

Biochemical Profile of White Rat Blood during Mating and Pregnancy Treated with Steeping Water of Dried Gedi Leaves (*Abelmoschus manihot*)

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Abstract: This study aimed to investigate the blood biochemical profile of white rats (*Rattus norvegicus*) during the mating process and pregnancy given water treatment steeping dried gedi leaves (*Abelmoschus manihot*). White rats are a commonly used animal model in biomedical and reproductive research. The research method involved the selection of female white rats which were divided into two groups, namely the control group given plain water and the treatment group given water steeping dried gedi leaves for 34 days. Blood measurements are carried out 3 times. Biochemical parameters evaluated include blood glucose levels, total cholesterol, triglycerides, uric acid, HDL, LDL, AST/SGOT, and creatinine. The results showed that the group of rats that received water treatment steeping dried gedi leaves experienced a decrease in glucose, total cholesterol, and AST/SGOT. This decrease is perfect for using Gedi steeping water as a health supplement. However, the biochemical profile is improved in uric acid, HDL, LDL, and creatinine. A good increase in blood content is HDL and decrease of AST/SGOT, glucose, total cholesterol which can potentially be hepatoprotective and anti-degenerative. However, the increase in uric acid, creatinine and LDL during 34 days of treatment is an indication of side effects of steeping water that need to be considered in the future in production development. The steeping water treatment group in the blood biochemical profile was significant compared to the control group. Blood glucose levels experienced different fluctuations during the mating and pregnancy periods in the treatment group. Changes in these biochemical parameters can have important implications for reproductive development and the health of pregnant women.

Keywords: Biochemical profile, Gedi, *Abelmoschus manihot*, HDL, LDL, Rat

1. Introduction

The biochemical profile of blood during the process of mating and pregnancy is an important aspect in the understanding of the health of the use of traditional medicine (natural medicine) (Pandiangan *et al.*, 2022). The use of herbs as health supplements is increasingly popular throughout the world (World Health Organization, 2010). One of the herbs that attract attention is Gedi (*Abelmoschus manihot*), which has the potential as a raw material for Health supplements (BPOM RI, 2021). However, to ensure the safety, efficacy, and quality of the health supplements produced, standardization of Gedi raw materials is very important (Pandiangan *et al.*, 2022). In this context, the standardization of Gedi raw materials (*Abelmoschus manihot*), is an important step to ensure safe, effective, and high-quality health supplements (Directorate of Drug Safety, Quality and ImportExport Supervision, 2015). It will also help integrate the use of herbs in modern health practices with a better understanding of their composition and potential side effects (Pandiangan *et al.*, 2023)

Indonesian people are familiar with medicinal plants or plants that can be used to treat various diseases, usually, the manufacture of herbal medicines can be in the form of herbs and also functional teas or herbal teas (Pandiangan, 2020). In a large-scale study involving pregnant women in 18 countries from five different regions, the use of herbal medicines was recorded in 28.9% of pregnant women, in another study conducted in Bangladesh, the use of herbal medicines during pregnancy was reported to reach 70%, this is because of during pregnancy The fetus develops rapidly and is susceptible to adverse side effects that affect cell growth and division, so the use of drugs in pregnant women needs to be considered, (Bebitoğlu, 2020). Herbal yang is Often used during pregnancy in the form of infusions or teas (Bebitoğlu, 2020).

The process of mating and pregnancy are very complex stages in the reproductive cycle of animals. Changes in the biochemical profile of the blood during this period can provide valuable insight into the body's response to hormonal and physiological changes that occur. The white

rat (*Rattus norvegicus*) is often used as a model in biomedical and reproductive research because of the resemblance of the reproductive system and physiology to other mammals, including humans (Pandiangan *et al.*, 2022).

Abelmoschus manihot known as dried Gedi leaves, is an herbal plant that has been used in traditional medicine for a variety of health conditions (Jain *et al.*, 2009). This plant contains various bioactive compounds such as flavonoids, alkaloids, and tannins, which have been known to have pharmacological and antioxidant effects (Jain *et al.*, 2009). Although there have been some studies on the pharmacological effects of *Abelmoschus manihot*. In humans, research on its effect on the biochemical profile of blood during mating and pregnancy in animals is limited.

Changes in the biochemical profile of blood during mating and pregnancy can include significant changes in blood glucose levels, total cholesterol, triglycerides, urea, creatinine, and reproductive hormones such as estrogen and progesterone (Hechler *et al.*, 2019). For example, during pregnancy, the body undergoes significant hormonal changes, including increased production of estrogen and progesterone, which can affect glucose and lipid metabolism in the body (Li *et al.*, 2018).

Some previous studies have explored the role of herbal compounds in the treatment of certain health conditions and their effects on blood biochemical parameters (Ukpai *et al.*, 2024). Several studies have shown that bioactive compounds in herbs can have positive effects on health, including a decrease in blood glucose levels (Pandiangan *et al.*, 2018) and cholesterol (Pandiangan *et al.*, 2020). However, research on the influence of *Abelmoschus manihot*. The biochemical profile of blood during crucial periods such as marriage and pregnancy is still poorly available. Therefore, this research will fill this knowledge gap and provide deeper insight into the potential influence of herbs in animal reproductive medicine.

