Lactic acid level in soccer who consume red dragon fruit juice and regular exercise

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Abstract. Energy sources for athletes based on their movement patterns come from aerobic and anaerobic metabolism which have the potential to produce lactic acid. The increase in lactic acid causes the pH to decrease so that ATP formation is disturbed and causes pain in the muscles. This situation can affect an athlete's performance. The antioxidants contained in red dragon fruit can reduce free radicals due to exercise. The purpose of this study was to determine the effect of giving red dragon fruit on reducing levels of lactic acid in an athlete's blood plasma The subjects were 20 persons, male, who were qualified as athletes, non-smokers and no consumption of supplement as long as the research. The subjects were split into two group, randomly. Group RE; had activity regular exercise and no red dragon fruit given. Group RE+RD; had activity regular exercise and obtained juice from red dragon fruit.The RDF team was given regular exercise and received red dragon fruit juice. Regular exercise combination antioxidant red dragon fruit antioxidants must maintain the anaerobic threshold value to prevent fatigue due to lactic acid.

1. Introduction

Soccers need individual and team training to achieve optimal performance. A good training program, hopefully athletes will have excellent performance play skills. Exercise requires intensive and continuous energy, so the oxygen requirement of the muscle is substantial, especial during intense and tiring physical activity. This can lead to relative hypoxia, which is a reduction in the amount of oxygen in the tissues. In this relative hypoxic condition, most of the energy sources come from anaerobic metabolism, which can produce lactic acid. Accumulation of lactic acid can impair muscle performance [1].

The metabolism of anaerobic glycolysis leads to extremely rapid accumulation of lactate. Accumulation of lactate in the blood becomes a basic problem in physical performance, leads to chronic fatigue an reduces physical performance [2].Any physical exercise can generate free radicals, which can ause oxidative stress. The body has a limited quantity of antioxidants, while there is an increased activity of free radicals up to 20% during exercise. Consequently, the body should have defences to protect itself against free radicals, and one of them is doing regular exercise. While ercise may increase the antioxidant defense system, long and intense periods of exercise will upset the balance of free radicals and antioxidants, which is referred to as oxidative stress [3].

In normal conditions, free radical formation is balanced with the formation of endogenous antioxidants produced by the body such as Superoxide Dismutase (SOD), Glutathione Peroxidase (GPx) and catalase [4-7].Exogenous antioxidants will help endogenous antioxidants counteract the free radicals that remain. The body needs exogenous antioxidants to provide antioxidants for free radicals and oxidative stress [8].One of the exogenous antioxidants derived from fruits is the red dragon, which contains a large amount of flavonoids [9].The purpose of this study was to assess the effect of red dragon fruit administration on the reduction of lactic acid levels in an athlete's blood plasma.

2. Methods

2.1 Subjects

The subjects were 20 individuals, men, who were qualified as athletes, non-smokers and no supplement consumption as long as researching. The subjects were assigned to two groups at random.RE Group; exercised regularly and no red dragon fruit has been provided. RE+RD Group; exercised regularly and obtained dragon's red fruit juice. Blood from the vena is collected for the assessment of lactic acid levels before and after the procedure.

2.2 Activity regular exercise procedure

The subject gets warmer by 3 to 5 minutes.Engage in physical activity running on a treadmill at an intensity of 80-85% of maximum heart rate over 30 minutes and cooling for 3-5 minutes.Treadmill carried out for 3 days/ week, for 3 weeks. Red dragon fruit drinks every day for three weeks.The treadmills are made at the physical laboratory Universitas Negeri Medan.

2.3 Lactic acid level measurement.

The measurement of lactic acid levels in the blood was performed using a lactate device acquired by Roche Germany, expressed in mmol/L units using the measuring stick method. Lactic acid measurements were made before regular exercise (before the procedure) as pre-test data. Following the physical intervention and regular red dragon fruit juice for 21 days, lactic acid testing was again performed as post-test data.

2.4 Statistic analysis

The data have been analysed with the t-test.

