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Oxygen Consumption and BB *Rattus novergicus* Obesity Sonde Treatment Glucomanan Porang Tubers and Moringa Leaf Extract

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ABSTRACT

Obesity or overweight is a disorder of the amount of weight that results in excessive accumulation of body fat and can pose a risk to the health of the body. This results in metabolism in the body and ends up increasing oxygen consumption in the body. The purpose of the study was to determine the amount of oxygen consumption and body weight of obese white rats (*Rattus norvegicus*) in the treatment of glucomannan porang tubers (*Amorphopallus muelleri* Blume) and Moringa leaf extract (*Moringa oleifera*). The research methods used are (1) Experimental methods prepared with Complete Random Design (RAL) in the form of Posttest Only Design using 8 treatment groups, (2) Documentation methods by documenting tools, research process materials and research results, (3) Literature methods by collecting data by looking for references to books, national and international journals and scientific papers. The results of this study stated the treatment of P2 with a body weight of 290 g with a volume of 9.93 x 10^{-4} ml / g.min. From this it can be concluded that the amount of oxygen 9.93 x 10^{-4} body weight 290 g results in increased oxygen consumption.

1. INTRODUCTION

Obesity is a condition where a person's weight exceeds a predetermined health standard. Obesity is a global problem, which every year experiences a very high increase per year. Not only in developed countries but also in developing countries in various countries. In 2016, the WHO stated that 39 % of adults aged 18 years and over were overweight and 13 % were obese. Most of the human population in the world is inhabited by humans who are overweight and obese. Obesity is a problem that causes more deaths compared to underweight people. In 2016, more than 340 million children and adolescents in the world aged 5-9 years were overweight or known as obesity. In Indonesia, according to Riskesdas 2018 data, it shows an increase in the prevalence of obesity in adolescents aged 16-18 years based on BMI / U in the last three periods, namely from 2010, 2013 and 2018 by 1.4 %, 1.6 % and 4 %. This shows that nationally obesity or overweight in children and adolescents and even adults is a health problem that is often experienced. Meanwhile, the prevalence of obesity in adolescents aged 16-18 years in South Sumantra Province based on the 2018 Riskedas is 2 % (Mardiana, 2022).

Obesity can be treated by going on a diet. A diet that is high in fiber is highly recommended to be one of the recommended diets for obese or overweight people. With the application of a high-fiber diet carried out, it is expected that someone who is obese can modify the nutritional arrangement and content in it and daily food portions by increasing high-fiber ingredients that are healthier also more than usual or exceed the recommended daily fiber intake. This high-fiber diet

aims to provide food intake according to the nutritional needs of the body that is high in fiber so as not to be excessive so that it can trigger intestinal peristalsis, so that the process of defecation becomes normal and does not experience problems. A high-fiber diet includes a diet that is good for health, easy to do, affordable and rich in benefits, especially for children and adolescents who are growing. This is because foods that contain high fiber are safer for the human body and most have a purchase price that is not too high so that anyone can buy and consume without an age limit (Zaki, 2021). Traditionally, dietary fiber is a part of the plant that can be consumed rich in benefits, composed of carbohydrates that are resistant to human digestive processes, can be absorbed in the small intestine and fermented partially or completely in the colon. For example, the fiber consumed is tubers that have a lot of glucomannan content such as porang tubers (*Amorphophallus muelleri* Blume) and Moringa leaf extract (*Moringa oleifera*). Glucomannan is 33 polysaccharides consisting of mannan groups such as monomers β-1,4 α-monnose and α-glucose. Glucomannan contained in porang tubers (*Amorphophallus muelleri* Blume) has benefits that can strengthen cells, improve texture, thicken, lower blood sugar levels, and reduce cholesterol levels in the blood (Almansyah, 2019).