This study is expected to provide a further understanding of the potential influence of *Abelmoschus manihot* on blood biochemical profiles during mating and pregnancy in white rats (*Rattus norvegicus*). With a better understanding of biochemical changes during the reproductive cycle, this research has the potential to contribute to the development of more effective treatment strategies in the context of human health as well. This study aims to investigate the effect of water treatment of steeping dried Gedi leaves (*Abelmoschus manihot*) on the blood biochemical profile of white rats (*Rattus norvegicus*) during two crucial phases in the reproductive cycle, namely the process of mating and pregnancy.

2. Materials and Methods

The research was conducted at the Biovina Herbal Sea Mitra Laboratory, during December 2021 to January 2023.

Tools and Materials

The tools used in this research include: Biosystems BTS-350 semi-automatic, analyzer, Miyako brand kitchen blender, Tray, Dispo, Rat drink pacifier, Measuring cup, Drinking

glass, Scissor, Tea bag, Stove, Kitchen pan, Mouse surgical table, Pot, Scalpel, Gloves, Blood serum (EDTA) tube, A place to eat mice, Digital scales, Tissue, Jar, Tweezers, Ointment pot

The materials used in this study consisted of Water, Gedi leaves (*Abelmoschus manihot*), Chloroform, Creatinine kinase reagent A, Creatinine kinase reagent B, and AD2 animal feed.

3. Methods

Sampling

The sample used was taken in the village of Biovina Garden South Bolaang Mongondow Regency. The samples taken were the leaves of the Gedi plant.



Figure 1: Gedi leaf samples (*Abelmoschus manihot*) are used as tea raw materials for samples.

Making Dry Gedi Steeping Water in tea bags This research procedure follows Pandiangan *et al.*, (2018; 2020; 2022) which modified, Gedi obtained from Biovina Gardens in South Bolaang Mongondow. Fresh Gedi is taken as much as 10 kg then cleaned then the leaves are washed and dried by air. The leaves are then dried in the sun until their weight is constant. The dried Gedi is then mashed using a blender to become powder.

Gedi powder that has been mashed earlier is then put into tea bags of 2 g / tea bag each, then distributed into each glass according to the treatment group, namely 1 tea bag for steeping 2 g of Gedi in 200 mL of water. Each tea bag in a glass is then brewed with 200 mL of boiling water like how to make tea, then let stand until the water turns brownish yellow. An organoleptic examination of Gedi tea steeping was carried out. The finished Gedi steeping is then allowed to stand until it is cold enough to be put in the rat's drinking pacifier (Pandiangan *et al.*, 2018; 2020; 2022).

Test Animal Cage Preparation and Test Animal Selection

Rat-keeping cage with a diameter of 50 cm and a height of 23 cm. To prepare a clean rat cage, first, transfer the mouse into a clean container then cover it with a cover wire, then the cage used for mice that were previously cleaned by disposing of used sawdust that has been dirty and washed clean. After cleaning, re-line the cage with new sawdust, and cover it with a cover wire, then arrange the rat feeding place well. After the cage is ready, put the rat in a clean cage and close the cage by ensuring a comfortable position of the rat place the rat drinking water container (Tagulihiet *et al.*, 2022; Pandiangan *et al.*, 2018; 2020; 2022). The selected test animals are morphologically showing an age of about 3-4

months, body size 170-200 g, white coat color and smooth shape, healthy pink organs, and agile activity (Pandiangan *et al.*, 2022).

Maintenance and acclimatization of white rats

The test animals used in this study were White Rats obtained from the Biovina Herbal Laboratory, Jaga 2, Sea Mitra, Pineleng District, Minahasa, North Sulawesi Regency. Preparation of experimental animals is carried out starting with acclimatization. The process of physiological adjustment or adaptation of an experimental animal to environmental climate change is called acclimatization (Pandiangan *et al.*, 2022).

In this study, the adaptation or acclimatization process needs to be carried out to observe so that the test animals to be used are ready in a healthy state physiologically and behaviorally. The mice selected in this study were mice that managed to adapt well in 14 days, with body weight ranging from 170-200 g (Pandiangan *et al.*, 2022). The number of rats used was 24 female rats divided into two large groups, namely 12 control rats as a comparison and 12 treatment mice. A total of all mice used for each treatment were used for four repetitions. Each repetition used 3 female rats with 1 male mouse in 1 cage, both control and treatment, (Tagulihi *et al.*, 2022; Pandiangan *et al.*, 2018; 2020; 2022).

Steeping Water Treatment of Female Rats during mating until pregnancy

- a) Mating rats: Adapted mice mated, with each group, put in a cage that had been prepared for 21 days to mate.
 - The control group (T0) with number of males 1 and females 3 was given 300 ml of drinking water.
 - The test group (Tt) with the number of males 1 and 3 females was given 300 ml of Gedi tea steeping water.
- b) Cage separation: Mated mice are carried out cage separation. Every 1 pregnant rat/rat mother is in 1 clean cage until the process of giving birth and separating rat pups from the mother mouse, this lasts about 21 days.
 - Females with a control group (T0) were given 200 ml of drinking water.
 - Each test group rat (Tt) was given 200 ml of Gedi tea steeping water per cage.

Treatment of Test Animals

The mice that had completed the adaptation period were then given different treatments according to the test group. During the testing period, the rats were given the same feed as they had when adapted and weighed their weight. Testing on mice was carried out for 34 days ad libitum, with the division of treatment testing groups and control groups. During treatment, steeping water given to rats is changed daily. Steeping Gedi water for treatment group 1, treatment 2, and treatment 3 was made as a substitute for drinking water for rats. During the treatment, the rats were observed morphology, and weight measurements were taken, to see physical changes and mouse growth.

