

**PENGARUH PEMBERIAN EKSTRAK KULIT KAYU MANIS
(*Cinnamomum burmanii*) TERHADAP GAMBARAN HISTOPATOLOGI
DAN EKSPRESI PROTEIN *MANGANESE SUPEROXIDE DISMUTASE*
HEPAR TIKUS HIPERGLIKEMIA**

TESIS



OLEH:

**UNTORO HERI SAPUTRO
2120312013**

PEMBIMBING:

**dr. Tofrizal, Sp.PA, M. Biomed, Ph.D
Dr. dr. Roza Silvia, MclinEmbryol**

**PROGRAM STUDI ILMU BIOMEDIS PROGRAM MAGISTER
FAKULTAS KEDOKTERAN
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ABSTRAK

PENGARUH PEMBERIAN EKSTRAK KULIT KAYU MANIS (*Cinnamomum burmannii*) TERHADAP GAMBARAN HISTOPATOLOGI DAN EKSPRESI PROTEIN *MANGANESE SUPEROXIDE DISMUTASE* HEPAR TIKUS HIPERGLIKEMIA

Untoro Heri Saputro

Latar Belakang: Kondisi hiperglikemia dapat memicu stres oksidatif dan kerusakan berbagai organ, termasuk hepar, yang ditandai oleh kerusakan hepatosit dan penurunan ekspresi enzim antioksidan *Manganese Superoxide Dismutase* (Mn-SOD). Salah satu upaya untuk menekan stres oksidatif adalah pemanfaatan antioksidan alami, seperti ekstrak kulit kayu manis (*Cinnamomum burmannii*) yang mengandung cinnamaldehyde dan senyawa fenolik.

Tujuan: Mengetahui pengaruh pemberian ekstrak *Cinnamomum burmannii* terhadap gambaran histopatologi dan ekspresi protein Mn-SOD pada hepar tikus hiperglikemia.

Metode: Penelitian eksperimental dengan desain *post-test only control group* menggunakan 30 blok parafin jaringan hepar tikus yang berasal dari penelitian sebelumnya. Sampel dibagi menjadi lima kelompok: kontrol negatif, kontrol positif (aloksan), serta kelompok perlakuan ekstrak *Cinnamomum burmannii* dosis 100, 200, dan 300 mg/kgBB selama 30 hari. Gambaran histopatologi dinilai dengan pewarnaan Hematoksin-Eosin (H&E) dan skor Mordue, sedangkan ekspresi Mn-SOD dianalisis menggunakan imunohistokimia (IHK) dan ImageJ. Analisis dilakukan menggunakan uji One Way ANOVA atau Kruskal-Wallis dengan $p < 0,05$.

Hasil: Terdapat perbedaan bermakna skor histopatologi hepar dan ekspresi protein Mn-SOD antar kelompok ($p < 0,001$). Pemberian ekstrak *Cinnamomum burmannii* menurunkan median skor histopatologi hepar dari 2,30 pada kelompok kontrol positif menjadi 1,20; 1,10; dan 1,10 masing-masing pada dosis 100, 200, dan 300 mg/kgBB. Ekspresi protein Mn-SOD meningkat dari $23,05 \pm 2,25$ pada kontrol positif menjadi $34,40 \pm 7,78$; $38,82 \pm 11,83$; dan $36,70 \pm 9,36$ pada kelompok dosis 100, 200, dan 300 mg/kgBB. Dosis 200 mg/kgBB menunjukkan rerata ekspresi Mn-SOD tertinggi dan median skor histopatologi terendah, namun tidak berbeda bermakna dibandingkan dosis lainnya ($p > 0,05$).

Kesimpulan: Pemberian ekstrak *Cinnamomum burmannii* berpengaruh terhadap perbaikan gambaran histopatologi hepar dan peningkatan ekspresi protein Mn-SOD pada tikus hiperglikemia.

Kata Kunci: Hiperglikemia, Hepar, Ekstrak *Cinnamomum burmannii*, Histopatologi, Imunohistokimia, *Manganese Superoxide Dismutase*

ABSTRACT

THE EFFECT OF CINNAMON BARK EXTRACT (*Cinnamomum burmannii*) ON LIVER HISTOPATHOLOGICAL FEATURES AND MANGANESE SUPEROXIDE DISMUTASE (Mn-SOD) PROTEIN EXPRESSION IN HYPERGLYCEMIC RATS

Untoro Heri Saputro

Background: Hyperglycemic conditions can induce oxidative stress and cause damage to various organs, including the liver, characterized by hepatocyte injury and decreased expression of the antioxidant enzyme Manganese Superoxide Dismutase (Mn-SOD). One potential strategy to mitigate oxidative stress is the use of natural antioxidants, such as cinnamon bark extract (*Cinnamomum burmannii*), which contains cinnamaldehyde and phenolic compounds.

Objective: To determine the effect of *Cinnamomum burmannii* extract administration on liver histopathological features and Mn-SOD protein expression in hyperglycemic rats.

Methods: This experimental study employed a post-test only control group design using 30 paraffin blocks of rat liver tissue obtained from a previous study. The samples were divided into five groups: a negative control group, a positive control group (alloxan-induced), and three treatment groups receiving *Cinnamomum burmannii* extract at doses of 100, 200, and 300 mg/kg body weight for 30 days. Liver histopathological changes were assessed using Hematoxylin–Eosin (H&E) staining and the Mordue scoring system, while Mn-SOD protein expression was evaluated by immunohistochemistry (IHC) and quantified using ImageJ software. Data were analyzed using One-Way ANOVA or the Kruskal–Wallis test, with a significance level of $p < 0.05$.

Results: Significant differences in liver histopathological scores and Mn-SOD protein expression were observed among the groups ($p < 0.001$). Administration of *Cinnamomum burmannii* extract reduced the median liver histopathological score from 2.30 in the positive control group to 1.20, 1.10, and 1.10 at doses of 100, 200, and 300 mg/kg body weight, respectively. Mn-SOD protein expression increased from 23.05 ± 2.25 in the positive control group to 34.40 ± 7.78 , 38.82 ± 11.83 , and 36.70 ± 9.36 in the 100, 200, and 300 mg/kg body weight groups, respectively. The 200 mg/kg body weight dose showed the highest mean Mn-SOD expression and the lowest median histopathological score; however, no significant differences were observed compared with the other treatment doses ($p > 0.05$).

Conclusion: Administration of *Cinnamomum burmannii* extract improved liver histopathological features and increased Mn-SOD protein expression in hyperglycemic rats.

Keywords: Hyperglycemia, Liver, *Cinnamomum burmannii*, Histopathology, Immunohistochemistry, Mn-SOD