

## EFFECTIVENESS OF BEE POLLEN ON RECOVERY OF SUBMAXIMAL EXERCISE PULSE RATE

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### Abstract

Exercise is an activity that is carried out systematically, and has been programmed, cyclical, regular and carried out several times using the capacity given progressively and has the aim of preparing itself in the development of individual quality to achieve certain goals. Pulse rate is an indicator that is needed by a person in order to know and carry out physical exercise properly. Energy is needed during physical exercise to move muscles and organs. To support the acceleration of recovery Bee Pollen contains antioxidant compounds useful for accelerating recovery back to normal. The method used is a quantitative method with the type of research Quasi Experiment. The research design is using pre post test control group design. From the results of the study, it is proven that the research hypothesis proves (H<sub>0</sub>) will be returned and (H<sub>a</sub>) is recognized or it can be interpreted that there is a significant difference between two or more groups or the average condition of pulse rate reduction over time. And it has been proven that there is a significant difference in supplementing Bee Pollen from both experimental and control groups for pulse rate recovery after submaximal exercise. so that the experimental group has a better recovery process compared to the control. This study provides that there is a significant effect of supplementing Bee Pollen in the experimental group on pulse rate after submaximal exercise and there is a significant difference in the effects of both experimental and control groups on heart rate after submaximal exercise.

Keywords: Heart Rate, Antioxidants, Pollen, Acceleration

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## Introduction

Training is an activity that is carried out systematically, and has been programmed, cyclical, regular and carried out several times using the capacity given progressively and has the aim of preparing oneself for the development of individual qualities to achieve certain goals (Sulastri & Mariati, 2018). The World Health Organization (WHO) revealed that regular physical exercise can impact the risk of CVD (cardiovascular disease) by reducing triglycerides and increasing HDL cholesterol, reducing blood pressure, increasing glucose

metabolism and insulin sensitivity, reducing body weight, and reducing the inflammatory response (Hamdani & Hasye, 2019). (Hamdani & Hasye, 2019). Sukarno, (2021) The aim of training is very crucial to consider the intensity of training and the recovery period. Physical exercise without thinking about it can cause damage to body organs. There are various types of training: low, light, medium, high, submaximal and maximum. This research focuses more on submaximal training. Submaximal exercise is exercise that approaches high intensity which is in the range of 80-90%. Excessive physical activity can result in the formation of free radicals and excessive physical exercise increases reactive oxygen species (ROS) in tissues, 2-5% of the oxygen used in metabolism is reduced to superoxide ions which are free radicals (Tarnajaya et al., 2018). (Hamdani & Hasye, 2019). Sukarno, (2021) The aim of training is very crucial to consider the intensity of training and the recovery period. Physical exercise without thinking about it can cause damage to body organs. There are various types of training: low, light, medium, high, submaximal and maximum. This research focuses more on submaximal training. Submaximal exercise is exercise that approaches high intensity which is in the range of 80-90%. Excessive physical activity can result in the formation of free radicals and excessive physical exercise increases reactive oxygen species (ROS) in tissues, 2-5% of the oxygen used in metabolism is reduced to superoxide ions which are free radicals (Tarnajaya et al., 2018). Some aspects of recovery such as lactic acid occur in a few minutes, while the repair of protein in the muscles will take several hours, which indicates that the heart rate will remain high after several minutes or even several hours after exercise so that the supply of oxygen and energy can help in this recovery period. Therefore, to support the acceleration of recovery carried out during this recovery phase, additional energy is needed so that later in this recovery phase we can get positive results so that in adaptation we will get good results and we can adjust to the portion of physical exercise given with several products such as consuming energy drinks and Bee Pollen.

