

# **EFFECT OF ETHANOL EXTRACT OF WHITE TURMERIC (CURCUMA ZEDOARIA) AS HEPATOPROTECTOR IN MALE RATS INDUCED BY CU<sub>SO</sub>4 PENTAHYDRATE**

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**Abstract.** White turmeric is known to the public as having various uses in terms of health, such as as a liver protector (hepatoprotector) which functions to destroy toxins that enter the human body, one of which is exposure to copper (CuSO<sub>4</sub>) Pentahydrate which is widely exposed in everyday life. to determine the protection against liver damage induced by copper by using ethanol extract of white turmeric rhizome (Curcuma Zedoaria) through histopathological examination of the liver of male wistar rats and to determine the best dose of white turmeric rhizome extract (Curcuma Zedoari). This study is categorized as an experimental research conducted following the posttest only control group design. Sampling is done through simple random sampling. After the data was proven to be normally distributed and continued with the ANOVA test and obtained a P value of 0.001 ( $\leq 0.05$ ). The mean value of changes in the histological structure of the rat liver P1 0.00/0.00; P2 0.00/0.00; P3(500mg dose) 2.00/1.41; P4(750mg dose) 6.00/0.00; P5 4.44/1.50; P6(1000mg dose) 6.00/0.00. This shows that the highest degree of change in liver function is the P4 treatment group with an average of 6.00 and the lowest is the P6 treatment group with an average of 3.75. Conclusion: These results indicate that the ethanoic extract of white turmeric rhizome has high hepatoprotective activity at a dose of 1000mg.

**Keywords:** white turmeric rhizome hepatoprotector; CuSO<sub>4</sub>; copper.

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## INTRODUCTION

Copper has a role important for the human body ([Osredkar & Sustar](#), 2011). This metal can be used as the main atom and has a crucial role in the management of water transportation in the human body. Thus, the use of copper in the form of complexes and additional protein has been widely used for health purposes ([Duncan & White](#), 2012).

Lack of copper in the body affects the inhibition of the formation and development of hemoglobin. Copper is an element that is needed by the body for metabolism, making hemoglobin and physiological stages in the body ([Kaler](#), 2013).

In Indonesia, there are three (3) types of white turmeric include zedoaria white turmeric (Curcumazedoaria Roscoe), mango white turmeric (Curcumamango Val) and white turmeric gombyok (Kaempferiarotunda). Curcuma Zedoaria is used as one of the agricultural products from white turmeric which has a role as an antioxidant ([Gafar & Agustini](#), 2020), epicurminol has anti-tumor properties, curcuminol has liver protective properties.

Curcuminoids compounds Curcuma zedoaria such as curcumin and demethoxy curcumin and bisdemethoxy curcumin are bioactive components. According to ([Saputra, Triatmojo, & Pertiwiningrum](#), 2010) investigated the methanol extract of Curcuma zedoaria which produced a pale yellow oily solid, non-crystalline, aromatic and had a yield of 8.7%. The ethanol extract of Curcuma zedoaria produced a pale yellow oily solid ([Osorio-Tobón, Carvalho, Rostagno, Petenate, & Meireles](#), 2016),

non-crystalline, aromatic, and had a yield of 8.2% extract Curcuma zedoaria produced a maroon-brown (gummy) solid ([Kimura, Sumiyoshi, & Tamaki](#), 2013), non-crystalline and containing a yield of 11.4%.

According to ([Naqvi, Azhar, Jabeen, & Hasan](#), 2012) researched that white turmeric plants can be used as medicinal plants for several diseases, including pain during menstruation (dysmenorrhea), absent menstruation (amenorrhea), digestive disorders (dyspepsia), swelling of the liver (hepatomegaly), splenomegaly, wounds, bruised toothache, sore throat, increase the effectiveness of radiation therapy and chemotherapy for cancer patients ([Gurrapu & Mamidala](#), 2016). Curcuma Zedoaria can also be used as a cytostatic, immunodulator ([Ahmed Hamdi et al.](#), 2014). Through in vitro screening of ethanolic extracts from 107 plant species from 48 plant families against Raji cells and assay of tumor promoter 12-O-hexadecanoylphorbol-13-acetas (HPA) with Epstein-Barr (EB) virus. activation, showed that 71% of plant ethanol extracts slowed >30% of EB virus activation at 200 mg/ml levels.

