fatigue in the muscles. Lactate is an intermediate product of glucose metabolism. Lactate is anaerobic metabolic waste, and this process takes place in the absence of oxygen. The level of lactic acid in a healthy person at rest is around 1-2 mM/L (Guntara et al., 2014). A heavy workload causes high lactic acid. This is due to the inability of the aerobic energy supply system so that energy supply from anaerobic energy sources dominates (Kekuatan, n.d.). The lactic acid in the blood in the athlete's body will increase when training or competing because most of the energy needs are obtained through anaerobic glycolysis. Anaerobic glycolysis occurs in two ways, namely: anaerobically lactate (phosphagen system), which does not produce lactic acid, and anaerobic glycolysis of lactate (lactic acid system), which has lactic acid in the body (Purnomo & Artikel, 2013). The limit of tolerance for high concentrations of lactic acid in muscles and blood during physical exercise is not known with certainty. However, tolerance for lactic acid levels in humans is estimated to be above 20 mM/l blood and 25 mM /l kg wet muscle weight, and can even reach above 30 mM / l in dynamic high-intensity training (Penelitian, 2011)

In people who regularly exercise or athletes, there is an increase in using lactic acid to exercise for a more extended period. Instead of tiring out, lactic acid slows down the onset of fatigue and increases your ability to exercise (Setiawan et al., 2018). Energy during athletic running through two routes, namely aerobics and anaerobic. The use of this energy system is very dependent on intensity practice. At high-intensity physical exercise, the muscles contract in a state anaerobic so that the provision of ATP occurs through the anaerobic glycolysis process. This results in increased levels of lactic acid in the blood and muscles. According to the book (Bompa & Buzzichelli, 2019), the 800-meter run is a medium distance run using the lactic anaerobic energy system. The energy use is 10% ATP-PC, 60% glycolysis, and 30% contribution from the aerobic energy system. At the same time, the 400-meter run is a medium distance run using the lactic anaerobic energy system, where the energy use is 40% ATP-PC, 55% glycolysis, and 5% contribution from the aerobic energy system. With the increase in training load, lactic acid levels in the blood and muscles will also increase. High-intensity exercise (exercise using an anaerobic energy system) will increase the accumulation of lactic acid levels. At a maximum of 30 - 120 seconds of exercise, lactate levels can reach 15-25 mM, measured after 3-8 minutes of exercise.

Some cases in the field were a lack of understanding by trainers about

lactic acid, how lactic acid can arise, the effects of lactic acid buildup, and how long it takes for lactic acid to decrease to enter the next high-intensity exercise program. This causes athletes often to ignore the pattern of their life as an athlete. The slow removal of lactate causes an overtraining syndrome in athletes, resulting in an increased incidence of injuries that can lead to temporary and permanent injuries. Meanwhile, the injuries that runners may experience are ankle and hamstring injuries. Sport Resource Group Inc (1998) states that blood lactate levels after training or matches are influenced by the subject's ability, differences in distribution, adaptation to muscle types, technique or content of the movement, and type test used (Widiyanto et al., 2014). In the recovery, the muscle will secrete lactate into blood circulation, be carried to the tissues or an underactive muscle. Partly muscle lactate is cleared through circulation, and others are converted back into pyruvate with the help of enzymes pyruvate dehydrogenase. The pyruvate portion will be oxidized to carbon dioxide and water, while others are changed to alanine.

The recovery of individual reactions to training is variable, as is identifying training load. Recovery is one of the most important things for athletes because, If you have done strenuous exercise, lactic acid levels can arise, which can cause muscle fatigue. It is through recovery that lactic acid levels can be eliminated. Therefore, the program must be adapted to the differences of each athlete to a minor extent. Many ways are commonly done to lower blood lactic acid levels after a match or training, including sports massage, jogging, ice bath, etc. The course of decreasing blood and muscle lactic acid levels. More or less needed 60 minutes of recovery to get rid of the lactic acid pile. Running subjects on the treadmill also takes a lot of time, more or less the same for lowering lactic acid levels. Generally needed took 25 minutes to get rid of half of the lactic acid buildup after maximal exercise. This means that removing 95% of the lactic acid buildup takes approximately 60 minutes after maximum exercise (Penelitian, 2011).

From the description above, the author aims to provide information to readers, especially for athlete coaches, to know the difference in the increase in lactic acid between running 400 meters and running 800 meters. What is the value of normal lactate levels before high-intensity exercise? Provides basic information on the effects of lactic acid peaks during training or competition and what remedies can effectively reduce lactic acid. With this research, the authors hope this research can be further developed and looking forward to new problems and the best results. Hopefully, this research can be a reference for other sports.

