

# Teknologi flushing aquaria ekstrak rosella (*Hibiscus sabdariffa* Linn) terhadap kadar SGOT dan SGPT pada ikan bandeng (*Chanos chanos*) yang diinduksi logam merkuri (Hg)

Aquaria flushing technique of rosella extract (*Hibiscus sabdariffa* Linn) to determine the value of SGOT and SGPT in milkfish (*Chanos chanos*) induced by heavy metals (Hg)

Olan Rahayu Puji Astuti Nussa<sup>1</sup>, Intan Permatasari Hermawan<sup>2</sup>✉, dan Ady Kurnianto<sup>2</sup>

<sup>1</sup> Departemen Patologi Veteriner, Fakultas Kedokteran Hewan, Universitas Wijaya Kusuma Surabaya, Jl. Dukuh Kupang XXV No 54, Surabaya, Indonesia.

<sup>2</sup> Departemen Klinik Veteriner, Fakultas Kedokteran Hewan, Universitas Wijaya Kusuma Surabaya, Jl. Dukuh Kupang XXV No 54, Surabaya, Indonesia.

Corresponding author: [intanpermatasari@uwks.ac.id](mailto:intanpermatasari@uwks.ac.id)

## Info Article:

Diterima: 24 Agustus 2022  
Disetujui: 26 Agustus 2022  
Dipublikasi: 04 Oktober 2022

## Article type :

	Riview Article
	Common Serv. Article
✓	Research Article

## Keyword:

Rosella extract; Milkfish; Mercury (Hg); SGOT & SGPT; Flushing Technique

## Korespondensi:

Intan Permatasari Hermawan  
Departemen Klinik Veteriner,  
Fakultas Kedokteran Hewan,  
Universitas Wijaya Kusuma  
Surabaya - Indonesia

Email:

[intanpermatasari@uwks.ac.id](mailto:intanpermatasari@uwks.ac.id)



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**Abstrak.** Tujuan penelitian ini adalah untuk mengetahui nilai SGOT dan SGPT pada ikan bandeng yang diinduksi logam berat (Hg) dengan teknik flushing aquaria dengan ekstrak Rosella (*Hibiscus Sabdariffa* Linn). Sampel yang dipakai adalah 30 Ikan bandeng dewasa jantan dibagi dalam 5 kelompok. Kelompok perlakuan diinduksi dengan logam berat merkuri (Hg) dosis toksik yang dilarutkan ke dalam volume m3 air. Pengambilan darah dari vena jantung ikan bandeng sebanyak 1-2ml untuk pemeriksaan SGPT dan SGOT dilakukan dengan menggunakan metode Berthelot. Lalu dilakukan pemeriksaan kadar Hg pada organ Organ hepar, insang dan otak ikan bandeng diambil 300 gram disentrifuge sampai halus kemudian dilarutkan dengan methanol hingga diperoleh konsentrasi 25ppm, 50ppm, 100ppm, 200ppm, 300ppm, 400ppm, 500ppm, 600ppm, 700ppm, 800ppm, 900ppm dan 1000ppm lalu data dianalisis dengan ANOVA. Berdasarkan hasil penelitian terapi ekstrak bunga rosella hitam dengan sistem flushing aquaria pada ikan bandeng jantan didapatkan nilai rata-rata SGOT dan SGPT menunjukkan penurunan sangat berbeda nyata kelompok P1, P2, P3 dan P4, terhadap kelompok P0 atau kelompok kontrol ( $P < 0,01$ ).

**Abstract.** The purpose of this study was to determine the value of SGOT and SGPT in milkfish induced by heavy metals (Hg) by aquaria flushing technique with Rosella (*Hibiscus Sabdariffa* Linn) extract. The samples used were 30 male adult milkfish divided into 5 groups. The treatment group was induced with a toxic dose of heavy metal mercury (Hg), which was dissolved in a volume of m3 of water. Blood collection from the heart vein of milkfish as much as 1-2 ml for SGPT and SGOT examination was carried out using the Berthelot method. The liver, gills and brain of milkfish were then examined, 300 grams were centrifuged until smooth and then dissolved in methanol to obtain concentrations of 25ppm, 50ppm, 100ppm, 200ppm, 300ppm, 400ppm, 500ppm, 600ppm, 700ppm, 800ppm, 900ppm. and 1000ppm then analyzed by ANOVA. Based on the research results of black roselle flower extract therapy with aquaria flushing system on male milkfish, the average value of SGOT and SGPT showed a very significant decrease in groups P1, P2, P3, and P4, against the P0 group or control group ( $P < 0, 01$ ).