The purpose of this study was to assess liver damage induced by CuSO<sub>4</sub> pentahydrate against the use of white turmeric extract (curcuma Zedoaria) livers through histopathological observations of male rats', to determine the best dose of white turmeric extract (Curcuma Zedoaria) livers. which can prevent liver damage in the histopathological description of male rats'induced by copper.

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## METHODS

This experimental study was conducted following the posttest only control group design. Sampling was done through a simple random sampling technique. This experiment was carried out over a period of 2 months, namely March 2019 – May 2019. The manufacture of white turmeric rhizome extract and the treatment of test animals were carried out at the Pharmacology and Toxicology Laboratory of the Faculty of Pharmacy, USU Medan. Liver histopathology was made at the Department of Histology, Faculty of Medicine, USU Medan. The test animals in this study were 24 male rats (*Rattus noverticus*) male wistar strain aged 6-8 weeks, whose weight ranged from 160-200gram. The sample size of this study was determined based on the Federer formula for experimental tests. The hepatotoxic material used is copper, in the form of  $CuSO_4$  pentahydrate which is obtained from PT. Artha Jaya Sanatyasa Chemindo, Jakarta. White turmeric extract solvent in the form of ethanol was obtained from the Faculty of Pharmacy, University of North Sumatra, Medan.

### Treatment of Test Animals

**Group 1** : Normal group was only given standard food and drink

**Group 2** : Negative control group, given standard food and drink with white turmeric extract 500mg/kgBW

**Group 3** : Positive control group, given standard food and drink without white turmeric extract but treated with a solution

containing  $CuSO_4$ pentahydrate 4mg / KgBW administered orally using oral intragastric tube 1 times a day on days 10,11,12,13,14.

**Group 4** : Treatment group 1 was given standard food and drink, white turmeric extract at a dose of 500mg/kgBW orally using an intragastric oral tube once a day for a period of 14 days continuously and given a solution containing  $CuSO_4$  pentahydrate 4m/kgBW on day 10 , 11, 12, 13, 14.

**Group 5** : Treatment group 2 was given standard food and drink, white turmeric extract at a dose of 750 mg/kgBW orally using an intragastric oral tube once per day for 14 consecutive days and given a solution containing  $CuSO_4$  pentahydrate 4mg/kgBW on days 10, 11, 12, 13, 14.

**Group 6** : Treatment group 3 was given standard food and drink, white turmeric extract at a dose of 1000mg/kgBW orally using an intragastric oral tube once a day for 14 consecutive days. participating were given a solution containing  $CuSO_4$  pentahydrate 4 mg/kgBW on days 10, 11, 12, 13, 14.

On day 15 the rats would be euthanized and persian surgical pan and then the preparation of liver histology preparations and microscopic observations

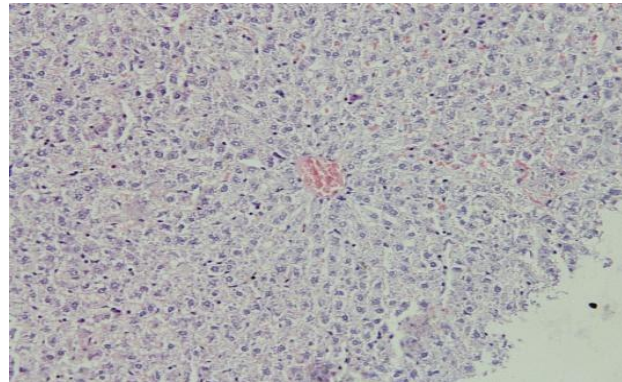
## RESULTS AND DISCUSSION

Following the observation of the effects of extract of white turmeric (*Curcumazedoaria*) as a hepatoprotective in male rats induced by  $CuSO_4$  pentahydrate, grouped in 6 treatments the group 1 control group 2 negative control group 3

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positive control, a group of 4 doses 500mg, group 5 doses of 750mg and group 6 doses of 1000mg, found the results of observations in the treatment group using rat liver histopathological picture data for

