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Research Article

A Study on Hepatoprotective Activity of *Mimosa pudica* in Albino Rats

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ABSTRACT

Liver disease is one of the outrageous diseases all over the world. Nature is the source of wide range of plants with medicinal value. Hence our study is focused on the study of efficacy and hepatoprotective activity of *Mimosa pudica* on experimentally induced hepatotoxic rats. Twelve healthy albino rats were taken for the study. These animals were segregated into 3 groups viz. normal, untreated and treated containing 4 animals in each group. Before the injection of hepatotoxic substance to the rats, they were fasted overnight. Then 0.3 ml of CCl_4 with paraffin in the ratio of 3:1 was injected for 10 days per animal. The crude powder of *Mimosa pudica* was administered to the animals belonging to the treated group starting from the day of injection of CCl_4 and was continued for 10 days. The liver function of the 3 distinct groups of the animals was assessed by collecting the blood sample and liver homogenate. The elevation in the serum and tissue markers was found in the group of animals under the untreated group. The treated group of animals showed approximately equal levels of enzyme markers as found in the normal animals. Hence, the hepatoprotective activity of *Mimosa pudica* is confirmed.

Keywords: Hepatoprotective, *Mimosa pudica*, CCl_4.

INTRODUCTION

Liver disorder is one of the highly increasing ailments throughout the world. Liver is the major organ that purifies the blood by detoxifying the chemicals that enter our body. Liver dysfunction may lead to death. But still there is no alternative to substitute the function of liver[1]. Several medicines are in practice to treat and to cure liver diseases[2]. Such synthetic pills cause various side effects. Hence, from olden days natural medicines especially from plant sources have great demand in the market[3]. Therefore, this study is targeted on discovering a drug from plant to treat liver disorders. Liver malfunction may occur due to a number of reasons. One among them is owing to some alcoholic compounds like carbon tetrachloride[4, 5]. This may lead to liver cirrhosis, liver fibrosis and end up with liver failure. The plant *Mimosa pudica* belong to the family of Mimosaceae and is commonly known as sensitive plant (touch me not). This plant is reported to contain alkaloid, glycoside, flavonoid and tannins[6]. Previous literatures have stated that these constituents were found to have anti-oxidant and wound healing activities[7]. All the five parts of the plant such as leaves, flowers, stem, root, and fruits were used as medicines in the traditional healthcare systems[8]. The ethanol extract of *Mimosa pudica* afforded significant dose dependent hepatoprotective and antioxidant effects in CCl_4-induced hepatic damage[9]. Hence, the present investigation is concentrated on the study of hepatoprotective activity of the plant *Mimosa pudica* against the albino rats that were experimentally induced with jaundice.

MATERIALS AND METHODS

Male albino rats were purchased from a private agency, Bangalore. The rats were in healthy condition. The animal experiments were performed in the Department of Siddha Medicine, Tamil University after the approval of animal ethics committee. Usual commercial diet (Hindustan Lever Ltd., Bangalore) and tap water ***ad libitum*** were given to the healthy rats. The rats were divided into 3 groups with 4 animals in each group, where group-1 was retained as normal, group-2 was kept as untreated control and group-3 was the group of rats with induced hepatotoxic activity and was treated with the crude extract of *Mimosa pudica.* Then the rats were fasted for one night. Carbon tetrachloride and paraffin in the ratio of 3:1 were given continuously for 10 days. The animals that were treated as control were given 0.9 % saline regularly. The jaundice induced rats were orally administered with the crude powder of *Mimosa pudica* at a dosage of 100 mg/100 g body weight along with 0.9 % saline as a carrying vehicle. The drug was given from the first day of injection in parallel to the CCl_4 and paraffin. The food was withdrawn 12 hours before the sacrifice of the animals but water was given unceasingly. On day 11 the animals were anesthetized and sacrificed. In clean dry test tubes the blood was collected and refrigerated overnight. On next day, the blood samples were centrifuged and clear serum was separated. The liver was perfused with 0.9 percent saline. It was removed and then homogenized with ice cold saline in a Teflon homogenizer.

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Table 1: Clinical parameters of various animal groups

Group	Dose	Bilirubin mg/dl	LPO in serum nM/ml MDA	LPO in tissue nM MDA/mg protein	γ-GT U/I	ALT U/I	AST U/I	ALP U/L	ACP U/I
Normal	Isosaline	0.26 ±0.028	1.60 ±0.13	2.36 ±0.25	1.00 ± 0.10	90.87 ± 9.63	102.84 ± 11.20	81.25 ± 4.79	87.26 ± 8.9
CCl_4 treated	0.3 ml	0.590 ±0.052	3.95 ±0.35	5.25 ±0.42	20 ± 2.18	197.71 ± 21.55	294.28 ± 30.01	92.20 ± 4.70	99.89 ± 10.68
Crude powder	100mg/kg	0.215 ±0.025	1.95 ±0.20	2.80 ±0.20	2.81 ± 0.24	122.50 ± 15.43	163.20 ± 13.22	70.00 ± 3.60	45.83 ± 4.30
Percentage of changes (%)		63	50.12	46	85.9	38	44.5	21.90	54.11

The levels of total bilirubin, alkaline phosphatase (ALP), acid phosphatase (ACP), lipid peroxide (LPO) in tissue and serum, gamma glutamyl transferase (γ-GT), aspartate transaminase (AST) and alanine transaminase (ALT) in serum were assessed.

