

Comparison of Malondialdehyde Levels in the Morning and Night at Private Vocational School

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Abstract— This research aimed to see a comparison of the levels of MDA on students sports hobbyists badminton in the morning and night. This study used a survey method. Sampling using a purposive sampling. Analysis data retrieval using test instruments in the form of a detailed questionnaire and blood sampling. Based on the ANOVA test with significance level $P < 0.05$ show that there were significant differences in the levels of MDA group exercise morning and night groups namely sig. 0.000. The results of this study showed the levels of MDA is higher in the morning than in the night.

Keywords— Malondialdehyde (MDA), Badminton, Sports

I. INTRODUCTION

The times and busy activities and job demands have changed a person's lifestyle in doing physical activities. Generally the physical activity carried out on Malang State University students is sports in the morning and evening. One sport performed in the morning and evening is badminton. This activity must be done with the right time and frequency, because if it will not threaten health[1]. Sports performed with inappropriate frequency and dosage will increase free radicals which will negatively affect tissue damage [2] and cell damage[3]. However, this has not been understood by sports people and the public. Maintaining the Integrity of the Specifications Morning and night sports can indirectly cause free radicals. Free radicals that can be generated can be seen with levels of Malondialdehyde (MDA) in the blood. Darwadi et al [4] also said that Malondialdehyde (MDA) can be used as an index of measuring free radical activity in the body. Badminton sport is one of the dominant sports using anaerobic energy system[5], this can lead to oxidative stress when done with inappropriate time and frequency. Fox in Sugiharto [6] also emphasized that 70% of badminton games use the Adenosine Triphosphate Phosphocreatine (ATP-PC) and lactic acid energy systems. Both of these energy systems take place anaerobically or without the need for oxygen, so they have a high risk of causing hypoxic conditions [5]. Hypoxia is a

condition where the oxygen concentration in the blood is very low[7].

High intensity exercise can cause free radicals, free radicals are one of the causes of oxidative stress. Oxidative stress is an imbalance between prooxins (free radicals) and antioxidants, namely the amount of antioxidants is greater than the amount of antioxidants. Hypoxia also increases the formation of Reactive Oxygen Species (ROS) which results in oxidative stress in cells [8]. Rahardjani[9] emphasizes that Malondialdehyde (MDA) is a final product of fat peroxidation which is used as a biological biomaker of fat peroxidation and can describe the degree of oxidative stress. The results of the study conducted by Yunus[5] also said that the decrease in melatonin concentration and its activity as an antioxidant would be able to cause an increase in Reactive Oxygen Species (ROS) in cells which resulted in increased productivity of Malondialdehyde (MDA) in blood plasma.

II. METHODS

The method used in this study is a survey using 10 samples which are divided into two groups namely morning group 5 students and night groups 5 students who are 19-23 years old. The data collection technique uses test and non-test instruments. Data was collected from the results of tests using medical equipment and laboratory equipment as well as the results of questionnaire analysis. The collected data was analyzed using the Statistical Package of Special Science (SPSS) computer program 22.0 for Windows. Sampling in this study was also carried out by purposive sampling technique. This purposive sampling technique is also called the judgmental sampling which is used by determining specific criteria for the sample, especially those who are considered experts. The criteria used to select samples in this study are the following criteria:

Identify applicable funding agency here. If none, delete this text box.

TABLE 1 AVERAGE MDA LEVELS FOR MORNING AND NIGHT GROUPS

Group	N	Mean (ng/ml)	Std.Deviation
Malam	5	357.83340	10.501439
Pagi	5	452.83320	15.156850
Total	10	405.33330	51.556276

Based on table 1 it can be seen that MDA levels in the morning exercise group were higher compared to the night sports group.

. Badminton sports hobbyists who are actively practicing in PB Badfed UM.

b. Male gender aged 19-23 years.

c. Has a normal Body Mass Index (BMI) category.

d. Active in doing the habit of exercising morning and night.

e. Do not have smoking habits.

Calculation of the number of samples using the Slovin formula in Setiawan[10] as follows:

$$n = N / (1 + N(e^2))$$

$$n = 6 / (1 + 6([0,2] ^2))$$

$$n = 6 / 1,24$$

$$n = 4,83$$

$$n = 5$$

information:

n = Sample size

N = population size

e = Error tolerance limit

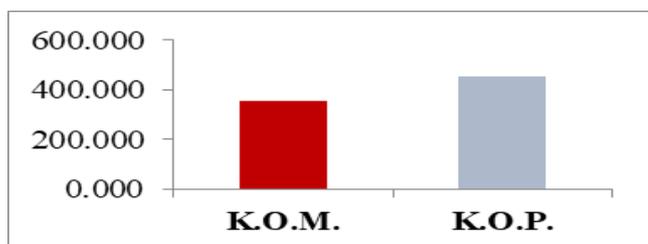
Based on the results of these calculations, the number of samples for each group is 5 people.

III. RESULT

Average Data on MDA Levels

Based on the results of data analysis, the average MDA levels at night and morning can be seen in the following table 4.1:

TABLE 2. FIGURE 1 MDA LEVEL AVERAGE GRAPH IN THE NIGHT AND MORNING SPORT GROUP



Information:

K.O.M: Night Sports Group

K.O.P: Morning Sports Group

Based on Figure 1 shows that the average MDA level in the morning exercise group was higher than the night sports group. Therefore, to see whether or not the comparison of each group is significant, an ANOVA different test is needed, but before ANOVA different tests are carried out a prerequisite test is carried out with the following stages:

1. Different ANOVA Data Test MDA Levels

After the normality test and homogeneity test were carried out, then ANOVA different tests were carried out as follows:

TABLE 3. ANOVA DIFFERENCE TEST RESULT MDA LEVELS

	Df	Mean Square	F	Sig.
Between Groups	1	22562.405	132.716	0.000
Within Groups	8	170.005		
Total	9			

Based on table 3 ANOVA different tests, showed that there were significant differences in MDA levels in the night sports group and morning exercise group Sig. 0,000 or (P <0.05).