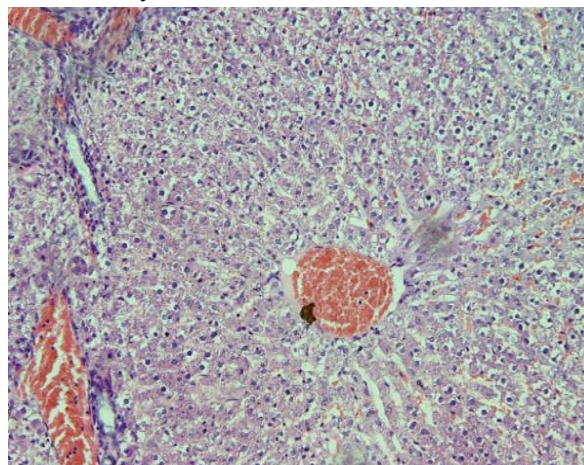
each group, analyzed descriptively by comparing changes in the histopathological structure of rat liver that occurred in 6 groups.



**Figure 1.** Microanatomical description of normal liver cells.

The control group which was only given standard food and drink and group 2 which was given food and drink and 500 mg white turmeric extract showed a normal liver histology structure where hepatocytes and sinusoidal clefts could be seen clearly, there

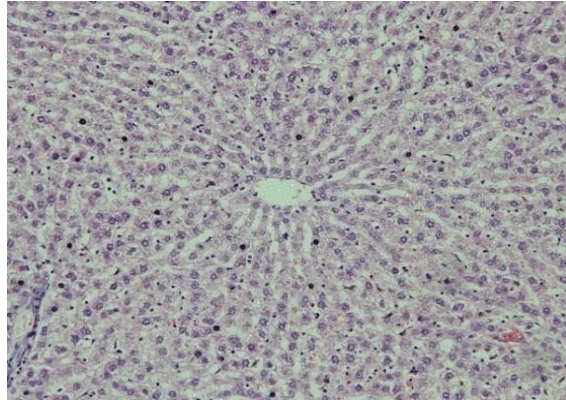
were no vacuoles. However, a number of damage to the nucleus of cells were identified, such as pyknosis and cariesorex that may occur due to aging and cell death. Where the incident, physiologically occurs in all normal cells.



**Figure 2.** Microanatomical description of abnormal liver cells (Group 3)

The positive control group who was only given CuSO<sub>4</sub> showed significant liver damage in the form of parenchymatous degeneration (fatty/DP), hydropic

degeneration (DH), cell necrosis characterized by pyknosis (PI). Solidification of the core and a change in color that looks darker.



**Figure 3.** Microanatomical description of abnormal liver cells (groups 4 and 5)

Groups 4 and 5 still had a lot of damage in the form of parenchymatous degeneration, hydropic degeneration, necrosis in the form of pyknosis, vacuole (VA) and hemorrhagic (HM).

The degenerative changes are reversible. Sustained degeneration has the potential to cause cell death (necrosis), which is irreversible. Furthermore, this

change can be identified by the occurrence of cytoplasmic changes ([Ebner & Götz, 2019](#)), for hydropic degeneration it is identified through the cytoplasm undergoing vacuolization, while for degeneration it is identified through fat-filled vacuoles that push the nucleus towards the edge of the cell.



**Figure 4.** Microanatomy depiction of abnormal liver cells in the

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Group of six. The administration of white turmeric extract (*Curcuma zedoaria*) at a dose of 1000 mg showed an improvement which showed reduced parenchymatous degeneration and hydrophilic degeneration, but abnormal liver abnormalities were still found.

White turmeric extract (*Curcuma zedoaria*) has an antioxidant effect that comes from the curcumin compound it has (Puspita, Yulianti, & Mozartha, 2019). The antioxidant has an essential role in the capture of free radicals that can help the positive control group who was only given CuSO<sub>4</sub> showed significant liver

## CONCLUSIONS

The from this study are white turmeric extract (*Curcuma zedoaria*) at a dose of 1000 mg has hepatoprotective activity against the histopathological description of the liver of male Wistar rats exposed to high doses of CuSO<sub>4</sub> pentahydrate.

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