## I. INTRODUCTION

Milkfish is one of the other fishery commodities that have high economic value which is cultivated in ponds. Milkfish is often consumed by the public to fulfill animal protein and is exported to western countries in the form of fresh (frozen) or processed. Milkfish has a lot of nutritional content (in every 100 grams of material) consisting of energy consisting of 129 kcal, calcium: 20 g, iron: 20 mg, Vitamin A : 150, Vitamin B1 : 0,05g, water : 74 g, fat : 4,8 g, protein : 20 g and that os category of high protein and medium fat fish (Saparinto, 2006). Milkfish is cultivated for household and restaurant consumption in the form of curry milk, fried, boiled, smoked and grilled. Milkfish cultivation in ponds is developed and

supported by excellent natural resource potential, especially for the fulfillment of milkfish (nener) seeds either naturally or in hatchery care and otherwise fish consumption is very good for health (Jemri and Jannah, 2021).

The low production is due to a lack of knowledge and lack of skills regarding milkfish cultivation techniques that need to be improved, through the Technical Reference Guide for milkfish cultivation and diseases that often attack and cause death, which are expected to be able to improve milkfish production. Acute mercury (Hg) heavy metal intoxication is also known as Minamata Disease or Minamata Syndrome. This disease is often found in humans and fish that live in marine waters. Symptoms in fish include

changes in the color of the gills to pale, symptoms of nerve paralysis, fish move swimming irregularly (motion incoordination), damage to internal organs (liver and kidneys). Deaths in humans and animals that have experienced acute intoxication due to mercury are often difficult to cure if treatment and therapy are delayed. Treatment therapy for intoxication often experiences obstacles in the form of expensive drug prices, difficult to obtain and causing other adverse side effects in these patients (Millot *et al.*, 2013).

However, previous study Sylvia *et al.* (2022) only were focused on determined of analysis of heavy metals in meat milkfish (*Chanos chanos forsk*) using atomic absorption spectrophotometry (aas) method and the average yield of milkfish (*Chanos chanos Forsk*) milkfish A heavy metal As - 5.9432 mg/kg, Sn 0.1235 mg/kg, Pb 1.6605 mg/kg, Cd -0.0861 mg/kg and Hg -1.4377 mg/kg. For milkfish meat samples, heavy metals As -5.6718 mg/kg, Sn 0.5820 mg/kg, Pb 1.2195 mg/kg, Cd -0.0958 mg/kg and Hg - 0.4281 mg/kg. This level is still within the maximum limit allowed by the Indonesian National Standard 7387:2009 (SNI, 2009). Research in Japan and America in 2006 proved that flowers Rosella (*Hibiscus sabdariffa*) contains high anthocyanin antioxidants. This red anthocyanin has the potential to reduce oxidative stress and used as a hepatoprotector. 18 Mechanisms of antioxidants in reducing oxidative stress and mitochondrial dysfunction is by reducing the expression of Bcl.

*Hibiscus sabdariffa Linn* (Rosella) is a type of shrub (shrub) that is found throughout the tropical regions of the world. Rosella plant is one of the medicinal plants in Indonesia which is very beneficial for health. Rosella *H. sabdariffa L.* flowers contain vitamins B1, B2, vitamin C, vitamin D, niacin, riboflavin, beta-carotene, iron, amino acids, polysaccharides, omega 3, calcium and citric acid. In addition, antioxidant substances such as polyphenols, anthocyanidins, heterogeneous polysaccharide acids and phenolic components including gossypetine-3-glycoside, flavonoids were found. Roselle flavonoid substances consist of flavanols and anthocyanin pigments. Rosella flower petals also contain other antioxidants such as alkaloids, L-ascorbic acid, anisaldehyde, anthocyanins, beta carotene, protocatechuic acid, beta sitosterol, citric acid, galactose, polyphenols, cyaniding-3-rutinoside, mucopolysaccharides, pectin, polysaccharides, stearic acid (Shafirany, *et al.*, 2021). The results of this study are expected to explain the effect of the flusing aquaria technique

of Rosella flower extract (*Hibiscus Sabdariffa Linn*) on the levels of SGOPT and SGPT of milkfish induced by heavy metal mercury (Hg).

## II. MATERIALS AND METHOD

### 2.1. Material

Heavy metals Mercury (Hg), Rosella flower, 10% formalin in 0.15 M PBS (pH 7.4), 30% formic acid / 0.28 M sodium citrate, ethanol, xylene, xylol, paraffin, distilled water, Mayer hematoxylin, eosin, chloroform, glacial acetic acid, 10% NaCl, gill organ tissue, liver and brain of milkfish.

