11.1 Introduction

Liver diseases are a serious health problem. In the absence of reliable liverprotective drugs in allopathic medical practices, herbs play a role in the management of various liver disorders. Numerous medicinal plants and their formulations are used for liver disorders in ethnomedical practices and in traditional system of medicine in India. However, we do not have satisfactory remedy for serious liver disease; most of the herbal drugs speed up the natural healing process of liver. So the search for effective hepatoprotective drug continues.

Recently a good number of materials form natural sources have been found to exhibit Hepatoprotective activity. The protective effects of the aqueous extract of *Argemone mexicana* (Linn.) whole plant, against CCl₄ induced hepatic failure in male albino rats (wistar strain) was investigated. For acute and massive invasion of hepatopathy, CCl₄ (i.p injection of CCl₄+Olive Oil in 1:1 ratio; 2ml/kg) was used and the insidious intoxication was evidenced by significant turmoil of various biochemical parameters followed by significant (p<0.001) weight loss in toxic control group (12.83±1.13). The administration of aqueous extracts (250mg/kg and 150mg/kg of body weight) for 7 days, elicited protective action since the elevated levels of marker enzymes (AST, A.I.T, ALP) of liver functions were found to be decreasing progressively in a dose dependent manner with net weight gain. In the aqueous extract 250mg/kg treated rat group all the marker enzymes were analyzed to be decreasing
significantly (p<0.001), (AST, 272.77±24.08; ALT, 189.15±7.16; ALP, 97.15±6.54) and the final body weight was also significantly (p<0.001) increased (6.16±1.01) when compared with the toxic control group. The serum total protein and the serum albumin were also approaching normal values. The results found in aqueous extract 250mg/kg treated rat were quite promising and were comparable with a standard polyherbal drug Liv-52. The statistically processed results support the conclusion, that the aqueous extract of *Argemone mexicana* (Linn.) whole plant (250mg/kg and 150mg/kg) possesses dose dependent, significant protective activity against CCl₄ induced hepatotoxicity.

The efficacy of the methanolic fraction (MF) of *Tribulus terrestris* fruit extract on mercury intoxicated mice, *Mus musculus* has been studied (Jagadeesan and Kavitha, 2006). At a median-lethal dose of mercuric chloride (12.9 mg/kg body wt.) administration an enhanced level of glutamate oxaloacetate transaminase (GOT), glutamate pyruvate transaminase (GPT) and simultaneously decreased level of acid phosphatase (ACP) and alkaline phosphatase (ALT) activities were noticed in the liver. Due to the mercury toxicity the liver cells are damaged to cause the alterations in their enzymes. During the recovery period, all the enzymological parameters are restored to reach near normal level. The result suggested that the oral administration of MF of T. terrestris fruit extract has (6 mg/kg body wt.) provided protection against the mercuric chloride induced hepatic damage in the mice, *M. musculus*.

As antioxidants are known to be useful in diabetes, liver damage etc and *Diospyros malabarica* is reported to have hypoglycemic activity. Mondal and group (Mondal et al., 2005) evaluated the Hepatoprotective activity of the defatted methanol extract of *Diospyros malabarica* (MEDM) bark in Carbon tetrachloride
(CCl₄) intoxicated Wister male rats (1 ml/kg, i.p., once in every 72 hours for 10 days). MEDM at the doses of 200 and 300 mg/kg were administered orally once daily for the same period. The effectiveness of the extract was evaluated by measuring the serum marker enzymes SGOT, SGPT, ALP (U/L), serum total protein (g%), bilirubin (mg%); reduced glutathione content (µg/g tissue) in liver, catalase activity (unit/g tissue) as well as lipid peroxidation (µmoles of MDA/g tissue) in the liver tissues. CCl₄ intoxicated rats showed significant elevation in serum enzymes, bilirubin and lipid peroxidation of the liver tissues and reduction in serum total protein, reduced glutathione content and catalase activity. The levels of these parameters were 198.33, 102.10, 382.94, 5.41, 2.61, 9.16, 0.84 and 113.22 respectively in CCl₄ intoxicated group. Treatment with MEDM 200 mg/kg altered the above parameters to the levels of 154.00, 82.04, 235.51, 6.93, 1.58, 12.78, 1.59 and 57.84 respectively and those in MEDM 300 mg/kg group were found to be 109.01, 67.67, 186.52, 6.98, 1.08, 26.99, 2.76 and 44.48 respectively. All the results were comparable with the standard drug silymarin (25 mg/kg) treated group. Their study ascertains that the defatted methanol extract of Diospyros malabarica bark possesses significant Hepatoprotective activity.

The seed oil of Hippophae rhamnoides markedly inhibits the rise of MDA in liver of mice and rats induced by CCl₄, AAP and ethyl alcohol, decreases significantly the activity of SGPT and SGOT, and markedly checks the depletion of GSH in liver of mice induced by AAP. The microscopic and electron-microscopic examination has shown that the seed oil can lighten liver injury (Cheng et al., 1994).
11.2 Experimental Procedure

Adult albino Swiss male mice weighing between 18-22 gm were used for the study. The animals are divided into four groups. Each group contains six animals. Normal saline solution is used as vehicle.

**Group I** served as control which received only vehicle 0.5 ml/kg body wt. at 12 hours interval four times through intraperitoneal injection.

**Group II** received only carbon tetrachloride in 0.8 ml/kg body wt. once and next three times treated with vehicle by intraperitoneal injection.

**Group III** received silymarin (standard drug) dissolved in normal saline in 100 ml/kg body wt. four times through intraperitoneal injection. This group also received carbon tetrachloride in 0.8 ml/kg body wt. through intraperitoneal injection after 30 minutes of first dose of silymarin administered.

**Group IV** received the test drug - oil in 200 ml/kg body wt. as like as silymarin.

All the animals received four doses of administration, anaesthetised after 12 hours of the last dose by diethylether. Blood sample were collected by penetrating the retro-orbital plexus. The serum was separated after coagulating at 37°C for 30 minutes and centrifuged at 250 r.p.m for 10 minutes.

SGOT, SGPT, Alkaline phosphate, Total bilirubin and Direct bilirubin content were determined for every animal.

11.3 Results

The results of the Hepatoprotective activity of *Basella rubra* seed oil on mice is presented in Table 11.1 below:
11.4 Conclusion

Biochemical and histopathological investigation on animals using *Basella rubra* seed oil apparently did not reveal toxic signs. General health conditions, serum biochemical profile and histopathological conditions of vital organs remained within normal variations. In view of the safety of seed oil of *Basella rubra* L. observed in the present investigation and further the fungitoxicity of the oil observed against fungal agents in food stuffs, the oil seems to be a potential candidate for use as edible
Scope of Further Studies

The thesis presents Phytochemical and Biological Studies on *Basella alba* and *Basella rubra*. Although the work comprises isolation and characterization of principles, isolation and physico-chemical characterization of seed oil, Hepatoprotective studies, antimicrobial and antifungal studies on the seed oil, yet further works may be initiated in the following line:

- Screening of antidiabetic potential of the plants.
- Isolation and characterization of Hepatoprotective and other medicinal principles
- Further in-depth screening of the edibility of the seed oil, etc.