# Differences in the Effect of Active Recovery Post Long Duration Interval Training towards Lactate in Young Men with Blood Type O and A

**Original Article**

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**Abstract**
Accumulation of lactate in the blood can cause fatigue and decreased physical performance. Therefore, proper recovery after physical activity is needed. This study aims to determine the effect of long duration interval training (LDIT) and active recovery on blood lactate and to determine the difference in the decrease in lactate levels between blood groups O and A after active recovery. This research is included in comparative research. The independent variable in this study was active recovery, and the dependent variable in this study was blood lactate levels (mmol/L). The sample in this study was taken from the NFC Academy which has a population of 35 members. Sampling was done by purposive randomized sampling, and obtained 16 members who are declared eligible and willing to be the research sample. Then the sample was given LDIT physical activity and active recovery. Data analysis used the T-Test difference test with the help of SPSS 25 software. The results in this study showed a significant increase in blood lactate levels after doing LDIT exercise. After performing active recovery, lactate levels from both groups decreased significantly. It can be said that the two groups had no difference in the effect of active recovery after doing physical activity.

**Keywords**: Exercise Therapy, Endurance Training, Hematology

## INTRODUCTION

In high-intensity exercise, the muscles contract under anaerobic conditions, the supply of ATP occurs through the anaerobic glycolysis process and results in excess blood lactate levels (1).The presence of lactate in the muscle can interfere with the working mechanism of muscle cells. Accumulation of lactate in the blood can also lead to fatigue and decreased physical performance (2). One of the problems that cause chronic fatigue and decreased physical performance is the accumulation of lactate in the blood. Lactate levels that accumulate if not treated immediately can cause overtraining syndrome in athletes. This can result in an increase in the possibility of injury to athletes (3).

Previous research from (4) classifies interval training into two types according to time, namely long duration interval training and short duration interval training. This exercise aims to increase endurance, where at high tempo use the anaerobic system with high intensity, while at

low tempo the body performs active recovery by light jogging. From the results of this study, it is stated that long duration training intervals can increase lactate which is higher than short duration training intervals (4).

Doing exercises or matches can result in fatigue and recovery is highly recommended. This recovery phase is very important for the body to return to its initial condition before carrying out the next physical activity. One of the activities that can be carried out to speed up recovery is active recovery. Previous research conducted stated that active recovery by walking can reduce lactate levels faster than passive recovery with massage (2). Lactate is found in blood and muscle cells. Blood is a red body fluid and is very important in human survival and is contained in a closed circulatory system (5). Blood is a very important part of human survival because most of the human body's transport system consists of liquid tissue (6). Blood type is a system of grouping blood types based on the type of antigen they have. Antigens can be in the form of carbohydrates and proteins (7). The different types of carbohydrates and proteins make each individual different so that the blood group type AB O is formed. Of the 6.2 billion people in the world, blood types are divided into four types, namely O as much as 46%, A as much as 40%, B as much as 10%, and AB as much as 4%, of the differences in blood types, there are several researchers who researched dietary food based on blood type (8). Previous research which examined the blood type diet stated that the key to the success of a diet for blood type O depends on the consumption of. This raises a gap in sports science that can be studied continuously. Therefore, the researchers wanted to observe, find out and research more deeply about "The Differences in Effect of Active Recovery Post-Exercise Long Duration Interval Training on Lactate in Young Men with Blood Types O and A".

## MATERIALS AND METHODS

This type of research is included in comparative research. In comparative research, several groups are compared. In this study, the groups that will perform the treatment are divided into two groups according to the blood type of each individual and will be given a long duration interval training exercise treatment. There are several designs that can be used in comparative research. the "Control Groups Pre-test & Post-test Design" design was applied in this study.

The population in this study are futsal members at the NFC (Ngaliyan Futsal Club) Academy. The number of futsal members at the NFC Academy is 35 players. The NFC Academy was chosen as the population because the researcher is a former member of the NFC Academy and has a routine training schedule of 2-3 times a week and regularly participates in tournaments of approximately 5 tournaments in one year. The sample in this study were 16 players who were taken according to blood type. These 16 players consisted of 2 groups consisting of 8 members of blood group O and 8 members of blood group A. The sampling technique in this study was carried out by purposive randomized sampling, where the sample to be taken had to meet the criteria and provisions in an effort to achieve the research objectives.

