
Effect of *Moringa Oleifera* Lam on Paracetamol-induced Hepatotoxicity

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Aqueous and alcoholic extracts of root and flower of *M. oleifera* were screened for antihepatotoxic activity in paracetamol treated albino rats. Liver function was assessed based on liver to body weight ratio, serum levels of transaminase (SGPT, SGOT), alkaline phosphatase (SALP) and bilirubin. All extracts were found to have antihepatotoxic activity.

In the traditional medicine, various herbal preparations are being used for treating liver disorders. In the absence of an effective treatment in modern medicine, efforts are being made to find out suitable herbal drugs. The plant *Moringa oleifera* lam (Syn : *M. pterygosperma* Gaertn) Fam. Moringaceae, is commonly called in Sanskrit as Sigru and in Hindi as Soanjan¹. It is a soft wooded deciduous tree. It grows to a height of 25 to 30 ft. Flowers are pink or white; axillary or terminal panicles. The plant is well known for its various medicinal properties.

Flowers contain nine amino acids, sucrose, d-glucose², traces of alkaloids, wax, quercetin and Kaempferol; the ash is rich in potassium and calcium³. The roots contain an active antibiotic principle, pterygospermin which in low concentrations (0.5 - 3 mcg/ml) inhibits growth of many gram positive and gram negative bacteria and in higher concentrations (7-10 mcg/ml), is active against fungi^{4,5}. Extracts of root and seed also have shown antimicrobial activity⁶. The alcoholic extract of root-bark showed anti-inflammatory and analgesic activity⁷. Alcoholic extract of leaves did not show any protection against carbon tetrachloride-induced hepatotoxicity in rats and mice⁸. Adesina⁹ (1982) reported the CNS depressant and anticonvulsant effects of the ethanolic extract of fresh roots of *M. oleifera*. The present study was taken up to evaluate the effect of root and flower extracts of *M. oleifera* on paracetamol-induced hepatotoxicity.

MATERIALS AND METHODS

Plant Material

The plant material used in this study was collected from Trichy, Tamilnadu and identified in the botany section of St. Joseph's College, Trichy.

Preparation of Extracts

The freshly detached roots and flowers were collected and dried under shade. The powdered root and flower material was macerated with 90% alcohol separately. The alcoholic extract were condensed and evaporated to dryness under vacuum. The marcs obtained from alcoholic extracts of root and flower were air dried, macerated with chloroform water, and freeze dried afterwards. The extracts were dissolved in normal saline and used for the experiment.

Animals

Male Albino rats (wistar strain) and albino mice were procured from King Institute of Preventive Medicine, Chennai and bred in the college animal house. They were fed on commercial diet (Hindustan Lever, Bangalore) and tap water *ad libitum* during the experiment. The room temperature was maintained at $25 \pm 1^\circ$.

Acute Toxicity Studies

The LD₅₀ values for the prepared extracts were

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determined in albino mice by Litchfield and Wilcoxon (1949) method¹⁰.

Antihepatotoxic Studies¹¹

Six groups (I-VI) comprising each of five male albino rats weighing in the range of 150-180 gm were selected. Group I served as control and received normal saline 1 ml per Kg i.p. daily for seven days. Group II rats were similarly treated as group I. Groups III and IV were treated with aqueous and alcoholic extracts of the root (200 mg/kg/day ip) while group V and VI with aqueous and alcoholic extracts of the flower (200 mg/kg/day i.p.) respectively for 7 days.

On the seventh day, paracetamol suspension was given by oral route, in a dose of 750 mg/kg to all rats except rats in group I. After 36 hours, all the rats were sacrificed under light ether anaesthesia, blood was collected in sterile centrifuge tubes and allowed to clot. Serum was separated by centrifuging at 2500 rpm for 10 min and used for the estimation of SGPT, SGOT, SALP and serum bilirubin levels.

Assessment of liver function

After the animals were sacrificed, the abdomen was

cut open and the liver was removed. The ratio of wet liver weight per 100 gm of animal body weight was calculated and recorded.

SGPT and SGOT levels were estimated by the method of Reitman and Frankel¹² (1957) and expressed in Karmen units (KU). SALP levels were estimated using Kind and King's¹³(1954) method and expressed in KA units. Serum bilirubin levels were estimated by Malloy and Evelyn¹⁴ (1937) method and expressed in mg %.

RESULTS AND DISCUSSION

The average percentage yield of ethanolic (90%) extracts of root and flower of *M. oleifera* were found to be 11.16, 12.17 % w/w respectively. The corresponding values for aqueous extracts were 19.14, 25.98 % w/w.

The LD₅₀ value of ethanolic (90%) extracts of roots and flowers of *M. oleifera* were calculated to be 1023, 1047 mg/kg i.p. in mice respectively. The corresponding values for aqueous extracts were 1078, 1092 mg/kg.

Table 1 shows the effect of alcoholic and aqueous extracts of flower and root of *M. oleifera* in albino rats intoxicated with paracetamol.

Table : Effect of *M. oleifera* on Paracetamol-induced hepatotoxicity

Group No.	Design of Treatment	Liver weight (g/g body weight)	SGOT (Units/ml)	SGPT (Units/ml)	SALP (K.A. Units)	Bilirubin mg %
I	Control (Normal Saline)	3.24±0.21	60±5.43	33±5.60	8.2±3.13	0.45±0.06
II	Paracetamol	3.68±0.11	125±7.95	60±5.45	37±5.00	0.80±0.19
III	Aqueous root extract	3.06±0.12	59*±5.22	32*±4.78	7.0*±1.87	0.48*±0.03
IV	Alcoholic root extract	3.20±0.20	62*±5.73	36*±4.79	13*±2.19	0.55*±0.05
V	Aqueous flower extract	3.08±0.12	63*±5.22	39*±5.33	5.0*±0.66	0.50*±0.03
VI	Alcoholic flower extract	3.22±0.19	55*±4.94	38*±4.79	7.0*±1.86	0.46*±0.04

Each value is mean ± standard error of mean of 5 determinations

* P < 0.01

The mean value \pm SEM was calculated for each parameter¹⁵. Paracetamol toxicity is due to the formation of toxic metabolites through the action of cytochrome P-450. Induction of cytochrome P-450 depletion of hepatic glutathione is a prerequisite for paracetamol-induced hepatotoxicity¹⁶.

Liver tissue, rich in both transaminases (GOT and GPT), contains more GPT than GOT, while both transaminases are elevated in sera of patients with acute hepatic disease, GPT, which is only slightly elevated by cardiac necrosis, is a more specific indicator of liver damage¹⁷. All the above mentioned extracts reduced the increased enzyme levels due to paracetamol intoxication.

The extracts show significant hepatoprotective effect against paracetamol-induced hepatotoxicity in the rat.

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