Porang tuber (*Amorphophallus muelleri* Blume) is one of the natural alternative ingredients used to reduce obesity and overweight. Porang tubers are a very promising Indonesian export commodity that will be sent to various countries such as Japan, China, Vietnam, Australia and other developed and developing countries (Ministry of Agriculture, 2020). Indonesia exports porang tubers in raw and mature form, for example, one of which is porang chips or coarse porang flour. Actually, porang tubers are widely used glucomannan as cosmetics, glue and supplements. Proper processing of porang can be profitable in sales because the selling price is very high per year which can increase. Porang tubers cannot be consumed directly. This is because porang contains oxalate crystals that can cause allergic reactions or irritation of the mouth to damage to organs in the body. Therefore its processing is given great attention. Based on research (Saputro et al., 2014) glucomannan levels in porang tubers (*Amorphpphallus melleri* Blume) obtained after the purification process to remove oxalate crystals are greater ranging from 36.69 % - 64.22 % compared to porang flour before purification, which is worth 28.76 %.

Glucomannan is a water-soluble non-starch polysaccharide known as water-soluble fiber. Glucomannan has the ability to lower cholesterol levels in the blood and blood sugar levels, reduce weight, obesity, and affect intestinal activity and immune function in the human body (Nissa &; Masjid, 2016). High levels of glucomannan are found in tubers that have been processed into flour. As in porang tubers that are converted into flour, which produces high glucomannan. Glucomannan is processed and developed as a weight loss product and has been approved by the European Food Safety Authority (EFSA) to lose body weight in overweight or obese adults with consumption of 3 grams / day (Meiliana, 2022). Porang tubers or known as (*Amorphophallus muelleri* Blume) have a fairly high glucomannan content, which is 45-65%. The content of each type of porang varies, for example in the type of white porang flour which has a water content of 13.477 %, ash content of 4.612 %, starch content of 47.554 %, amylose content of 17.536 %. As for the content of the yellow porang type has a content of 12.326 %, ash content of 3.901 %, starch content of 5.598 %, amylose content of 16.948 %. For the extraction results from white porang flour with water solvents, glucomannan levels were obtained 73.70 % and for ethanol solvents glucomannan levels were obtained of 64.67 % (Aryanti &; Abidin, 2015). Meanwhile, according to (Nissa &; Madjid, 2016) the dose is 200 mg / kg. BB glucomannan of porang tubers (*Amorphophallus muelleri* Blume) in white rats induced with a high-fat diet was very effective in losing body weight and appetite of white rats (*Rattus novergicus*)

In addition to porang tubers (*Amorphophallus muelleri* Blume), natural ingredients that can be used in the diet to deal with obesity and overweight are Moringa leaves (*Moringa oleifera*). Moringa leaves (*Moringa oleifera*) is one of the superfood ingredients because it has high nutritional levels in meeting the nutritional needs in the body. Moringa leaves also contain several antioxidants that are very beneficial for the body such as flavonoids, vitamin C, polyphenols, and β-sitosterol which are useful for reducing lipid peroxidase levels and LDL concentrations in plasma and inhibiting reabsorption in cholesterol from endogenous sources (Tjong et al., 2021). Based on research (Nahar et al., 2016) Moringa oleifera powder is very useful as an anti-obesity and overweight that can manage weight gain. Giving a single dose of Moringa leaf powder 50 mg / day / rat can reduce food intake and body mass index in white rats treated by the obesity control group, while treatment dose 50 mg / day / rat for a day twice can result in a significant decrease in body mass index of white rats treated by the obesity control group.

