

Difference of Sitokin Blood Proinflammation Levels of Interleukin-1 Beta (IL-1 β) in Aerobic Gymnasts Mix Impact Morning Days and Nights Day

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ABSTRACT

Radicals in the body will cause inflammation, one of which is cell damage which makes the IL- 1 β reaction work as an inflammatory process in the body. Aerobic exercise performed in the morning and at night causes inflammation due to free radicals. This study aims to determine the effect of Mix Impact Aerobic Gymnastics on differences in blood levels of IL-1 β in the morning and at night. The research method used is a survey by giving questionnaires and providing treatment with a quantitative approach. The population in this study were 30 Mix Impact Aerobics Gymnastics in the morning and evening at the Vina Studio and GYM Profit Studio. In this study sampling using purposive sampling technique is the population taken with certain considerations. While the data analysis technique uses ANOVA Test and analyzed descriptive statistics with the help of SPSS 24. The results of data analysis showed that the morning had a lower average of 1218,916 ng/ml and at night had a higher average of 1495,916 ng/ml.

Keywords: IL-1 β blood levels, Impact of mix aerobic exercise.

1. INTRODUCTION

The government is currently launching a healthy living community (GERMAS) movement program by carrying out physical activities. In the guidebook (GERMAS) states that regular physical activity and becoming a habit will increase physical endurance. Physical activity can be increased to physical exercise if done well, correctly, regularly and measurably. Physical exercise can improve physical endurance, health and fitness. However, there are changes in people's lifestyles such as busy activities and job demands. Generally, the hobbyists of mix impact aerobics in GYM Profit Fitness and Vina Gymnastics Studio. Thus, hobbyists condition their physical condition in the morning and evening. It is important to know that doing physical exercise requires the right time and frequency, because if it does not threaten health [1]. Because irregular and non-dose exercise will increase free radicals that threaten tissue damage and cell damage [2],[3]. However, this is not understood by hobbyists as sportsmen.

Aerobics mix impact as a body stressor that is carried out in the morning and evening certainly causes free

radicals, because the sport itself is responded by the body to maintain the body's homeostasis. Sugiharto explained in the book Physiology of Sport that the body's effort to maintain the homeostasis, responded with an increase in heart rate, blood pressure, tidal volume, respiratory frequency, hormonal and cytokine secretion [4]. Regarding the influence of morning and night sports, Yunus states that exercise carried out at night causes a disturbance in the circadian rhythm [5]. Disruption of the circadian rhythm will cause a decrease in the concentration of melatonin and its activity as an anti-oxidant. Decreasing the concentration of melatonin and its activity as an anti-oxidant will have an impact on increasing reactive oxygen species (ROS) in cells that cause oxidative stress. Yunus explains that free radicals can damage important cell components if they are not able to be suppressed by the anti-oxidants available in the body [6]. High free radicals in the body will cause oxidative stress which is an imbalance between pro-oxidants (free radicals) and anti-oxidants, namely the number of free radicals is greater than the number of anti-oxidants [7]. Excessive free radicals in the body

can damage macromolecules in cells such as carbohydrates, DNA proteins and others [8].

The occurrence of inflammation due to free radicals can be seen from levels of IL-1 β in the blood. IL-1 β is an agonist causing an inflammatory reaction or called proinflammatory cytokine which functions to minimize inflammation due to inflammation in the body. Baratawidjaja in arifin, explains the mechanism of action of IL-1 β caused by free radicals with the onset of inflammation and cell damage causing T-cell activation to proliferate into helper I T cells which stimulate macrophages to produce IL-1 β and TNF- α cytokines [9].

Associated with the presence of pro- inflammatory secretions of IL-1 β cytokines during physical exercise. Peake et al., in their study entitled expression and secretion of cytokines by skeletal muscle cells: regulatory mechanisms and effects of exercise revealed, "Moderate to high aerobic exercise stimulates an increase in circulating concentrations of interleukin IL-6, IL-8, IL-10, IL-1 receptor antagonists, granulocyte-colony stimulating factor, and small increases in tumor necrosis factor- α , monocyte chemotactic protein-1, IL-1 β , brain derived neurotrophic factor (BDNF), IL-12p35 / p40 and IL-15 " [10]. Therefore, aerobics mix impact exercises in the morning and evening certainly cause an IL-1 β response. However, whether there is a difference in the response of IL-1 β levels in the blood due to exercise in the morning and evening.

