



Hepatoprotective Activity of Methanolic Extract of *Maesa Indica* Bark Against CCL₄ Induced Liver Damage in Rats

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ABSTRACT

In the present work, hepatoprotective activity of methanolic extract of *Maesa indica* bark were tested against carbon tetrachloride (CCl₄) induced hepatotoxic rats. Carbon tetrachloride has been widely used as the screening model for hepatoprotective activity. The methanolic extract of *Maesa indica* at dose levels of 100 mg/kg, 200 mg/kg and 400 mg/kg b.w, were tested against Silymarin as a standard at a dose of 50mg/kg b.w, in CCl₄ induced hepatotoxicity rats. The results of serum biochemical parameter levels (SGOT, SGPT, ALP and total bilirubin) have been presented as mean \pm SEM. The percentage decrease or increase was calculated by considering the enzyme level difference between hepatotoxin treated and control rats as 100% level of reduction. The present investigation showed hepatoprotective effect against carbon tetrachloride (CCl₄) induced hepatotoxic rats.

Keywords: *Maesa indica*, Hepatoprotective activity, carbon tetrachloride.

INTRODUCTION

Liver diseases are among the important diseases affecting mankind. According to WHO about 18,000 people die every year due to liver diseases. The common ailments of liver are cirrhosis, cholestasis, hepatitis, portal hypertension, hepatic ncephalopathy, fulminant hepatic failure and certain tumors like hepatoma. It is estimated that two billion people around the world are infected with hepatitis B. About 350 million of these have the chronic form of the disease. This alarming statistics with perplexing report, warrant the immediate necessity of studies of any level to either ensure the effectiveness of available formulations or exploration of the new herbal therapies to reduce the morbidity and mortality rate due to hepatic complications. In modern medicine cortico steroids and immunosuppressants are commonly used to treat liver disease in allopathic form of medicine. But, these drugs are associated with adverse effects such as immunosuppression and bone marrow depression. Further, the success rate of treating liver diseases is disappointing. Attempts are being made globally to get scientific evidences for these traditionally reported herbal drugs^{1,5}. In view of severe undesirable side effects of synthetic agents and absence of reliable liver protective drugs in the modern medicine, there is growing focus to follow Systematic research methodology and to evaluate scientific basis for the use of traditional herbal medicines which are claimed to possess hepatoprotective activity.

About 70-80% of the world populations rely on the use of traditional medicine, which is predominantly based on plant materials. The traditional medicine refers to a broad range of natural health care practices including Ayurveda,

Siddha, Homeopathy and Unani. About 600 commercial preparations with claimed liver protecting activity are available all over the world. About 100 Indian medicinal plants belonging to 40 families are used for herbal formulation. A few reports on the hepatoprotective activity are cited here, e.g. *Apium graveolens* Linn. (Umbelliferae), *Boerhaavia diffusa* Linn. (Nyctagina ceae), *Euphorbia antisyphilitica* (Euphorbiaceae), *Rubia cordifolia* (Rubiaceae), *Solanum lyratum* (Solanaceae), *Tylophora indica* (asclepiadaceous)^{6,7}.

MATERIALS AND METHODS

Plant material

The plant collected from the Sri Venkateswara University, Tirupathi and indentified, Authenticated by Dr. K. Madhava Chetty.

Preparation of plant extracts

The shade dried powder of the plant was collected and it was treated with methanol then extracted by percolation process.

Animals

Wistar albino rats of either sex weighing between 200-250 g were obtained from Mahaveer Enterprises, Hyderabad. The animals were housed under standard environmental conditions (temperature of 22 \pm 1 °C with an alternating 12 hrs light- dark cycle and relative humidity of 60 \pm 5%), one week before the start and also during the experiment as per the rules and regulations of the Institutional Ethical Committee and by animal regulatory body of the government.



Drugs and chemicals

Carbon tetra chloride (CCl₄), Poona Chemical Laboratory, Pune, India, Silymarin-Nature remedies, Bangalore, Karnataka, India, Estimation kits (SGOT, SGPT, SALP, BILIRUBIN) - SPAN Diagnostics, Surat, India. All the other chemicals were obtained from local sources and were of analytical grade.