High metabolic rate can be measured by calculating the amount of oxygen consumption in unity of time. This allows because oxidation in food ingredients requires oxygen to create a recognizable amount (Melisa, 2020). Respiration that occurs plays an important role in maintaining the continuity of cellular metabolism in the body so that a very strong respiration function is needed. So that cells contained in the body can metabolize properly so that they can produce energy. Cells need an adequate supply of oxygen and nutrients into the body. Nutrients are obtained from the intake of food and fluids that enter the body. The effects of overweight and obesity on the respiratory mechanism and lung volume with an increase in the amount of fat in the chest wall and abdomen, have an effect on the mechanical properties of the chest and diaphragm and indicate changes in respiratory function in the body. This decreases lung volume and changes in the picture with each respiration. Furthermore, an increase in the amount of fat mass indicates a widespread decrease in the respiratory system where the respiratory system decreases more than it should. Changes in respiratory volume per unit, pressure changes and greater reductions can be seen in the chest wall of the lungs. The total decrease occurs when overweight sufferers sleep flat due to the pressure of fat tissue pressing against their chest wall, this state of activity is observed also at normal body weight. This accumulation of fat mass increases the elasticity and ability of the respiratory system in the body, thus increasing the work of the respiratory muscles, increasing the speed of metabolism in obesity or overweight will increase oxygen consumption, carbon dioxide production and this change results in increased ventilation where air exchange in the lungs increases. So in both obese and overweight marked, chest wall compliance decreases, respiratory work increases and residual respiratory volume and vital capacity decrease. Overweight and obesity can lead to hypoventilation, due to increased carbon dioxide retention. Mechanical respiratory work increases by up to 30 % in mild overweight. So that oxygen consumption in the body has increased high.

Cholesterol tests at the laboratory level usually use white rats (*Rattus novergicus*). White rats (*Rattus norvegicus*) are experimental animals that are often used in obesity reduction research because white rats have more advantages compared to other test animals such as easy to handle, can be obtained in large quantities but the price is not too expensive, and has valid repeat results (Lahamendu et al., 2019). White rats (*Rattus norvegicus*) are often used as food trials and food substance deficiencies in all types of animals including humans (Rejeki et al., 2018).

2. MATERIALS AND METHODS

2.1. Time and Place of Research

This research was conducted from September 2022 to May 2023 from taking the title to drawing conclusions. This research was carried out at the Veterinary Laboratory of Sebelas Maret University as a place for keeping, perpetrators, and taking test animals. Research was also conducted at the Biological Education Laboratory, Faculty of Teacher Training and Education, University of Muhammadiyah Surakarta as a place for examination and large analysis of oxygen consumption in white rats.

2.2. Tools dan Materials.

The tools used in this study include: (1) One cake scale, (2) A pair of glove, (3) One connecting hose, (4) One open manometer, (5) One 10 ml measuring cup, (6) One 100 ml glass beker, (7) one petri dish, (8) One syringe, (9) One tray, (10) One small bowl, (11) One dropper, (12) One rat cage. The ingredients used include: (1) Eight white rat samples, (2) One piece of tissue, (3) 1.6 ml brudy solution, (4) KOH to taste, (5) Silica gel to taste, (6) Vaseline to taste.

2.3. Sample Determination (Sampling Method)

Samples were taken at the UNS Test Animal Laboratory by preparing rat cages and taking one white rat in each treatment such as: P1, P2, P3, P4, P5, P6, P7, and P8. Then brought to the UMS Biological Laboratory to measure the amount of oxygen consumption of white rats.

2.4. Measurement Method

The measurement methods used in this study are (1). Experimental method with *Posttes Only Control Design*, (2). Documentation method, this method is an aid in taking research images used in documenting tools, materials, research processes and research results, (3). Literature method, Literature collection techniques, are carried out by looking for references to national and international journal books, scientific papers, and existing theses and studying the same scope. This method is used to support the creation of literature reviews and discussions on research.

2.5. Research Design

This study used a true experimental method prepared with a Complete Randomized Design (RAL) in the form of *Posttest Only Control Design* using 8 treatment groups. Details are as follows:

1) Treatment 1 (positive control): Control group with normal feed (P1).
2) Treatment 2 (negative control): Control group with high-fat diet feed (P2).
3) Treatment 3: Treatment group of high-fat diet feed + glucomannan and Moringa leaf extract 100 mg / kg BB : 100 mg / kg BB (P3).
4) Treatment 4: Treatment group of high-fat diet feed + glucomannan and Moringa leaf extract 120 mg / kg BB : 80 mg / KgBB (P4).
5) Treatment 5: Treatment group of high-fat diet feed + glucomannan and Moringa leaf extract, 80 mg / kg BB: 120 mg / kg BB (P5).