To prove the existence of differences in blood levels of IL-1 β in the hobbyists of aerobic mix impact exercises in the morning and evening, an examination of these levels is needed. Therefore, based on the concepts, theories and phenomena above, the researcher was interested in examining the differences in the blood level response of IL-1 β in hobbyists of mixed impact aerobics in the morning and evening.

2. METHOD

This study uses a comparative research method. This comparative study aims to compare between samples [11]. Sampling in this study was also carried out by purposive sampling technique. The purposive sampling technique is a sampling technique that is carried out with certain considerations. The method in this study is a survey method that aims to obtain data in a particular place by giving a questionnaire and can provide treatment [11]. Examination of the results of the data was carried out in the Laboratory of Physiology, Faculty of Medicine, Universitas Brawijaya, Malang.

The main population in this study is that all members hobby mix mix aerobics who practice in the morning and evening at Profit Gym Malang with 30 members. Sampling in this study was also carried out by purposive sampling technique. Sampling will be divided

into two groups, namely the group that trains in the morning with a group that practices at night to measure the normal levels of IL-1 β . This study uses a mix impact aerobics gymnastic sample with the following criteria: (1) Hobbyists of mixed impact aerobics who are actively practicing at the Gym Profit and Vina Gymnastics Studio in Malang City with 30 people. (2) Gender Women aged 20-25 years. (3) Having a normal Body Mass Index (BMI) category, 18-23. (4) Active in the practice of morning and evening training. (5) Not taking drugs or smoking. (6) Does not have a history of disease.

The study began on April 15-23 April 2018. Blood sampling in the sports groups in the morning and evening was conducted at Profit Gym Malang on Jl. Raya Sigura-gura Barat, Sumbersari and Sanggar Senam Vina Jl. Raya Sutami Dam. Meanwhile, for the analysis of blood levels IL-1 β in the Laboratory of Physiology, Faculty of Medicine, Universitas Brawijaya, Malang.

There are two types of instruments used in this study, namely test instruments and non-test instruments. The test instruments used in this study consisted of medical equipment and laboratory equipment used for blood sampling and examination of the levels of IL-1 β in the blood as follows; Material: Plaster, Alcohol swab, EDTA tube Tools: Height measuring instruments, Weight Scales Tourniquet, 5 ml injection syringe, Spectrophotometer. The non-test instruments used in this study were questionnaires. The commissioner used to dig up information about the characteristics of the study sample such as: habit or routine research samples in doing aerobic exercise mix the impact of morning and night, the habit of not smoking the study sample, the consumption of drugs sample study and disease history of the study sample.

The procedure in data collection that will be carried out starting from the initial stage to the end is as follows; (1) Submitting a research permit that was approved if the Deputy Dean 1 of the Faculty of Sports Sciences, State University of Malang, was addressed to the research site. (2) Contact to submit a research permit and complete all administrative requirements according to the established procedure. (3) Research begins by giving informed consent forms to all research samples. (4) Fill out the questionnaire for the research sample. (5) The research sample was asked to do mix impact aerobics in the morning and evening like their usual routine. (6) Taking blood samples is done after the pulse returns to normal after mix impact aerobics. Blood sampling is carried out by nurses who are experts in their fields. (7) The sample of venous blood was taken in mediana cubiti as much as 5 ml and put into EDTA tube. (8) After the blood sample is collected, then the blood sample is taken to the Brawijaya University Malang Laboratory for analysis of blood levels of IL-1 β .

The normality test used is Shapiro - Wilk because the data analyzed amounts to 30 samples, use $\alpha = 5\%$ or $\alpha = 0.05$ (significance level / trust) where: If $P > \alpha$, then H_0 is accepted which means normal distribution data. If $P < \alpha$, then H_0 is rejected which means the distribution data is not normal. Homogeneity test using the Levene Test of Equality of Variance test with $\alpha = 5\%$ or $\alpha = 0.05$. The homogeneity test is conducted to find out that the study sample has the same initial conditions or not, where: If $P > \alpha$, then H_0 is accepted which means homogeneous data. If $P < \alpha$, then H_0 is rejected which means the data is not homogeneous.

Analysis of Variance (ANOVA) is a variance analysis which in this case is intended to determine the level of IL-1 β in blood plasma in aerobic mix exercises impacting morning and night, the significance level of error is 5% (0.05). Anova test uses One Way Anova. With hypothesis testing using probability: (1) If $P < 0.01$ then $H_0 =$ rejected and $H_1 =$ accepted (significant). (2) If $P > 0.01$ then $H_0 =$ accepted and $H_1 =$ rejected (not significant). Data analysis in the questionnaire is descriptive statistical data analysis. The data analysis was carried out using the Statistical Package of Social Science (SPSS) program for Windows 24.0.

