Medicomplementary Journal

Fakultas Kedokteran Universitas Wahid Hasyim, Semarang

# EFFECT OF ILER LEAF EXTRACT (*Plectranthus scutellarioides l.*) ON SGOT LEVELS IN RATS WHITE MALE BORAX-INDUCED WISTAR STRAIN

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**Abstrak**

*Borax is now widely used in the food industry, even though this substance is toxic and prohibited as a food ingredient. Borax can trigger lipid peroxidation and inflammation in hepatocyte cells, which disrupts cell permeability. As a result, intracellular enzymes like SGOT are released excessively into the bloodstream. Iler leaf extract (Plectranthus scutellarioides L.) functions as a hepatoprotector capable of suppressing lipid peroxidation and inflammation in hepatocyte cells, which is marked by increased SGOT levels. This study aims to investigate the impact of Iler leaf extract on SGOT levels in male Wistar strain rats induced by borax. The method used is a post-test control group experimental design involving 20 male Wistar rats divided into 4 groups. Group K1 received no treatment, while group K2 was given borax at a dose of 40 mg/Kg body weight (BW), group P1 was given Iler leaf extract at a dose of 600 mg/Kg BW, and group P2 was given Iler leaf extract at a dose of 1200 mg/Kg BW. The results of the One Way ANOVA statistical test showed a significant difference ($p < 0.014$), which was followed by post-hoc LSD testing between groups. The administration of Iler leaf extract (Plectranthus scutellarioides L.) affected the reduction of SGOT levels in male Wistar strain rats induced by borax. The most effective dose was found in treatment group 2, which was given Iler leaf extract at a dose of 1200 mg/Kg BW, with SGOT levels approaching those of the normal control group.*

***Keywords:*** *borax, Iler leaf, extract, SGOT*

## INTRODUCTION

Currently, the use of borax can be found in various food industries.[1] According to information from the World Health Organization (WHO), the fatal dose of borax that can cause death due to consumption in young children and infants ranges between 3–

6 grams per day, while in adults, it is approximately 15–20 grams per day. The safe consumption dose of borax for human health is considered to be ≤ 8.8 mg/kg body weight per day.[2]

When borax enters the body, it transforms into the radical ion 4B(OH)4-, which will bind with unsaturated fatty acid ions to form 3 hydroxyl (OH)- radicals. These hydroxyl free radicals cause oxidative stress in hepatocyte cells, which can increase Serum Glutamic Oxaloacetic Transaminase (SGOT). Research on Wistar rats has shown that a dose of 40 mg/Kg body weight, orally for 10 days, causes damage to the hepatocyte cells of the rats, including 12% parenchymatous degeneration, 48% hydropic degeneration, and 40% necrosis using histopathology methods.[4]

The liver plays a crucial role in the process of eliminating toxic substances from the body. Due to its crucial function, the liver is an organ that is easily damaged. Liver damage caused by exposure to harmful substances damages hepatocyte cells, disrupts their permeability, and releases intracellular enzymes into the blood as a sign of damage. One of these enzymes is SGOT.[6] Therefore, hepatoprotective substances are needed to protect hepatocytes from the harmful effects of borax. Based on previous experimental results, it was shown that the ethanol extract of Iler leaves, through maceration for 3x24 hours, has antioxidant activity with an IC50 value of 80.23 ppm and can be classified as strong because

the IC50 value is between 50- 100 ppm.[7]

Iler leaves (*Plectranthus scutellarioides L.*) are known to have high antioxidant activity due to the presence of phenolic compounds and flavonoids in the ethanol extract of Iler leaves. These compounds prevent cell damage from free radicals by binding with free radical substances and preventing inflammation in body cells.

## RESEARCH METHODS

This study used an experimental design with a post-test only control group to observe the effect of Iler leaf extract (*Plectranthus scutellarioides L.*) on SGOT levels in male Wistar rats induced with borax. The Iler leaves were obtained from the Center for Research and Development of Medicinal Plants (BP2TOOT) in Tawangmangu in April 2024 and were confirmed through a determination test, which verified that the leaves were indeed from the Iler species (*Plectranthus scutellarioides L.*).The Iler leaf extract was prepared using the maceration method, beginning with moisture content testing of the Iler leaf powder using a moisture balance. The Iler leaf powder was macerated for 5 days with 96% ethanol in a ratio of 1:10, followed by two filtrations.