Mating and Pregnancy Process

The process of mating and pregnancy in white rats will be carefully monitored. This will include determining the stage of marriage, the stage of pregnancy, and the timing of blood sampling at various stages of marriage and pregnancy.

Blood Sampling

Blood sampling is carried out at various stages of marriage and pregnancy according to a predetermined schedule. Blood samples will be taken from both groups of study subjects. First of all, the rats were weighed before dissection. The rats were then euthanized by putting them in jars filled with chloroform tissue. Biochemical measurements of initial blood were carried out after adaptation for 2 weeks in the same environment, taken and biochemical parameters of blood serum using a Multi-Monitoring System (Autocheck) tool, then after treatment or administration of steeping water for 34 days rat blood was taken from the heart by surgically also observing anatomical parts that would affect the biochemistry of mouse blood. Blood is taken about 1 injection of 3 mL inserted into the tube

Biochemical Parameter Analysis

Blood samples will be analyzed for various biochemical parameters, including blood glucose levels, total cholesterol, uric acid, triglycerides, urea, creatinine, and AST/SGOT. This analysis will provide an understanding of changes in the biochemical profile of blood during water administration of steeping dried Gedi leaves during mating and pregnancy in white rats.

Biochemical Examination of Rat Blood Serum

Biochemical examination of rat blood serum was carried out following Pandiangan *et al.*, (2020, 2021, 2022, 2023). Biochemical measurement of blood using BTS-350 Biosystems semi-automatic analyzer. The examination was carried out four times. Each examination took one rat from each treatment group. The examination procedure is carried out the same on three examinations.

The mice were then dissected quickly before blood clots occurred. Blood taken comes from the heart of the rat because this part contains the most blood fluid. Blood is taken as much as 3 mL using a dispo, then inserted into a serum blood tube. The same method is repeated for other mice that will be examined on the same day. Blood samples from those that have been collected are then centrifuged at a speed of 3000-4000 rpm for 15 minutes to obtain blood serum. After that, blood serum of as much as 0.1 mL was mixed with biochemical examination reagents (glucose, total cholesterol, uric acid, triglycerides, HDL, LDL creatinine, AST, and SGOT blood serum treatment and control rats. After the blood serum and reagent samples are mixed, the samples are then tested in a spectrophotometer with wavelengths above 400 nanometers (visible) at 37°C. After waiting for a while, the Blood Biochemistry results will be immediately visible on the spectrophotometer monitor, with the measured parameters are glucose levels, total cholesterol, uric acid, triglycerides, HDL, creatinine, AST, and SGOT of rat blood serum.

Data Analysis

The data obtained are tabulated, then the data obtained from the measurement of biochemical parameters will be analyzed using appropriate statistical methods. This will include a comparison between the control group and the treatment group for each biochemical parameter evaluated.

4. Results and Discussion

Sample Preparation into Stew

Sampling was carried out in the Kombat Tribe of Biovina Garden, Pinolosian Sout Bolaang Mongondow. Samples are quite easy to find around residential areas, both those that grow wild or those that are intentionally planted by residents. In South BolaangMongondow, residents use Gedi as a complementary ingredient for spices and vegetable mixtures. In the sample preparation process based on the modified Pandiangan *et al.*, (2018) guide, there were no obstacles found in making steeping. The sample which was originally taken as much as 10 kilograms decreased in weight after drying, but it crumbled well when blended.

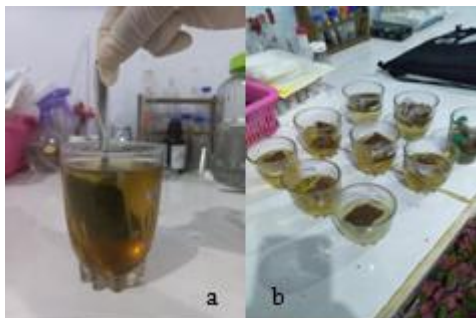


Figure 2: The process of making Gedi steeping. (a) weighing of Gedi powder to be packed in tea bags. (b) Gedi is ready to be used for treatment.

Gedi brewed water has a distinctive and strong odor that almost resembles the smell of mint and is fragrant, with a bland to quite strong taste depending on how much Gedi is brewed. Gedi brewing water also differs in color depending on the amount of Gedi that is brewed. Steeping 2 grams of Gedi is light yellowish-brown like tea.

Rat Growth Observation

After acclimatization for 7 days, the body weight of the mice was continuously monitored to see the growth of the mice during the treatment period. The growth of mice was determined by using data on the body weight of mice. Measurement of body weight of rats was carried out before giving Gedi, and for 34 days giving Gedi water steeping. This study was designed to provide a deeper understanding of the effect of steeping water of dried *Abelmoschus manihot* leaves on the biochemical profile of blood during mating and pregnancy of white rats (*Rattus norvegicus*). Using detailed methods and proper selection of research subjects, it is hoped that this study will make a valuable contribution in the understanding of the body's response to the influence of herbs during important periods in the reproductive cycle.

Interpretation of Data

The results of this study showed that treatment with steeping water of dried Gedi leaves (*Abelmoschus manihot*) on white rats (*Rattus norvegicus*) during the mating and pregnancy process had a significant impact on blood biochemical parameters. The interpretation of this data is by the research objectives The Effect of Water Treatment of Steeping Dried Gedi Leaves (*Abelmoschus manihot*) on the Blood

Biochemical Profile of White Rats (*Rattus norvegicus*) During the Mating and Pregnancy Process.

