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The Effectiveness of Rosy Periwinkle (*Catharanthus roseus*) and Cherry (*Muntingia calabura L.*) Decoction on SGOT and SGPT Serum in Male Wistar Strain Rats of Acute Hepatitis Model

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ABSTRACT

Acute hepatitis is an inflammation that occurs in the liver caused by infection, drugs, autoimmune, or alcohol consumption and causes an increase in SGOT and SGPT levels. This study aims to determine the effectiveness of Rosy Periwinkle (Catharanthus roseus) and Cherry (Muntingia calabura L.) decoction on decreasing serum levels of SGOT and SGPT. The objects in this study were 30 male wistar strain rats aged 2-3 months with a weight between 180-200 grams. Rats were randomly divided into 3 groups: the negative control, positive control, and treatment group. All rats were adapted for 7 days. The liver of treatment group and the positive control group were induced by Paracetamol 120 mg/day orally for 7 days. The decoction of 2.6 grams of Rosy Periwinkle (Catharanthus roseus) and 5 grams of Cherry (Muntingia calabura L.) as much as 3.6 cc/day orally for 7 days was given to the treatment group. The data were analyzed with SPSS version 24, One Way ANOVA test was performed to compare SGOT SGPT levels. The results showed a significant difference in SGOT levels between the treatment group, positive control group and negative control group ($p<0.05$) and there were significant differences in SGPT levels between the treatment group and positive control group ($p<0.05$). The conclusion of this study is that Rosy Periwinkle (Catharanthus roseus) and Cherry (Muntingia calabura L.) decoction has an effect on decreasing SGOT and SGPT serum levels in male wistar strain rats of acute hepatitis model.

Keywords: Paracetamol, SGOT, SGPT, Catharanthus roseus, Muntingia calabura L.

INTRODUCTION

According to the Center for Public Communication of the Indonesian Ministry of Health's Secretariat General (2015), July 28 is celebrated as World Hepatitis Day and the warning is expected to make all parties aware of the high incidence of hepatitis in the world, even more so in Indonesia and by this the awareness and knowledge about hepatitis can increase. It is

estimated that there are around 28 million people experience hepatitis in Indonesia, even 14 million of them are likely to worsen into chronic and 10% of the number of chronic cases has the potential to become cirrhosis and liver cancer. In Indonesia, hepatitis sufferers reach 1.2% per 100,000 population. As it is known that the number of Indonesian people now reaches 250 million people, it is estimated there are around 2.9 million Indonesian people who suffer from hepatitis ("Media Mandiri Inhealth", 2018).

In 2019, precisely in June there was a reported of significant increase in the incidence of hepatitis in one of the provinces in Indonesia, namely East Java. The case precisely occurred in 3 districts, namely Magetan (80 cases of hepatitis B), Trenggalek (303 cases of hepatitis A), and Pacitan (975 cases of hepatitis A). Seeing and knowing so many cases of hepatitis that occurred in Pacitan made the incident classified as an Extraordinary Event (Ria A., 2019).

It is noteworthy to know that Indonesia is included in a country that is high in biodiversity. There are around 30,000 plant species embedded in Indonesia's tropical forests. A total of 9,600 plants from 30,000 species are known as medicinal plants. Unfortunately, out of 9,600 plants that have medicinal properties, only 200 species have been used as basic ingredients for medicines. An expert explained that globally the maximum utilization of nutritious plants as medicines has not been done. Only about 15% of the 250,000-500,000 plant species in the world have been studied phytochemically. Whereas plants whose biological activities have been tested only have around 6%. Research shows there are 122 compounds from 94 species of plants that are used as medicines. 80% of the 94 species are currently used as people medicine (Ika, 2017).

Research from Silalahi (cited in Sari, N. K. Y. and Putra, I. M. W. A.) states that antioxidants play an important role in neutralizing free radicals that can cause damage to cells and biomolecules, such as the important parts for cells, namely DNA, protein, and lipoprotein in the body that will cause the emergence of degenerative diseases, such as heart disease, cancer, cataracts, diabetes, arthritis, and even liver disease. Therefore, additional antioxidants are needed from outside the body, especially when the body is attacked by hepatitis.