3. Results

In the regular exercise group, before the procedure, the mean concentration of lactic acid was 2.41 ± 0.253 mmol/L, and after the procedure, the mean concentration of lactic acid was 3.58 ± 0.55 mmol/L.In the regular exercise and red dragon groups, before the procedure, the average lactic acid concentrations were 2.50 ± 0.25 mmol/L, and after the procedure, the average lactic acid concentrations were 3.41 ± 0.39 mmol/L as presented in the table 1 and 2.

Table 1. Themeans lactic acid levels on two groups

Groups	Pre-test	Post-test	
	Mean±sd	Mean±sd	p
RE	2.41±0.253	3.58±0.55	0.000*
RE+ RD	2.50±0.25	3.41±0.39	0.000*

Note ; group RE= Regular exercise ; group RE+RD= Regular Exercise + Red dragon; sd= standar deviation; *=significant

Table 2. The Difference mean lactic acid levels on two groups

Groups	Mean	sd	p
RE	3.58	0.55	0.434
RE+RD	3.41	0.39	

Note : group RE= Regular exercise : group RE+RD= Regular Exercise + Red dragon;
sd= standar deviation;

Established along the t-test, the results of this work indicated that there was a significant increment in the average levels of lactic acid in each group in front and after the intervention ($p<0.05$), but there was no substantial deviation in the mean increase in lactic acid levels between the two groups after the intervention ($p>0.05$).

4. Discussion

Increased levels of lactic acid in both groups after the procedure compared to before the procedure were due to hypoxia in muscle tissue resulting in anaerobic metabolism, which produced lactic acid. Increased levels of lactic acid are consistent with research by Kobialka et al.(back to 2014) where the results of their research demonstrate an increase in lactic acid levels in elite athletes running 100 m by an average of 9.51 mmol/L measured at the 10th minute after running 100m [10].

Lactic acid levels were lowest in the regular exercise and red dragon groups following the procedure. Exercise is given with a well-measured, regular, and scheduled dose of exercise that may increase lactic acid tolerance and increase the buffering capacity of bicarbonate and phosphate in the muscles [11].

Running or treadmill tests result in an increased metabolic requirement that exceeds the resting level, and lactic acid production increases above the anaerobic threshold (4 mmol/L).Lactic acid is the result of pyruvate being reduced by the action of the enzyme lactate dehydrogenase. The accumulated lactic acid can then be re-oxidized in the pyruvate cytosol, which occurs physiologically [12,13].In this study, average concentrations of lactic acid after intervention were still in normal conditions, which were always below 4 mmol/L, so always within the anaerobic threshold.

Lactic acid is excreted in urine and skin in smaller quantities. The lactic acid level in resting venous blood is 0.63-2.44 mmol/L, while the largest lactic acid source during resting comes from the breakdown of glucose in the blood cells. The lactic acid formed will be rapidly eliminated in continuous flow. An individual's ability to remove lactic acid depends on his or her physical state and fitness. If there is an increment in the level of lactic acid in the blood circulation, it implies that there is an increment in the entry of lactic acid into the blood circulation that goes past the liquidation rate of lactic acid [14].

The production of lactic acid depends a lot on the level of physical activity. The production of lactic acid in people without training is the same as in people with training; the difference is the elimination of lactic acid. For trained individuals, the process of disposing is faster than for untrained individuals [15].The lower mean of lactic acid levels in the RE+DR group after the procedure was also due to antioxidants in red dragon fruits. Red dragon fruit can prevent formed free radicals due to strenuous physical exercise by giving antioxidants in sufficient quantities[16].

The findings of this study are consistent with the effect of giving Changbai Mountain after prolonged exercise to reduce levels of lactic acid and creatine kinase [17-18].Another supporting research finding is that giving red dragon extract to mice with high levels of exercise can reduce lactic acid levels [19]. Research by Rosidi et al. (2013), reported that giving curcumin extract with curcumin levels of 750 mg was the best in reducing lactic acid levels significantly in athletes [20].

5. Conclusion

The conclusion of this study is the regular exercise combination antioxidant red dragon fruit antioxidants should maintain the anaerobic threshold value to prevent fatigue due to lactic acid.

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