



Original Article

## Exercise pulse frequency reviewed from sport activities

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### ABSTRACT

*Pulse rate is one indicator that indicates that the heart and circulatory systems in the body are working. The pulse can be used to analyze the functional abilities of a person's body, which of course is influenced by the activity of the body itself. The purpose of this study intends to examine the differences in the frequency of exercise pulse in terms of the type of activity or exercise, and in this study the type of sports activity carried out is the type of aerobic and anaerobic exercise. This type of research is quantitative descriptive research with a survey method approach. The number of respondents involved in the research was 31 people, namely students of the physical education study program STKIP Pasundan class of 2021. The research instrument used an exercise pulse test measured for 60 seconds on the wrist, while for research data analysis techniques using descriptive statistics. The results showed that the average frequency of the initial pulse or resting pulse of 31 respondents showed an average value of 79.9 times per minute, then after doing anaerobic exercise activity was 151.58 and the average pulse rate after doing aerobic activity was 149.58. The conclusion is that there appears to be a slight difference in the average frequency of the training pulse in terms of the type of training activity. Anaerobic exercise activity has a greater increase in average value than aerobic activity.*

**Keyword:** Pulse, Exercise, Sport Activities.

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## INTRODUCTION

Physical activity, or exercise, has immediate impacts on the cardiovascular system that might last for a long time. The acute effect of exercise is to increase the pulse rate and breathing frequency (Arya Maulana et al., 2023). Pulse is a wave felt in the arteries caused by the pumping of blood by the heart to the blood

vessels (Sandi, 2016). The chronic effects of exercise are to increase the heart rate, especially the left ventricle, increase blood supply, lower resting pulse rate, normalize blood pressure, and improve blood distribution (Makawekes et al., 2020). Heart rate frequency can easily be measured by measuring the pulse.

The increase in pulse frequency is caused because during exercise, the need blood to transport oxygen to active body tissues will increase (Tanzila & Bustan, 2017). In addition to acute effects, exercise also causes chronic effects, namely in the form of a decrease in the frequency of resting pulses. Heart rate or pulse rate is controlled by the nervous system. Changes in heart rate, both increasing and decreasing it are regulated by sympathetic and parasympathetic activity (Syiafuddin, 2012).

Each exercise activity carried out certainly has a different effect on the pulse rate, this is because the higher the energy needed, the higher the O<sub>2</sub> needed, and the higher the frequency of heart rate. Sports activities according to the energy system are divided into two types, namely aerobic activity and anaerobic activity (Saifu & Rusli, 2017). The type of exercise activity in sports can be seen from the type of activity, whether it is aerobic or anaerobic (Supriatna, 2016).

In order for the process of burning energy sources to proceed as smoothly as possible, aerobic exercise depends on the availability of oxygen. As a result, it also depends on the body's organs, including the heart, lungs, and blood vessels, performing at their best to transport oxygen (Sandi, 2019). Low-to-moderate intensity exercise that is done on a regular basis is called aerobic exercise, such as: walking, running, cycling and jogging (Novita Sari Harahap & Urat Purnama Pahutar, 2017). Anaerobic exercise, on the other hand, is a high-intensity activity that burns energy quickly and cannot be done continuously for an extended period of time (Palar et al., 2015). It is also explained that anaerobic physical activity is exercise that uses energy from burning without oxygen, in this case the exercise incurs oxygen debt and discharge (Hita, 2020). Examples of anaerobic physical activity are short-distance running or exercises that are done quickly with maximum strength (Park & Kwak, 2016). To increase anaerobic capacity, exercise with maximum weights is given with a rest of 4 to 5 minutes. In the rest period it should not rest completely, but still it should be active (Saifu & Rusli,

2017). Anaerobic exercise requires rest intervals so that adenosine triphosphate can be regenerated, so that it can resume activities (Afera & Siantoro, 2022). The energy used by the body to perform activities that require energy quickly is obtained through anaerobic glycolysis of glucose, as well as through phosphocreatine hydrolysis (Patel et al., 2017). These studies do not describe the extent of the increase in pulse rate in each type of activity, both in aerobic activity and anaerobic activity. That's where it seems that there is still a void in some previous studies, so here researchers are interested in conducting research on pulse frequency analysis in terms of the type of activity, and therein lies the novelty in this study.