METHODS

This research method uses an experimental method with a research design using two groups, pre-test, and post-test design. Namely to determine the independent and dependent variables, while the independent variables are running 800 meters and running 400 meters, while the dependent variable increases lactic acid.

Participants

The place of this research was carried out at the Velodrome Athletic Stadium Rawamangun. A population is a group of organisms with the same characteristics (Gunawan I, 2016). The sample is a part or representative of the

population under study. The sampling technique in this research uses the purposive sampling technique, the technique used if researchers have specific considerations within sampling or determination of samples for a particular purpose. In this study, 85 active students who are members of the athlete KOP Athletics state Jakarta university will be the population. In this study, a sample of 20 people, ten male athlete participants ran the 400 meters, and ten male athlete participants ran the 800 meters. The subject of This study is an active member of the Athletic Achievement Sports Club Jakarta State University, which meets the following criteria:

1. An active member of the Jakarta State University athletics
2. Male gender.
3. I have been practicing for at least two years.
4. Healthy for exercise.
5. Lactic acid levels at rest / before the test 3 mMol / L.

Instrument

The instrument used for data collection in this study was to measure the variables contained in this study. The tool needed for acquired lactate was a lactic acid measuring instrument: Accu trend lactate, lactic acid strip, lancet, alcohol swap, whistle, stopwatch, and stationer.

Data collection technique

Check lactic acid before running. Participants warmed up, ten participating athletes were given the 400-meter running treatment, and ten participating athletes were given the 800-meter running treatment. After arriving at the finish line, participants are invited to sit down and finally take the blood back to check lactic acid results after running.

Statistical analysis

The data analysis technique used is a statistical technique with t-test significant t-significant = 0,05 data analysis technique used is t-test analysis to compare with t-table considerable level 5%. Interpreting t_0 with the procedure: Formulating an alternative hypothesis (H0), "there is (there is) a significant difference in the mean between Variable X and Variable Y.

RESULTS

1. Test Results Data Effect of Running 800 Meters on the Increase of Lactic Acid.

Initial test data for lactic acid levels in the 800-meter running group obtained the lowest value of 2.0 mmol/L and the highest value of 2.9 mmol/L with an average (X1) of 2.52 mmol/L, standard deviation (SX1) 0,34, and standard error means (SEmx1) 0.11. The final test data for lactic acid levels in the 400-meter running group obtained the lowest value of 15.9 mmol/L and the highest value of 20.2 mmol /L with an average (X1) of 17.51 mmol/L, the standard deviation (SX1) 1, 55, and the standard error of the mean (SEmx1) is 0.52.

2. Test Results Data Effect of Running 400 Meters on the Increase of Lactic Acid.

Initial test data for lactic acid levels in the 400-meter running group obtained the lowest value of 2.2 mmol/L and the highest value of 2.9 mmol/L with an average (X1) of 2.59 mmol/L, standard deviation (SX1) 0,25, and the mean, standard error (SEmx1) is 0.08. The final test data for lactic acid levels in the 400-meter running group obtained the lowest value of 12.8 mmol/L and the highest value of 17.3 mmol/L with an average (X1) of 14.8 mmol/L, standard deviation (SX1) 1,43

and the mean, standard error (SEmx1) is 0.48.

Discussion

Data collection is used as research data obtained from the initial test and the final test of lactic acid levels in the blood, based on observations of the work effect of running 800 meters and 400 meters on the increase in lactic acid.

1. Initial and Final Test Results of Lactic Acid Levels in the 800-Meter Running Group

The results of the analysis from the initial test and the final test of lactic acid levels using the effect of running 800 meters obtained the mean value (MD) = 14.99, the standard deviation (SD) = 1.65, and the mean, standard error (SEMD) = 0, 55. This value becomes the t-count obtained = 9.085. Then the results were tested with t-table at degrees of freedom (DK) = n - 1 = 10 - 1 = 9 with the level of confidence (α) = 0.05, the critical value of t-table = 2.262 was obtained. Thus the t-count value is greater than t-table (t-count = 9.085> t-table = 2.262), with an increase in lactic acid from resting lactic by 85.6%.

Based on the data analysis, it can be concluded that the null hypothesis (H0) is rejected, the working hypothesis (H1) is accepted, so the effect of running 800 meters can increase lactic acid levels.