### 2.2. Preparation of *Hibiscus sabdariffa* (Rosella) Ethanol Extract

Rosella flowers are cleaned and cut into small pieces and then dried. After drying, grind it to a powder. This powder is soaked with ethanol solvent several times. The obtained macerate was collected and evaporated using a rotary evaporator to obtain an ethanolic extract of Rosella flowers.

### 2.3. Samples

Thirty male adult milkfish aged 4-6 months divided into 5 groups. The five groups of milkfish used in this study can be described as follows: The first group (negative control) consisted of 6 healthy male milkfish without being given *Hibiscus sabdariffa* (Rosella) extract solvent and flushing technology. The second group (positive control) consisted of 6 male milkfish which were given a toxic dose of mercury (1 ppm) dissolved in aquarium water to induce acute intoxication without being given *Hibiscus sabdariffa* (Rosella) extract and flushing technology. The third group (P1) consisted of 6 male milkfish which were given a toxic dose of mercury dissolved in aquarium water to induce acute intoxication, given *Hibiscus sabdariffa* (Rosella) extract at a dose of 5 ppm and flushing technology.

The fourth group (P2) consisted of 6 male milkfish who were given a toxic dose of mercury dissolved in aquarium water to induce acute intoxication, given *Hibiscus sabdariffa* (Rosella) extract at a dose of 10 ppm and flushing technology. The fifth group (P3) consisted of 6 male milkfish who were given a toxic dose of mercury dissolved in aquarium water to induce acute intoxication given *Hibiscus sabdariffa* (Rosella) extract at a dose of 20 ppm and flushing technology. In each group, necropsy was performed and gill, liver and brain tissue was taken as well as cardiac venous blood collection and examination of SGPT, SGOT, BUN, creatinine levels in blood serum and mercury (Hg)

levels on the 7th day after induction with heavy metal mercury and day 15 post therapy.

2.4. Biochemical Test SGOT and SGPT

Milkfish blood collection from the heart vein as much as 1-2 ml for SGOT and SGPT examination was carried out using the Berthelot method. This method is based on the reaction of the formation of colored complexes, due to the increased levels of the enzymes SGPT (Serum Glutamic Pyruvate Transaminase) and SGOT (Serum Glutamic Oxaloacetic Transaminase) in the damaged liver parenchyma; an increase in the urease enzyme which hydrolyzes urea into ammonium ions and CO<sub>2</sub> to form a blue-green complex. The color complex formed is proportional to the levels of SGPT and SGOT in the sample which is read at a wavelength of 578 nm from a spectrophotometer (Corwin, 2009).

2.5. Examination of Mercury (Hg) Levels in Liver, Gills and Brain Organs

The liver, gills and brain of milkfish were taken 300 grams and centrifuged until smooth then dissolved with methanol to obtain concentrations of 25ppm, 50ppm, 100ppm, 200ppm, 300ppm, 400ppm, 500ppm, 600ppm, 700ppm, 800ppm, 900ppm and 1000ppm. Then the absorption of each solution was measured at  $\lambda=320$  nm by using a UV-Vis Helios-a spectrophotometer or by using an HPLC apparatus. As a standard standard for making standard solutions used pure original mercury (Hg) compounds from Sigma Aldrich products. The results of the absorption of each concentration were compared with a standard solution of mercury (Hg) and then the mercury (Hg) level at the highest concentration (peak) in the liver, gill and brain extracts of the milkfish could be calculated (Rismana *et al.*, 2013).

2.6. Data Analysis

Statistical analysis carried out was calculating the mean (mean) examination of SGPT and SGOT levels in blood samples and Hg levels in samples of liver, gills and brain organs were analyzed by ANOVA and followed by Duncan's multiple distance test with a significance level of 5%.

III. RESULTS AND DISCUSSION

3.1. Serum Glutamic Oxaloasetic Trasminase (SGOT)

The results of the analysis of variance showed that the administration of rosella (*Hibiscus sabdariffah*) extract decreased significantly, which was significantly different from the P1 group with a significance value ( $P<0.01$ ). For more details, it can

Table 1. Mean SGOT of Control and Treatment Group.

Group	Mean $\pm$ SD
P0	23,00 $\pm$ 5,54 <sup>b</sup>
P1	68,00 $\pm$ 15,13 <sup>b</sup>
P2	56,00 $\pm$ 7,58 <sup>b</sup>
P3	30,00 $\pm$ 13,81 <sup>b</sup>
P4	8,00 $\pm$ 1,49 <sup>a</sup>

Table 2. Mean SGPT of Control and Treatment Group.