6) Treatment 6: Treatment group of high-fat diet feed + glucomannan and Moringa leaf extract 50 mg/kgBB (Nugraheni et al., 2014): 50 mg/kgBB (Nahar et al., 2016modified) (P6).
7) Treatment 7: Treatment group of high-fat diet feed + glucomannan and Moringa leaf extract 60 mg / kg BB : 40 mg / kg BB (P7).
8) Treatment 8: Treatment group of high-fat diet feed + glucomannan and Moringa leaf extract 40 mg / kg BB : 60 mg / kg BB (P8).

2.6. Aktivity Stage

The stages of activities in this study include: (1). Maintenance Stage, (2). Treatment Stage, (3) Measurement Stage of oxygen consumption by selecting 8 rats to be tested with oxygen consumption treatment. Prepare the tools and materials to be used.. The desiccator or breathing chamber is filled with silica gel and KOH to taste, then install a divider. Weigh the weight of the experimental animal, then put it into the breathing chamber. After the circuit is ready, the system in the circuit is closed, sealed with enough vaseline smear. Insert Brody's lar as much as 1.6 ml into the manometer pipe (until balanced), Then observed the scale on the manometer (its strip change) in the first 10 minutes and the second 10 minutes. Then input it into the oxygen consumption calculation formula

2.7. Data Calculation and Analysis

The results of the calculation of the amount of oxygen consumption of white rats will continue to be calculated using the following formula:

Formula 1	**Information :**
	v = Oxygen Consumption (to 1,2,….etc)
$v = \frac{x}{y} . \Delta V$	x = Scale / large solution (ml)
	y = Scale / large manometer resipirometer (ml)
	ΔV = Change of scale / strip on respirator manometer (ml)
Formula 2	**Information :**
	Oxygen consumption time 1 and time 2
$v_1 + v_2$	
Formula 3	**Information :**
	t = Required time (hours)
$\sum t = t1 + t2$	$\sum KO$ = Total oxygen consumption (ml/min.g)
	$\sum v$ = Total oxygen consumption (ml)
$\sum KO = \frac{\sum v}{\sum t . BB}$	BB = Aminal body weight (g)

Then the results of the study were analyzed in a quantitative statistical discriptive manner to determine the average between treatment groups.

3. RESULTS AND DISCUSSION

3.1. Body Weight

This study used experimental animals of white rats (*Rattus norvegicus*) male wistar strain aged 8 weeks with an average before acclimatization was 162 kg., healthy state and has never been

used for research. The experimental animals were divided into 8 groups consisting of 8 white rats *(Rattus norvegicus*). The treatment was carried out for 2 weeks of high-fat feed treatment or a combination of glucomannan porang tubers (*Amorphophallus muelleri* Blume) and Moringa leaf extract (*Moringa oleifera*). Data on 8 treatment groups, namely P1 (normal), P2 (high-fat diet), P3 (100:100 mg/KgBB), P4 (120:80 mg/KgBB), P5 (80:120 mg/KgBB), P6 (50:50 mg/KgBB), P7 (60:40 mg/KgBB) and P8 (40:60 mg/KgBB).

The average body weight of white rats (*Rattus norvegicus*) before and after receiving high-fat feed treatment or giving a combination of glucomannan porang tubers (*Amorphophallus muelleri* Blume) and Moringa leaf extract (*Moringa oleifera*) can be seen in figure 3.1