Knowing the impact of these activities on increasing pulse rate becomes very useful for a coach, because it can later help choose which activities are suitable to increase the pulse rate of his athlete. This study intends to examine the differences in the frequency of exercise pulse rate in terms of the type of activity or exercise, and in this study the type of sports activity carried out is the type of aerobic and anaerobic exercise, so it is expected to provide knowledge information about the difference in the increase in exercise pulse rate in terms of aerobic activity and also anaerobic activity.

## METHOD

This research is a descriptive research with a survey method approach, where researchers analyze the findings directly from what respondents have done. The population used in this study is all students of PJKR STKIP Pasundan Class of 2021. The sampling technique uses *cluster sampling technique*, where researchers only take one class out of a total of 10 classes and there are 31 people involved as subjects of this study. This is due to the ease and suitability of researchers who directly teach the class, so that research is more economical and practical.

In this study researchers used an exercise pulse measurement test instrument calculated for 60 seconds / 1 minute, which is a pulse rate measurement carried out after doing a form of exercise / greeting activity a set, where the pulse measurement is done on the wrist. This is because the pulse can be felt or palpated

in arteries close to the surface of the body, one of which is the radial artery located in front of the wrist (Ganong, 2008).

The stage in the research is the first way respondents calculate the resting pulse rate or normal pulse rate, which is then continued by warming up independently and structured until the pulse rate increases in the range of 50-60% of the initial pulse rate. After that, respondents are welcome to do aerobic and anaerobic exercise activities in at different times. Then after finishing directly, respondents were required to count their pulse for 60 seconds. The technique used in research data analysis is to use descriptive statistics.

## **RESULT AND DISCUSSION**

### **Result**

Based on the results of research that has been conducted, where each respondent did anaerobic and aerobic exercise activities, namely push ups for 30 seconds for 3 sets, and shuttle run with a distance of 10 meters is carried out at a speed of 60% of the maximum speed for 5 minutes as many as 2 sets. And obtained the results of the training pulse of 31 respondents as follows:

Table 1. Respondents' Pulse Results

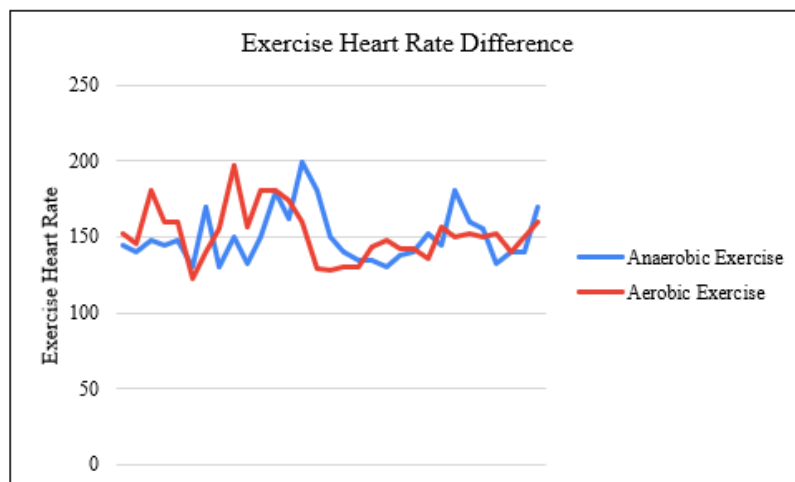
Subject No.	Rest Hate Rate (bpm)	Training Hate Rate (bpm)	
		Aerobic Exercise	Anaerobic Exercise
1	84	144	152
2	80	140	145
3	84	148	180
4	76	144	160
5	88	148	160
6	85	130	122
7	84	170	140
8	88	130	155
9	80	150	182
10	80	132	156
11	88	150	180
12	92	179	180
13	88	162	174
14	64	199	160
15	64	180	129
16	65	150	128
17	60	140	130
18	75	134	130
19	80	134	143