The research of Selvia I. P. D. and Guruh S. P. (2016) explained that the rosy periwinkle has chemical contents such as alkaloids, saponins, flavonoids, and tannins. Flavonoids actually act as antioxidants, so virgin treads can also be used as antioxidants which can help neutralize free radicals in the body. In a study conducted by Fiqih K. M., Siti A., and Noor W. (2016) it was also found that the extract of cherry leaves had an effect in reducing liver damage. This research

was conducted to determine the effectiveness of rosy periwinkle (Catharanthus roseus) and cherry (Muntingia calabura L.) decoction on decreasing levels of SGOT and SGPT serum. As it is known that hepatitis causes an increase in levels of SGOT and SGPT. This research uses boiling method because extracting a plant into something that can be consumed is not easily done by the community when compared to boiling the plant.

LITERATURE REVIEW

The liver is the largest accessory gland in the human body. The liver is brown and weighs between 1,000-1,800 grams. The liver is located in the upper right abdominal cavity, under the diaphragm. The liver has 4 lobes, namely the left lobe, the right lobe, the caudate lobe and the quadrat lobe. The liver is also the most important organ for the body that has many functions, especially in the digestive process. Among other liver functions are metabolic, excretory, body defenses, regulation of blood circulation, formation of bile acids, protein synthesis, and for detoxification (Syaifuddin, 2016).

According to the Data and Information Center of Indonesian Ministry of Health (2014), hepatitis can be interpreted as an inflammation of the liver cells caused by infection (either through viruses, bacteria, or parasites), autoimmune, alcohol consumption, and even can also be caused by excess fat. When someone has hepatitis, SGOT and SGPT levels will increase. This is due to hepatocyte damage (Aleya and Khairun N. B., 2015).

A research from Widmann FK. (cited in Lomanorek, V. Y., Assa, Y. A. and Mewo, Y. M.) stated that the Serum Glutamic Oxaloacetic Transaminase (SGOT) is one of the enzymes found in the liver muscle. When the liver cells are injured, this enzyme will be released into the blood. The most important function of this enzyme is as a marker of liver damage. According to Riswanto (quoted from Nasution, A. Y., Adi, P. and Santosa, P. A.) Serum Glutamic Pyruvic Transaminase (SGPT) is an enzyme used to detect hepatocellular destruction, this enzyme is also present in the liver. Comparing with SGOT, SGPT is considered more specific to determine the level of liver damage.

In this study, Paracetamol was used to damage rats' liver. Study of Jozwiak-Bebenista M, Nowak JZ. (quoted from Azzami, N. A. and Nugroho, T. E.) stated that Paracetamol is the type of non-narcotic analgesic that is most commonly used to reduce fever and can also be obtained without a doctor's prescription. According to Wibowo (quoted from Rahimah, S. et al.), administration of Paracetamol with toxic doses will increase the production of one of the liver metabolites (N-acetyl-p-benzoquinoneimine [NAPQI]) which triggers glutathione (GSH) to

neutralize excess NAPQI so it does not become toxic, but the high workload of GSH will make it thinner so that NAPQI increases and damages hepatocytes.

Rosy periwinkle has a local name: *kembang sari cina, tapak doro, sindapor, kembang serdadu,* and others. This plant has the Latin name *Catharanthus roseus* and is an ornamental plant. Rosy periwinkle (*Catharanthus roseus*) is used as an anticancer, asthma, hypertension, diabetes, inflammation, skin disorders, mumps, and dysentery. In this plant there are active compounds, such as vinrosidin, vindoline, vincristine, vindolinine, vinblastin, vincamine, vinleurosin, reserpine, lochnerine, serpentine, catharanthine, leurosine, and aquammine (Tim Trubus, 2013). In the research of Kardinan (2003) rosy periwinkle is classified into:

Kingdom : *Plantae*
Division : *Magnoliophyta*
Class : *Magnoliopsida*
Order : *Gentianales*
Family : *Apocynacaeae*
Genus : *Catharanthus*
Species : *Catharanthus roseus*

The height of this plant can reach 100 cm and can be classified as wild plants that can grow in tropical climate and also raise in residential areas. This plant has round stems with small diameter, it has hair, woody, branched, broad, and hung a seed house similar to cylindrical. This plant is single leaf, shaped like an ovoid and its flowers are like a trumpet and its surface is soft (Abednego B., 2012).

