INTRODUCTION

Liver has a prominent role in the regulation of physiological processes. It is involved in various vital functions such as metabolism, secretion and storage. Furthermore, detoxification of a variety of drugs and xenobiotics occurs in liver. Hence liver diseases are among the most serious health ailments. They may be classified as acute or chronic hepatitis (inflammatory liver diseases), hepatosis (non-inflammatory diseases) and cirrhosis (degenerative disorder resulting in fibrosis of the liver). Liver diseases are mainly caused by toxic chemicals (certain antibiotics, chemotherapeutics, peroxidised oil, aflatoxin, carbon-tetrachloride, paracetamol, chlorinated hydrocarbons, etc.), excess consumption of alcohol, infections and autoimmune disorder. So it has become very much necessary to protect the liver from all these agents.

In spite of the tremendous advances made in allopathic medicine, no effective antihepatotoxic medicine is available till date. Plant drugs are known to play a vital role in the management of liver diseases. In India, more than 87 medicinal plants are used in different combinations in the preparation of 33 patented herbal formulations

In the traditional system of medicine there are numerous plants and polyherbal formulations have been used in liver diseases. But only a small portion of them have been pharmacologically evaluated for their efficacy. Still more number of medicinal plants is needed to be investigated for their antihepatotoxic effect.

Smilax China (Liliaceae) is distributed throughout the tropic and sub-tropic parts of the world. Some pharmacological activities of Smilax spp. rhizome have been studied. Oral administration of the extract from S. sarsaparilla at the dose of 500 mg/kg reduced the paw edema induced by carragenan in rats. The methanol extract of rhizomes of S. glabra (100mg/kg, i.p.) reduced the blood glucose of normal mice and KK-Ay mice. The aqueous extract (400, 800 mg/kg, p.o.) from rhizome of S. glabra inhibited the swelling of the adjacent arthritis in rats. The ethyl acetate, butanol and aqueous extracted fractions from S. china root showed high levels of DPPH free radical scavenging activity. The decoction of S. china (90 and 180 mg/kg, p.o.) could significantly inhibit inflammatory swelling on adjunctive arthritis mouse.

MATERIALS AND METHODS

The plant material and preparation of extracts:

The roots of Smilax China for the proposed study was purchased from a commercial source, at Visakhapatnam, and was authenticated by Professor K. Venkiah, Department of Botany, Andhra university, Visakhapatnam. A voucher specimen has been deposited at the museum of our college. After collection the roots were washed thoroughly under running tap water, cut into pieces, shade dried at room temperature (24–26°C) and ground into a coarse powder. The powdered roots were extracted by using ethanol in soxhlet apparatus (Yield 14.52%). The preliminary phytochemical screening was carried out and revealed the presence of mainly glycosides, flavonoids, tannins and triterpenoids in EESCR.

The Experimental animals and acute toxicity studies:

The male albino rats weighing 170 – 200 g were used for the experimentation. They were housed in polyacryl cages (38x28x10cm) with not more than four animals per cage. After randomization into various groups, animals were acclimatized for the period of 7 days under standard laboratory conditions (room temperature 27 ± 3°C, relative humidity 65 ± 10%, with dark and light cycle 12/12 hrs). All the animals were allowed free access to standard pellet diet (Hindustan liver, Kollo, India) and water was allowed ad-lib (under strict hygienic condition). Ethical clearance was obtained from Institutional Animal Ethics Committee (IAEC) prior to the dosing. Fixed dose (OECD Guideline No. 420) method of CPSEA was adapted for toxicity studies.

CCL4-induced hepatotoxicity

Albino rats weighing 170 – 200 g were divided into six groups of each containing eight (n=8) animals.

Group I – Negative control (received vehicle, distilled water 1 ml/kg, p.o.).

Group II – Positive control (CCL4 1ml/kg, i.p.).

Group III – Standard (Silymarin 25 mg/kg, p.o.).

Group IV – EESCR (100 mg/kg, p.o.).

Group V – EESCR (250 mg/kg, p.o.) and

Group VI – EESCR (500 mg/kg, p.o.).