Group	Mean $\pm$ SD
P0	9,00 $\pm$ 0,75 <sup>a</sup>
P1	11,00 $\pm$ 0,89 <sup>b</sup>
P2	9,00 $\pm$ 0,98 <sup>a</sup>
P3	8,00 $\pm$ 0,51 <sup>a</sup>

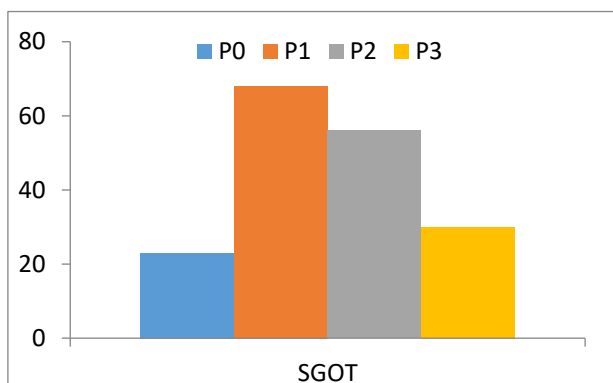


Figure 1. Graph of the average SGOT in the treatment group.

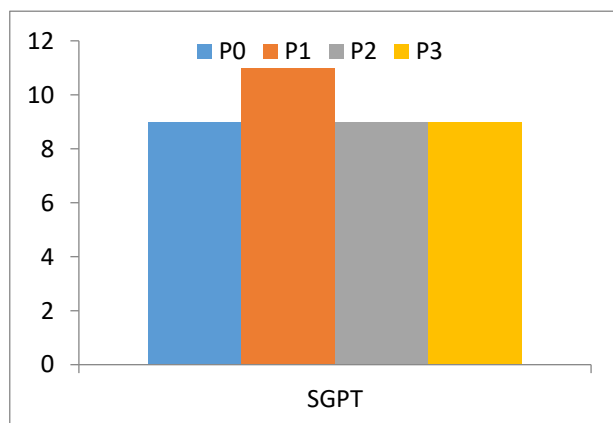


Figure 2. Graph of the average SGPT in the treatment group.

be seen the average SGOT value of milkfish which is presented in the following Table 1.

From the results of the study for SGOT levels, the mean SGOT levels of the male milkfish group P0 or control were  $23.00 \pm 5.54b$ , group P1 was worth  $68.00 \pm 15.13b$ , Group P2 was worth  $56.00 \pm 7.58 b$ , Group P2 was worth  $56.00 \pm 7.58 b$ . P3 is worth  $30.00 \pm 13.81 b$ , Group P4 is worth  $8.00 \pm 1.49 a$ . Based on the research results of black roselle flower extract therapy with aquaria flushing system on male milkfish, the average value of SGOT showed a very significant decrease in the P1, P2, P3 and P4 groups, against the P0 group or the control group ( $P < 0.01$ ). As in the study of Nurkhasanah *et al.* (2017) which Rosella extract decrease in levels of SGPT in rats.

The results of the study using black roselle extract therapy with aquaria flushing system were able to prevent the increase in SGOT levels, it was seen that SGOT levels decreased with each increase in the black roselle extract dose. When the damaged liver cells are replaced by new liver cells, the SGOT enzyme will leave and enter the blood circulation. Therefore, the SGOT enzyme that remains in the blood indicates that the liver is working and carrying out its functions normally. Liver cells are in normal condition, so the SGOT enzyme remains in the cells. None or very little escapes from the cells and enters the blood vessels. It is different if the liver cells are damaged and the walls are broken, the SGOT enzyme will leave the cells and enter the bloodstream. Black roselle extract contains essential oils that function to recover or repair liver cells or hepatocyte cells (Hidayat *et al.*, 2017).

### 3.2. Serum Glutamic Pyruvic Transaminase (SGPT)

The results of the analysis of variance showed that the administration of rosella (*Hibiscus sabdariffa*) extract decreased significantly, which was significantly different from the P1 group with a significance value ( $P < 0.01$ ). For more details, it can be seen the average SGPT value of milkfish which is presented in the following Table 2.

