

Hepatoprotective Potential of *Elaeis Guineensis* Leaf Against Paracetamol Induced Damage in Mice: A Serum Analysis

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Abstract. *Elaeis guineensis*, a medicinal herb, is commonly used in folk medicine to treat various diseases. The aim of the present study is to evaluate the hepatoprotective activity of *E. guineensis* against experimentally induced liver injury through serum analysis. Serum activity was measured by monitoring the levels of aspartate aminotransferase (AST), alanine aminotransferase (ALT) and bilirubin. The results of the paracetamol-induced liver toxicity experiments showed that mice treated with the *E. guineensis* leaf extract (200 mg/kg) showed a significant decrease in ALT, AST, and bilirubin levels, which were all elevated in the paracetamol treated group ($p < 0.01$). The hepatoprotective action is likely related to its potent antioxidative activity.

Keywords: *E. guineensis*, Hepatoprotective, Serum analysis

1. Introduction

Although notable development in modern medicine, hepatic disease remains a global health problem, thus the search for new drugs is still ongoing. Hepatic cells participate in a variety of metabolic activities; therefore the development of liver protective agents is of paramount importance in the protection from liver damage. The literature has constantly shown that hepatoprotective effects are associated with plant extracts rich in antioxidants [1]. One of such plant known to have healing potential with various pharmacological activities is *Elaeis guineensis* Jacq (Arecaceae). *E. guineensis* has many therapeutic uses in traditional medicine practice. Every part of the plant can be used medicinally. Our previous study showed that the *E. guineensis* leave extract possessed good hepatoprotective activity [2]. In this study we further verified the hepatoprotective activity through serum analysis. Hence, the present study focused on evaluating the potential hepatoprotective effect of methanolic extract from *E. guineensis* leaves on paracetamol-induced liver injury in mice serum.

2. Material and Methods

2.1. Sample Collection

Fresh leaves of *E. guineensis* were collected Semeling, Kedah in January 2010. The leaves were separated and cut into small pieces, which were first washed with tap water and then with distilled water. The leaves were then dried in an oven at 60°C for 7 days, after which the dried leaves were ground into fine powder using a grinder.

2.2. Extraction Procedure

Dried sample (approximately 100 g) was added to methanol (300 mL) and soaked for 4 days at room temperature (30 ± 2 °C). The suspension was stirred from time to time to allow the leaf powder to fully dissolve in the methanol. Removal of the sample from the solvents was done by filtration through cheesecloth followed by filter paper (Whatman No. 1); the filtrate was concentrated under vacuum to one-

fifth its volume using a rotary evaporator at 60 °C and then sterilized by filtration using a 0.22-mm membrane. The thick paste obtained was further dried in an oven at 40 °C. The resultant extract was kept at 4 °C for further analysis.

2.3. Animals

Wister albino mice of either sex were used to study the hepatoprotective activity of the *E. guineensis* leaf extract. The Institution Animal Ethics Committee has approved the animal study for this project. The animals were kept at 27 ± 2°C, relative humidity 44–56% and light and dark cycles of 10 and 14 h respectively, for a week before and during the experiments. Animals were provided with standard diet (Lipton, India) and water *ad libitum*. The food was withdrawn 18–24 h before starting the experiment. All experiments were performed in the morning according to current guidelines for the care of the laboratory animals and the ethical guidelines for the investigation of experimental pain in conscious animals [3].

2.4. Paracetamol Dose Regimen

Paracetamol tablets were obtained from a nearby clinic. Each tablet contains 500 mg of paracetamol. The dose administered to the mice was set as 1 g/kg. The paracetamol was made into fine powder using a mortar and pestle. The powdered paracetamol was suspended in saline and was administered according to the body weight of mice.

2.5. Grouping of Mice and Treatments

Eighteen mice (25–30 g) were randomly divided into three groups and each group consists of 6 mice (Table 1). The first group received 1 mL/kg of saline (control). Group II was given paracetamol (1.0 g/kg) orally and group III received orally both 1.0 g/kg paracetamol [4] and 200 mg/kg of *E. guineensis* leaf extract respectively. Extract was administered three hours after the administration of paracetamol. Paracetamol 1g/kg was given to mice to induce hepatotoxicity. The treatments were continued for seven days and on the Eighth day of the experiment; all animals were anesthetized and dissected [5].