The independent variable in this study is active recovery. The dependent variable in this study was blood lactate levels (mmol/L). Both groups will perform LDIT treatment and active recovery. The instrument used in this research is accutrend plus meter. Data collection was carried out 4 times by taking one drop of blood from the sample. Test 1 was carried out before the sample did the LDIT activity. Test 2 was carried out 2 minutes after doing the LDIT activity. Test 3 was carried out for 10 minutes by performing Active Recovery after performing LDIT activities, and Test 4 was carried out 1 hour after doing LDIT activities. The type of data obtained is primary data taken directly. The data that has been obtained is then analyzed using SPSS 25. Normality test uses the Shapiro-Wilk Test, with data normally distributed if the data $p > 0.05$. The

homogeneity test was carried out using the Stem and Leaf Plots test. And the different test t-test with paired t-test in pairs with a significant level of 5% or 0.05. Paired samples were samples with different blood groups but underwent the same treatment. The t-test produces a calculated value (t) and a probability value (p) that can be used to prove whether or not there is a significant difference.

## RESULTS

This research was conducted on April 12, 2020 at the Soccer Field of Ngaliyan District, Semarang City. The sample who participated in this study were members of the NFC Academy. From the total population of 35 members and based on the inclusion criteria mentioned in Chapter III, 16 members were declared eligible and willing to be the sample of this study. A total of 16 samples were divided into 2 groups based on blood type, of which 8 samples belonged to blood group O and 8 samples belonged to blood group A.

The data obtained before being analyzed using a different t-test was analyzed using the normality and homogeneity test. The test results of this data have the aim of seeing the difference in the effect of each test between group O and group A. The results of the different test between groups are presented in the table 1.

Table 1. Different Tests of Each Inter-Group Test

| Test | Average lactate level (mmol/L) | | P Value |
| --- | --- | --- | --- |
| | Group O | Group A | |
| **Test 1** | 2.3 | 2.1 | 0.526 |
| **Test 2** | 13.8 | 16.1 | 0.005 |
| **Test 3** | 10.7 | 12.9 | 0.009 |
| **Test 4** | 2.7 | 3.4 | 0.141 |

Based on table 4.5 above, the results of the different T-test in each test between the blood group O and the blood group A, in test 1 the probability value obtained is a p value of $0.526 > 0.05$ which means there is no difference in test 1. test 2 obtained p value of $0.005 < 0.05$ which means there is a difference in test 2. In test 3 obtained p value of $0.009 < 0.05$ which means there is a difference in test 3. And in test 4 obtained p value of $0.141 > 0.05$ which means that means that there is no difference in test 4.



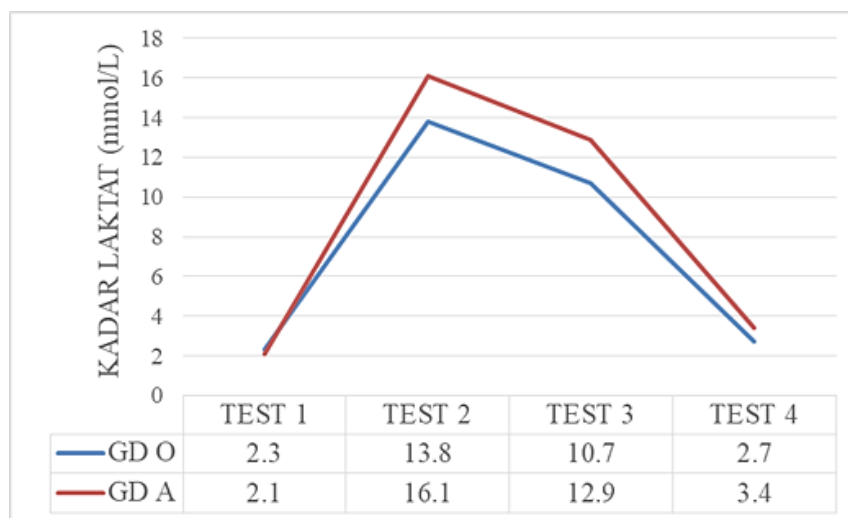| | TEST 1 | TEST 2 | TEST 3 | TEST 4 |
| --- | --- | --- | --- | --- |
| GD O | 2.3 | 13.8 | 10.7 | 2.7 |
| GD A | 2.1 | 16.1 | 12.9 | 3.4 |