RESULTS

The regular level of bilirubin in normal animals was found to be 0.26±0.028 mg/dl. The group of animals which were given CCl_4 exhibited increased level of bilirubin up to 0.590±0.052 mg/dl. After the oral administration of the crude powder of *Mimosa pudica* at a dosage of 100 mg/100 g of body weight, the bilirubin level was about 0.215±0.025 which showed significant decrease when compared to the untreated group of animals.

The normal level of LPO in serum and tissue were 1.60±0.13 nM/ml MDA and 2.36±0.25 nM MDA/mg protein respectively. These levels were increased to 3.95±0.35 nM/ml MDA and 5.25±0.42 nM MDA/mg protein in the untreated animals. The crude powder was given to third group of animals where they showed decreased level up to 1.95±0.20 nM/ml MDA and 2.80±0.20 nM MDA/mg protein respectively.

The γ-GT indicated a level of 1.00±0.10 U/l as normal and showed rapid increase to about 20.00±2.18 U/l. When the crude powder of *Mimosa pudica* was given the γ-GT level decreased to 2.81±0.24 U/l which was a significant decreased level.

The normal level of ALT in first group of animals was 90.87±9.63 and after the introduction of CCl_4 the ALT level increased to 197.71±21.55. After the intake of the crude powder of *Mimosa pudica* the ALT level decreased to 122.50±15.43.

The level of AST was found to be 294.28±30.01 U/l in the untreated animals whereas the normal level was found to be 102.84±11.20 U/l. The animals that were treated with crude powder indicated 163.20±13.22 U/l.

The normal level of ALP was 81.25±4.79 U/l and the CCl_4 treated animals showed 92.20±4.70. The crude powder treated animals showed 72.00±3.60 U/l which was nearly equal to the normal level.

The usual level of ACP was recorded as 87.26±8.90 U/l. The group of animals which were induced with CCl_4 showed 99.89±10.68 and after the treatment with crude powder of *Mimosa pudica* the animals showed ACP level of 45.83±4.30 U/l.

The results showed high hepatotoxicity due to the induction of carbon tetrachloride and this was evidenced by the increased levels of total bilirubin, alkaline phosphatase (ALP), acid phosphatase (ACP), lipid peroxide (LPO) in tissue and serum, gamma glutamyl transferase (γ-GT), aspartate transaminase (AST) and alanine transaminase (ALT). The administration of crude powder of *Mimosa pudica* resulted in reducing these parameters to normal level. Hence, the drug administration was able to treat and protect the hepatic cells.

DISCUSSION

This study was undertaken to demonstrate the hepatoprotective activity of *Mimosa pudica* on the experimentally induced jaundice affected albino rats. Carbon tetrachloride is considered to be a hepatotoxic substance which could induce the oxidative stress and liver damage[10]. Due to the induction of CCl_4 there was an increase in various hepatic parameters such as total bilirubin, alkaline phosphatase (ALP), acid phosphatase (ACP), lipid peroxide (LPO) in tissue and serum, gamma glutamyl transferase (γ-GT), aspartate transaminase (AST) and alanine transaminase (ALT). These parameters play a major role in liver impairment. The activity of phosphatases and transaminases were inhibited by the induction of CCl_4 which give rise to liver cell necrosis and lysomal latency[11]. The oral administration of the crude powder of *Mimosa pudica* for 10 days resulted in the control of these hepatic parameters and thereby protecting the liver. This hepatoprotective effect of *Mimosa pudica* may be due to the activity of its constituents like alkaloid, tannins, glycosides, terpenoids, flavonoids and saponins[12]. These constituents were expected to have protection against the enzyme activities and liver destruction. Thus, the study admitted that the effect of alcoholic compounds like CCl_4 in healthy rats could be prevented by the oral administration of crude powder of *Mimosa pudica*[9]. This study could be performed on various organisms and their effect can also be overcome by the crude powder of *Mimosa pudica*. In conclusion, the present investigation suggested that the oral administration of crude powder of *Mimosa pudica* has significant effect towards the hepatoprotective activity. Further studies can be done to confirm our results.

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