

The Effect of Regular and Unregular Exercise against Network Damage

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Abstract

The purpose of this study was to determine the difference in the effect of regular and irregular exercise on tissue damage, while the indicator used to determine tissue damage was creatine kinase. This study is an experimental laboratory study with a randomized control group post-test-only design, using a sample of 39 male Rattus norvegicus strain wistar mice divided into 3 groups consisting of: swimming exercise group regularly with exercise frequency 3 times per week, swimming training group irregularly. With irregular exercise frequency and control group who were not given swimming training. The treatment was carried out for 3 months. From the results of the study, the following results were obtained: there was a very significant difference ($p < 0.01$) between the groups of regular and irregular exercise on tissue damage, where irregular exercise has a greater effect on tissue damage. Based on the results of the study, it can be concluded that irregular exercise has a greater potential for tissue damage than regular exercise.

Keywords

regular exercise; irregular exercise; and tissue damage



I. Introduction

Exercise is one of the basic human needs. By doing regular exercise there will be an increase in the functional systems in the body. Along with technological advances, there is a change in the lifestyle of people who tend to be lazy to move. Therefore, WHO launched the slogan "move for health™" that is moving to be healthy (WHO, 2002:3). But in reality, not all movement can nourish the body. Based on research from the NHLBI (National Heart, Lung, and Blood Institute) which is an institution in the United States that handles heart, lung, and blood health, states that more than 70% of Americans who are busy with their work have a tendency to exercise regularly. The concept of primary health care as a Gatekeeper was developed by the Johns Hopkins University Primary Care Center, covering 4 main domains namely first contact care (continuity function), continuity care, coordination care and comprehensiveness care (comprehensiveness care) service (Novita et al, 2020). Mu'rifah in Hasibuan et al (2019) stated about personal health, namely that someone will try to maintain and increase their own level of health in order to achieve peace of life and have the best workforce.

Everyone already knows that by doing exercise there will be an increase in body fitness. But exercise does not always have a good effect on the body. Exercise is a form of physical stressor, therefore exercise that does not heed the basic principles of exercise will have the potential to cause health problems. Some studies say that exercise has the potential to cause tissue damage. Tissue damage due to physical exercise has been widely disclosed. But how the potential for tissue damage due to irregular exercise has not received serious attention. One theory that can be used to explain the occurrence of tissue damage is the free radical theory.

So, in this study the researchers wanted to reveal about how the effect of regular exercise on tissue damage, how the effect of irregular exercise on tissue damage and how the different effects between regular exercise and irregular exercise on tissue damage.

By doing this research, it is hoped that people will know that exercise does not always have a positive impact on health. Exercise that is done irregularly actually has a greater potential for tissue damage than regular exercise.

II. Review of Literature

Free radicals can be defined as atoms or a group of atoms that have one or more unpaired electrons in their outermost orbital, (Halliwell, 1991:14; Marieb, 2001:81; Mayes, 1993:217). By all aerobic organisms including humans. Aerobic organisms require oxygen (O₂) to form energy in the form of adenosine triphosphate (ATP) through an oxidation process that occurs in the mitochondria. The formation of oxygen free radicals is the main cause of cell or tissue damage in physical exercise (Sjodin. 1990:236). Below, the process of free radical formation during exercise will be divided into 6, namely: (1) formation of free radicals due to xanthine oxidase, (2) formation of free radicals during respiration, (3) formation of free radicals due to the production of lactic acid. (4) formation of free radicals due to ischemia and reperfusion. (5) free radical formation due to catecholamine autoxidation and (6) free radical formation due to inflammation.

