



Hepatoprotective Activity of *Thalictrum Foliolosum* (Ranunculaceae) Root Ethanolic Extract

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Abstract: The trend in healthcare is moving towards disease prevention rather than treatment, wherein people choose herbal medicines, functional foods and nutraceuticals over pharmaceuticals for their wellbeing. *Thalictrum foliolosum* is one of the well-known medicinal plants used in Indian traditional medicine to treat several disease, studies related to the pharmacological properties of *Thalictrum foliolosum* are very less. The *Thalictrum foliolosum* root is widely used as traditional medicine to treat various diseases including antiperiodic, diuretic, febrifuge, ophthalmic diseases. In this present investigation we studied the hepatoprotective activity of *T. foliolosum* root ethanolic extract for the first time. Dried roots of *T. foliolosum* were, powdered and extracted in ethanol. A single oral doses of *Thalictrum foliolosum* root ethanolic extract (250, 500 and 1000 mg/kg) was used for acute toxicity study. The acute-toxicity studies show that the extract is non-toxic even at relatively higher concentrations (1000 mg/kg). Wister rats were administered with silymarin or *T. foliolosum* root ethanolic extract for one week. On the fifth day except the control group, all the test animals were administered with 2 g/kg paracetamol to induce hepatotoxicity. The biochemical parameters and histopathological parameters were used to measure hepatoprotective activity of *T. foliolosum* root ethanolic extract. Behavioral observation, biochemical analysis of serum and histopathological examination of the experimental animals indicated that *T. foliolosum* root ethanolic extract offer significantly higher hepatoprotection.

Key words: Hepatoprotection, *Thalictrum foliolosum*, acute toxicity, ethanolic extract

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1. INTRODUCTION

Herbal medicines have been used for centuries as a remedy for many diseases. The pharmacological safety and efficacy of herbal drugs make them a potential medicine for the treatment and prevention of a wide variety of human diseases including those associated with Liver¹⁻³. Indian traditional system of medicine is rich in herbal cures and in the protection of hepato toxicity, which are considerably safe for chronic use. One such plant is *Thalictrum foliolosum*, the root powder of which is employed to treat many diseases in folk medicine⁴. Recently it is reported that *T.foliolosum* extract possess considerable in vitro anti-plasmodial potential without any general cytotoxicity⁵. In another study, antipyretic activity of aqueous extracts of *T.foliolosum* rhizome on yeast induced pyrexia in albino rats were reported⁶. More recently, it is reported that the hydroethanolic extract of whole plant of *T. foliolosum* have shown significant antiepileptic potential with minimal toxicity⁷. However no systemic investigation has been carried out to analyze the hepatoprotective activity of *T. foliolosum* root ethanol extract. Hence in the present study an attempt has been made to screen the root extract of *T. foliolosum* for its hepatoprotective activity in experimental animals.

2. MATERIALS AND METHODS

2.1 Plant material

Dried roots of *T.foliolosum* were purchased from local market at Chennai, India. The roots were identified taxonomically and authenticated by Mr. Sukumar, Botanist (Department of botany, Annamalai University). For extraction, dried roots of *T.foliolosum* powder 250 g was loosely packed in the thimble of soxhlet apparatus and extracted with ethanol for 18 h at 55 °C. The extract was air dried at 25-30 °C and weighed. *T.foliolosum* extract was dissolved in 10 ml phosphate buffer saline (PBS) at different concentrations for oral administration.

2.2 Animals

Wistar rats (180-200 g) and male albino mice (20-25 g) were obtained from the Central animal house, Annamalai University and kept in standard environmental conditions. They were fed with rodent diet and water *ad libitum*. Experiments were carried out in accordance with CPCSEA guidelines and the study was approved by Institutional animal ethical committee (IAEC/CPCSEA/02/01/2016).

2.3 Acute toxicity study

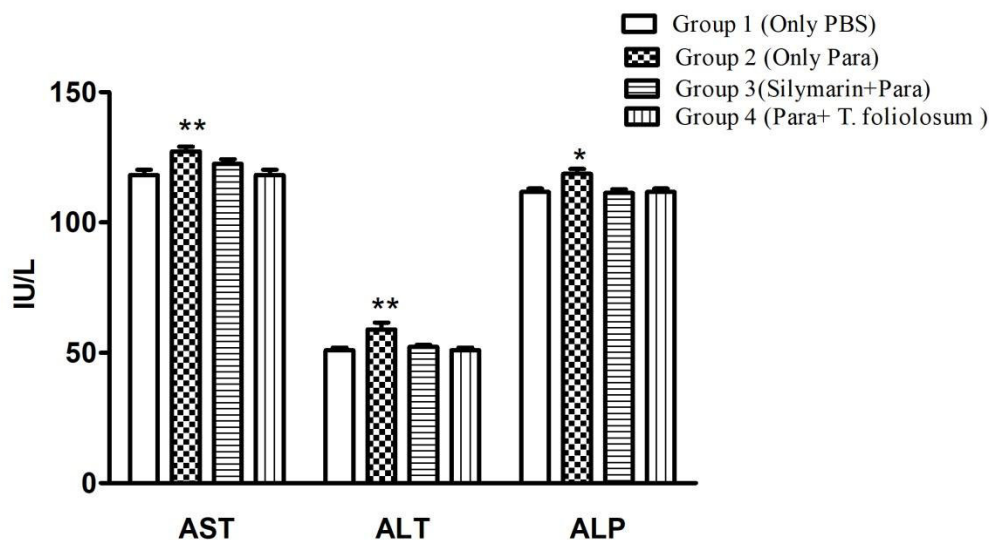
Four groups of male albino mice (n=6) were used to study the acute toxicity of *T.foliolosum* root extract administration. Animals were fasted overnight and administered with ethanolic extract (250, 500 and 1000 mg/kg). A group of animals which received equal volume of PBS served as control. Changes in the animal behavior were noted before and after administration for 24 h. Treated animals were further observed up to 14 d for any signs of toxicity⁸.