Bee Pollen is a supplement product that comes from pollen attached to the body of bees and is added with a mixture of extracts and minerals. Bee Pollen means nutritional origin whose active components contain bioactive compounds such as lipids, minerals and vitamins which can increase the body's resistance (Khalifa et al., 2021b). Bee Pollen contains antioxidant compounds which are useful for increasing the body's endurance and improving performance (Emilia et al., 2017). Bee Pollen contains polyphenolic compounds and flavonoids (Salles et al., 2014). As a result, it can be assumed that with the many ingredients in Bee Pollen which are beneficial for health, Bee Pollen can be given and consumed, especially in this aspect, namely as a support for recovery of blood pressure and also immunity which will later have an impact on the quality of performance. body. Bee Pollen itself has been widely used for many years in various countries to prevent the use of doping which is not allowed to be used in sports because of the dangerous side effects for users. Using high nutritional content and minimal side effects, Bee Pollen is suitable for consumption with various benefits with the aim of supporting performance and recovery, especially in blood pressure. Based on the literature that researchers reviewed, there are still not many studies that examine the role of giving Bee Pollen supplements on blood pressure. With this aspect, researchers are interested in analyzing the benefits of Bee Pollen on blood pressure after exercising at submaximal intensity.

Based on the description above, this research was conducted with the aim of this research being to determine the effectiveness of Bee Pollen on the recovery of submaximal exercise heart rate.

## **Research methods**

The type of research used is a quantitative method with a Quasi Experimental research type. The research design was to use a pre-post test control group design. The population and

sample in this study consisted of students who were active in the 2021 class of the Bachelor of Sports Science Study Program, Faculty of Sports and Health Sciences, with a class of 142 people. This research involved a sample of 20 students selected using the simple random sampling method from 2 groups, namely 10 experimental and 10 control groups. This research uses data collection techniques using observation, test and measurement methods. The standard operational procedure for measuring pulse is carried out using a Heart Rate Sensor (Polar).

Tools used to measure the pulse rate of athletes/sportsmen include: Heart Rate Sensor, Ergocycle. The aim of this research is to use these tools to find out and record the results of the heart rate performance in this research. The data that has been collected will be analyzed to determine whether there is a relationship or influence between the two variables, namely the independent variable and the dependent variable. In this quantitative research, data analysis will be carried out using statistics and assisted by the Statistical Package for the Social Sciences (SPSS) software version 23. Before carrying out data analysis, it is necessary to test the analysis requirements, first the normality test, namely the Shapiro-Wilk. Next, several tests will be tested on the hypothesis, namely the Mauchly Test of Sphericity, Tests of Within-Subjects Effects, Pairwise Comparisons Test, and Overall Results Percentage Test.

### Results and Discussion

This study aims to test the effectiveness of Bee Pollen on the recovery of submaximal exercise heart rate. Data obtained on the characteristics of respondents showed that the majority of the 2021 students majoring in sports science at Surabaya State University were male.

Based on interest category percentage data, the average percentage of interest is obtained as follows:

Tabel 1. Karakteristik Responden

karakteristik	N = 20	
	N	%
<b>Usia (tahun)</b>		
19	8	40
20	9	45
21	3	15
<b>Tinggi badan (cm)</b>		
160 - 169	17	85
170 - 173	3	15
<b>Berat badan (kg)</b>		
58 - 65	16	80
66 - 69	4	20
<b>Indeks Massa Tubuh (IMT)</b>		
Normal	17	85
Kurus ( <i>Underweight</i> )	2	10
Gemuk ( <i>Overweight</i> )	1	5

Based on the respondents in this study, they consisted of several students who were said to be athletes who had trained regularly and had experience in submaximal training. And the characteristics of respondents include ages between 19-21 years with a relatively high level of physical fitness. The respondents were physically active individuals and regularly engaged in various types of submaximal exercise, such as cardio and general fitness. All respondents in this study were in good health and had no history of heart disease or medical conditions that could affect pulse recovery. Berdasarkan data hasil minat olahraga indoor dan outdoor diperoleh sebagai berikut:

Tabel 2. Hasil Uji Normalitas Data

Variabel	<i>P Value</i>	Sig.	Berdistribusi
Kontrol	0.743	0,05	Normal
Eksperimen	0.552		Normal

Based on table 2 above, from the control group data normality test, a p value of 0.743 was obtained and the experimental p value was 0.552, which means that the p value of the two groups was normally distributed. After knowing the level of normality of the data obtained from the tests that have been given. Then the Repeated Measures Anova test was carried out. To answer the hypothesis results in this research, the mean difference test is used using the f-test, namely the Repeated Measures Anova test. It can be seen in the following table.