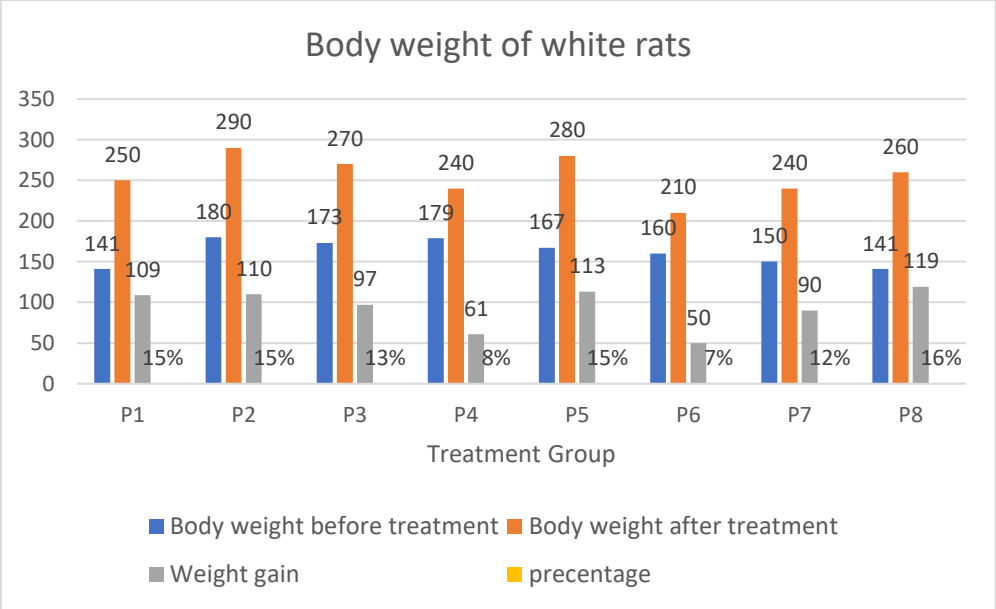

Figure 3.1 Bar chart of body weight of white rats before and after treatmen

Based on the diagram table above, it shows an increase in white rats (*Rattus norvegigus*), sonde glucomannan treatment, porang tubers (*Amorphollus muelleri* Blume) and Moringa leaf extract (*Moringa oleifera*). In the P1, P2, and P5 treatment groups experienced a gain of 15 % of body weight before being treated. In the P3 treatment, there was an increase of 13 %. In P4 experienced an increase of 8 %. In P7 it experienced an increase of 12 %. The lowest weight gain was in the P6 treatment group, which was 7 %. While in the P8 treatment, the increase was 18 %, which is the highest weight gain. If averaged all the increases that occurred in experimental animals, white rats (*Rattus norvegicus*), sonde glucomannan treatment, porang tubers (*Amorphollus muelleri* Blume) and Moringa leaf extract (*Moringa oleifera*) were 13 %, which means white rats are obese. Obesity that occurs.due to the treatment of sonde glucomannan porang tubers (*Amorphollus muelleri* Blume) and Moringa leaf extract (*Moringa oleifera*).

Overall, during the high-fat feed treatment and dosing of glucomannan treatment combination of porang tubers (*Amorphophallus muelleri* Blumen) and Moringa leaf extract (*Moringa olifera*) there was an increase in body weight of white rats as experimental animals.

3.2. Oxygen Consumption

The results of large measurements of oxygen consumption of obese white rats (*Rattus norvegicus*) in the treatment of sonde glucomannan porang tubers (*Amorphophallus muelleri* Blume) and Moringa leaf extract (*Moringa oleifera*) from experimental animals were carried out by calculating oxygen consumption in units (minutes / grams. BB). The serving value in figure 3.2 is the result of research that shows that the value of oxygen consumption is getting higher with time and increasing weight. The increased level of oxygen consumption shows an increased metabolic rate in white rats (*Rattus norvegicus*). The highest level of oxygen consumption is found in P4 treatment (120:80 mg/KgBB) which is 10.6 x 10^{-4} ml/gr.min. . This is thought to be because the more weight you gain will increase oxygen consumption. According to Wiraatnaja (2016), the rate of respiration in the body can be influenced by several factors including, weight: the heavier an organism is, the more oxygen consumption is needed. Body size: the larger the body size, the more oxygen consumption is required. Oxygen levels: if oxygen consumption is low the frequency of respiration increases to increase O_2 uptake. Activity: the more activity performed, the higher the oxygen consumption required.

