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Effect of Seaweed Extract *(Sargassum Sp.)* against Feed Intake and Body Weight of Pregnant Wistar Rats *(Rattus Novergicus)*

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Abstract

Sargassum sp. is one of the algae that belongs to the group of brown algae (*Phaeophyceae).* Some studies show that *Sargassum sp.* has a high nutritional content, such as protein, antioxidants, and essential minerals. Pregnancy can be a physiological stressor that can cause decreased body resistance. This study aims to determine the effect of seaweed extract on feed intake and body weight on wistar rats (*Rattus novergicus*). The study used ten pregnant rats divided into two groups, namely the control group and the treatment group. The treatment group rats were fed basal feed plus *Sargassum sp.* dose 450 mg/kg body weight, while the control group was given basal feed; the entire treatment was carried out for 21 days. Every day, rats were given 100 ml of drinking water and 30 grams of pellet feed. Feed intake was recorded, while body weight was weighed every ten days. This study showed increased feed intake and body weight in the control and treatment group (pregnant rats). The statistical analysis showed a significant increase in rat body weight ($p < 0.005$) weekly in both groups. Based on the study's results, it can be concluded that the administration of seaweed extract (*Sargassum sp.*) in Wistar rats (*Rattus novergicus*) did not significantly affect feed intake but significantly affected body weight.

Keywords: body weight, feed intake, *Sargassum sp.*

Introduction

Oxidative stress is characterized by an imbalance between the production of reactive oxygen and its biological ability to detoxify or repair the damage immediately. Oxidative stress can cause damage to cell components (Samsu, 2017). Pressure usually begins with the emergence of stressors, often called stressors. A *stressor* is a stimulus that causes effects on the organism both physically and psychologically. Stressful conditions cause many reactions, including increased tension, emotions, sympathetic nerve activity, psychological and pathological disorders, and changes in various endocrine functions and metabolic processes (Hawari, 2001). Pregnancy is one of the causes of oxidative stress. It is because there is an increase in metabolic activity in the placental mitochondria so that antioxidant power is reduced (Kasanah *et. al*., 2018).

Seaweed is a polycellular algae; *Sargassum sp.* is one of the algae that belongs to the group of brown algae *(Phaeophyceae*) (Firdaus, 2017). Some studies show that *Sargassum sp* has a high nutritional content, such as protein, antioxidants, and several essential minerals (Handayani *et. al*., 2004). *Sargassum sp.* contains carbohydrates, fats, proteins, and micromineral elements such as color, potassium, magnesium, sodium, sulfur, phosphorus, calcium, iron, and bromine that are beneficial to the body (Ghufron *et. al*., 2010). *Sargassum sp.* It also contains one of the active substances called polyphenols. Polyphenols are naturally occurring bioactive compounds. This substance has a distinctive sign that it has many phenol groups in its molecules. Polyphenols

are secondary metabolites of plants that can be composed of various phytochemical compounds as powerful antioxidants that have many benefits, one of which is as an antistress. In addition, polyphenols can also inhibit the occurrence of oxidative stress caused by pregnancy (Kasanah *et. al*., 2018).

Body weight is a parameter of conditions during normal or stressful circumstances. Under normal circumstances, body weight develops with age. Conversely, in stressful circumstances, there are two possibilities for weight development, which can develop faster or slower than normal conditions (Melinda, 2010). Feed intake is also one of the parameters to determine normal or stressful state conditions (Melinda, 2010). It is necessary to research the effect of giving sargassum sp to pregnant rats because of the content of microminerals and antioxidants in sargassum sp, which has the potential to be used as a supplement during pregnancy.

Materials and Methods

This study used ten female Wistar white rats (Rattus novergicus), divided into two groups, five as a control group and five as a treatment group, with a body weight range between 130-160 grams. These rats were kept in individual metabolic cages with a capacity of 1 metabolic cage rat equipped with one drinking place and one feed bin. Every day, rats are fed with pallets as much as 30 grams/rat and given 100 ml/rat of drinking water. Every morning, the treated rats were given seaweed extract (Sargassum sp.) as much as 1 ml, and control rats were given aquadest as much as 1 ml given orally using a cannula to white rats (Rattus novergicus). It was knowing body weight by using scales.

Sargassum sp. *seaweed extract.* obtained from the extraction of seaweed *Sargassum sp.* conducted at the Faculty of Pharmacy, Universitas Gadjah Mada. Seaweed *Sargassum sp.* Obtained from D.I. Yogyakarta. *Sargassum* sp extract dose 450 mg/kg body weight was diluted and homogenized with 1 ml of 0.5% NaCMC solution and 100 ml Aquadest.

The pregnant wistar rats *(Ratus novergicus)* was obtained from the Integrated Research and Testing Laboratory (LPPT) Universitas Gadjah Mada. The initial selection was done by selecting with appropriate body weights, and then checking the rat's estrus was carried out by the vaginal swab method. That experience estrus rat were then mated with males, and ten metabolic cages were prepared to accommodate rat.

The research was conducted for 21 days at LPPT UGM. Rats were placed in metabolic cages with a temperature of 23 degrees Celsius and humidity of 75%, equipped with feed and drinking stations. Every day, rats were given 100 ml of drinking water, 30 grams of pallet feed, and 1 ml of *Sargassum sp*. extract for treatment rats and 1 ml of aquadest for control rats orally using a cannula. Feed intake were recorded daily, and then body weight was weighed every three days in each treatment and control rat. The LPPT Preclinical Ethics Commission has approved all stages of research with No. 000022/04/LPPT/2018.

