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Hepatoprotective Activity of Andrographis Paniculata Extract in Ccl₄-induced Liver Damage in Rats

G.Syam Prasad, M.Pharmacy, Department of pharmacology, Sri venkateswara college of pharmacy

Co-author: N. Rajeswari

Objective & Aim: The present study aimed to evaluate the hepatoprotective potential of Andrographis paniculata extract against carbon tetrachloride (CCl_4)-induced hepatic damage in Wistar rats. The primary objective was to assess its protective efficacy by analyzing biochemical, enzymatic, and histopathological alterations in liver tissue following CCl_4-induced toxicity, while the secondary objectives included determining its antioxidant effect and comparing its hepatoprotective activity with that of a standard reference drug**.**

Methods: Liver injury was induced in Wistar rats by intraperitoneal administration of CCl_4 (1 mL/kg, 1:1 v/v in olive oil) twice weekly for 7 days. *Andrographis paniculata* extract was administered orally at graded doses for the same duration. Silymarin served as the standard hepatoprotective reference. Serum biochemical markers including alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), and total bilirubin were estimated. Hepatic antioxidant parameters such as superoxide dismutase (SOD), catalase (CAT), glutathione (GSH), and malondialdehyde (MDA) were also determined. Histopathological examination of liver tissue was conducted to confirm morphological recovery.

Results: CCl_4 administration resulted in significant elevation of liver enzyme levels and lipid peroxidation, accompanied by marked histopathological alterations. Treatment with *Andrographis paniculata* extract produced a dose-dependent reduction in serum liver enzymes and MDA levels while enhancing antioxidant enzyme activity (SOD, CAT, GSH) compared to CCl_4-treated controls ($p < 0.05$). Histological observations revealed substantial restoration of normal hepatic architecture in treated groups, similar to the silymarin standard.

Conclusion: *Andrographis paniculata* extract exhibits significant hepatoprotective activity against CCl_4-induced hepatic damage, likely mediated through its antioxidant and membrane-stabilizing effects. These findings support its traditional use in liver disorders and suggest its potential as a natural hepatoprotective agent.

Keywords: *Andrographis paniculata*, hepatoprotective activity, carbon tetrachloride, oxidative stress, liver enzymes, antioxidant defense, silymarin, Wistar rats

Biography1: Mr. G. Syam Prasad is pursuing his M.Pharmacy in the Department of Pharmacology at *Sri Venkateswara College of Pharmacy*. His research focuses on toxicology and herbal pharmacology, particularly the protective effects of natural compounds. His study on the *Hepatoprotective Activity of Andrographis paniculata Extract in CCl_4-Induced Liver Damage in Rats* highlights his interest in developing safe, plant-based therapies for liver disorders.

Biography2: Ms. N. Rajeswari, M.Pharm (Pharmacology), is an Assistant Professor at Sri Venkateswara College of Pharmacy with over 6 years of academic and research experience. Her interests include experimental pharmacology, toxicology and herbal drug research, with a focus on integrating traditional medicine with modern therapeutics.

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