3. RESULTS

The results of data analysis are presented through descriptions of research variables based on descriptive statistical data analysis. Descriptions of the variables presented in this study include age variables, height variables, weight variables, exercise habits variables, and data descriptions as a result of examination of Interleukin 1 Beta (IL- 1 β) levels. While some of the descriptive statistical analysis components presented in the study include the calculation of the average value (mean), calculation of the minimum value (min), calculation of the maximum value (max), and the percentage that describes the spread of data frequency.

The description of the variables of the morning and evening aerobics mix impact gymnastics group is presented to give an illustration of the characteristics of the aerobics mix impact gymnastics in the morning and evening. Data on the hobbyist characteristics of morning and evening aerobics mix impact were obtained from the results of questionnaire analysis given to all morning and evening aerobics mix impact hobbyists presented in this study covering age variables, height variables, weight variables, exercise habits variables, and description of data from Interleukin-1 Beta (IL-1 β) examination results.

Based on table I, it was seen that the Interleukin-1 Beta (IL-1 β) level in the night sports group was higher compared to the morning group.

Table 1. Average morning and night il-1 β levels

| | N | Mean(ng/ml) | St. deviation |
|---------------|----|-------------|---------------|
| Morning group | 15 | 218.9167 | 374.26322 |
| Night group | 15 | 495.9167 | 320.35794 |
| Total | 30 | 357.4167 | 370.14899 |

Therefore to see whether or not the comparison of each group is significant, an ANOVA test is needed, but before the ANOVA test is carried out the prerequisite test is carried out. From table 2, it can be concluded that the variables used are normally distributed because of the probability value (Sig.) > 0.05 .

Table 2. Normality test result for the interleukin-1 beta (il-1 β) group in the morning and night

| | Shapiro Wilk | Sig. |
|---------------|--------------|-------|
| Morning group | 0.968 | 0.175 |
| Night group | 0.980 | 0.175 |

The next requirement after the data is declared a normal distribution is that the data must be homogeneous. The test results for the homogeneity of Interleukin-1 Beta (IL-1 β) levels concluded that the distribution of IL-1 Beta level data is homogeneous (Sig. (0,319) > 0.05) (Table 3).

Table 3. Homogeneity test result for levels of interleukin-1 beta (il-1 β) in morning and night group

| | Levene's Statistic | df 1 | Df 2 | Sig. |
|--|--------------------|------|------|-------|
| Interleukin-1 Beta (IL-1 β) Level | 1031 | 1 | 28 | 0.319 |

After the normality test and homogeneity test were carried out, then ANOVA different test were carried out. The test concluded that H_0 is rejected. It's mean that both data did not have an identical average (Sig. $0.038 < 0.05$). The average of Interleukin-1 Beta (IL-1 β) level among night group was higher than in the morning (Table 4).

Table 4. Anova test results

| | F | Sig. |
|--|-------|-------|
| Interleukin-1 Beta (IL-1 β) Level | 4.742 | 0.038 |

4. DISCUSSION

Hobbyists of mixed impact aerobics in Vina gymnastics and gymnastics studios The GYM profit made as samples in this study were 30 hobbyists, the sex in this study was female. The study was divided into two groups, those who are accustomed to practicing in the morning and those who practice at night with age characteristics: (1) 10% or 3 hobbyists aged 20 years, (2) 27% or 8 hobbyists aged 21 years, (3) 50% or 15 hobbies are 22 years old, (4) 10% or 3 hobbyists are 23 years old, and (4) 3% or 1 hobbyist is 25 years old. Broadly speaking, the average age of mixed impact aerobics gymnastics hobbyists in Vina gymnastics and GYM Profit gymnasia which were sampled in this study was 50% or rounded up to 22 years.

Judging from the Body Mass Index (BMI) 30 mix impact aerobics hobbyists in Vina gymnastics and gymnastics studios, the GYM Profit that was sampled in this study had a normal category. The normality of the IMT was made as one of the prerequisites of the research sample in a purposive sampling so that the results of IL-1 β levels in mix impact aerobics hobbyists in Vina gymnastics and GYM Profit gymnasia showed more results as a result of mixed impact aerobics exercises in the morning and evening and not a result of abnormal body mass index (BMI).