From the results obtained, it is known that the mean SGPT levels of milkfish group P0 or control are  $9.00 \pm 0.75a$ , group P1 is  $11.00 \pm 0.89b$ , group P2 is

$9.00 \pm 0.98a$ , group P3 is  $8.00 \pm 0.51a$ . The results of the research on black roselle flower extract therapy with aquaria flushing system found that the average SGPT level was below the normal number, namely  $9.00 \pm 0.75a$ , indicating a very significant difference ( $P < 0.01$ ). Based on a non-statistical assessment, the change in the mean number in the P1 group resulted in a significant decrease in SGPT levels compared to the P0 or control group. This is possible because according to research by Saraswati (2015), black roselle flower extract contains essential oils that have anti-inflammatory, antioxidant and hepatoprotective effects. Black roselle flower plays a role in improving liver function (as seen in the first phase of the study using Tnfa immunohistochemistry, where there was improvement in liver cells that had been treated with black roselle extract) then increased RNA biosynthesis, protected liver cell damage and stimulated the production of bile. Another study mentions the ability of Rosella extract in can reduce SGPT levels in rats (Hidayat *et al.*, 2019).

The hypothesis of the mechanism of action of Rosella in reducing enzymes SGOT and SGPT is through antioxidant activity that reduces oxidative stress and dysfunction mitochondria with decreased Baz and tBID in the liver, resulting in decreased liver enzymes such as SGOT and SGPT (Li *et al.*, 2015).

## IV. CONCLUSION

Based on the research results of black roselle flower extract therapy with aquaria flushing system on male milkfish, the average value of SGOT and SGPT showed a very significant decrease in the P1, P2, P3 and P4 groups, against the P0 group or the control group ( $P < 0.01$ ).

## ACKNOWLEDGEMENTS

This research has been supported by Lembaga Penelitian dan Pengabdian Masyarakat (LPPM) Universitas Wijaya Kusuma Surabaya year 2021-2022.

## REFERENCES

- Corwin EJ. 2009. Handbook of pathophysiology, 3th Edition. Jakarta: Buku Kedokteran EGC. hal 725-730.
- Hidayat, M., Adhika, O.A., Tanuwijaya F., Nugraha, A., and Hutagulung, R.B., 2019. Effective Dose of Rosella Calyx Extract (*Hibiscus sabdariffa* L.) against Liver Marker Enzymes and Liver Histopathological of High-Fat Feed-Induced Rats. Journal of Medicine and Health. Vol.2 No.4. [:10.28932/jmh.v2i4.1827](https://doi.org/10.28932/jmh.v2i4.1827)

- Jemri, J and Jannah, H. 2021. Compressing Hedonic Test Between Milkfish (*Chanos chanos*) and Skipjack Fish (*Katsuwonus pelamis*) Process. International Conference on Applied Science and Technology on Social Science 2021 (iCAST-SS 2021). Advances in Social Science, Education and Humanities Research, volume 647.
- Li S, Tan HY, Wang N, Zhang ZJ, Lao L, Wong CW, et al. The role of oxidative stress and antioxidants in liver diseases. Int J Mol Sci. 2015; 16:26087-124. [10.3390/ijms161125942](https://doi.org/10.3390/ijms161125942)
- Milot, E., Perrier, C., Papillon, L., Dodson, J. J., & Bernatchez, L. (2013). Reduced fitness of Atlantic salmon released in the wild after one generation of captive breeding. *Evolutionary Applications*, 6, 472– 485. <https://doi.org/10.1111/eva.12028>.
- Nurkhasanah, & Nurani, Laela. (2017). Effect of rosella (*Hibiscus sabdariffa* L) extract on glutathione-S-transferase activity in rats. *Tropical Journal of Pharmaceutical Research*. 16. 2411-2416. 10.4314/tjpr.v16i10.14.
- Rismana E, Kusumaningrum S, Bunga OP, Rosidah I, dan Marhamah, 2013. Sintesis Dan Karakterisasi Nanopartikel Kitosan-Ekstrak Kulit Buah Manggis (*Garcinia mangostana*). *Jurnal Sain dan Teknologi Indonesia*. Vol.14. No.3, Desember 2012. Hlm189-196, Dicitak 27 Maret 2013.
- Saparinto. 2006. Making Various Processed Milkfish. Self-Help Spreader. Jakarta
- Sylvia, D., Pratiwi D., and Fauziah, D. 2022. Analysis Of Heavy Metals In Meat Milkfish (*Chanos chanos Forsk*) Using Atomic Absorption Spectrophotometry (Aas) Method. *Jurnal Ilmiah Kefarmasian Vol 7 (2) : 191-200*.
- SNI. 2009. Batas Maksimum Cemaran Logam Berat Dalam Pangan.
- Shafirany, Mareetha & Indawati, Iin & Sulastri, Lela & Sadino, Asman & Kusumawati, Anggun & Alkandahri, Maulana. (2021). Antioxidant Activity of Red and Purple Rosella Flower Petals Extract (*Hibiscus sabdariffa* L.). *Journal of Pharmaceutical Research International*. 33. 186-192. 10.9734/jpri/2021/v33i46B32931.