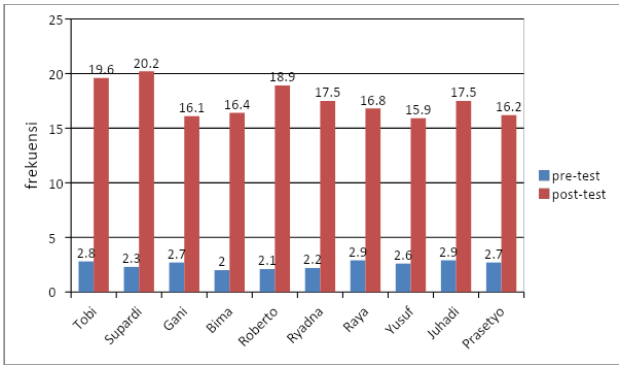

Figure 1.Pre-test and post-test group running 800 meters

2. Initial and Final Test Results of Lactic Acid Levels in the 400-Meter Run Group

The results of the analysis from the initial test and the final test of lactic acid levels using the effect of running 400 meters obtained the mean value (MD) = 12.21, the standard deviation (SD) = 1.64 and the mean, standard error (SEMD) = 0, 55. This value becomes the t-count obtained = 7.445. Then the results were tested with t-table at degrees of freedom (DK) = n - 1 = 10 - 1 = 9 with the level of confidence (α) = 0.05, the critical value of t-table = 2.262 was obtained. Thus the t-count value is greater than t-table (t-count = 7.390> t-table = 2.262), with an increase in lactic acid from resting lactic by 82.5%.

Based on the data analysis, it can be concluded that the null hypothesis (H0) is rejected, the working hypothesis (H1) is accepted, so the effect of running 400 meters can increase lactic acid levels.

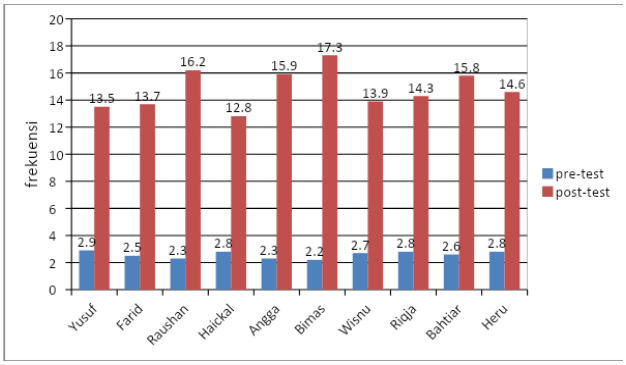

Figure 2. Pre-test and post-test for the 400-meter running group

3. Final Test Results of Lactic Acid Levels for the 800-Meter Running Group and the 400-Meter Running Group

From the final test of lactic acid levels in the 800 meter running group and the 400 meter running group, the standard difference between the two means (SEmxmy) = 0.78, this value becomes t-count = 3.564, then the results of these calculations are tested with t-table at degrees freedom (dk) = (n1 + n2) - 2 = (10 + 10) - 2 = 18 with the level of confidence (α) = 0.05, the critical value of t-table = 2.101 (t-count = 3.564> t-table = 2.101).

Based on the results of the data analysis, H0 is rejected, and H1 is accepted. It can be concluded that there is a significant difference between running 800 meters and 400 meters on the increase in lactic acid levels and the effect of running 800 meters. An increase in lactic acid is more significant than the effect of running 400 meters at the Jakarta State University Athletic sports club members.

CONCLUSIONS

Based on the problems that have been raised and supported by theoretical descriptions, data, existing research, and analysis of existing data done, it can be concluded that:

1. Running 800 meters can increase the body's lactic acid levels (by 85.6%) for students who are members of athletic achievement clubs at the State University of Jakarta.
2. Running 400 meters can increase the body's lactic acid levels (by 82.5%) for students from the athletic achievement sports club State University of Jakarta.
3. Run 800 meters higher than running 400 meters profound increases the body's lactic acid levels in student club members at the Athletics State University of Jakarta with a ratio of 1.03: 1.

The 800-meter run is an intermediate run with the use of the lactic anaerobic energy system. Its energy use is 10% ATP-PC, 60% glycolysis, and 30% contribution from the aerobic energy system. As activity with duration increases towards two minutes, the ATP supply changes and slows down glycolysis. Theoretically, as the intensity of the match decreases and the rate of glycolysis, the breakdown of glucose and glycogen is slowed down, resulting in acid buildup. The lactate decreases and allows the body to reject lactic acid forms pyruvate. After pyruvate is formed, lactic acid heading into the mitochondria is used in metabolism aerobics. At the same time, the 400-meter run is a medium distance run using the lactic anaerobic energy system, where the energy use is 40% ATP-PC, 55% glycolysis, and 5% contribution from the aerobic energy system.

Running 800 meters and 400 meters can both increase levels of lactic acid in the body. Both can be options for increasing lactic acid levels in the body. However, run 800 meters higher in increasing lactic acid than running 400 meters.

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