Judging from the practice of morning and evening exercises, hobbyists of mixed impact aerobics in Vina gymnastics and gymnastics studios, the GYM profit that was sampled in this study was variable frequency of exercise per week, in the morning trained group of hobbyists (1) 20% or 3 hobbyists practice once a week, (2) 54% or 8 hobbyists practice twice a week and (3) 26% or 4 hobbyists practice 3 times a week. In the group of trained hobbies at night as much as 20% or 3 hobbyists practice once a week, (2) 60% or 9 hobbyists practice twice a week and (3) 20% or 3 hobbyists practice 3 times a week.

Judging from smoking habits, 100% of mixed impact aerobics gymnastics hobbyists in Vina gymnastics and gymnastics studios, GYM Profit that were sampled in this study did not have smoking habits. Judging from the history of the disease or consuming drugs 100% of the mix impact aerobics gymnastics hobbyists in Vina gymnastics and gymnastics studios, the GYM Profit that was sampled in this study did not consume drugs or history of the disease or in a healthy state. As well as the variable smoking habits, consuming drugs and history of the disease, the sample was also used as one of the prerequisites for the study sample by purposive sampling. This was done to avoid an increase in IL-1 β levels as a result of sample smoking habits but because of the influence of mix impact aerobic exercise in the morning and evening Level of IL-1 β in Mix Impact Aerobics Gymnastics in the Morning Students in

the Mix Impact aerobics gymnastics in the morning at the Vina gymnasium and gymnastics studio The GYM profit that was sampled in this study had an average IL-1 β level in blood plasma of 1218,917 (ng / ml). The lowest IL-1 β levels in mix impact aerobics hobbyists in Vina gymnastics and gymnastics studio GYM Profit that were sampled in the study were at S14 of 578,250 (ng / ml). And the highest level of IL-1 β in the sample contained in S9 was 1705.75 (ng / ml). The high and low IL-1 β that occurs in these samples is influenced by many factors. One of the factors that influence the high and low in IL-1 β in the sample is the level of exercise frequency. The highest levels were found in the S9 sample with a frequency of exercise twice a week, while the lowest levels were found in the S14 sample with a frequency of exercise 3 times a week.

Increased levels of IL-1 β were also significantly affected by the frequency of exercise. This has been proven in research discusses about irregular training and the frequency of improper exercise causing an imperfect body adaptation process [4]. The imperfect adaptation process causes no coping mechanism and the stressor will disrupt the homeostatic process in the body. Irregular exercise can increase acute response which can increase free radical production [1][12][13]. The statement was also reinforced that exercises carried out irregularly caused an increase in the level of anti-oxidants which was greater than the pro-oxidant, resulting in an increase in oxidative stress [14].

Levels of IL-1 β at Night Mix Impact Aerobics Students who mix Mix Impact aerobics gymnastics at Vina gymnastics and gymnastics studios at night in GYM Profit that were sampled in this study had an average IL-1 β level in blood plasma of 1495,916 (ng / ml). The lowest levels of IL-1 β in the students of Mix Impact aerobics gymnastics at night in the Vina gymnasium and gymnastics studio GYM Profit that was sampled in the study were in S3 with an IL-1 β value of 397,000 (ng / ml). And the highest level of IL-1 β in the sample was found in S1 with an IL-1 β value of 1890,750 (ng / ml). The high and low levels of IL-1 β that occur in these samples are influenced by many factors. One of the factors that influence the high and low levels of IL-1 β in the sample is the level of exercise frequency. Where the highest levels were found in S1 samples with the frequency of exercise samples used to exercise with frequency 1 time a week, and the lowest levels were found in S3 samples with a frequency of exercise twice a week.

In this case the difference between the sample of hobbyists who practice the morning is frequency. More frequency of morning exercise hobbies. The decrease in IL-1 β levels was also significantly affected by the frequency of exercise. This is evidenced by previous researchers by Radak et al that regular exercise can cause proteasome complex activity that is significantly

involved in the degradation of oxidatively modified proteins, increasing levels of protein turnover with exercise reducing accumulation of oxidative damage [15].

Comparison of IL-1 β Levels in Mix Impact Aerobics Hobbyists in the Morning and Night Based on the results of the statistical test in the table, it shows the average value of 1218,916 (ng / ml) from the morning aerobic mix impact and the mean value of 1495,916 (ng / ml) from aerobics exercises at night impact mix with a significance level of 5% (0, 05). From these results, the aerobics mix at night has a difference of more than 277 (ng / ml) from the aerobics mix in the morning. From this we can conclude that aerobic exercise at night mix has a significant difference with aerobic exercise in the morning mix impact on IL-1 β levels. One of the points from the questionnaire given to the sample was the frequency of exercises conducted in the morning having an average of 2-3 times per week, while the Mix impact aerobics performed at night had an average of 1-2 times per week.