20	80	130	148
21	72	138	142
22	82	140	142
23	80	152	136
24	78	144	156
25	90	180	150
26	80	160	152
27	80	155	150
28	75	132	152
29	78	140	140
30	89	140	150
31	87	170	160

Table 2. Description of Exercise Pulse Test Results

Activity	N	Min	Max	Mean	Std. D
Anaerobic Exercise	31	130	199	151.58	17.3
Aerobic Exercise	31	122	197	149.58	17.5
Valid N (listwise)	31				

Based on table 1, it can be seen directly that there is an average difference in the amount of training pulse from the activity performed, where the average results of the pulse of exercise with the type of anaerobic exercise, namely respondents doing push up exercises for 30 seconds have an average value of the pulse rate of 151.58 times per minute with a standard deviation of 17.3, while the average results of the pulse of exercise with the type of aerobic exercise are respondents doing The five-minute shuttle run exercise had an average pulse rate of 149.58 times per minute with a standard deviation of 17.5. As for the minimum value obtained from anaerobic activity, which is 130 times per minute, while in aerobic activity it is 122 times per minute. Then for the maximum value in the type of aerobic activity obtained the pulse rate 199 times per minute, while in aerobic activity obtained the pulse rate 197 times per minute. For more details on the difference in training pulse frequency can be seen in the following graphic image:



**Figure 1.** Training Pulse Frequency Graph in terms of Training Type

If you look carefully from figure 1, it appears that anaerobic activity is slightly more able to increase the pulse rate higher than aerobic activity. However, it still appears that some respondents actually increase their exercise pulse rate higher if doing aerobic activity. This indicates that the ability of the pulse can indeed be affected by the type of activity, but it will also be influenced by the functional ability of a person's body.

## Discussion

Based on the results of the study that has been explained that there is a slight difference in the average frequency of the pulse of exercise in terms of the type of exercise activity. Anaerobic exercise activity had a greater increase in average value than aerobic activity, where the initial pulse rate of the respondents had an average value of 79.9 times per minute. This indicates that anaerobic activity has a greater impact on increasing pulse rate, the heavier the type of activity performed the greater the energy needed (Atan & Alacam, 2015), so that when the energy requirement is greater it will affect the need for more oxygen (Saunders et al., 2004), and when the need for more oxygen the body will respond by increasing the frequency of breathing and heart work, so the heart rate will be faster (Sammito & Böckelmann, 2016). This is also in line with other studies that say that one of the factors for increasing pulse rate is the lightness or severity of exercise intensity (Tanzila & Bustan, 2017), the heavier the exercise activity carried out, the faster the need for metabolic processes in the body, and this is the

need and scheme of the anaerobic work system that uses its main source is ATP (Saptono et al., 2021), which will be directly reshaped after the completion of the activity.

In addition, the results of this study also showed that aerobic exercise type activities in the form of shuttle runs for 5 minutes can increase the frequency of exercise pulse to around an average of 149.58. This also indicates that with a relatively stable oxygen transport system, the exercise pulse rate is not too high. Exercise with aerobic activity can also have a good impact on the body, especially for body immunity (Maulana et al., 2020), because other studies say aerobic activity can increase the number of *leukocyte* on the body that can help strengthen antibodies in the body (Novita Sari Harahap & Urat Purnama Pahutar, 2017). While other studies say that the average pulse frequency when given 2x30 minutes of exercise is  $159.22 \pm 3.70$  (Sandi, 2016), where this result is much greater than the average pulse result made by the researchers. Even so, researchers assume that this is due to the duration of the exercise performed, where in this study only 5 minutes of activity was carried out, because one of the determining factors of the amount of pulse is the length of exercise activity (Myllymäki et al., 2012).

## CONCLUSION

Based on the results of research and discussion that has been described earlier, here researchers can conclude that the average pulse frequency of exercise with anaerobic activity is higher than with aerobic activity. However, here researchers do not directly analyze whether the difference is significant or not. Therefore, it is expected that the next researcher if you want to study this topic again, it is necessary to analyze the level of significance and also the increase in percentage. Especially for coaches must be smart in choosing forms or types of exercise that are in accordance with the characteristics of their sport, so that the training activities carried out have a positive effect on the development of the quality of athletes' performance.

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