

EFFECT OF ILER LEAF EXTRACT (*Plectranthus Scutellarioides* L.) ON MDA LEVELS IN RATS WHITE MALE BORAX-INDUCED WISTAR STRAIN

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Abstrak

*Borax is an ingredient that is often used to be added to food, even though the use of borax as a chemical in food is prohibited because it can harm the body. Borax entering the body will increase the amount of free radicals, excess free radicals will result in an increase in lipid peroxidation process so that the production of MDA increases. The leaves of iler (*Plectranthus Scutellarioides* L.) function as antioxidants to prevent the increase in free radicals so as to prevent lipid peroxidation. This study aims to determine the effect of iler leaf extract on MDA levels in male white rats of the borax-induced wistar strain. The method used was an experimental study with a post-test only control group design, involving 20 mice divided into four groups. The control group without treatment (K1), the borax induction group (K2), and two treatment groups with iler leaf extract doses of 600 mg/kgBB (P1) and 1200 mg/kgBB (P2). Data analysis using the One Way ANOVA Test showed a p-value of 0.000, followed by the Post Hoc LSD test. A dose of 1200 mg/kgBB is more effective in lowering SGPT levels than a dose of 600 mg/kgBB. In conclusion, iler leaf extract affects MDA levels and can act as an antioxidant.*

Keywords: borax, iler leaves, extracts, MDA

INTRODUCTION

According to the BPOM report (2020) based on the results of an evaluation by taking food samples, the results found that borax as an additive in food is classified as dangerous.¹ Regulation of the Minister of Health No. 033 of 2012 explains that the use of borax for the purpose of being an additive chemical in food is prohibited because it is toxic to all cells.²

Body conditions exposed to unsafe food additives, such as borax, can cause damage to the liver, cardiovascular, nerves and kidneys. Free radicals produced in the liver have the potential to spread to different parts of the body through the blood circulation, potentially causing damage to cells and tissues in various organs.³ The results of previous studies in test animals of wistar strain rats showed that the administration of borax for 10 days at a dose of 40 mg/kgBB caused damage to mouse hepatocyte cells in the form of cell degeneration and necrosis using the histopathological examination method.⁴

High levels of free radicals are the cause of an increase in lipid peroxidation processes which also have an impact on increasing the production of malondialdehyde (MDA).⁵ Previous research has shown that iler leaf extract shows antioxidant activity against decreased MDA levels in mice.⁶

Iler leaf extract is proven to contain flavonoids, saponins, and polyphenols.⁷ And in previous studies, it showed that iler leaves were classified as a very active category because the IC50 value was at < 10 µg/ML.⁸ This compound acts as an antioxidant that plays a role in neutralizing free radicals as well as protecting cells from the impact caused by oxidative stress. through the procedure of inhibiting lipid peroxidation. Research.⁹

RESEARCH METHOD

This study is an experimental study with a post-test-only control group design to evaluate the effect of iler leaf extract (*Plectranthus scutellarioides* L.) on MDA levels in white rats males of borax-induced Wistar strains. Iler leaf samples were obtained from the Tawangmangu B2P2TOOT in April 2024 and have been confirmed through a determination test. The manufacture of iler leaf extract by the maceration method begins with testing the

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moisture content of simplicia powder using moisture balance. After the moisture content < 10%, the pollination process is continued. The iler leaf powder is macerated for 5 days with 96% ethanol then filtered with a caccum pump before the thickening process is carried out using an evaporator with a temperature 50°C.

A total of 20 male white rats of the wistar strain were divided into 4 research groups by random sampling (simple random sampling), namely Control 1 (K1) without treatment only given feed, in Control 2 (K2) 0.5% NaCMC was given orally once a day for 17 days and on the 4th day at an interval of 1 hour borax 40 mb/kgBB per oral for 14 days, in Treatment 1 (P1) iler leaf extract was given at a dose of 600 mg/kgBB in NaCMC 0.5% orally per day for 17 days and on the 4th day at an interval of 1 hour borax at a dose of 40 mg/kgBB orally once a day for 14 days, and in Treatment 2 (P2) iler leaf extract was given at a dose of 1200 mg/kgBB in NaCMC 0.5% orally per day for 17 days and on day 4 at an interval of 1 hour was induced borax dose of 40 mg/kgBB orally once a day for 14 days.

On the 17th day, blood was taken from rat veins, then the method to analyze MDA used 20% TCA reagents and 1% TBA to check MDA levels using spectrophotometry methods. The data were analyzed with the Shapiro-Wilk normality test because the sample was <50 samples, followed by the test Levene homogeneity as well as the One-Way ANOVA test to test for differences in influence between groups, followed by a Post-Hoc LSD test if there were significant differences. This research has received approval from the Bioethics Commission for Medical Research/Health, Faculty of Medicine, Sultan Agung Islamic University, Semarang with number 369/IX/2024/Bioethics Commission. This research follows animal ethics involving animals and is carried out in accordance with ethical standards.