Figure 1. Graph of Lactate Levels in Each Test

Based on Figure 1, the value of test data 1.0 minutes before carrying out the LDIT activity in group O was 2.3 ± 0.54 and in test 1 group A was 2.1 ± 0.45. In test 2, 2 minutes after doing the LDIT activity the value of group O data was 13.8 ± 1.34 and in test 2 group A was 16.1 ± 1.42. In test 3 10 minutes after active recovery the value of group O data was 10.7 ± 1.52 and in test 3 group A was 12.9 ± 1.37. In test 4 1 60 minutes after doing the LDIT activity the value of the data in group O was 2.7 ± 0.96 and in test 4 group A was 3.4 ± 0.89. It can be seen that the increase in lactate levels of the two groups in test 1 to test 2. It can be concluded that LDIT has an influence on blood lactate in the research sample (9). In test 2 to test 3, lactate levels in both groups decreased. This strengthens the evidence that active recovery has an effect on blood lactate after physical activity (2). Furthermore, in test 3 to test 4 both groups experienced a decrease in lactate levels, this concluded that one hour after doing activity lactate levels almost returned to their initial conditions.

## DISCUSSION

Giving LDIT treatment can increase blood lactate levels, the theory of high-intensity activity states that blood lactate is formed as a result of high-intensity and long-term body activity and this is in accordance with what happened in the sample of this study (10). Physical activity with high intensity will trigger muscle contraction, so that through anaerobic glycolysis ATP supply occurs, this process takes place in the absence of oxygen. This causes the formation of lactate in the blood and muscles (11). Two minutes after doing long duration interval training, the average lactate levels in both groups increased. The average lactate level in group O increased from 2.3 mmol/L to 13.8 mmol/L, the increase increased by 11, 5 mmol/L (500%), while the average lactate level in group A increased from 2.1 mmol/L to 16.1 mmol/L, the increase increased by 14.0 mmol/L (666%). The two groups had a mean difference of 2.3 mmol/L with $p < 0.05$.

High levels of lactate in the human body if not treated immediately can cause overtraining syndrome or overtraining syndrome. This increases the possibility of sports injuries that can cause disability ranging from temporary to even permanent. Therefore, after doing physical activity or sports that are heavy or light, it is highly recommended to do recovery (12). Comparison of lactate levels of the two groups after 10 minutes of active recovery showed almost the same decrease in lactate levels where blood group O experienced a decrease in lactate levels by 3.1 mmol/L and blood group A decreased by 3.2 mmol/L. How quickly an individual overcomes fatigue is seen from how quickly the individual recovers.

The history of the early human era of the discovery of blood is classified into four. From this, it is stated that the type of blood type O is the blood type of hunters who demand that humans with blood type O have good speed and physical endurance. Type O blood is also stated to have the highest immune system among other blood types. In human history who has blood type A is defined as an agrarian man. Blood type A is a blood type that can adapt to a lifestyle and has a cooperative personality. People with blood type O have a high stomach acid content which makes it easier to digest fat. this is inversely proportional to blood type A where blood type A has a low stomach acid content as an adaptation of ancestors who survived on an agrarian diet in the past. Type A blood type also has a long digestive system so it can't quickly produce energy, inversely proportional to Type O blood which can burn meat into energy while blood type A makes the meat as fat in the body (8).

One hour after doing physical activity followed by active recovery, there was no significant difference in blood lactate levels between the two groups and they fell back to almost the same as the initial condition (below the threshold). Where the average lactate level in group O is 2.7 mmol/L and the average lactate level in group A is 3.4 mmol/L. These results are linear with the

theory from (13), which states that lactate can return to normal conditions one hour after doing physical activity.

## CONCLUSION

Long *Duration Interval Training* proven to significantly increase blood lactate levels, but blood group A has higher lactate levels than blood group O. Recovery Active is proven to significantly help reduce blood lactate levels. The two blood groups (O and A) proved that there was no significant difference in decreasing blood lactate levels after active recovery.

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## CONFLICTS OF INTEREST

Conflict of interest   : Author state no conflict of interest.

Disclosure statement  : No author has any financial interest or received any financial benefit from this research.

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