A total of 20 male white rats of the wistar strain were included in 4 study groups, namely Control 1 without treatment, Control 2 was given 0.5% NaCMC followed by borax 40 mg/KgBB on the 4th day for 14 days, treatment group 1 was given iler leaf extract at a dose of 600 mg/kgBB followed by borax on day 4 for 14 days, and treatment group 2 was given iler leaf extract at a dose of 1200 mg/KgBB followed by borax on day 4 for 14 days.

On day 17, blood was collected from the ophthalmic vein of the rats to measure SGOT levels using a spectrophotometer. The data were analyzed using the Shapiro-Wilk normality test, Levene's homogeneity test, and the One-Way ANOVA test, followed by the Post-Hoc LSD test if significant differences were found. All research procedures were conducted in accordance with ethical standards for animal research. This study received approval from the Bioethics Committee for Medical/Health Research, Faculty of Medicine, Sultan Agung Islamic University, Semarang, under approval number 369/IX/2024/Komisi Bioetik. All procedures involving laboratory animals were performed following ethical guidelines for animal research to ensure the well-being of the test animals.

## RESULT

Based on Table 1, the results of the phytochemical test of Iler leaf extract indicate the presence of flavonoids, saponins, and phenols. Table 2 displays the results of the One Way ANOVA test, which shows a significant difference in SGPT levels between treatment groups with a p-value < 0.014, indicating that Iler leaf extract affects SGOT levels. Furthermore, Table 3 presents the results of the Post Hoc LSD test comparing SGOT levels between two groups. Based on Table 3, there is a significant difference between control group 2, which was given borax, and treatment group 2, which received a high dose of Iler leaf extract. This indicates the effectiveness of Iler leaf extract in reducing SGOT levels. In Figure 1, a bar chart illustrates the differences in mean SGOT levels across the treatment groups, where the group receiving Iler leaf extract at a dose of 1200 mg/kgBW experienced a decrease in SGPT levels that was closer to the normal control group compared to other groups. The Iler leaves sample was obtained from B2P2TOOT Tawangmangu in April 2024 and has been confirmed through a determination test.

**Table 1. Results of Phytochemical Content Identification Test of Iler Leaf Extract**

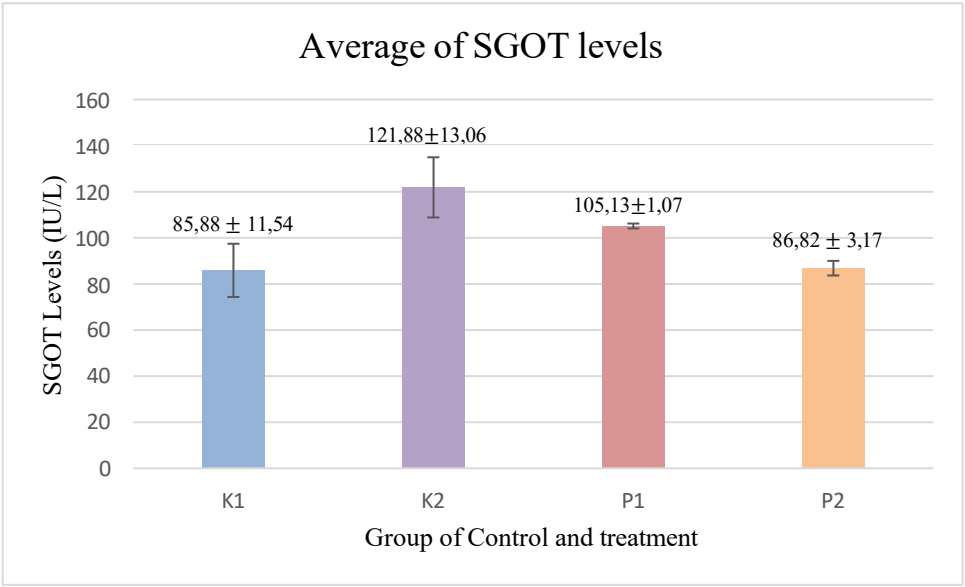
| Composition Chemical | Observation Result | Description |
|---|---|---|
| Flavonoid | + | The colored compound dissolves in the upper phase of forms a precipitate on top. |
| Saponin | + | A stable foam precipitate appears at the top and persists for more than 10 minutes |
| Fenol | + | The color intensity changes to a darker shade. |
| Alkaloid | - | No orange precipitate is observed with Dragendoff's reagent |