Tabel 3. Tests of Within-Subjects Effects

Variabel	<i>Mauchly's Test of Sphericity<sup>a</sup></i>	<i>Sig. (2-Tailed)</i>
Kontrol	0.191	0.026
Eksperimen	0.639	0.633

Based on what was obtained by the control group, the significance value (Sig.) was  $0.026 < 0.05$ , so it can be stated that from this data there is the same variance. So the decision obtained refers to the assumed sphericity value, while the significance value (Sig.) obtained from the experiment is  $0.633 > 0.05$ , so it can be stated from the data that there is no similarity in variance. So the decision obtained refers to the Greenhouse-Geisser value in the Tests of within-subjects effects table.

Tabel 4. Tests of Within-Subjects Effects

Variabel	<i>Greenhouse-Geisser</i>	<i>Sig. (2-Tailed)</i>
Kontrol	33132.675	0.000
Eksperimen	44112.675	0.000

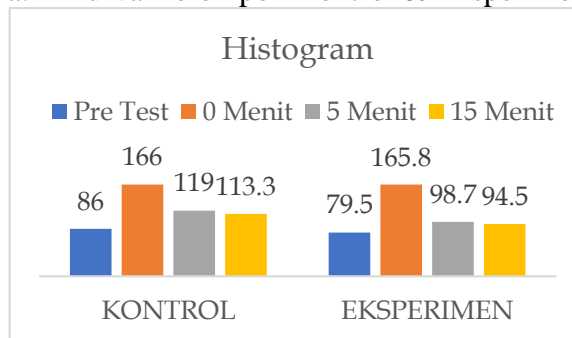
Based on table 4.8 output above, the Greenshouse-Geisser Sig value. is 0.000 which is less than 0.05. So, (H0) will be rejected and (Ha) accepted or it can be interpreted that there is a significant difference in the average value of the decrease in heart rate over time. So it was concluded that from the control and experimental groups the recovery process was able to reduce a person's pulse rate for the experiment to be really better.

Tabel 5. Uji Pairwise Comparisons

Variabel	<i>Waktu 1 ke waktu 4</i>	<i>Sig. (2-Tailed)</i>
Kontrol	Pre-Test ke Post Test	0.000
Eksperimen	Pre-Test ke Post Test	0.009

Based on table 4.12 output above, it is known that the Sig value. Pairwise Comparisons from time 1 to 4 are respectively  $0.000 < 0.05$  (control data) and  $0.009 < 0.05$  (experimental data). So the recovery of the pulse is said to be real. Thus it can be concluded that the class of the control group in the 15 minute rest period after submaximal exercise decreased so quickly compared to the experimental data.

a. Kurva Kelompok Kontrol & Eksperimen



The output image obtained shows a comparison of the average heart rate in the control and experimental group data over time which decreased so rapidly for the experimental group after resting during submaximal exercise.

**Conclusion**

Based on this research, it can be concluded that Bee Pollen has the potential to increase pulse recovery after submaximal exercise. The research results show that regular consumption of Bee Pollen can reduce pulse recovery time and speed up physical recovery after moderate intensity physical activity. This shows that Bee Pollen can be an effective supplement in improving athlete performance and recovery. As for suggestions as a researcher, there are definitely weaknesses and shortcomings and limitations. Namely, this research only focuses on one variable that is treated with consuming Bee Pollen supplements, namely the

experimental group. Therefore, the author suggests that further research examine other variables that are still related to Bee Pollen on pulse recovery. So that we can compare more accurate results from previous research.

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