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HEPATOPROTECTIVE ACTIVITY OF SESBANIA CANNABINA SEED EXTRACT ON EXPERIMENTAL RATS

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ABSTRACT
Liver diseases continue to be a major global health concern, often resulting from exposure to environmental toxins, drugs, and unhealthy lifestyle practices. In search of effective hepatoprotective agents, medicinal plants offer promising therapeutic potential. This study evaluates the hepatoprotective effect of *Sesbania cannabina* seed extract in Wistar albino rats with carbon tetrachloride (CCl_4)-induced liver injury. Rats were divided into five groups: Normal Control, Toxin Control, Silymarin Treated (100 mg/kg), and two groups receiving low (200 mg/kg) and high (400 mg/kg) doses of the plant extract. Over 14 days, the treatment groups were assessed for liver function biomarkers (ALT, AST, ALP, total bilirubin), antioxidant activity, and histopathological changes. Methanolic extracts were prepared using Soxhlet extraction. The results demonstrated that *Sesbania cannabina* seed extract significantly restored liver enzyme levels, improved antioxidant defenses, and preserved liver histology in a dose-dependent manner, comparable to the standard hepatoprotective agent silymarin. These findings suggest that *Sesbania cannabina* possesses potent hepatoprotective and antioxidant properties, supporting its traditional medicinal use and potential for therapeutic development.

KEYWORDS: Sesbania cannabina, Hepatoprotective activity, Carbon tetrachloride (CCl_4), Liver injury, Liver function biomarkers.

1. INTRODUCTION
Liver diseases are among the leading causes of morbidity and mortality worldwide, largely due to environmental toxins, drug-induced injuries, and lifestyle-related factors. The liver plays a pivotal role in metabolism, detoxification, and nutrient storage. Hepatoprotective agents, particularly those derived from medicinal plants, are being explored to counteract liver damage caused by various hepatotoxins. Sesbania cannabina, a leguminous plant, is traditionally known for its medicinal properties, including antioxidant and anti-inflammatory effects. This study investigates the hepatoprotective activity of Sesbania cannabina seed extract in rats with chemically-induced liver injury, with a comparative analysis using the standard drug silymarin.

2. MATERIALS AND METHODS
The study employed healthy Wistar albino rats, divided into five groups of six animals each: Normal Control, Toxin Control, Silymarin Treated, Low Dose Extract, and High Dose Extract. Liver injury was induced using carbon tetrachloride (CCl4). The experimental groups received either silymarin (100 mg/kg) or Sesbania cannabina seed extract (200 mg/kg and 400 mg/kg) for 14 days. Liver function biomarkers (ALT, AST, ALP, and total bilirubin) were evaluated in serum samples. Antioxidant assays were conducted to determine the free radical scavenging activity of the extract. Histopathological studies were performed on liver tissues to assess morphological changes.

Plant Material and Extraction
Sesbania cannabina seeds were shade dried and extracted using Soxhlet apparatus with methanol as solvent. The extract was concentrated and stored for phytochemical screening and biological testing.

Experimental Animals
Wistar albino rats (150–200 g) were divided into five groups (n=6). The study was conducted following ethical guidelines for laboratory animal care.

Treatment Groups
- Group I: Normal control
- Group II: Gentamicin (80 mg/kg, i.p.) – toxic control
- Group III: Silymarin (100 mg/kg) + Gentamicin
- Group IV: Sesbania cannabina extract (100 mg/kg) + Gentamicin
- Group V: Sesbania cannabina extract (200 mg/kg) + Gentamicin

Biochemical Analysis
Serum levels of SGPT, SGOT, ALP, and total bilirubin were measured using standard biochemical kits.

Antioxidant Activity
DPPH radical scavenging assay and total phenolic and flavonoid content were evaluated.

Histopathological Studies
Liver tissues were preserved in formalin, embedded in paraffin, sectioned, and stained with hematoxylin and eosin for microscopic examination.

3. RESULTS

Biochemical analysis revealed a marked elevation in ALT, AST, ALP, and total bilirubin levels in the toxin control group, indicating severe liver damage. Treatment with Sesbania cannabina extract significantly restored these parameters toward normal levels, particularly at the higher dose. Antioxidant assays showed enhanced levels of catalase, SOD, and glutathione peroxidase in the treated groups. Histopathological examinations demonstrated that extract-treated liver sections had near-normal architecture, with reduced necrosis and inflammation.

Phytochemical Screening
The extract revealed the presence of alkaloids, flavonoids, tannins, glycosides, saponins, and phenolic compounds, which are responsible for antioxidant and hepatoprotective actions.

Antioxidant Activity
Total phenolic content was measured as 20.5 mg GAE/g, and flavonoid content was 15.2 mg RE/g. DPPH assay showed dose-dependent scavenging with IC50 of 89.34 µg/mL compared to ascorbic acid's 74.56 µg/mL.

Biochemical Parameters
Treatment with the extract significantly restored SGPT, SGOT, ALP, and bilirubin levels toward normal, indicating hepatoprotective activity comparable to Silymarin.