Tissue damage is a condition in the body that causes impaired function of a tissue. According to Halliwell & Gutteridge (1999: 246) one of the things that triggers tissue damage is an imbalance between the production of oxidants and antioxidants (stress. oxidative). One theory that can be used to explain the occurrence of tissue damage due to exercise is the theory of free radicals (Pincemail, 1995:87; Toskullkao & Glinsukon, 1996:67). One of the effects of free radicals is tissue damage, if this continues it will cause disturbances in various organs. According to Orji and Yakubu (2020) stress will be categorized into five. They are: 1) Physical stress: There are many physical sources of stress such as work overload, irregular work hours, loss of sleep, noise, improper lighting, trauma (injury, infection, surgery), intense physical labor/over-exertion, environmental pollution (pesticides, herbicides, toxins, heavy metals, inadequate light, radiation, noise, electromagnetic fields), illness (viral, bacterial, or fungal agents), fatigue, inadequate oxygen supply, hypoglycemia (low blood sugar), hormonal and/or biochemical imbalances, dietary stress (nutritional deficiencies, food allergies and sensitivities, unhealthy eating habits), dehydration, substance abuse, dental challenges, and musculo-skeletal misalignments/imbbalances. 2) Psychological stress: when we have psychological stress we can experience a variety of symptoms including anxiety and nervousness, panic attacks, physical sensations. 3) Emotional stress: Emotional stress can be considered to be processed by way of an 'inhibition-implosion' dimension (to implode means to collapse or cause to collapse inwards in a violent manner as a result of external pressure), modulated by dispositional factors (innate, personality and socialization). It can produce marked elevations of BP that can outlast the stimulus. Feelings of tension, conflicted relationship, irritability, restlessness, worries, inability to relax, depression, anxiety, low sex drive, mood swings, compulsive behavior, memory and concentration problems. One can cope with emotional stress by practicing mindfulness, distract yourself, block off time, practice meditation, talk to a therapist, etc. 4) Environmental stress: Stressors that are found in our surroundings are called environmental stressors. Everyday life is full of environmental stressors that cause minor irritations. If you use an alarm clock to wake up, the loud noise from your alarm is an environmental stressor. Extreme temperatures are also

environmental stressors and can lead to discomfort. Other common environmental stressors include: environment uncertainties, political, technological uncertainties that influence the organization's structure as well as the employees in that organization. Recent research has linked extreme temperature, crowding and noise with increased levels of discomfort and aggression. The political threats and changes induce stress among employees. New innovations can make an employee's skill and experience obsolete in a very short period of time. 5) Economic stress is the feeling of stress due to the current state of one's personal finances and/or due to fear about the economy. Although some stress can be healthy, in the way that it can give someone the energy and initiative to take needed actions or encourages the person to challenge him/herself.

The occurrence of tissue damage is not only caused by free radicals. Other factors that cause tissue damage include: heat stroke, cold attacks, trauma, ischemia-reperfusion, exercise, toxins, radiation, and infection (Halliwell & Gutteridge. 1999: 620). Stroke is the third most common cause of death after heart disease and cancer and ranked first as a cause of disability (WHO in Mulyanti et al, 2020). Of all strokes, about 80% are ischemic strokes. Ischemic stroke occurs when the arterial blood flow that supplies oxygen to the brain is blocked (Mozaffarian et al., 2015).

III. Research Methods

This study is an experimental laboratory study, with a randomized control group post-test-only design. The sample used in this study was a single strain of *Rattus norvegicus* strain wistar rats, which consisted of 39 males. In this study the rats were divided into 3 groups consisting of: (1) 13 control groups, (2) 13 regular swimming exercise groups and (3) 13 irregular swimming exercise groups.

The research data were collected by means of laboratory examination through the blood analysis unit taken from the orbital sinus opticus at 5 minutes after the experimental animals were given the last swimming exercise. Data collection was carried out at the Prodia Laboratory. To test the hypothesis, the Anova difference test was used followed by the Tukey HSD test with a confidence level of $\alpha = 0.01$.