IV. DISCUSSION

Comparison of MDA Levels in Morning and Night Sports Hobbyists

Based on the results of the statistical test in table 1, it shows the average value of 452,833 (ng / ml) of morning badminton and the mean value of 357,833 (ng / ml) of nighttime badminton with a significance level of 5% (0.05). From these results, morning badminton has a difference of 95.00 (ng / ml) from badminton at night. From this it can be concluded that morning badminton has a significant difference with badminton against MDA levels. One of the points from the questionnaire given to the sample, which is about the frequency of exercises performed at night, has an average of 3-4 times per week, while badminton sports performed in the morning have an average of 1-2 times per week.

Increased MDA levels are also significantly influenced by the frequency of exercise. This has been proven in research [11] discusses about irregular training and the frequency of improper exercise which causes an imperfect body adaptation process. The imperfect adaptation process causes no coping mechanism and the stressor will disrupt the homeostatic process in the body. And regular exercise with the right dose can increase antioxidants by as much as 13% and can reduce ROS by as much as 20% [12]. Regular exercise can reduce the production of free radicals with a mechanism to increase

proteasome activity and DNA repair enzymes, decrease DNA bonds with redox sensitive transcription factors such as (NF- κ B, AP-1, MAPK, and CREB) and increased production of GPx and MnSOD[13] which can cause hormesis in the body. The results of the measurement of badminton in the morning have an average MDA level of blood higher than badminton at night, this proves that exercise can increase MDA levels in the blood, namely regular exercise three times a week can increase MDA levels better than exercise one times a week. Basically the exercise must follow the concept of F.I.T (Frequency, Intensity and Time) is regular exercise carried out with a frequency of 3-5 times a week with moderate intensity and time spent 20-30 minutes. Exercise once a week and three times a week is better than no exercise at all, seen from the increase in levels of Malondialdehyde (MDA) in the blood. However, it is more recommended to exercise at least 3 times a week, because the effects of exercise will not be of much use if the rest period is too long. Exercise must be carried out regularly and continuously because the physical abilities obtained during the exercise will decrease again if they do not do the exercises in a certain period of time. Exercises performed with the right frequency or regular exercise can increase adaptation to oxidants and reduce the incidence of oxidative stress[14]. Regular long-term exercise can improve the body's antioxidant abilities, so it can help maintain the balance of oxidation reduction[2]. Regular exercise can also influence lipid profiles and reduce cardiovascular risk. Regular exercise with the right dose can increase VO₂ max, increase anti-oxidants by 13% and can reduce ROS by 20%[12]. However, exercises carried out with inappropriate frequency and dosage will increase free radicals which will have a negative impact on tissue damage [2] and cell damage[3]. Regular exercise is expected to reduce free radicals in the body, so regular training needs to be analyzed further to find out the impact of training on free radicals is more clearly not just a debate.

Under normal circumstances there is a balance between oxidant formation and antioxidant activity in cells [15]. The formation of oxidants can occur after exercise and the body responds to the activation of antioxidant enzymes that function to maintain body homeostasis[2]. However, an imbalance between oxidants (free radicals) and antioxidants can have an impact on increasing the reactive oxygen system (ROS)[16]. The factors that can also influence the results are due to a small number of samples with a total sample of 5 samples. This small amount can affect the results because if there is extreme data discarded it will only make the data inaccurate. Whereas if it is carried out with a relatively large number of samples each group will be able to sort samples that meet the criteria and discard data or samples with extreme serum MDA levels among one group because it is thought to affect the data. Other factors can also be caused by the habit of consuming spicy foods that contain high antioxidants. Other factors can also be caused by consumption of exogenous antioxidants (which come from outside the body) such as vitamin C, E, spicy foods, vegetables and fruit. In addition, there are other factors that influence MDA levels in badminton at night and in

the morning are smoking. From some of the literature traced it is known that MDA levels in smokers are relatively higher compared to nonsmokers.

V. CONCLUSION

Based on the results and discussion described above, conclusions can be obtained, namely:

1. Badminton exercise carried out in the morning has free radicals by showing higher levels of MDA than badminton performed at night. This is evidenced by showing MDA levels in the morning badminton sports group had an average of 452,833 (ng / ml).
2. Badminton sports performed at night have free radicals by showing lower MDA levels compared to badminton performed in the morning. This is proven by showing MDA levels in the night badminton sports group to have a mean of 357,833 (ng / ml).
3. Based on the ANOVA difference test with a significance level of $P < 0.05$, it indicates that there are significant differences in MDA levels in the morning exercise group and the night sports group, namely sig. 0,000.

Based on the results of the research and conclusions, the following suggestions can be given:

1. Exercise is highly recommended because it can reduce blood MDA levels especially in regular exercise because it can reduce blood MDA levels more and increase antioxidants in the body such as SOD.
2. In further research, it is expected to examine the effect of MDA training on a longer and homogeneous treatment in order to obtain significant results.
3. It is hoped that in the future there will be a more complex type of research and with more in-depth discussion.

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