According to Binawati and Amilah (quoted from Ilkafah), cherry is a plant that is commonly found on the roadside. This plant has another name for *talok, kerukup siam,* and others. Cherry has a small size and has lushly trees. It has antioxidant, and it also has flavonoids, triterpene, polyphenols, saponins, tannins. This plant is classified into dicotyledonous plants and has a leaf structure consisting of upper and lower epidermis, mesophyll, crystals, trichomes, reinforcing tissue, and vascular tissue.

Cherry has a single as 10.67 cm length and 4 cm wide. The flowers are white-crowned with green petals. The weight of the ripped fruit reaches around 1.71 grams with a round shape, it is green when not ripe yet and turns red when ripe (Nur H. and Ismail S., 2019). The classification of cherry according to Sari (quoted from Zahara, M. and Suryady) is as follows.

Kingdom : *Plantae*
Division : *Spermatophyta*
Sub-Division : *Angiospermae*

Class	: *Dicotyledoneae*
Sub-Class	: *Dialypetalae*
Family	: *Malvales / Columniferae*
Order	: *Elaeocarpaceae*
Genus	: *Muntingia*
Species	: *Muntingia calabura L.*

METHODS

This research uses laboratory experimental methods. The objects of this study were 30 male wistar strain rats which were randomly divided into 3 groups, namely group 1 (negative control, only received food and drink as usual), group 2 (positive control, liver damaged by induction of Paracetamol 120 mg/day), group 3 (treatment, liver damaged by induction of Paracetamol 120 mg/day and administration of the decoction of 2.6 gr of rosy periwinkle (Catharanthus roseus) and 5 gr of cherry (Muntingia calabura L.) in 200 cc of water given as much as 3.6 cc/oral every day for 7 days). The object was adapted for 7 days by being fed and drinking normally, aged 2-3 months with a weight between 180-200 grams. The object of the study was adapted to 12 hours of light and 12 hours of dark. The object to be selected for further study is the rats which after being adapted for 7 days, the changes in its weight ± 10%. Each group consisted of 10 rats.

Rosy periwinkle (Catharanthus roseus) and cherry (Muntingia calabura L.) were obtained from Parongpong, West Bandung. Both plants are washed (all part of rosy periwinkle (Catharanthus roseus) and the leaves of cherry (Muntingia calabura L.) are used), it cuts into small pieces, then dried without being exposed to direct sunlight for ± 1 week. After drying, the rosy periwinkle (Catharanthus roseus) is taken and weighed up to 2.6 grams, then the cherry (Muntingia calabura L.) is also weighed up to 5 grams. After that, both are boiled in one pan with 200 cc of water boiled for ± 4 minutes 30 seconds until the remaining 100 cc. When it remains to 100 cc, the cooking water is filtered and then cooled in an open container. Then, taken as much as 3.6 cc every day for 7 days to be given orally to group 3 (treatment) as therapy. Male wistar strain rats were damaged to experience acute hepatitis by inducing 120 mg Paracetamol/oral every day for 7 days. As explained previously, the excessive usage of Paracetamol will result in hepatocyte damage resulting in an increase in SGOT and SGPT levels. The same dose was given to 2 groups, namely group 2 (positive control) and group 3 (treatment), so it was hoped that differences could be obtained in examining SGOT and SGPT

levels. Male wistar strain rats tail was cut and blood was taken to check the levels of SGOT and SGPT.

Research Procedure

The object of the study is 30 male wistar strain rats through the process of adaptation with 12 hours of light and 12 hours of dark for 7 days and was only given food and drink as usual. On the 8th day, group 2 (positive control) and group 3 (treatment) began to be induced with Paracetamol 120 mg/oral every day for 7 days. After that, in the 15th day the SGOT and SGPT levels of the three groups were examined. On the same day, group 3 was also given water therapy of 2.6 grams of rosy periwinkle (*Catharanthus roseus*) and 5 grams of cherry (*Muntingia calabura L.*) as much as 200 cc that was boiled for ± 4 minutes 30 seconds until it remained 100 cc. The remaining cooking water is 100 cc then cooled and taken as much as 3.6 cc every day for 7 days or until the 21st day to be given to group 3 (treatment) orally. On the 22nd day, all groups again underwent an examining SGOT and SGPT levels.