The increased level of oxygen consumption and body weight of white rats showed an increased respiration process. This increased respiration process will increase the metabolic rate of white mice. According to Putra (2015), basal metabolism includes the processes of respiration, blood circulation, and peristatics.

No	OXYGEN CONSUMPTION RATE (MIN / Gr . BB)						
	EXPERIMENTAL GROUP	BODY WEIGHT	TIME			OXYGEN CONSUMPTION	ROUNDING OF OXYGEN CONSUMPTION
			10^1	10^2	Total		
1	P1	250 g	+7	+5	+12	7,68 x 10^{-4} ml/gr.min	8 ml/gr.min
2	P2	290 g	+9	+9	+18	9,93 x 10^{-4} ml/gr.min	10 ml/gr.min
3	P3	270 g	+8	+4	+12	7,11 x 10^{-4} ml/gr.min	8 ml/gr.min
4	P4	240 g	+10	+6	+16	10,6 x 10^{-4} ml/gr.min	11 ml/gr.min
5	P5	280 g	+7	+10	+17	9,71 x 10^{-4} ml/gr.min	10 ml/gr.min
6	P6	210 g	+6	+7	+13	9,90 x 10^{-4} ml/gr.min	10 ml/gr.min
7	P7	240 g	+9	+3	+12	8 x 10^{-3} ml/gr.min	8 ml/gr.min
8	P8	260 g	+8	+8	+16	9,85 x 10^{-4} ml/gr.min	10 ml/gr.min

Figure 3.2 Large oxygen consumption of white rats (*Rattus norvegicus*)

Description:

- The amount of oxygen consumption shows that there is not too much difference between P1-P8 treatment.
- 10^1 = first 10 minutes.
- 10^2 = first 10 minutes
- Total = first 10 minutes + second 10 minutes

While the results of the bar chart show the results of no significant far difference between P1-P8 which can be seen in figure 4.3 below:

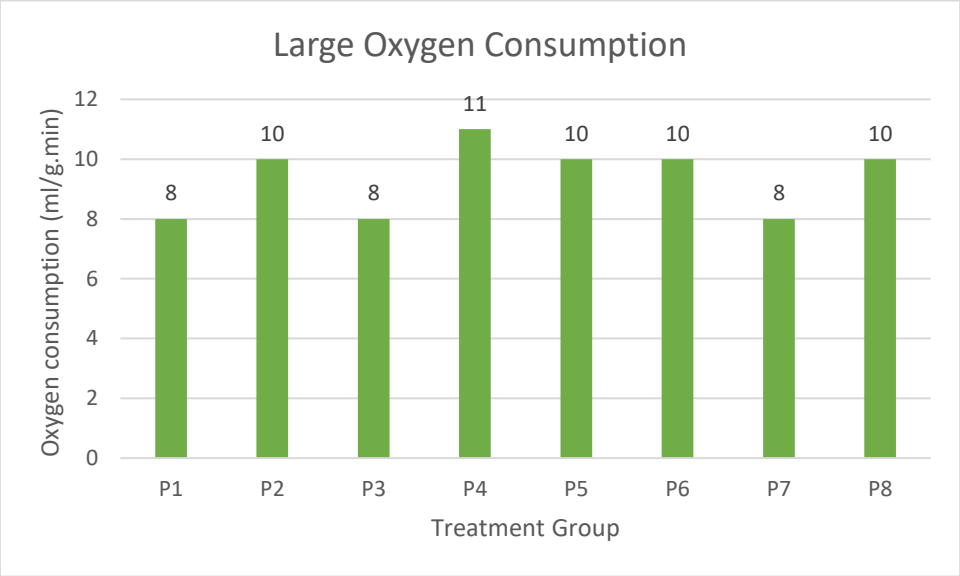

Figure 4.3 Large bar chart of oxygen consumption of obese white rats that have been treated with a combination of glujomanan porang tuber and moringa leaf extract.