2.4 Hepatoprotective effect of *T.foliolosum* ethanolic extract

Wistar rats in groups (each containing 6 animals) were used. Groups I and II received 1 ml/kg PBS once a day and were used as control. Groups III and IV respectively received silymarin (100 mg/kg) and 500 mg/kg *T. foliolosum* root ethanolic extract every day. On the fifth day, after the administration of the respective treatments, all the animals of groups II, III and IV were administered with 2 g/kg paracetamol⁹. On the seventh day after 2 h of respective treatment, blood samples were collected from the retro-orbital plexus of treated animals for the estimation of biochemical marker enzymes. After collecting the blood samples, liver samples from the animals were collected and preserved in 10% formalin. Subsequently, the liver samples were fixed, embedded in paraffin using standard procedures and 5µm thick sections were taken in a microtome. Photomicrographs were analyzed for any histopathological changes¹⁰.

3 RESULTS AND DISCUSSION

Liver is a vital organ of the body as it plays important functions in digestion, metabolism and detoxification, which are necessary for survival, liver injury may lead to serious health consequences and even to death¹¹. Acute toxicity study results revealed that single dose (250, 500, and 1000 mg kg⁻¹) of *T. foliolosum* root ethanolic extract administered to albino mice showed no death up to 14 days study period. In addition, the maximum dose (1000 mg kg⁻¹), there were no physical signs of toxicity as indication by normal breathing and convulsions, absence of tremors, diarrhoeas, salivation and paralysis in the tested animals. The result from acute toxicity study concluded that administration of *T. foliolosum* extract was relatively safer even at higher concentration. Liver injury alters the membrane permeability and transport function of the liver, which leads to excessive leakage of liver enzymes such as AST, ALT and ALP that could be used as biomarkers of liver damage¹².



Asterisks in a graph are significantly different from the respective control as analyzed by Student's t-test (* $P < 0.05$, ** $P < 0.01$ and *** $P < 0.001$). The data represented as mean \pm SD of three replications

Fig. 1. Effect of the *T. foliolosum* ethanolic extract on biochemical parameters.

The animals administered with 2 g/kg paracetamol alone shows the significant elevation in AST, ALT and ALP. It is the indication that the administered paracetamol has induced the

liver toxicity in test animals (**Fig. 1**). Animals co-administered with *T. foliolosum* extract and paracetamol has not shown any significant changes when compared with control.

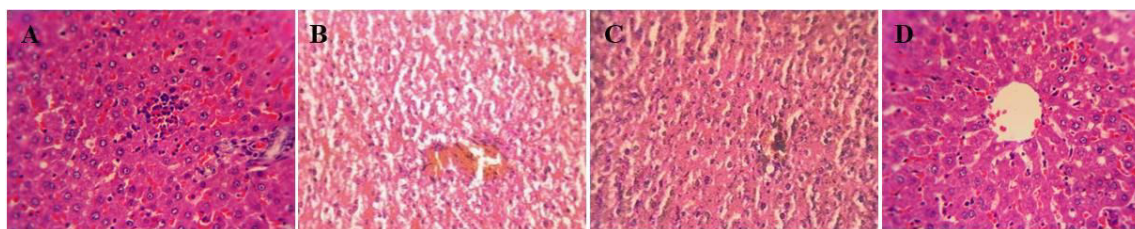


Fig 2. Histopathological photograph showing normal architecture of hepatocytes in section of liver Sample obtained from a control animal (A), cellular inflammation, area necrosis and hepatic sinusoid in animals treated with paracetamol alone (B) mild changes in the architecture, pathological nucleus cell division in animals treated with silymarin and paracetamol (C) and normal hepatocytes architecture in animals treated with paracetamol and *T. foliolosum* extract (D).

The histological examination of the liver samples from control animals revealed normal hepatic architecture and polyhedral hepatocytes (Fig 2.A). However, the liver of animals administered with paracetamol alone showed disorganized hepatocytes, multi focal area necrosis, congested blood vessels and fatty degradation (Fig 2.B). Although the liver tissues of animals treated with silymarin and paracetamol showed mild changes in liver architecture and congested blood vessel (Fig 2C), no signs of damage was observed in liver tissue obtained from the animals treated with *T. foliolosum* extract and paracetamol (Fig 2 D). Pandey and their research group reported that alkaloids, mainly belonging to the class of isoquinoline alkaloids are the major secondary metabolites found in *Thalictrum* species; much of the therapeutic potential of the plant can thus be attributed to them¹³⁻¹⁴. The enhanced hepatoprotective activity achieved in this study might be due to the presence of alkaloids in *T. foliolosum* extract¹⁵. However, further characteristic studies have to be performed for future exploration. .

4. CONCLUSION

From this study, it is clear that *T. foliolosum* extract has significant hepatoprotective activity in animal models. The extract is non-toxic even at relatively high concentrations. The hepatoprotective activity is probably due to the presence of alkaloids. Additional studies should to be carried out to explore the pharmacological activity of the compounds present in *T. foliolosum* extract.

5. AUTHORS CONTRIBUTION STATEMENT

Dr. Gregory Marslin conceived the idea and guided me in conducting this research study and also reviewed the manuscript. Dr. Gregory Marslin and Dr. Jose Prakash were carried out the research study, evaluated the results and drafted the manuscript.

6. CONFLICT OF INTEREST

Conflict of interest declared none.

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