

The effect of aqueous extracts of ceiba on stabilizing the hepatic enzymes

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ABSTRACT

Hepatotoxicity is the major physiological defect in the body that adversely effects the body and is responsible for the drug toxicity deposition. The liver is a large organ that helps to eliminate the toxins and eliminate the food toxins through metabolism through enzymes like cytochrome P450enzyme. The liver enzymes were altered due to the changes in liver function and integrity. But the liver tissue could regenerate itself, and any permanent damage to the tissue cannot be recovered. These drugs also cause damage to the liver tissue. The extraction solvents like methanol, ethanol and ether are very toxic and not considered safe. Even though they are dried up completely, there will be some traces remaining in the extracts. The study of the hepatoprotective activity of the extracts was performed in two methods like CCl₄ and paracetamol method. The estimation of the liver enzymes was done to determine the hepatoprotective activity. The hepatoprotective herbs and the formulations incorporating their extracts have been patented too, and the use and applications have been significant. The extracts were tested in two doses, like 100 and 200. As it is seen, the 200mg/kg of the extract showed better activity compared to the standard drug and the extract at the lesser dose that is the 100mg/kg.



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INTRODUCTION

Hepatotoxicity is the major physiological defect in the body that adversely effects the body and is responsible for the drug toxicity deposition. The liver is a large organ that helps to eliminate the toxins and eliminate the food toxins through metabolism through enzymes like cytochrome P450enzyme [1, 2]. The liver enzymes were altered

due to the changes in liver function and integrity. But the liver tissue could regenerate itself, and any permanent damage to the tissue cannot be recovered. These drugs also cause damage to the liver tissue [3].

Ceiba pentandra is a native plant of tropical countries and is significant for many properties like anti-inflammatory, antihyperlipidemic activity and hepatoprotective activity too [4]. It was already investigated for the hepatoprotective activity in the ethyl acetate fraction in the methanol extract. In the point that the herbs are safer and more potent than synthetic drugs, they have been employed to use in many diseases as treatment. Diseases like liver dysfunction, hepatitis are also treated effectively [2]. The hepatoprotective herbs and the formulations incorporating their extracts have been patented too, and the use and applications have been significant [5].

The extraction solvents like methanol, ethanol and

ether are very toxic and not considered safe. Even though they are dried up ultimately, there will be some traces remaining in the extracts. So with that idea, this current focusses on investigating the plant *Ceiba pentandra* for its potential to prevent hepatotoxicity in the extract using the distilled water which is neutral and safe when compared to other solvents of extraction.

Preparation of extract

The stem was collected from the natural area, and a botanist authenticated it, and the herbarium was submitted to the library. The stems were dried in the shade for about five days. This was done in the ambient temperature and humidity. The dried parts were powdered, and then the powder was passed through the sieve. This powder was macerated for extraction using double distilled water. 100g of powder was taken in a beaker and then macerated with 500ml of distilled water. It was shaken occasionally and the resultant as collected after seven days. This macerate was filtered, and then the filtrate was evaporated for dryness in a rotary vacuum evaporator. The dry extract was stored under a moisture lock container for further use. This was tested for the activity in two methods and at two doses of 100 and 200mg/kg.

Phenol and flavonoid content

The total phenol content and flavonoid content in the aqueous extracts was determined using the spectrophotometric method using the standard procedure [6]. The standard graphs of the quercetin and gallic acid were drawn, and the determination of the phenol content was expressed as the gallic acid equivalents. The determination of the flavonoids was expressed as the quercetin equivalents by comparing them to the standard graphs.

Laboratory animals

Spraguey mice were used to study the hepatoprotective property of the extract. The mice weighed about 45-55gm, and they are allowed to adapt to the lab environment for about two days and are kept in their cages and allowed to have their pellet food and water with free of access. They fasted the night before experiment starting and the induction of the hepatotoxic drugs.

Animal aggregations

The animals were segregated into five groups, and the group contained five mice which were divided based on the males and females and of different weights too.

Group I was administered with a normal saline solution which was readily made in the laboratory and is

administered about 1.8ml/kg.