RESULT

Based on Table 1. showing the results of phytochemical tests of iler leaf extract containing flavonoids, saponins, and phenols. Table 2. display the results of the One Way ANOVA test which showed significant differences in MDA levels between treatment groups with sig values. 0.000, indicates that there is a significant difference indicating that iler leaf extract has an effect on MDA levels. Next, Table 3. presented Post Hoc LSD test results to find out the differences in each of the 2 groups, where there were significant differences between the control group and the treatment group. In the treatment group, significant differences were shown indicating the efficacy of the extract in lowering MDA levels.

In Figure.1 there is a bar chart showing the difference in MDA levels. In the treatment group (P1) and the treatment group (P2) the results were not significant but the average results showed a difference, the results showed a decrease in MDA levels compared to the control group 2 (K2).

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 or 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 Dragendorff's reagent

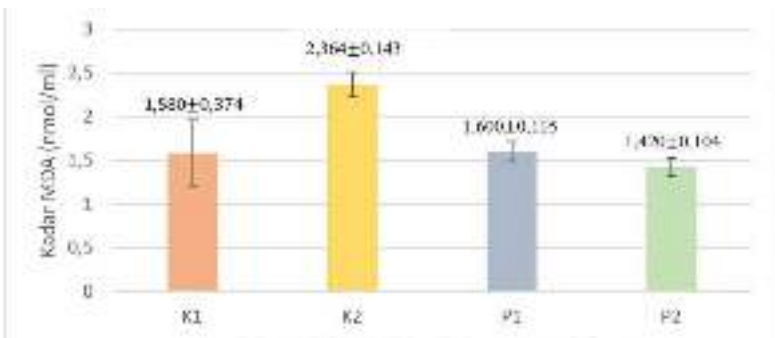
Table 2. Result of One Way Anova Test

Variable	Group				
	K1 n=5 <i>Avg+SD</i>	K2 n=5 <i>Avg+SD</i>	P1 n=5 <i>Avg+SD</i>	P2 n=5 <i>Avg+SD</i>	<i>Grade P One Way Anova</i>
MDA	1,580±0,374	2,364±0,143	1,600±0,115	1,420±0,104	0,000

Table 3. Result of Post Hoc LSD test

No.	Kelompok	Nilai p	Keterangan
1.	K1 K2	0,000	There is a difference
2.	K1 P1	0,897	There is no difference
3.	K1 P2	0,310	There is no difference
4.	K2 P1	0,000	There is a difference
5.	K2 P2	0,000	There is a difference
6.	P1 P2	0,255	There is a no difference

Picture 1. Average Level MDA



DISCUSSION

The results of this study show that exposure to borax can cause a significant increase in MDA levels in male white rats of the wistar strain. Borax will interact with HCl which is converted from borax to boron, boron will then be distributed through the arteries. The distribution of boron can cause damage, this is due to the active group of borax B-O-B (B=O) binding to unsaturated proteins and lipids which can cause lipid peroxidation. When peroxidized lipids are formed, they will interact with hydrogen ions to form hydroperoxide radicals (ROOH). The final stage of the mechanism, namely the hydroperoxide radical (ROOH) will be menghasilkan dan meningkatkan senyawa MDA.¹⁰

The administration of iler leaf extract (*Plectranthus scutellarioides* L.) showed effectiveness in reducing MDA levels, especially in the treatment group given a dose of 1200 mg/kgBB. The content of active compounds in iler leaves has a role as an antioxidant by reducing hydroxyl ions from the administration of iler leaf extract which contains flavonoid compounds that function to suppress the formation of ROS.¹¹ In addition to flavonoids in iler leaves, they also contain phenols, which have a hydroxyl group chemical structure that functions to contribute hydrogen atoms, when they react with radical compounds through an electron transfer mechanism so that the oxidation process can be inhibited.

Chemically, antioxidant compounds are electron-donor compounds (donor electrons). Biologically, the definition of antioxidant is a compound that can counteract or

dampen the negative effects of oxidants. Antioxidants work by donating one electron to an oxidant compound so that the activity of the oxidant compound can be inhibited. Saponins increase antioxidant enzymes thereby strengthening protection against free radicals by capturing or breaking down reactive oxygen molecules.¹²

These results are in line with a study conducted by Siti Nur Bela in 2019 which showed that all groups of iler leaf extract doses exhibits antioxidant activity against decreased MDA levels.⁶

CONCLUSION

There was a significant difference in MDA levels in the control group and the treatment group with a dose of 600 mg/KgBB and 1200 mg/KgBB. MDA levels in the treatment group given iler leaf extract (*Plectranthus Scutellarioides* L.) at a dose of 1200 mg/kgBB were lower than in the group with a dose of 600 mg/KgBB. MDA levels at a dose of 600 mg/KgBB were close to normal levels in the healthy control group (K1). Based on the results of the study, looking at the significance value, it can be concluded that iler leaf extract with a dose of 1200 mg/KgBB is more effective in reducing MDA levels compared to iler leaf extract with a dose of 600 mg/KgBB. It can be concluded that the use of a dose of 1200 mg/KgBB is more effective in reducing free radical levels so as to prevent oxidative stress in the body. Thus, iler leaf extract has the potential as a natural antioxidant that can help lower MDA levels. With its antioxidant content, iler leaves have great potential as a natural herbal therapy. Its use in traditional medicine can help ward off free radicals.

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