Blood Glucose (mg/dL)

The blood glucose content (mg / dL) of blood serum of white rats (*Rattus norvegicus*) before (To) treatment (initial) there was 128 mg / dL or day 0 while after 34 days of maintenance with feed and ordinary water drinks increased to 226.88 mg / dL. His increase in blood glucose after 34 days was 98.88 mg/dL (Figure 3). Treatment (Tt) on day 0 glucose level of 105.00 mg/dL increased after 34 days of steeping water of dry leaves to 186.56 mg/dL (Figure 3). The increase in blood glucose treatment after 34 days of steeping water Gedi leaves (*Abelmoschus manihot*) dry (Tt) during the process of mating and pregnancy is 81.58 mg / dL. The effect of steeping water treatment of Gedi leaves shows that it can reduce blood glucose levels (98.88-81.58) = 17.29 mg/dL. These results show that giving steeping water for dried Gedi leaves can reduce blood glucose levels for 34 days of drinking steeping water. This is in line with the research of Pandiangan *et al.*, year 2020 (Pandiangan *et al.*, 2020) and (Rebecca *et al.*, 2020) state that combination with Gedi or single only Gedi alone can lower blood glucose levels in Wistar white rats. These results show the potential for dried Gedi to be used as an antidiabetic for experimental animals or other mammals including humans. The decrease in blood glucose levels in the treatment group during the mating and pregnancy process showed that *Abelmoschus manihot* can affect glucose metabolism in the body of white rats. This illustrates that this herb may have potential effects on blood glucose regulation during the reproductive cycle (Dewantara *et al.*, 2017).

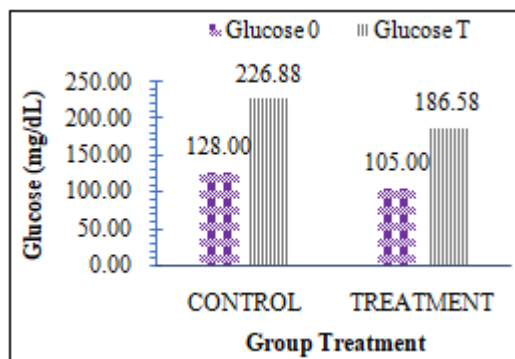


Figure 3: Blood glucose levels (mg/dL) of blood serum of white rats (*Rattus norvegicus*) before (To) treatment (initial) and after 34 days steeping water steeping dried Gedi leaves (*Abelmoschus manihot*) (Tt) during mating and pregnancy

Total Cholesterol

The content or level of total cholesterol (mg / dL) blood serum of white rats (*Rattus norvegicus*) before (To) treatment (initial) there was 106.00 mg / dL or day 0 while after 34 days of maintenance with feed and ordinary water drinks decreased to 65.25 mg / dL. His total blood cholesterol decreased by 40.75 mg/dL (Figure 4). Treatment (Tt) on day 0 glucose levels of 109.00 mg / dL decreased after 34 days of steeping water from dry leaves to 69.67 mg / dL. The reduction in total cholesterol treatment after 34 days of steeping water Gedi leaves (*Abelmoschus manihot*) dry (Tt) during mating and pregnancy was 39.33 mg/dL (Figure 4). The effect of steeping water treatment of Gedi leaves

showed that the decrease in total cholesterol levels between control and treatment was not statistically different. These results show that giving steeping water for dried Gedi leaves can reduce total cholesterol levels for 34 days of drinking steeping water by 39.33 mg / dL. This is in line with Pandiangan's research *et al.*, the year 2020 (Pandiangan *et al.*, 2020) and (Rebecca *et al.*, 2020) state that combination with Gedi or single only Gedi alone can reduce the total cholesterol levels of Wistar white rats. These results show the potential for dry Gedi to be used as an anti-hypercholesterolemia for experimental animals or other mammals including humans. The decrease in total cholesterol levels in the treatment group during the mating and pregnancy process showed that *Abelmoschus manihot* can affect cholesterol metabolism in the body of white rats. This illustrates that this herb may have potential effects on total cholesterol regulation during the reproductive cycle (Dewantara *et al.*, 2017).

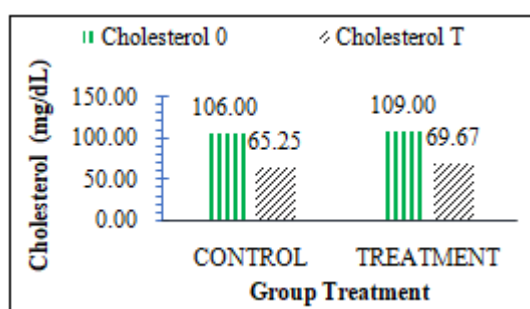


Figure 4: Total cholesterol levels (mg/dL) of blood serum of white rats (*Rattus norvegicus*) before (To) treatment (initial) and after 34 days steeping water dried Gedi leaves (*Abelmoschus manihot*) (Tt) during mating and pregnancy

The presence of a decrease in total cholesterol levels in the treatment group indicates that the treatment with *Abelmoschus manihot*. May affect lipid profiles in the blood of white rats during the mating and gestation periods. This indicates changes in lipid metabolism that need to be further understood (Mandey *et al.*, 2015)