RESULTS

Table 1. **Test Result of SGOT and SGPT Level in Male Wistar Strain Rats Before and After The Therapy**

Dependent Variable	(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.
SGOT_PRE	Negative Control	Positive Control	-226,92000*	17,00173	,000
		Treatment	-226,12000*	17,00173	,000
	Positive Control	Negative Control	226,92000*	17,00173	,000
		Treatment	,80000	17,00173	,999
	Treatment	Negative Control	226,12000*	17,00173	,000
		Positive Control	-,80000	17,00173	,999
SGOT_POST	Negative Control	Positive Control	-963,23000*	14,97255	,000
		Treatment	-68,96000*	14,97255	,000
	Positive Control	Negative Control	963,23000*	14,97255	,000
		Treatment	894,27000*	14,97255	,000
	Treatment	Negative Control	68,96000*	14,97255	,000
		Positive Control	-894,27000*	14,97255	,000
SGPT_PRE	Negative Control	Positive Control	-83,17000*	9,67702	,000
		Treatment	-78,58000*	9,67702	,000
	Positive Control	Negative Control	83,17000*	9,67702	,000
		Treatment	4,59000	9,67702	,884
	Treatment	Negative Control	78,58000*	9,67702	,000

	Control	Treatment	-35,57000	17,96232	,136
	Positive Control	Negative Control	986,37000*	17,96232	,000
		Treatment	950,80000*	17,96232	,000
	Treatment	Negative Control	35,57000	17,96232	,136
		Positive Control	-950,80000*	17,96232	,000
		Positive Control	-4,59000	9,67702	,884
SGPT_POST	Negative	Positive Control	-986,37000*	17,96232	,000

*. The mean difference is significant at the 0.05 level.

DISCUSSION

Examination of SGOT and SGPT levels was carried out 2 times. The examination was carried out before and after inducing water therapy of rosy periwinkle (*Catharanthus roseus*) and cherry (*Muntingia calabura L.*). The data above was obtained from the One Way ANOVA test from SPSS 24.

Table 2. **Test Result of SGOT Level in Male Wistar Strain Rats Before The Therapy**

Dependent Variable	**(I) Group**	**(J) Group**	**Mean Difference (I-J)**	**Std. Error**	**Sig.**
SGOT_PRE	Negative Control	Positive Control	-226,92000*	17,00173	,000
		Treatment	-226,12000*	17,00173	,000
	Positive Control	Negative Control	226,92000*	17,00173	,000
		Treatment	,80000	17,00173	,999
	Treatment	Negative Control	226,12000*	17,00173	,000
		Positive Control	-,80000	17,00173	,999

*. The mean difference is significant at the 0.05 level.

From the results of the analysis above, the negative control group compared with the positive control and treatment groups shows a significant difference ($p<0.05$). This is because the liver of the negative control group was not damaged. As for the positive control group compared with the treatment group, there was an insignificant difference ($p=0.999$) due to the induction of Paracetamol 120 mg/oral in male wistar strain rats that were only given to the two groups causing damage to the liver due to metabolism that occurred in the liver and produce compounds that are toxic and produce elevated levels of SGOT in the blood. This was proven

by Aminah D.'s research (2018) which was conducted on 20 male rats by giving toxic doses of Paracetamol for 14 days. An increase in SGOT and SGPT levels was found due to the induction of Paracetamol.

Table 3. **Test Result of SGOT Level in Male Wistar Strain Rats After The Therapy**

Dependent Variable	**(I) Group**	**(J) Group**	**Mean Difference (I-J)**	**Std. Error**	**Sig.**
SGOT_POST	Negative Control	Positive Control	-963,23000*	14,97255	,000
		Treatment	-68,96000*	14,97255	,000
	Positive Control	Negative Control	963,23000*	14,97255	,000
		Treatment	894,27000*	14,97255	,000
	Treatment	Negative Control	68,96000*	14,97255	,000
		Positive Control	-894,27000*	14,97255	,000

*. The mean difference is significant at the 0.05 level.