Animals were treated as shown above for a period of 10 days. At the end of every 72 hrs, i.e. 4th, 7th and 10th day CCL4 (30% in liquid paraffin 1 ml/kg, i.p.) was administered to all groups other than Group I. Group III received standard drug silymarin25 mg/kg p.o. once a day and CCL4 as mentioned above. Whereas Group IV, V and VI were treated with test extract dose of (100, 250 and 500 mg/kg, p.o.) respectively. During this period of treatment, the rats were maintained under normal diet and water. The biochemical parameters were determined after 24 hrs. After the last dose of CCL4 i.e. on 11th day, all the animals were sacrificed by cervical dislocation for the study of liver biochemical parameters. Blood was collected
by carotid bleeding under mild ether anesthesia using disposable syringe and needle. Blood was allowed to clot at room temperature for 30 min. then subjected to centrifugation (3000 rpm for 15 min.) and estimation of biochemical parameters namely SGPT, SGOT, ALP, ACP, Bilirubin (Total and Direct). The liver was dissected out and subjected for morphological study such as wet liver weight and wet liver volume. The volume of wet liver was measured by displacement method and further the livers were placed in 10% formalin solution for histopathological study.

**Statistical analysis**

The results were expressed as the mean ± standard error of mean (SEM). The results were analyzed for statistical significance by one way ANOVA followed by Dunnett’s post hoc test of significance.

**RESULTS**

Administration of CCl4 resulted in a significant rise in the levels of SGPT, SGOT, ALP, ACP and Bilirubin (Total and Direct) significantly due to its enzymatic activation of liver cells 15-16. The results of the present study reveal that Methanolic extract of Smilax China roots (100,250 and 500 mg / kg, p.o.) exhibited protective action against CCl4 induced liver damage in a dose related fashion. The amelioration of liver toxicity by the test extract was evident from its significant effect on serum enzyme levels and morphological parameters. These findings were further supported by histopathological observations.

Further, preliminary photochemical investigation revealed that the extract showed presence of flavonoids, tannins, alkaloids, saponins and glycosides. The literature has already documented the hepatoprotective action of some fitochemicals 3,4. Administration of CCl4 resulted in enlargement of liver which was pale reddish brown. Rats subjected to the CCl4 challenge exhibited dose dependent significant reduction in the morphological parameters. Treatment with reference standard, Silymarin (25 mg/kg, p.o.) also reversed increased morphological parameters significantly. Organ protective potency of the test extract at the dose of 500 mg/kg was found closer to that of standard. Histopathological profile of liver in CCl4 (Group-II) intoxicated rats showed the fatty degeneration of hepatocytes, hepatic cell necrosis, portal tract fibrosis and presence of fatty cyst. The sinusoids of liver were congested and the central vein of gllobe was constricted. Administration of test extract at the dose of 500 mg/kg showed a significant recovery in the hepatic architecture. The sinusoids are recovered, the globule was normal and hepatocytes are improved. However, there was an improvement in the hepatic architecture observed in rats treated with 100 mg/kg and 250 mg/kg of test extract.

**DISCUSSION**

Liver injury induced by CCl4 is a commonly used model for the evaluation of Antihapatotoxic agents 13, 14. Administration of CCl4 elevated the serum levels of SGPT, SGOT, ALP, ACP and bilirubin (Total and direct) significantly due to its enzymatic activation of CCl4 free radical, which in turn alters the structure and function of liver cells 15-30. The results of the present study reveal that Methanolic extract of Smilax China roots (100,250 and 500 mg / kg, p.o.) exhibited protective action against CCl4 induced liver damage in a dose related fashion. The amelioration of liver toxicity by the test extract was evident from its significant effect on serum enzyme levels and morphological parameters. These findings were further supported by histopathological observations.

Further, preliminary photochemical investigation revealed that the extract showed presence of flavonoids, tannins, alkaloids, saponins and glycosides. The literature has already documented the antihapatotoxic value of flavonoids 31-32. Thus, it appears that the hepatoprotection offered by Smilax China roots extract may be due to its flavonoid content.

**REFERENCES**


