Protective effect of *Lawsonia alba* Lam., against CCl₄ induced hepatic damage in albino rats

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Liver, an important organ actively involved in many metabolic functions is the frequent target of number of toxicants. Therefore, the disorders associated with the organ are numerous and varied. In absence of a reliable liver protective drug in the modern medicine, there are number of medicinal preparations in Ayurveda recommended for the treatment of liver disorders. *Lawsonia alba* Lam. (Myrtaceae), a medicinal plant mentioned in Ayurveda for the treatment of liver disorders has not been subjected to systematic scientific investigations to assess its hepatoprotective activity.

Keeping this in view, the present study has been undertaken to investigate hepatoprotective activity of *Lawsonia alba* Lam., bark against the CCl₄, a known hepatotoxin in albino rats.

**Plant material** — *Lawsonia alba* Lam., bark collected locally during December was washed, dried and powdered in the grinding mill. Dr. Mrs. Alka Chaturvedi (Department of Botany, Nagpur University, Nagpur, India) authenticated the plant, where a voucher specimen of the plant has been deposited (Acc. No.5627). A 10% extract was then prepared in 20% alcohol. This was kept for 14 days with daily shaking and then filtrate was concentrated to dryness (the extract when concentrated the yield was found to be 09%). After evaporation 0.9 g of the material was obtained from 10 g, which corresponds, to the 09% of the 10 g of starting plant material.

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**Animals and treatment** — Inbred male albino rats (Wistar strain) of 8-10 weeks of age, weighing between 100-120 g were housed in polypropylene cages and fed on Hindustan Lever’s pellet diet and water ad libitum. Animals were divided into 5 groups of 6 animals each. Group I (Normal) received liquid paraffin (1 ml/kg body weight, ip). Group II (Control) received 30% CCl₄ in liquid paraffin (1 ml/kg body weight, ip). Group III, IV and V received orally 250, 500 and 750 mg/kg body weight aqueous suspension of extract respectively, once in a day and CCl₄ as above. Treatment duration was 10 days and the doses of CCl₄ were administered after every 72 hr. Animals were sacrificed 24 hr after the last injection. Blood was collected, allowed to clot and serum separated. The liver was dissected out and used for biochemical studies.

**Biochemical determination** — Serum, alanine aminotransferase (ALT; EC 2.6.1.2), aspartate aminotransferase (AST; EC 2.6.1.1), alkaline phosphatase (ALP; EC 3.1.3.1), total serum protein and bilirubin were measured. Lipid peroxidation (LP) in terms of thiobarbituric acid reacting substances (TBARS), superoxide dismutase (SOD; EC 1.15.1.1), catalase (CAT; EC 1.11.1.6), glutathione (GSH), glutathione peroxidase (GPX; EC 1.11.1.19), glutathione-s-transferase (GST; EC 2.5.1.18), glycogen (GLY) and protein were estimated in liver homogenate.

**Statistical analysis** — Results are expressed as mean ± SE, and Student’s *t* test was used for statistical significance.

CCl₄, an extensively studied liver toxicant and its metabolites such as trichloromethyl peroxo radical
(CCl₄) are involved in the pathogenesis of liver damage.¹⁶,¹⁷

The abnormal higher level of marker enzymes such as ALT, AST, ALP and bilirubin in the serum of CCl₄ treated rats (Table 1) indicate damage to hepatic cells. Effective control of serum marker enzymes and the lowering of GST activity by L. alba extract seems to offer protection and maintains functional integrity of the cells.

Enhanced level of lipid peroxidation (LP) and reduced activities of SOD and CAT observed (Table 1) point out the hepatic damage in the rats treated with CCl₄ (ref. 18). But the oral administration of the L. alba extract to such CCl₄ treated rats reduced the enhanced level of LP and increased the activity of SOD and CAT. This in every likelihood indicates the antilipid peroxidative and/or adaptive nature of the system against CCl₄ treatment as brought about by L. alba extract.

Glutathione (GSH) constitutes the first line of defense against the free radicals.¹⁰ Reduction in liver GSH and decreased activity of glutathione peroxidase (GPX) and glutathione-s-transferase (GST) in CCl₄ treated rats (Table 1) indicate damage to the liver cells.²⁰ But the reconstitution of the levels of the GSH, GPX and GST activity in the rats treated with L. alba extract for 10 days accounts for the protective and antioxidative efficiency of the drug.

Decrease in total serum protein (TSP) and liver glycogen (GLY) observed in CCl₄ treated rats (Table 1) may be associated with the decrease in the number of hepatocytes which in turn may result into the decreased hepatic capacity to synthesize protein and GLY. But the restoration of the levels of TSP and liver GLY after feeding of extract confirms the hepatoprotective nature of the Lawsonia alba extract.

These results suggest the hepatoprotective and antioxidative activity of the extract of L. alba.

References
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