Based on figure 4.3 above, it can be seen that there is not much difference in the amount of oxygen consumption between treatment groups. The P1, P3, and P7 treatment groups showed a total oxygen consumption of 8 ml/min. While the treatment of P2, P5, P6, and P8 shows the amount of oxygen consumption of 10 ml / minute. Then the P4 treatment showed oxygen consumption of 11 ml / minute.

Metabolic activity in the body is very important in our body. Metabolic activities are closely related to breathing, because breathing is the process of making energy from environmental food molecules that depend on the presence of oxygen, the metabolic rate in the body can be calculated and measured by measuring the amount of oxygen consumption in the unity of time. This is allowed because the oxidation of the material requires oxygen to create a known amount of energy (Suharso, 2018)

Oxygen consumption in white rats (*Rattus novergicus*) can be calculated by the formula: Final scale - initial scale of manometer (ml) Body weight (g) x time (mt) (Haris, 1985). The data obtained is processed by discriptive methods and analyzed manually. The white rat (*Rattus novergicus*) used was weighed using a digital scale, then prepared a petri dish, poured KOH and silica gel and put it into the desiccator tube. Then put 1.6 ml of brudy solution into the manometer pipe. Next, attach the manometer pipe to the desiccator tube using a connecting hose and then insert the white mouse. Apply Vaseline around the respirometer tube cap hole so that the air outside does not enter and the air inside does not come out when it will be used. It further records the treatment name data, body weight and oxygen consumption required in minutes. Recorded the development of oxygen consumption of white rats at oxygen consumption of the first ten minutes and the second ten minutes. After each recording and calculation one eosin organism is cleaned, then put it in the basket and mark it according to treatment. Then it is repeated until each repetition and treatment is completed, finally cleaning the laboratory and tools used when doing work and documenting the results and research activities (Melesi, 2020).

The test animals used in this study were white mice that were obese after being given a dose of feed. The feed doses given were 8 treatment groups dose P1 (positive control), P2 (negative

control), P3 (100 mg / kg.BB : 100 mg / kg.BB), P4 (120 mg / kg.BB : 80 mg / kg.BB), P5 (80 mg / kg.BB : 120 mg / kg.BB) , P6 (50 mg / kg.BB : 50 mg / kg.BB), P7 (60 mg / kg.BB : 40 mg / kg.BB and 40 mg / kg.BB).

The results of the study obtained the highest value in white rats in P2 treatment weighing 290 g with a volume of 9.93 x 10-4 ml / gr. min and the lowest value in P1 treatment weighing 250 g with a volume of 7.68 x 10-4 ml / gr.min. Ersawati (2018) stated that Moringa leaf extract can increase the body weight of white rat pups by 0.1 grams and increase the body length of white rats (*Rattus novergicus*) by 0.2 cm. In the cultivation of Moringa leaf flour (*Moringa oleifera*) as a natural protein in reinforcement feed has been widely applied. Moringa contains a lot of complete nutrients ranging from carbohydrates, proteins, fats, vitamins and minerals that are good for the body. In a dose of 100 grams of Moringa leaf powder contains 28.2 iron and 17.3 vitamin C in it. Iron is indispensable for the material of hemoglobin formation. Hemoglobin in the body serves to transport oxygen throughout the cells. The availability of hemoglobin in the body is sufficient to make the metabolic system in our body can run well and increase the weight of an organ, while vitamin C can make the iron in Moringa leaves absorbed by the body properly and maximally when consumed. According to Ologhobo and Affiku (2014), flour derived from Moringa leaves is one type of traditional herbal feed known as a substitute for the use of antibiotics for weight boosters. Antibiotics have properties that can stop the growth or kill other trace bodies that are panthogen which results in soaring bacterial populations in the body found in the digestive tract. From the above results it can be concluded that the body weight of white rats (*Rattus novergicus*) greatly affects oxygen consumption. . Where the heavier the weight of the animal tested, the higher and greater the oxygen consumption in the animal, and by giving sonde glucomannan treatment of porang tubers (*Amorphophallus muelleri* Blume) and Moringa leaf extract (*Moringa oleifera*).