**Tabel 2. Result of One Way Anova Test**

| Variable | Group | | | | |
|---|---|---|---|---|---|
| | K1 n=5 *Mean ±SD* | K2 n=5 *Mean ±SD* | P1 n=5 *Mean ±SD* | P2 n=5 *Mean ±SD* | *P value One Way Anova* |
| SGOT | 85,88 ± 11,54 | 121,88 ± 13,06 | 105,13 ± 1,07 | 86,82 ± 3,17 | 0,014* |

**Table 3. Result of Post Hoc LSD test**

| No. | Group | Value of p | Description |
|---|---|---|---|
| 1. | KI K2 | 0,006* | There is a difference |
| 2. | K1 P1 | 0,126 | There is no difference |
| 3. | K1 P2 | 0,921 | There is no difference |
| 4. | K2 P1 | 0,135 | There is no difference |
| 5. | K2 P2 | 0,005* | There is a difference |
| 6. | P1 P2 | 0,106 | There is no difference |




**Picture 1. Average of SGOT Levels**

## DISCUSSION

The results of this study indicate that borax exposure can significantly increase SGOT levels in male Wistar rats. Toxic substances entering the body, such as borax, are metabolized by the liver and cause damage to the hepatocyte cell membranes, followed by damage to the liver parenchymal cells. This occurs because the active groups in borax bind to proteins and unsaturated lipids, leading to lipid peroxidation. This cell membrane damage is what causes the increase in SGOT levels in the blood. [8, 9, 10]

These results are consistent with previous studies stating that borax can increase the

production of free radicals, which ultimately leads to oxidative stress and damages the structure and function of the liver.[9]

Especially in the group given a dose of 1200 mg/kgBW, the active compounds in Iler leaves play a role as antioxidants by reducing hydroxyl ions from borax exposure. The number and position of groups on the flavonoid ring influence antioxidant and enzyme activity. 3-hydroxyflavone is a simple antioxidant. Free radical scavenging activity increases with the presence of the C-3'- hydroxyl group and hydroxyl group on ring B. The combination of a carbonyl group at C-4 and a double bond between C-2 and C-3 inhibits NADH-cytochrome b5 reductase more strongly. This free radical scavenging activity is further enhanced by methoxy groups at C-5 and C-7.[11]

In addition, the flavonoid content and other bioactive compounds in Iler leaf extract exhibit anti-inflammatory activity by reducing IL-1 receptor-associated kinase 4 (IRAK4) bound to TLR-4 on macrophage cells. This leads to the inhibition of NF-κB, which subsequently decreases the production of TNF-α, IL-1β, COX-2, and iNOS, all of which play a role in the inflammatory process.[9]

Based on the results obtained, Iler leaf extract at a dose of 1200 mg/kgBW, which produced an average SGOT level close to that of the normal control group, was proven to be more effective in protecting hepatocyte cells from damage caused by borax exposure over 14 days. The treatment group with a dose of 600 mg/kgBW showed less effective results, although there was a decrease in SGOT levels. These findings indicate that the 1200 mg/kgBW dose has stronger antioxidant activity.

## CONCLUSION

Administration of Iler leaf extract (*Plectranthus scutellarioides L*) can significantly reduce SGOT levels in rats induced with borax. A dose of 1200 mg/kgBW has been proven to be more effective than a dose of 600 mg/kgBW in reducing SGOT levels in male Wistar rats given borax at a dose of 40 mg/kgBW.

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