Increased levels of IL-1 β were also significantly affected by the frequency of exercise. This has been proven in research that discusses about irregular training and the frequency of improper exercise which causes an imperfect body adaptation process [4]. 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%. Regular exercise can reduce the production of free radicals with a mechanism to increase proteasome activity and DNA repair enzymes, decrease DNA bonds with sensitive transcription factors such as (NF-kB, AP-1, MAPK, and CREB) and increase production of GPx and MnSOD which can cause homeostasis in the body [7] [16].

Aerobic exercise measurement results Impact mix at night has an average level of blood IL-1 β higher than morning mix aerobic exercise in the morning, this proves that exercise can reduce levels of IL-1 β in the blood that regular exercise three times a week can reduce inflammation inside body compared to exercise once a week. Basically 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 not exercising at all, judging from the increase in IL-1 β levels in the blood. However, it is more advisable to exercise 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 carried out with the right frequency or regularly can increase adaptation to oxidants and reduce the incidence of oxidative stress [15]. Regular long-term exercise can improve the body's antioxidant abilities, so it can help maintain the balance of oxidation reduction [2]. Regular exercises can also affect lipid profiles and reduce cardiovascular risk [17]. Regular exercise with the right dose can increase VO $_2$ max, increase antioxidant by 13% and can reduce ROS by 20%. However, exercises carried out with inappropriate frequency and dosage will increase free radicals which will have a negative impact on tissue damage and cell damage [2] [3].

The other factors that can also influence the results are training time. In this study mix impact aerobic exercise carried out in the morning and evening there was a significant difference, this was reinforced by a theory relating to the influence of morning and night sports stating that exercise carried out at night causes interference circadian rhythm [5]. Disruption of the circadian rhythm will cause a decrease in the concentration of melatonin and its activity as an anti-oxidant. Decreasing the concentration of melatonin and its activity as an anti-oxidant will have an impact on increasing reactive oxygen species (ROS) in cells that cause oxidative stress. Free radicals can damage important cell components if they are not able to be suppressed by the anti-oxidants available in the body [6]. High free radicals in the body will cause oxidative stress which is an imbalance between pro-oxidants (free radicals) and anti-oxidants, namely the number of free radicals is greater than the number of anti-oxidants [7]. Peake et al., in their study entitled expression and secretion of cytokines by skeletal muscle cells: regulatory mechanisms and effects of exercise revealed, "Moderate to high aerobic exercise stimulates an increase in circulating concentrations of interleukin IL-6, IL-8, IL-10, IL-1 receptor antagonists, granulocyte-colony stimulating factor, and small increases in tumor necrosis factor- α , monocyte chemoattractant protein-1, IL-1 β , brain derived neurotrophic factor (BDNF), IL-12p35 / p40 and IL-15 " [10]. Therefore, the physical exercise of mixed impact aerobics in the morning has a lot of antioxidants because the ability of hemoglobin to bind O $_2$ increases so that it suppresses free radicals. From this theory it can be concluded that exercise carried out in the morning and evening affects the increase in free radicals in the body due to the ability of hemoglobin to bind O $_2$. From the data in this study there are differences seen from the increase in levels of IL-1 β in the blood, nighttime has a higher level of inflammation than in the morning.

5. CONCLUSION

Based on the results and discussion above, conclusions can be obtained, namely: (1) Mix impact

aerobics performed at night has inflammation as indicated by IL-1 β levels higher than mix impact aerobics performed in the morning. This is evidenced by showing IL-1 β levels in the mix impact aerobics gymnastics group conducted at night having an average of 1495,916 (ng / ml). (2) Mix impact aerobic exercise carried out in the morning has inflammation as indicated by IL-1 β levels lower than mix impact aerobics performed at night. This is evidenced by showing IL-1 β levels in the mix impact aerobics group conducted in the morning having an average of 1218,917 (ng / ml). (3) Based on the different ANOVA test with a significant level of $P > 0.05$, it shows that there are significant differences in IL-1 β levels in the group Aerobics mix impact exercises in the morning and at night aerobic mix impact exercises, namely Sig. 0.038. 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 IL-1 β levels especially in regular exercise because it can reduce blood IL-1 β levels more and reduce inflammation due to cell damage. (2) The next researcher is expected to examine the effect of exercise on IL-1 β with a longer and homogeneous treatment in order to obtain significant results.

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