The results of the analysis above indicated the presence of a negative control group compared to the positive control group shows a significant deference ($p<0.05$), this is caused by an increase in liver damage from the positive control group that makes SGOT levels higher in the blood. Significant differences were found ($p<0.05$) between the positive control group and the treatment group due to the administration of rosy periwinkle (*Catharanthus roseus*) and cherry (*Muntingia calabura L.*) decoction which contained flavonoids with antioxidant that able to repair the liver damage which is marked by a decrease in SGOT levels in the treatment group. This is proven by Selvia and Guruh's research (2016) which states that rosy periwinkle have flavonoid and in the research of Mhd Riza M., Afrinaldi, and Ari (2015) found the presence of flavonoids can protect lipid membranes from damage caused by oxidation reactions. The same results were obtained from the comparison of the negative control group and the treatment group ($p<0.05$), it shows a significant difference. This is thought to occur due to the lack of duration of therapy as well as the need for dose modification to achieve optimal reduction in SGOT levels.

Table 4. **Test Result of SGPT Level in Male Wistar Strain Rats Before The Therapy**

Dependent Variable	**(I) Group**	**(J) Group**	**Mean Difference (I-J)**	**Std. Error**	**Sig.**
SGPT_PRE	Negative Control	Positive Control	-83,17000*	9,67702	,000
		Treatment	-78,58000*	9,67702	,000
	Positive Control	Negative Control	83,17000*	9,67702	,000
		Treatment	4,59000	9,67702	,884
	Treatment	Negative Control	78,58000*	9,67702	,000
		Positive Control	-4,59000	9,67702	,884

*. The mean difference is significant at the 0.05 level.

The table above shows a significant difference in the SGPT levels of the negative control group compared to the positive control group and the treatment group ($p<0.05$). This is because the negative control group did not experience liver damage. Meanwhile, no significant difference was found in the comparison of the positive control group and the treatment group ($p=0.884$) because the liver of both groups was damaged by induction of Paracetamol 120 mg/oral every day for 7 days which caused an increase in SGPT levels, then the SGPT ratio of the two groups shows no significant difference. This was proven by the research of Ita, Lisdiana, and Aditya (2015) which induced 15 wistar male white rats with Paracetamol for 7 days and found an increase in SGOT and SGPT levels of all rats.

Table 5. **Test Result of SGPT Level in Male Wistar Strain Rats After The Therapy**

Dependent Variable	**(I) Group**	**(J) Group**	**Mean Difference (I-J)**	**Std. Error**	**Sig.**
SGPT_POST	Negative Control	Positive Control	-986,37000*	17,96232	,000
		Treatment	-35,57000	17,96232	,136
	Positive Control	Negative Control	986,37000*	17,96232	,000
		Treatment	950,80000*	17,96232	,000

	Treatment	Negative Control	35,57000	17,96232	,136
		Positive Control	-950,80000*	17,96232	,000

*. The mean difference is significant at the 0.05 level.

Based on the results of the analysis above, a significant difference was found in the comparison between the positive control group and the negative control group ($p<0.05$) which indicates the severity of liver damage that occurred in the positive control group due to administration of Paracetamol at the toxic dose. This is supported by the research of Naufal, Innawati, and Amallia (2017) who found an increase in SGOT and SGPT levels in wistar rats due to the induction of Paracetamol 1500 mg/kg body weight given to 28 wistar rats weighing 140-250 grams. There was also a significant difference ($p<0.05$) in the comparison between the positive control group and the treatment group which showed that SGPT levels in the both groups were significantly different, indicating an improvement in the liver damage experienced by the treatment group. In this table, there was no significant difference ($p=0.136$) in the comparison between the negative control group and the treatment group that showed the effectiveness of rosy periwinkle (*Catharanthus roseus*) and cherry (*Muntingia calabura L.*) decoction which given to the treatment group. In other words, this therapy is able to repair the liver damage that in male wistar strain rats of acute hepatitis.

Conclusion

Based on this study, it can be concluded that administration of Paracetamol at a dose of 120 mg/oral every day for 7 days can lead to acute hepatitis which is characterized by increased levels of SGOT and SGPT in male wistar strain rats. The decoction of rosy periwinkle (*Catharanthus roseus*) and cherry (*Muntingia calabura L.*) had the effectiveness in reducing levels of SGOT and SGPT in male wistar strain rats of acute hepatitis model as evidenced by the value ($p<0.05$). It is recommended to further researchers to modify the dose and time period for providing therapeutic water of rosy periwinkle (*Catharanthus roseus*) and cherry (*Muntingia calabura L.*).

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