Uric Acid

The content or level of uric acid (mg / dL) blood serum of white rats (*Rattus norvegicus*) before (To) treatment (initial) there was 2.9 mg / dL or day 0 while after 34 days of maintenance with feed and ordinary water drinks increased to 3.46 mg / dL. His blood uric acid increased by 0.56 mg/dL (Figure 5). Treatment (Tt) on day 0 uric acid 2.4 mg / dL increased after 34 days of steeping water dry leaves Gedi to 3.34 mg / dL. Increased uric acid treatment after 34 days given steeping water Gedi leaves (*Abelmoschus manihot*) dry (Tt) during mating and pregnancy was 0.94 mg/dL (Figure 4). The effect of steeping water treatment of Gedi leaves showed that it could increase uric acid levels between control and treatment was not statistically different, namely by $0.94 - 0.56 = 0.39$ mg / dL. These results show that giving steeping water for dried Gedi leaves can increase uric acid levels for 34 days of drinking steeping water by 0.39 mg / dL. This shows that Uric Acid levels of Wistar white rats can increase if using steeping water-dried Gedi leaves. These results indicate there is a possibility of increased uric acid if using steeping water-dried Gedi leaves. Elevated uric acid levels in the treatment group during mating and pregnancy

indicate that *Abelmoschus manihot* can affect uric acid metabolism in the body of white rats. This illustrates that this herb may have the side effect of increasing uric acid (Keating *et al.*, 2017; Leonte *et al.*, 2022; Kim *et al.*, 2023)

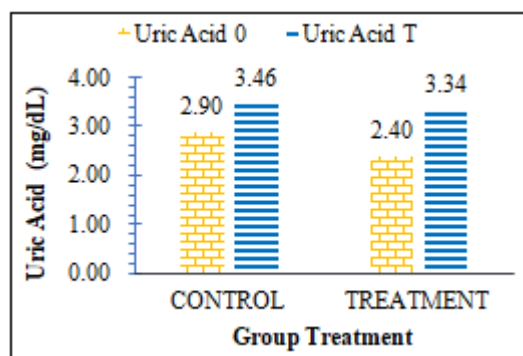


Figure 5: Uric acid levels (mg/dL) of blood serum of white rats (*Rattus norvegicus*) before (To) treatment (initial) and after 34 days steeping water dried Gedi leaves (*Abelmoschus manihot*) (Tt) during mating and pregnancy

The presence of reduced uric acid levels in the treatment group indicates that the treatment with *Abelmoschus manihot* may affect lipid profiles in the blood of white rats during the mating and gestation periods. This indicates changes in uric acid metabolism that need to be further understood (Umboh *et al.*, 2019).

Triglyceride

The results of blood biochemical observations of blood triglycerides can be seen in Figure 6. Triglyceride content (mg / dL) blood serum white rats (*Rattus norvegicus*) before (To) maintenance of the study (initial) there was 185.00 mg / dL or day 0 while after 34 days of maintenance with feed and ordinary water drinks decreased to 253.25 mg / dL. His blood triglycerides decreased by 68.25 mg/dL (Figure 6). Treatment (Tt) on day 0 triglycerides 146 mg / dL then decreased after 34 days of steeping water dry leaves Gedi to 118.17 mg / dL. Triglyceride reduction treatment after 34 days given Gedi leaf steeping water (*Abelmoschus manihot*) dry (Tt) during mating and pregnancy was 27.83 mg/dL (Figure 6). The effect of steeping water treatment of Gedi leaves showed that it could increase triglyceride levels between control and treatment was not statistically different, namely by $68.25 - 27.83 = 40.42$ mg / dL. These results show that giving steeping water for dried Gedi leaves can reduce triglyceride levels for 34 days of drinking steeping water by 40.42 mg / dL. This shows that Wistar white rat triglyceride levels can decrease if using steeping water-dried Gedi leaves. These results are in line with Rebecca's research *et al.*, (Rebecca *et al.*, 2020) and Walking *et al.*, (2015) Shows a decrease in triglyceride levels if using steeping water-dried Gedi leaves. Elevated triglyceride levels in the treatment group during mating and pregnancy indicate that *Abelmoschus manihot* can affect the metabolism of Triglycerides in the body of white rats. This illustrates that this herbal plant has the potential to be developed to be an anti-hypertriglyceride (Li *et al.*, 2024; To *et al.*, 2011; Kim *et al.*, 2023)

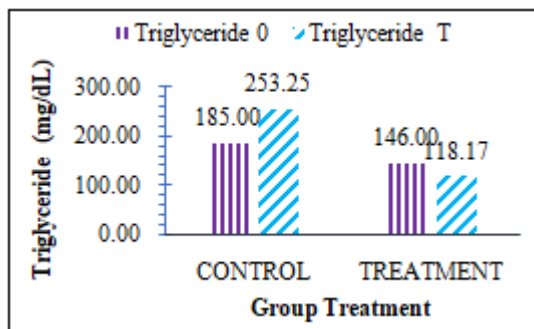


Figure 6: Triglyceride levels (mg/dL) of blood serum of white rats (*Rattus norvegicus*) before (To) treatment (initial) and after 34 days of steeping water dried Gedi leaves (*Abelmoschus manihot*) (Tt) during mating and pregnancy

The presence of a decrease in triglyceride levels in the treatment group indicates that the treatment with *Abelmoschus manihot* can affect lipid profiles, particularly triglycerides, in the blood of white rats during the mating and gestation periods. This indicates changes in lipid metabolism that need to be further understood (Rebecca *et al.*, 2020).

