

Undergraduate Thesis

**THE EFFECT OF OREGANO (*Origanum vulgare*)
LEAVES EXTRACT ON HISTOPATHOLOGICAL
CHANGES OF MICE (*Mus musculus*) KIDNEY
INDUCED BY RHODAMIN B**



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AIRLANGGA UNIVERSITY
SURABAYA
2022**

APPROVAL

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Submitted in partial fulfillment of the requirement for degree of Bachelor of
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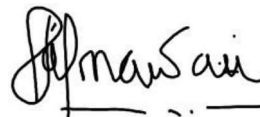
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DECLARATION

Hereby, I declare that in this thesis entitled:

**THE EFFECT OF OREGANO (*Origanum vulgare*) LEAVES EXTRACT ON
HISTOPATHOLOGICAL CHANGES OF MICE (*Mus musculus*) KIDNEY
INDUCED BY RHODAMIN B**

There is no other work ever published to obtain a college degree in a certain college and to my knowledge there is also no work or opinion ever written or published by others, except those in writing referred to this paper and mentioned in the references.

Surabaya, 14 Oktober 2022



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SUMMARY

The use of dyes in the culinary and food industries is common to make people interest into the food itself. Food and Drug Supervisory Agency (FDSA) declared some hazardous materials, one of them is Rhodamine B. The use of Rhodamine B is still can be found on several food, this is shown by a study Abdurrahmansyah et al., 2017 and also according to the data by FDSA, the incidence of food poisoning was the highest at 66,7%, when compared to another causes. The results revealed that the most significant discovery on snaks was Rhodamine B. Rhodamine B contains chlorine compounds (Cl-), which are dangerous and highly reactive because contains free radicals compound. Rhodamine B metabolism generates by-products in the form of free radicals, and the presence of free radicals induces the formation of ROS (Reactive Oxygen Species) and a state of oxidative stress, initiate lipid peroxidation, which causing DNA strands to break and oxidize all membranes and biological tissues, resulting in organ damage. Kidney is the main organ that is attacked by ROS (Reactive Oxygen Species), especially tubular cells. This is because tubules are most severely affected due to their high metabolic demands and first line of defense. A number of cytokines such as TNF- α can be produced in tubular cells induced by oxidative stress, causing degeneration, cell death (necrosis) and congestion of vessels.

Oregano (*Origanum vulgare*) leaves are herbal plants or aromatic herb also known for their anticarcnogenic, antimutagenic, antimicrobial and antioxidant properties, this is supported by the high content of phenolic

compound that can maximize antioxidant properties. The mechanism for preventing free radicals by phenolic compound is slowing down the formation of ROS, breaking down ROS and increasing the activity of antioxidant endogen such as SOD and will stabilize free radicals, to prevent damage to kidney tissue.

This study aims to investigating the ability of Oregano leaves extract as antioxidant properties in preventing kidney cell damage in the form of degeneration, necrosis, and congestion of vessels in mice kidney induced by Rhodamine B. The mice (*Mus musculus*) used were male and weighed 20 – 30 grams, divided into five groups, each group consisting of four mice. Before treatment, the mice were adapted for seven days, then given Oregano leaf extract from the 1st to the 24th day and given Rhodamine B induction from the 4th to the 24th day. The group consisted of a negative control group (given CMC-Na 1% and aquadest), a positive control group (given Rhodamine B 3.5 mg/20 g BW and aquadest), a T1 treatment group (Oregano leaf extract at a dose of 100 mg/kg BW + induction Rhodamine B 3.5 mg/20 g BW), treatment group T2 (Oregano leaf extract dose 200 mg/kg BW + induction Rhodamin B 3.5 mg/20 g BW), and treatment group P3 (Oregano leaf extract at 400 mg/kg BW + induction of Rhodamine B 3.5 mg/20 g BW). On the 25th day, all mice were killed using cervical dislocation method and the kidney was taken for histopathological examination with Haematoxylin-Eosin for staining.

Histopathological examination of the kidney tissue of mice induced by Rhodamine B in the positive control group revealed tubular cells damage in the form of degeneration, necrosis, and congestion. According to this study, administration of Oregano leaf extract at doses of 100, 200, and 400 mg/kg BW can prevent tubular cells damage, which is characterized by a lower degree of damage based on the results of scoring the histopathological changes of kidney tissue in the form of degeneration, necrosis, and congestion. According to the Kruskal-Wallis and Mann-Whitney tests, the best dose of Oregano leaf extract for preventing tubular cells damage was 200 mg/kg BW.

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ABSTRACT

This research was conducted to examine the effect of Oregano (*Origanum vulgare*) leaves extract on the histopathological changes of kidney induced by Rhodamin B in mice (*Mus musculus*). Twenty male mice were divided into five groups and were administered via oral gavage with different treatments for 24 days. The groups consisted of C- (CMC Na 1% + aquadest), C+ (Rhodamine B 3.5 mg/20 g BW), T1, T2, and T3 (100, 200, and 400 mg/kg BW of Oregano leaves extract respectively + Rhodamine B 3.5 mg/20 g BW). The histopathological changes of kidney were examined by using Klopffleisch Scoring method. Then, the data were analyzed using Kruskal-Wallis and then continued with using Mann-Whitney test. The result of statistical analysis showed significant difference ($p < 0.05$) between treatment groups for degeneration, necrosis, and congestion of vessels examination. This research showed that Oregano leaves extract could protect and prevent the damage of mice kidney from the destructive effect of Rhodamine B. The effective dose of Oregano leaves extract on this research was 200 mg/kg BW.

Keywords: *Origanum vulgare*, Rhodamine B, kidney, *Mus musculus*

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Surabaya, 30 September 2022

Author

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ABBREVIATIONS

ATP	: Adenosine triphosphate
BW	: Body Weight
cc	: cubical centimeter
cm	: centimeter
CRD	: Completely Randomized Design
DNA	: Deoxyribo Nucleic Acid
FDSA	: Food and Drugs Supervisory Agency
H ₂ O	: Dihydrogen Monoxyde
H ₂ O ₂	: Hydrogen Peroxidase
Kg	: Kilogram
mg	: miligram
ml	: mililiter
O ₂	: Oxygen
ROS	: Reactive Oxygen Species
rpm	: revolutions per minute
SOD	: Superoxide Dismutase
SPSS	: Statistical Product and Service Solution
WHO	: World Health Organization