IV. Results and Discussion

4.1 Results

From the research data, the mean value in the control group was 129.3964, in the regular exercise group it was 55.8391 and in the irregular exercise group it had a mean value of 126.3373. After the Tukey test on creatine kinase levels, the following results were obtained:

There was a very significant difference in the effect between the regular exercise group and the control group on tissue damage ($p < 0.01$). There was no significant difference in the effect between the irregular exercise group and the control group on tissue damage ($p > 0.01$). There was a very significant difference in the effect between the regular and irregular exercise groups on tissue damage ($p < 0.01$).

4.2 Discussion

a. Effects of Regular Exercise on Tissue Damage

The results showed that the regular exercise group had a lower mean value (55,8391) than the control group (129,3964). The results of this study are supported by a similar

study conducted by Patellongi (2003:16) that there are differences in the level of tissue damage in trained and untrained subjects.

Exercise that is carried out continuously will protect the negative effects of exercise caused by increased production of free radicals. This happens because in exercise there has been an adaptation in forming antioxidants in every skeletal muscle and heart muscle (Leeuwenburgh & Heinecke, 2001: 836). Creatine kinase levels were higher in the control group (the group that was not given an exercise program for + 3 months) this was due to: the control group was still unable to respond to stressors as stimulators.

b. Effects of Irregular Exercise on Tissue Damage

The results of the study were that the irregular exercise group had a mean value of 126.3373 while the control group had a mean value of 129.3964. After the Tukey test, it was found that there was no significant difference between the control group and the irregular exercise group (with p of 0.472). These results indicate that untrained rats (control group) when subjected to physical exercise will increase creatine kinase levels, this indicates that tissue damage has occurred, as well as in irregular exercise.

Based on the results of this study, irregular exercise had almost the same response as the control group. So that between irregular exercise and not doing exercise both have the potential to cause tissue damage, but the mean value states that the control group has a greater potential for tissue damage. The results of this study are supported by research from Halperin (2004: 1) which states that exercise performed with an irregular frequency will result in short breaths, chest tightness, and also heart attacks (Halperin, 2004: 1). The person's heart muscle has tissue damage.

c. Differences in the Effects of Regular Exercise and Irregular Exercise on Tissue Damage

Based on the results of the study, there was a significant difference between regular and irregular exercise on tissue damage (with $p < 0.01$) which could be seen from the Tukey test on the creatine kinase variable. The mean value between regular exercise (55,8391) and irregular exercise (126,3373).

These data show that the keratin kinase in the regular exercise group has a lower mean than the irregular exercise group. This indicates that in regular exercise there is a perfect adaptation process so that tissue damage can be avoided. The results of this study are the same as the results of research conducted by Aslan et al (1998: 411) which states that people who exercise regularly can improve body condition due to decreased fat peroxidation, besides that regular exercise can increase the antioxidant system and can also reduce the risk of tissue damage.

In the irregular exercise group, the mean (126,3373) was higher than the regular exercise group, which means that the irregular exercise group had a greater possibility of tissue damage than the regular exercise group. The results of this study are supported by research from Vnis (2004:12) which states that antioxidants can protect against tissue damage. And the formation of free radicals during exercise is the key to tissue damage due to exercise. In regular exercise, the production of antioxidants can protect against tissue damage due to physical exercise (Frank, 1996: 9), because regular exercise has a good adaptation process to produce these antioxidants.

Meanwhile, irregular exercise has a longer adaptation time to the schedule of giving exercise (Austin, 2004: 1), therefore the production of antioxidants is not able to reduce the negative impact of free radicals. This is in accordance with the results of research which states that irregular exercise has greater potential for tissue damage than regular exercise.

V. Conclusion

Regular exercise has no effect on the occurrence of tissue damage, it is characterized by creatine kinase levels in regular exercise lower than normal levels. While the irregular exercise has creatine kinase levels that are higher than normal levels, this means that irregular exercise affects the occurrence of tissue damage. The risk of tissue damage in regular exercise is smaller when compared to irregular exercise.

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