HDL (High-Density Lipoprotein)

The results of biochemical observations of HDL blood can be seen in Figure 7. The HDL content of white rat blood serum (*Rattus norvegicus*) before (To) maintenance of the study (initial) was 45.65 mg / dL or day 0 while after 34 days of maintenance with feed and ordinary water drinks increased to 45.75 mg / dL. His blood HDL increased by 0.1 mg/dL (Figure 7). Treatment (Tt) on day 0 HDL 51.00 mg / dL then increased after 34 days of steeping water dry leaves Gedi to 59.67 mg / dL. The increase in HDL treatment after 34 days of steeping water Gedi leaves (*Abelmoschus manihot*) dry (Tt) during mating and pregnancy was 8.67 mg/dL (Figure 7). The effect of steeping water treatment of Gedi leaves showed that it can increase HDL levels in controls (only ordinary drinking water is given). However, treatment increased markedly statistically by $8.67 - 0.1 = 8.57$ mg/dL. These results show that the application of steeping water for dried Gedi leaves is clear may increase HDL levels blood of female white rats for 34 days of drinking steeping water of 8.57 mg / dL. This shows that HDL levels of Wistar white rats can increase HDL if using steeping water from dried Gedi leaves. These results show that there is an increase in HDL levels when using steeping water from dried Gedi leaves. Elevated HDL levels in the treatment group during mating and pregnancy indicate that *Abelmoschus manihot* can affect HDL metabolism in the body of white rats (McGowan & Matthews, 2018). This illustrates that this herbal plant has the potential to be developed to become an herbal medicine (Li *et al.*, 2024; Lai *et al.*, 2011; Kim *et al.*, 2023)

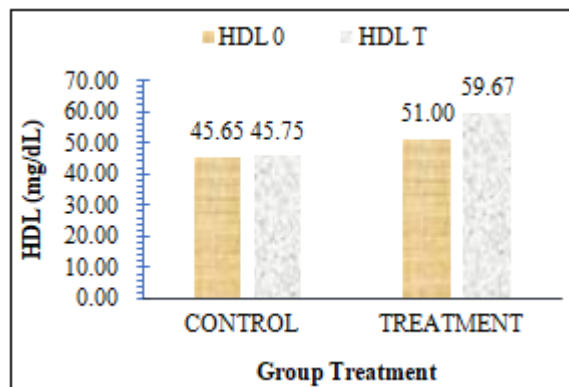


Figure 7: HDL levels (mg/dL) of blood serum of white rats (*Rattus norvegicus*) before (To) treatment (initial) and after 34 days steeping water steeping dried Gedi leaves (*Abelmoschus manihot*) (Tt) during mating and pregnancy

The presence of elevated HDL levels in the treatment group indicates that treatment with steeping water *Abelmoschus manihot* may affect the Biochemical profile of HDL blood in the blood of white rats during the mating and gestation periods. This indicates a change in HDL metabolism that needs to be further understood (Bebitoğlu, 2020). If there is an increase in HDL in an herb it is very good to overcome degenerative diseases (Pandiangan *et al.*, 2021).

LDL (Low-Density Lipoprotein)

The results of biochemical observations of LDL blood can be seen in Figure 8. The LDL content (mg/dL) of blood serum of white rats (*Rattus norvegicus*) before (To) maintenance of the study (initial) was 24.00 mg / dL or day 0 while after 34 days of maintenance with feed and ordinary water drinks increased to 25.50 mg / dL. His blood LDL increased by 1.50 mg/dL (Figure 8). Treatment (Tt) on day 0 LDL 26.00 mg / dL then increased after 34 days of steeping water dry leaves Gedi to 28.67 mg / dL. The increase in LDL treatment after 34 days of steeping water Gedi leaves (*Abelmoschus manihot*) dry (Tt) during mating and pregnancy was 2.67 mg/dL (Figure 8). The effect of steeping water treatment of Gedi leaves shows that it can increase LDL levels between control and treatment did not differ statistically at $2.67 - 1.50 = 1.17$ mg/dL. These results show that the application of steeping water for dried Gedi leaves is clear and may lower LDL levels for 34 days of drinking steeping water of 1.17 mg / dL. This shows that the LDL levels of Wistar white rats can increase if using steeping water-dried Gedi leaves.

These results are in line with research Stepanikova *et al.*, (2019) show an increase in LDL levels when using steeping water from dried Gedi leaves. Elevated LDL levels in the treatment group during mating and pregnancy indicate that *Abelmoschus manihot* can affect LDL metabolism in the body of white rats and also affect degeneration of the heart. This illustrates that this herbal plant has a side effect in increasing LDL levels of 1.17 mg / dL every 34 days of treatment. It needs to be paid attention to further research for the development of natural medicinal raw materials that will be more supportive for Be degenerative (Li *et al.*, 2024; To *et al.*, 2011; Kim *et al.*, 2023)

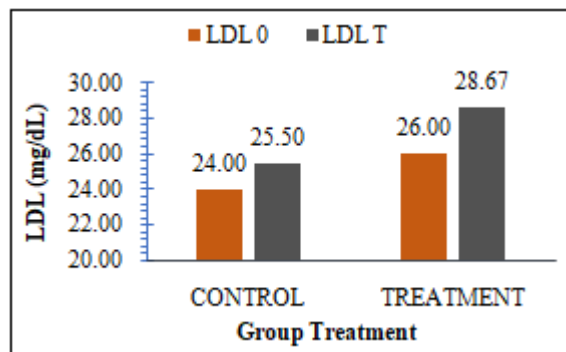


Figure 8: LDL levels (mg/dL) of blood serum of white rats (*Rattus norvegicus*) before (To) treatment (initial) and after 34 days steeping water steeping dried Gedi leaves (*Abelmoschus manihot*) (Tt) during mating and pregnancy

The presence of elevated LDL levels in the treatment group indicates that treatment with steeping water *Abelmoschus manihot* may affect the blood biochemical profile of LDL in the blood of white rats during the mating and gestation periods. This indicates a change in HDL metabolism that needs to be further understood (Bebitoğlu, 2020). If there is an increase in HDL in an herb it is very good to overcome degenerative diseases (Pandiangan *et al.*, 2021).