Experimental Procedure

Albino rats of either sex (200-250 g) were used in the study. The animals were fed with standard diet and water *ad libitum* two weeks before and during the experimental period. Each methanolic extract was tested at 400 mg/kg dose level. The animals were divided into 5 groups (I-VI), each consisting of 6 animals. Group I received 5% gum acacia suspension and acts as a normal control and Group II received CCl₄ at a dose of 1 ml/kg orally (p.o.) acts as negative control. Groups III-VI were treated with selected drugs (Silymarin and plant extracts) for 5 days before the commencement of experiment and on day 6th of the experiment, blood samples were collected (6th day) at 0 hr in all groups and CCl₄ was administered to all groups except group I (normal control) one hour after the administration of drugs. On 7th day blood samples were

collected from all groups by retro orbital puncture and serum was separated by centrifugation and used for the estimation of blood serum biochemical parameters (SGOT, SGPT, SALP and T. BILL.) using autoanalyser according to standard procedures. Finally, the liver sections were carefully dissected out, subjected to histopathology study.

Statistical analysis

The mean ± SEM values were calculated for each parameter. Percentage reduction in biochemical parameters with the test samples was calculated by considering the difference between the hepatotoxin treated group and the control group as 100% reduction. For the determination of significant inter group difference, each parameter was analyzed separately using one way analysis of variance (ANOVA) followed by Dunnet's test was carried out to assess the hepatoprotective potency of different extracts of the plants.

RESULTS

Table 1: Protocol for study of hepatoprotective

S. No.	Group	Treatment
1	Group I	Receives vehicle orally, 1 ml/kg (2% gum acacia)
2	Group II	Receives CCl ₄ orally at a dose of 1 ml/kg in paraffin oil (1:1).
3	Group III	Receives CCl ₄ orally at a dose of 1 ml/kg + Silymarin orally at a dose of 50 mg/kg.
7	Group IV	Receives CCl ₄ orally at a dose of 1 ml/kg + Methanolic extract of <i>Maesa indica</i> , orally at a dose of 100 mg/kg.
8	Group V	Receives CCl ₄ orally at a dose of 1 ml/kg + Methanolic extract of <i>Maesa indica</i> , orally at a dose of 200 mg/kg.
9	Group VI	Receives CCl ₄ orally at a dose of 1 ml/kg + Methanolic extract of <i>Maesa indica</i> , orally at a dose of 400 mg/kg.

Table 2: Effect of methanolic extract of bark of *Maesa indica* against CCl₄ - induced hepatotoxicity in albino rats

S. No	Treatment group	Serum biochemical parameters			
		SGOT (IU/L)	SGPT (IU/L)	SALP (IU/L)	T.BILI. (mg/dl)
1	Control (2% gum acacia 1ml/kg p.o.)	85.15±0.45	76.34±0.24	139.21±0.20	0.51±0.02
2	Hepatotoxin - CCl ₄ (1ml/kg p.o.)	472.16±0.21 ^{***}	359.21±0.22 ^{***}	740.61±0.32 ^{***}	5.06±0.24 ^{***}
3	Standard- Silymarin (50 mg/kg p.o.)	115.25±0.43 ^{***}	121.13±0.11 ^{***}	230.34±0.31 ^{***}	1.25±0.11
4	Methanolic extract of <i>Maesa indica</i> (100mg/kg p.o.)	330.12±0.14 ^{***}	263.36±0.56 ^{***}	625.01±0.14 ^{***}	3.92±0.01 ^{**}
5	Methanolic extract of <i>Maesa indica</i> (200mg/kg p.o.)	257.03±0.33 ^{***}	197.81±0.83 ^{***}	380.36±0.78 ^{***}	2.78±0.02
6	Methanolic extract of <i>Maesa indica</i> (400mg/kg p.o.)	147.06±0.84 ^{***}	149.42±0.21 ^{***}	278.23±0.14 ^{**}	1.75±0.01 ^{**}

Values are mean ± SEM, n=6, Significance: *P<0.05, **P<0.01, ***P<0.001



Table 3: Percentage reduction of various serum biochemical parameters due to treatment with methanolic extract of bark of *Maesa indica* against CCl₄ - induced hepatotoxicity in albino rats

Treatment	SGOT	SGPT	SALP	T.BILI.
Standard- Silymarin (50 mg/kg p.o.)	92.22	84.16	84.84	83.73
Methanolic extract of <i>Maesa indica</i> (100mg/kg p.o.)	36.70	33.88	19.22	25.05
Methanolic extract of <i>Maesa indica</i> (200mg/kg p.o.)	55.58	57.05	59.90	50.10
Methanolic extract of <i>Maesa indica</i> (400mg/kg p.o.)	84.10	74.16	76.80	72.74