Group II was administered with the inducing agent and not given any drugs or other extracts that cures the hepatotoxicity.

Group III was given with the induction agent and also a standard drug, Silymarin at a dose of 10mg/kg.

Group IV and V were administered with extracts at the doses of 100 and 200mg/kg body of the mice which were about to around for 2-3ml.

Hepatotoxicity by Paracetamol

The toxicity to the liver was induced using the paracetamol as an inducing agent [7]. The drug paracetamol was safe and very useful as an NSAID but is noted to pass through the first-pass metabolism and at large doses causes the liver damage. The paracetamol was administered to the mice at a dose of 2g/kg of the mice, and the induction was significant, which was carried out until the seven days of the study.

Hepatotoxicity induced by CCl4

Carbon Tetrachloride was the most well-known inducer of the hepatotoxicity, and the experiments were carried out for seven days as in the above experiments. The drug was administered at a dose of 1.5ml per kg of the mice [8].

In both methods, the inducing agents were administered only after 30mins of the administration of the extracts for protection. On the 7th day, the mice were left alone and were not fed with any food. The next day morning in the day of the experiments, the mice were sacrificed, and the blood was withdrawn and was estimated for the liver filled enzymes like the serum glutamates and transaminases [9] [10].

RESULTS & DISCUSSION

The study of the hepatoprotective activity of the extracts was performed in two methods like CCl4 and paracetamol method. The estimation of the liver enzymes was done to determine the hepatoprotective activity [11] [12]. The extracts were tested in two doses, like 100 and 200. As it is seen, the 200mg/kg of the extract showed better activity compared to the standard drug and the extract at the lesser dose that is the 100mg/kg.

The extract showed a significant lowering to the liver enzymes, which was shown in the tables. The considerable activity was due to the content of phenols and flavonoids in the quantities like 120.9mg of the gallic acid in the one gm of the extract and the 4.5.8mg quercetin in the one gm of the extract.

Table 1: The hepatoprotective effect of aqueousextracts of Ceiba in CCl4

Groups	SGOT-(IU/L)	SGPT-(IU/L)	ALP-(IU/L)	Total bilirubin-(mg/dl)	Total protein-(mg/dl)
Group-I	129.20±9.03	67.1±11.05	179.04±15.67	15.8±0.92	8.14±5.23
Group-II	270.32±10.01	358.25±6.42	302.63±29.58	9.07±2.13	10.5±2.62
Group-III	164.13±8.21*	70.15±12.34*	184.02±11.12*	6.24±0.95*	9.11±1.44*
Group-IV	165.456±28.16*	12.39±13.58*	219.75±7.0*	5.019±4.6*	8.34±4.79
Group-V	176.81±21.35*	81.03±11.69*	201.0±12.46*	7.92±5.2*	11.42±3.85*

Table 2: The hepatoprotective effect of aqueous extracts of Ceiba in Paracetamol

Groups	SGOT-(IU/L)	SGPT-(IU/L)	ALP-(IU/L)	Total bilirubin-(mg/dl)	Total protein-(mg/dl)
Group-I.	91.05±5.42	46.02±6.11	137.09±7.63	12.04±0.74	13.56±0.98
Group-II.	155.86±7.04	117.04±8.72	346.17±9.05	5.01±0.68	10.39±0.81
Group-III	106.12±8.23*	58.51±7.62*	157.03±6.36*	2.26±0.99*	11.67±1.04*
Group-IV	129.07±27.58*	61.83±9.10*	206.04±7.06	6.72±0.82*	10.12±1.17*
Group-V	133.8±6.73*	64.15±6.25*	218.16±5.47*	2.43±0.53*	14.05±2.09*

There was a literature that says the antioxidant activity can also help in the hepatoprotective activity.

CONCLUSION

The methanol or chloroform extracts were found to be more toxic, and the water was used to extract the chemical constituents in the plant Ceiba. It was investigated for the prevention of the hepatotoxicity of the mice caused in two methods like carbon tetrachloride and paracetamol drugs.

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Conflict of Interest

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