AST/GOT (Transferase Aspartat/Transaminase Glutamik- Oksaloasetat)

The results of biochemical observations of blood AST/GOT blood can be seen in Figure 9. The content of AST / GOT (mg / dL) blood serum of white rats (*Rattus norvegicus*) before (To) maintenance of the study (initial) was 418.00 mg / dL or day 0 while after 34 days of maintenance with feed and ordinary water drinks decreased to 387.50 mg / dL. His blood AST/GOT decreased by 30.50 mg/dL (Figure 6). Treatment (Tt) on day 0 AST/GOT 366.00 mg/dL then decreased after 34 days of steeping water from dried leaves to 326.00 mg/dL. The decrease in AST/GOT treatment after 34 days of steeping Gedi leaf water (*Abelmoschus manihot*) dry (Tt) during mating and pregnancy was 40.00 mg/dL (Figure 6). The effect of steeping water treatment of Gedi leaves shows that it can lower AST/GOT levels between control and treatment of the average AST/SGOT levels of 3 white rats were 40.00-30.50 = 9.50 mg/dL. These results show that the application of steeping water for dried Gedi leaves is clear and may lower levels of AST / GOT for 34 days of drinking steeping water of 9.50 mg / dL. This shows that the AST/GOT levels of Wistar white rats can decrease if steeping water from dried Gedi leaves. This result is in line with research showing a decrease in AST / GOT levels when using steeping water from dried Gedi leaves.

The decrease in AST/GOT levels in the treatment group during mating and pregnancy showed that *Abelmoschus manihot* can potentially be good for development as hepatoprotectors (Dingse Pandiangan, Nelson Nainggolan, Ivana Chrity Nainggolan, 2023). Steeping water from dried Gedi leaves also affects the metabolism of AST / SGOT in the body of white rats just like Gedi (*Dysphania ambrosioides*) patented by Pandiangan *et al.*, 2023 (Pandiangan D., Nainggolan N, Nainggolan IC., 2023). This illustrates that this herbal plant has the potential to be developed to become a hepatoprotective (Li *et al.*, 2024; To *et al.*, 2011; Kim *et al.*, 2023)

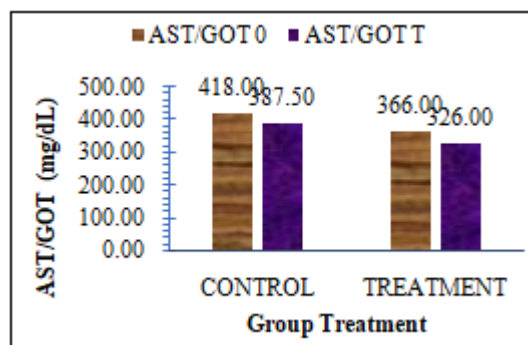


Figure 9: Blood serum levels of AST/SGOT (mg/dL) of white rats (*Rattus norvegicus*) before (To) treatment (initial) and after 34 days of steeping water-dried Gedi leaves (*Abelmoschus manihot*) (Tt) during mating and pregnancy

The decrease in AST / SGOT levels in the treatment group showed that treatment with steeping water *Abelmoschus manihot* may affect the Biochemical profile of AST/SGOT blood in the blood of white rats during the mating and gestation periods. This indicates a change in HDL metabolism that needs to be further understood (Bebitoğlu, 2020). If there is a decrease in AST/SGOT in an herbal is very good for overcoming hepatitis (Pandiangan *et al.*, 2021).

Creatinine

The results of blood biochemical observations of blood creatinine can be seen in Figure 10. Creatinine content (mg/dL) blood serum white rats (*Rattus norvegicus*) before (To) maintenance of the study (initial) there was 0.60 mg/dL or day 0 while after 34 days of maintenance with feed and ordinary water drinks increased to 0.65 mg/dL. His blood creatinine increased by 0.05 mg/dL (Figure 10). Treatment (Tt) on day 0 Creatinine 0.60 mg/dL then increased after 34 days of steeping water dry leaves Gedi to 0.67 mg/dL. Increased creatinine treatment after 34 days given steeping water Gedi leaves (*Abelmoschus manihot*) dry (Tt) during mating and pregnancy was 0.07 mg/dL (Figure 10). The effect of steeping water treatment of Gedi leaves shows that it can increase Creatinine levels between control and treatment did not differ statistically at 0.07-0.05 = 0.02 mg/dL. These results show that the application of steeping water for dried Gedi leaves is clear and may lower levels of Creatinine for 34 days of steeping water of 0.02 mg/dL. This shows that the increase levels of Wistar white rats can increase if steeping water from dried Gedi leaves not significantly different statistically. These results are in line with Taghulih's research *et al.*, (Taghulih *et al.*, 2022) that Pasote steeping for Rats safely and differently with Walk *et al.*, (2015) show a decrease in creatinine levels when using steeping water for dried herbal leaves. Elevated creatinine levels in the treatment group during mating and pregnancy indicate that *Abelmoschus manihot* can affect creatinine metabolism in the body of white rats. This illustrates that this herbal plant has the potential to be developed to become herbal medicine (Li *et al.*, 2024; To *et al.*, 2011; Kim *et al.*, 2023)