Table 1: Grouping of mice and treatment administered.

GROUPS	TREATMENTS
Control	1mL/kg of saline of per body weight
Induced	1g/kg of paracetamol per body weight
Treatment	1g/kg of paracetamol + 200 mg/kg of extract per body weight

18 adult mice were divided into 3 groups (n = 6)

2.6. Biochemical Parameters

The mice of each group were anaesthetized with ether, and blood was collected directly from the heart. It was centrifuged at 2,000 g for 10 min at 4 °C to separate the serum and kept at 4°C to assay the activities of serum enzymes. Aspartate aminotransferase (AST) and alanine transferase (ALT) were determined by the method described by Reitman and Frankel, [6]. Serum bilirubin level was estimated according to Malloy and Evelyn [7].

3. Results and Discussion

The effect of *E. guineensis* leaf extract on liver marker enzymes and serum bilirubin content are given in Table 2. Based on Table 1, it can be seen that, the control group showed a normal range of AST, ALT and bilirubin levels. Nevertheless, the paracetamol treated group, showed an high level AST, ALT and bilirubin. This indicates that, paracetamol caused the liver injury at higher doses. The elevation of AST, ALT and bilirubin were an indicative for the release of enzymes from disrupted cells. Alternatively, the *E. guineensis* leaf extract treated group showed a very interesting result. Based on the table, the results for *E. guineensis* leaf extract treated group is higher than the control group, however, it showed a much lower levels of AST, ALT and bilirubin than the paracetamol treated group. *E. guineensis* leaf extract treatment significantly reduced the raised levels of AST, ALT and bilirubin in hepatotoxic mice. The decrease in the

serum levels of these enzymes might possibly be due to the presence various antioxidant phytochemicals in the *E. guineensis* leaf extract that enhanced the regeneration ability of liver. *E. guineensis* leaves extract was used first time to study its hepatoprotective effect at serum level. One way ANOVA (Analysis of Variance) was done where p is less than 0.05 and n=6 to prove the significant of the result obtained.

In the evaluation of liver damage, the determination of liver function tests enzyme levels such as AST and ALT is largely applied [8, 9]. In the current study, exposure to paracetamol resulted in a significant hepatic damage as elicited by the elevated level of serum marker enzymes, AST and ALT. These marker enzymes are cytoplasmic in origin and are released in to the circulation after cellular damage [10]. The rise in the enzyme AST is usually accompanied by an elevation in the levels of ALT, which plays a vital role in the conversion of amino acids to keto acids [11]. The decrease in the serum levels of these enzymes after the treatment of leave extract, further confirmed the hepatoprotective potential of *E. guineensis* leaf. The results of this study further verified the results of our previous study.

Table 1: Effect of *E. guineensis* leaf extract on liver marker enzymes and serum bilirubin content

Parameters	Control	Paracetamol Treated	Extract Treated
AST (IU/L)	36.54 ± 4.58	105 ± 10.89**	47.26 ± 7.24*
ALT (IU/L)	33.42 ± 5.42	89.27 ± 9.27**	36.22 ± 4.88*
Billirubin (mg/L)	1.47 ± 0.6	9.1 ± 2.8**	3.1 ± 2.4*

Results are expressed as mean ± S.E.M

* Statistically significant compared to paracetamol treated animals ($p < 0.05$)

** Statistically significant to control animals ($p < 0.05$).

4. Conclusion

In the present study, *E. guineensis* leaf extract possessed hepatoprotective activity in a mice model of paracetamol-induced at serum level. The hepatoprotective activity of *E. guineensis* leaf leaf may be due to its various bioactive compounds in the extracts. Further studies are in progress to better understand the mechanism of action of *C. ternatea* that is responsible for the hepatoprotective and antioxidant activity.

5. Acknowledgements

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