Data Analysis

Data analysis in this study was carried out after knowing the total body weight weighing and feed intake measurements using the One-Way ANOVA.

Result and Disscusion

The clinical examination results of early rats were healthy, had normal physiology, and showed no symptoms of organic or systemic diseases. Feed intake, as one of the parameters that determine normal or stressful conditions, to determine the amount of feed consumed is obtained from the calculation between the difference in feeding with the remaining feed consumed (grams/rat), which is usually measured once a day (Melinda, 2010). The average volume of feed intake in rats (*Rattus novergicus)* of pregnant female Wistar strains can be seen in Table 1.

Table 1. Average feed intake (grams) white rat (Rattus norvegicus) control and treatment for 20 days

	Feed Intake (grams)		
	day-1	day-10	day-20
Control	18.00 ± 2.77	19.35 ± 5.72	21.98 ± 6.51
Treatment	14.24 ± 4.11	14.38 ± 4.33	18.40 ± 2.45

Based on the data in Table 1 showed that the feed intake of control rats on day 1 was 18.00 ± 2.77; on Day 10, 19.35 ± 5.72; on Day 20, 21.98 ± 6.51, treatment group for Day 1, 14.24

± 4.11; Day 10, 14.38 ± 4.33; and Day 20, 18.40 ± 2.45. The statistical analysis results showed that administering *Sargassum sp*. extract for 20 days had no significant effect on rat feed intake ($p>0.05$).

Body weight is weighed on the 1st, 10th, and 20th days in control and treatment rats can be seen in Table 1.

Table 2. Average body weight (grams) of white rats (Rattus norvegicus) control and treatment for 20 days.

	Body Weight (grams)		
	day-1	day-10	day-20
Control	151.58 ± 11.55a	184.42 ± 19.80a	220.36 ± 29.97a
Treatment	155.86 ± 13.13	167.37 ± 13.36b	205.92 ± 12.01b

Note : the same letter in the same lane indicates significance ($p<0.05$).

Table 2 showed that the body weight of day 1of control rats was 151.58 ± 11.55; on Day 10, 184.42 ± 19.80; on Day 20, 220,36 ± 29.97. For rat body weight, treatment was obtained for day 1 155,86 ± 13.13; Day 10 167,37 ± 13.36; and day 20 205,92 ± 12.01. The results of statistical analysis showed a difference in body weight between the control and the treatment groups that the administration of *Sargassum sp*. significant effect on weight gain ($p< 0.05$).

Feed intake is used to find out how much feed is consumed. When there is an increase in feed intake, the volume of residual feed obtained is relatively low (Smith & Mangkoewidjojo, 1988). Based on the data in Table 2, feed intake in control and treatment rats has increased. The initial feed intake in the two groups is different; this can be caused when the initial rats enter the metabolic cage, which usually begins with the emergence of stress or a stressor. A stressor is a stimulus that causes effects on the organism both physically and psychologically. The reactions include disruption of metabolic processes that can reduce feed intake (Hawari, 2001).

Sargassum sp. has a high nutritional content, such as protein, antioxidants, and several essential minerals (Handayani *et. al.,* 2004), which are needed during pregnancy because there is an increase in metabolic activity in placental mitochondria so that antioxidant power is reduced (Kasanah *et. al.,* 2018). Statistical analysis showed no significant difference ($p>0.05$) in the increase in feed intake of control and treatment rats for 20 days. Based on body weight data from Table 2, control and treatment rates improved. This can be caused because the period of organogenesis occurs at the age of the pregnancy, days 10 and 20, when there is an increase in feed needs for the growth and formation of fetal organs, so the impact of increased body weight (Fleeman *et. al.,* 2005). Sargassum *sp.* contains protein, fat, carbohydrate, vitamins, and minerals (Mota-Rojas *et. al., 2011).* Besides, it contains 61% water (Murata & Nakazre, 2001), ash 14-44%, protein 0.5-3.9%, total fat 9-20%, and dietary fiber 49-62% (Marinho-Soriano *et. al.,* 2001). *Sargassum sp.* a content of dietary fiber will stay in the digestive tract for a relatively short time to reduce the absorption of food substances. In addition, dietary fiber will provide satiety because digestive enzymes cannot hydrolyze carbohydrate components to reduce appetite feed consumption and make weight gain smaller (Artiss, et.al., 2006).

Statistical analysis showed a significant difference ($p<0.05$) in the body weight of the control and treatment group in each period. The body weight gain of treatment rats is smaller than that of control rats, as evidenced by the calculation of body weight gain per day with a formula according to Shiyan et al. (2017); the results of the calculation of treatment rats are 2.5 grams per day while control rats are 3.4 grams per day. Research conducted by Hanum et al. (2020) showed that administering *Sargassum sp.* can prevent thrombocytopenia in pregnant rats. Based on the study results above, the administration of *Sargassum sp.* can increase body weight without being followed by adding feed intake to be used as a functional feed ingredient.

Conclusion

Based on the study's results, it can be concluded that the administration of seaweed extract *(Sargassum sp.)* in pregnant rats *(Rattus novergicus)* Wistar did not significantly affect feed intake but significantly affected body weight.

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