In the treatment also using sonde glucomannan tuber porang (*Amorphophallus muelleri* Blume). Giving glucomannan has a role in reducing obesity because glucomannan in porang tubers (*Amorphophallus muelleri* Blume) contains dietary fiber can help provide a satiating effect so that it can reduce excess food consumption intake and raise HDL cholesterol levels through the process of binding fat in the intestine and binding bile salts in the digestive tract, thereby increasing the excretion of cholesterol in the faeces and can reduce cholesterol levels that go to the liver and stimulates the synthesis of HDL cholesterol levels in the liver (Nurdiantini, I., Prastiwi, S., &; Nurmaningsari et al., 2017). Glucomannan imbi porang (*Amorphophallus muelleri* Blume) and Moringa leaf extract (*Moringa oleifera*) were factors used to reduce obesity in this study and the most effective treatment in providing an obesity-reducing effect in obese mice. Nissa (2016) stated, both normal and obese groups who were given porang tuber flour containing glucomannan were proven to lose weight who were obese compared to groups that were not given porang tuber flour. Research conducted in the United States in 2007 and 2008 proved that glucomannan was able to lose weight in subjects suffering from obesity or overweight. Weight loss in obese people is thought to be due to the physical properties of glucomannan which can form gels and increase the viscosity of the gastrointestinal tract thereby decreasing the absorption of food by the intestine. Another study conducted in Spain in 2010 stated that consumption of high-fiber protein increases viscosity through the formation of a gel layer and is impermiable in the gastrointestinal tract, that is, the channel that extends from the mouth to the anus. The formation of the gel by fiber is able to block the contact of food with the walls of the gastrointestinal tract. Thus, to consume glucomannan fiber must be in accordance with the needs of the body, if consumed in too much amount it is feared that it can cause excessive weight loss. Therefore, to avoid excessive weight loss in normal individuals, it is recommended to consume fiber according to the needs in the body, while for someone who is obese can be done a slightly higher fiber consumption above the needs.

The results of the treatment of sonde glucomannan porang tubers (*Amorphophallus muelleri* Blume) and Moringa leaf extract (*Moringa oleifera*) affect the oxygen consumption of

the white rats, where the treatment causes white rats to be obese and affects their oxygen consumption. In accordance with Wiraatnaja's statement (2016) that respiration can be influenced by several factors including, weight: the heavier an organism is, the more oxygen consumption is needed. Body size: the larger the body size, the more oxygen consumption is required. Oxygen levels: if oxygen consumption is low the frequency of respiration increases to increase O_2 uptake. Activity: the more activity performed, the higher the oxygen consumption required. So that it is the same as the results of this study that in oxygen consumption P2 treatment with a body weight of 290 g experienced an increase in oxygen consumption with a volume result of 9.93×10^{-4} ml / gr.

4. CONCLUSIONS

Based on the results of the research obtained, it can be concluded that body weight in test animals of this study greatly affects the rate of respiration of these animals, the greater the body weight of an organism, the more oxygen consumption needed and the faster the respiration process and the need for oxygen consumption increases. The combination of glucomannan porang tuber (*Amorphophallus muelleri* Blume) and Moringa leaf extract (*Moringa oleifera*) at a dose of P2 (high-fat diet feed) weighing 290 g affected the oxygen consumption of white rats (*Rattus novergicus*) because it resulted in increased body weight of white rats resulting in a large amount of oxygen consumption needed.

This study can be continued to calculate the large differential of oxygen consumption and see the effect of glucomannan porang tuber and Moringa leaf extract that is effective against antibodies.

5. ACKNOWLEDGMENTS

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