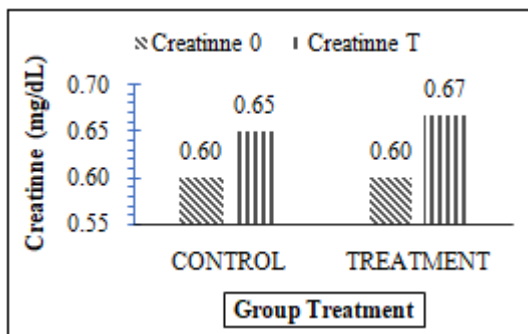


Figure 10: Creatinine levels (mg/dL) of blood serum of white rats (*Rattus norvegicus*) before (To) treatment (initial) and after 34 days of steeping water dried Gedi leaves (*Abelmoschus manihot*) (Tt) during mating and pregnancy

The results of this study imply that *Abelmoschus manihot* has the potential to affect blood biochemical profiles during mating and pregnancy in white rats. This influence is most likely related to the hormonal changes that occur during these stages (OECD, 2021). Although these results indicate changes in blood biochemical parameters, it is important to remember that this study was only conducted on white mice and may not be directly applicable to humans (Selvaraj et al., 2020).

This study provides additional insight into the influence of herbs in animal reproductive medicine. The use of *Abelmoschus manihot* or similar herbs in the context of animal reproductive medicine may require further research to understand the underlying mechanisms and their potential benefits. In addition, this research can contribute to scientific knowledge in the field of animal biochemistry and the influence of herbs on health parameters. More research is needed to reveal more detailed mechanisms and long-term impacts of herbal use on animal reproductive health. In discussing the results of this study, comparisons with previous research or references to other Scopus international journals can be used to corroborate the findings and provide further context about the implications of the research results. Here's how this discussion can be compared to previous research:

The results of this study describe changes in the biochemical profile of blood during mating and pregnancy in white rats affected by *Abelmoschus manihot*. To compare, previous studies examining the influence of herbs or natural substances on the biochemical profile of blood during the reproductive cycle in animals can be cited. Research examples illustrating the effects of herbs on blood glucose or total cholesterol levels in animals can be used to compare the findings in these studies (Babu et al., 2017; Kumar et al., 2015).

The study showed significant changes in estrogen and progesterone levels during mating and pregnancy in the treatment group. To support these findings, references to international Scopus journals examining the effect of natural or herbal substances on reproductive hormones in animals can be included. Research examples reflecting the effects of herbs on hormonal regulation in animals may provide further context (Adeoye et al., 2016).

An increase in total cholesterol and triglycerides in the treatment group indicated a change in lipid metabolism. Previous research looking for the impact of herbs or natural substances on lipid metabolism in animals can be used as a comparison. Research examples illustrating the effects of herbs on lipid profiles in animals may provide additional insights (Kumar et al., 2015).

Although there was an insignificant increase in urea and creatinine levels in the treatment group, it is important to compare it with previous studies examining the effect of herbs or natural substances on kidney function in animals. Scopus international journal references reflecting the effects of herbs on kidney function in animals can be used for additional context (Asif, 2017). By comparing the findings of this study with relevant previous studies, its discussion can confirm or add insight into the influence of *Abelmoschus manihot* on blood biochemical profiles during mating and pregnancy in animals. It can also provide further support to the implications of research results in the context of animal reproductive health and the influence of herbs (Jain et al., 2009).

The steeping water treatment group in the blood biochemical profile was significant compared to the control group. Blood glucose levels and experienced different fluctuations during the mating and pregnancy periods in the treatment group (Braithwaite et al., 2017). Changes in these biochemical parameters can have important implications for reproductive development and the health of pregnant women (Korenromp et al., 2019). The study provides additional insight into the influence of herbs in animal reproductive medicine and has the potential to contribute to scientific knowledge in the field of animal and reproductive biochemistry (Aditama & Jember, 2017). The results of this study have significant relevance in the context of understanding of animal reproductive health and the use of herbal plants in medicine (Goyal et al., 2023).

5. Conclusion

This study investigated the effect of treatment with steeping water of dried Gedi leaves (*Abelmoschus manihot*) on white rats (*Rattus norvegicus*) during mating and pregnancy on the biochemical profile of blood. The results showed that the treatment had a significant impact on blood biochemical parameters, including decreased blood glucose, total cholesterol, triglycerides during 34 days of administration during the period of marriage and pregnancy. This decrease is very good for the potential utilization of Gedi steeping water as a health supplement. However, the biochemical profile is improved in uric acid, HDL, LDL, AST/SGOT and Creatinine. A good increase in blood content is HDL and decrease of AST/SGOT, Glucose, and Cholesterol which can potentially be hepatoprotectors and antidegeneratives medicine supplement. However, the increase in Uric Acid, LDL, and Creatinin during 34 days of treatment is an indication of side effects of steeping water that need to be considered in the future in production development.

Acknowledgments

Thank you for the Ministry, of Education, Culture, Research and Technology for Research Funding assistance with

contract number 053/E5/PG.02.00.PL/2023 on April 12th, 2023. Sam Ratulangi University Manado with derivative contract number 179/UN12.13/LT/2023 at April 14th, 2023, with title Standardization of Pasote (*Dysphania ambrosioides*) and Gedi (*Abelmoschus manihot*) Raw Materials, Production Process and Biovina Tea Products as Antidiabetic and Antihypercholesterolemia drugs.

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