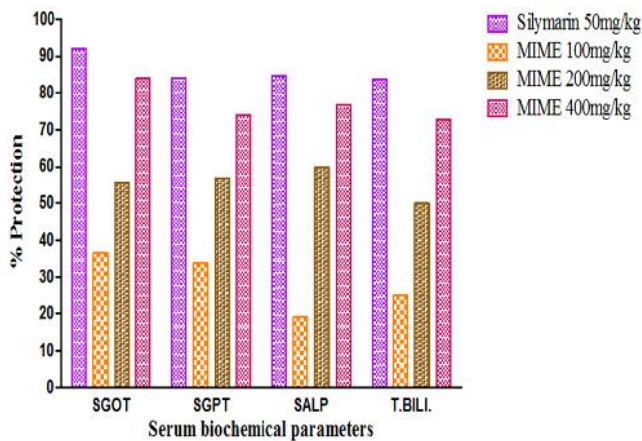
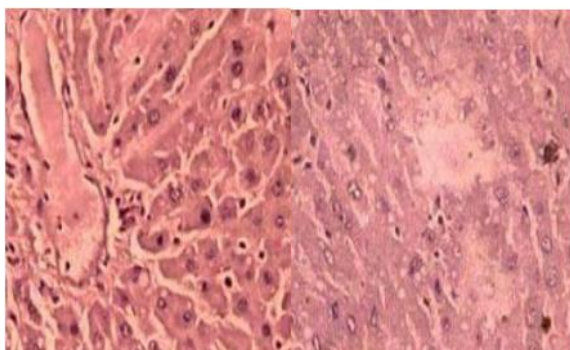


Figure 1: Percentage reduction of various serum biochemical parameters due to treatment with methanolic extract of bark of *Maesa indica* against CCl₄ - induced hepatotoxicity in albino rats

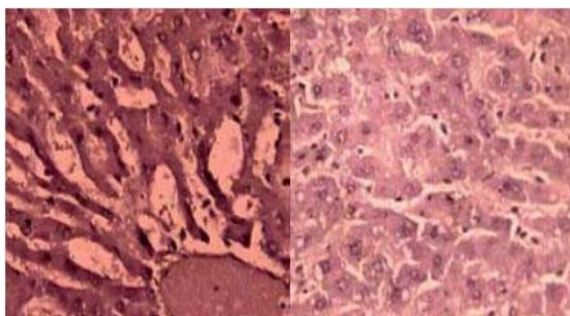
MIME: Methanolic extract of *Maesa indica*

Histopathology: Photomicrographs of liver sections



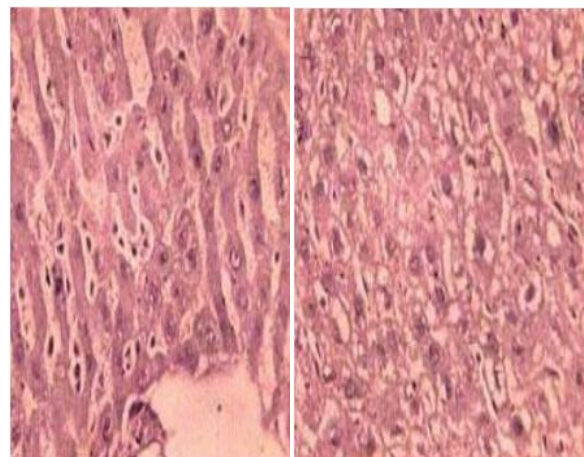
Normal control

MIME 100 mg/kg b.w



Negative control (CCl₄ treated)

MIME 200 mg/kg b.w



Positive control (Silymarin treated) MIME 400 mg/kg b.w

Figure 2: Effect of methanolic extract of *Maesa indica* against CCl₄ - induced hepatotoxicity in albino rats

Normal control: Showing cords of hepatocytes around the central vein; prominent nucleus and Nucleolus, Negative control: Showing liver with focal hepatocytic damage and inflammatory Collection, MIME 100 mg/kg b.w: Showing minimal inflammatory collection and damaged hepatocytes. MIME 200 mg/kg b.w: Showing minimal inflammatory collection and damaged hepatocytes. MIME 400 mg/kg b.w: Liver appearing normal no foci of damage or inflammation collection. Positive control: Liver appearing near to normal condition.

CONCLUSION

From the above results, we can conclude that, the methanolic extract of maesa indica Bark showed significant hepatoprotective activity against ccl₄ induced liver damage in rats. Further studies are needed to determine the exact mechanism of action and its clinical studies.

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