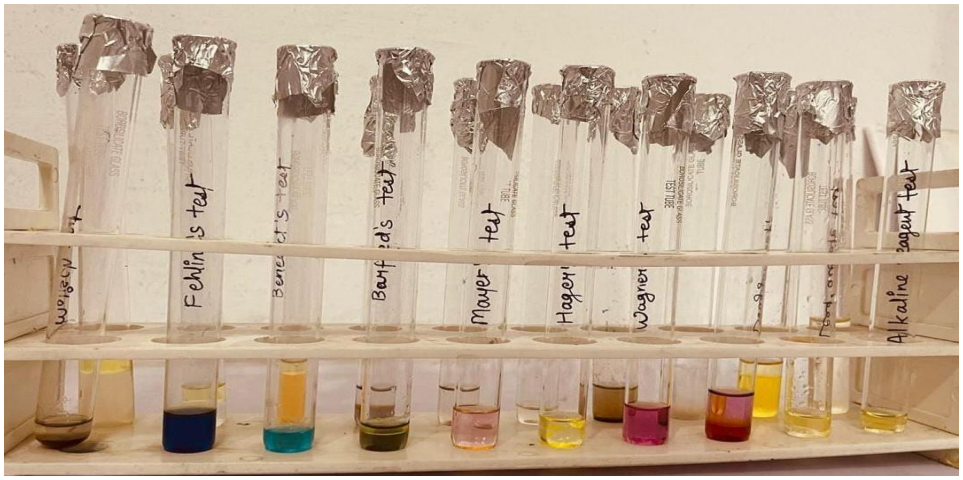

Table 1: Effect of Sesbania cannabina Extract on Liver Enzymes.

Group	ALT (U/L)	AST (U/L)	ALP (U/L)	Total Bilirubin (mg/dL)
Normal Control	32.5	45.2	110.3	0.7
Toxin Control	120.4	134.6	220.9	3.5
Silymarin Treated	40.2	52.3	118.9	0.9
Low Dose Extract	48.7	60.1	135.0	1.1
High Dose Extract	35.4	48.2	115.2	0.8

4. DISCUSSION

The findings of this study support the hepatoprotective effect of Sesbania cannabina seed extract against chemically-induced liver damage. The reduction in liver enzyme levels and histopathological improvements in the treated groups indicate that the extract can effectively mitigate hepatocellular injury. The protective effects are likely due to the presence of bioactive compounds such as flavonoids, saponins, and galactomannan, which exhibit antioxidant and anti-inflammatory activities. These results are consistent with previous research on plant-based hepatoprotective agents. Moreover, the dose-dependent response highlights the therapeutic potential of Sesbania cannabina in liver disease management.

5. SUMMARY

In conclusion, Sesbania cannabina seed extract demonstrated significant hepatoprotective effects in CCl4-induced liver injury in rats. Biochemical, antioxidant, and histopathological evidence collectively support its role in restoring liver function and structure. The results justify the traditional use of Sesbania cannabina and underscore its potential in developing plant-based hepatoprotective therapies.

REFERENCES

1. Singleton, V. L., & Rossi, J. A. Colorimetry of total phenolics with phosphomolybdic-phosphotungstic acid reagents. *American journal of Enology and Viticulture*, 1965; *16*(3): 144-158.
2. Lin, J. Y., & Tang, C. Y. Determination of total phenolic and flavonoid contents in selected fruits and vegetables, as well as their stimulatory effects on mouse splenocyte proliferation. *Food chemistry*, 2007; *101*(1): 140-147.
3. Tepe, B., Sokmen, M., Akpulat, H. A., &Sokmen, A. In vitro antioxidant activities of the methanol extracts of four Helichrysum species from Turkey. *Food Chemistry*, 2005; *90*(4): 685-689.
4. Dhivya, S. M., & Kalaichelvi, K. UV-Vis spectroscopic and FTIR analysis of Sarcostemmabrevistigma, wight. and arn. *International Journal of Herbal Medicine*, 2017; *9*(3): 46-49.
5. P'ng, X. W., Akowuah, G. A., & Chin, J. H. Acute oral toxicity study of Clinacanthus nutans in mice. *International Journal of Pharmaceutical Sciences and Research*, 2012; *3*(11): 4202.
6. Aboubakr, M., & Abdelazem, A. M. Hepatoprotective effect of aqueous extract cardamom against gentamicin induced hepatic damage in rats. *Int J Basic Appl Sci.*, 2016; *5*(1): 1.
7. Dybkaer, R., & Hertz, H. A reference for determination of bilirubin concentration in serum using bilirubin in cyanide-formamide for enrichment of serum. *Scandinavian Journal of Clinical and Laboratory Investigation*, 1970; *25*(2): 151-160.
8. O'brien, P. J., Slaughter, M. R., Polley, S. R., & Kramer, K. Advantages of glutamate dehydrogenase as a blood biomarker of acute hepatic injury in rats. *Laboratory animals*, 2002; *36*(3): 313-321.
9. Azab, A. E., Albasha, M. O., & Elsayed, A. S. I. Prevention of hepatotoxicity with Curcuma longa and Rosmarinus officinalis in gentamicin treated guinea pigs. *Indo Amer J Pharm Res.*, 2016; *6*(03): 4791-802.
10. Arfat, Y., Mahmood, N., Tahir, M. U., Rashid, M., Anjum, S., Zhao, F& Qian, A. R. Effect of imidacloprid on hepatotoxicity and nephrotoxicity in male albino mice. *Toxicology reports*, 2014; *1:* 554-561.
11. Gurib-Fakim, A. Medicinal plants: traditions of yesterday and drugs of tomorrow. Molecular aspects, 2006.