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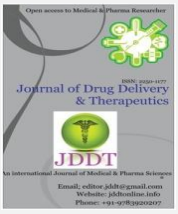

Open Access Research Article

Hepatoprotective Activity of the Extract of *Crataeva nurvala* Bark Against CCl_4 induced Hepatotoxicity in Rats

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ABSTRACT

The present work is focused on investigation of hepatoprotective activity of bark of Crataeva nurvala. It's hepatoprotective activity was studied in the form of its aqueous and ethanolic extract and its isolated compound, against CCl4 induced hepatotoxicity in albino rats. The In-vitro study demonstrated the lowering of GPT and LDH level in isolated hepatocytes. Furthermore, an alteration in the level of biochemical markers, i.e., SGOT, SGPT, SALP and bilirubin were studied in-vivo on albino rats after CCl4 induced hepatic damage. Ethanolic extract (dose 250 mg/kg & 500 mg/kg) and isolated compound (dose 50 mg/kg) induced lowering of biochemical markers near to the normal levels in dose dependent manner, while there was no remarkable change with the aqueous extract (dose 250 mg/kg and 500mg/kg). Hence, the findings confirmed that ethanolic extract and isolated compound of C. nurvala bark possess hepatoprotective activity.

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INTRODUCTION:

Liver diseases are the most serious ailment and are mainly caused by toxic chemicals. Plant drugs are known to play a vital role in the management of liver diseases[1, 2, 3]. There are numerous plants and polyherbal formulations claimed to have hepatoprotective activities. *Crataeva nurvala*. Buch. is a moderate sized evergreen tree with their rounded hard fruits, grows on the banks of canals and rivers throughout Bangladesh. Traditional uses of the investigated species are reported as contraceptive, oxitocic, urinary complaints, laxative, and litho tropic, febrifuge and as tonic[1].

MATERIAL AND METHODS:

Plant material

Stem bark of *C. nurvala* were collected from forest area of Sagar, M.P. and authenticated in Department of Botany, Dr. H. S. Gour University Sagar (M.P.). A voucher herbarium specimen number Bot/H/012010 was also preserved. The collected bark were dried under shade and powdered and stored in an airtight container.

Extraction and isolation

The powdered bark (1kg) was successively extracted in a soxhlet apparatus with petroleum ether (60-80°C), ethanol (95%) and finally with water[5].

Isolation and purification of compound

Isolation of triterpenoids from the ethanolic extract of bark was carried out on the basis of solubility[6]. Firstly ethyl acetate (150 ml) was added to the concentrated ethanolic extract (50 g) after about 20 minutes it gets separated in two fraction first ethyl acetate soluble fraction and ethyl acetate insoluble fraction. This ethyl acetate insoluble fraction was properly washed with methanol for 10 times and finally obtained creamish powder after drying, which is subjected to TLC studies which shown single spots with some impurities. Qualitative test for identification of triterpnoids was performed, which was found to be positive. For the separation of pure compound, it (creamish powder) was re-crystallized with 10 ml acetone[7].

Evaluation of hepatoprotective activity

The general principle involved in the evaluation of hepatoprotective activity is to induce toxicity with the help of hepatotoxins in experimental animals. The hepatotoxins are widely used to induce the diseased condition in experimental animals followed by an attempt to counteract their hepatotoxicities with the preparation under test. The magnitude of the protective activity is measured both *In Vitro* and *in-vivo* by estimating the two parameters viz. histopathological and biochemical parameter[8].

RESULTS AND DISCUSSION:

A very important observation of *In Vitro* studies that ethanolic extract in higher dose is particularly very effective in decreasing the level of GPT, LDH and recovery is almost comparable to that of silymarin.

Table 1: Estimation of serum parameters and percentage restoration

Group	Conc.	GPT		LDH ▲ O.D./min./3 ml medium	
		Level (IU/L)	% Restoration	Level (IU/L)	% Restoration
Normal		4.4±0.21	0	3.41±1.31	0
CCl_4	10 mM	33.9±1.30	0	21.8±1.02	0
Ethanolic ext.	50 µg/ml	18.2±0.71	53.22	10.18±0.30	63.1
Ethanolic ext.	100 µg/ml	13.6±0.48	68.81	6.7±0.23	82.1
Aqueous ext.	50 µg/ml	28.3±1.21	18.98	18.1±0.60	20.1
Aqueous ext.	100 µg/ml	26.1±1.10	26.44	16.8±0.64	27.18
Isolated compound	50 µg/ml	20.8±1.01	44.4	13.4±0.47	45.67
Isolated compound	100 µg/ml	17.8±0.62	54.57	10.9±0.34	59.27
Silymarin	10 µg/ml	12.8±0.53	71.52	9.4±0.26	67.42
Silymarin	20 (µg/ml)	8.6±0.23	85.76	6.9±0.17	81.02

O.D.: Optical Density

A very important observation in the studies that ethanolic extract in higher dose is particularly very effective in decreasing the level of serum bilirubin. These rapid decreases in serum bilirubin is suggest that ethanolic extract can be used in the acute condition of jaundice, and drug is effective in the maintenance of normal functional status of liver.

The histopathological studies also exhibit the efficacy of drug as liver protectant, simultaneous treatment of ethanolic extract with CCl_4 produces lesser degree of damage to the liver cells as compared to the animals treated with CCl_4 alone.

The biochemical functional and histopathological studies clearly show the hepatoprotective activity of *C. nurvala* Buch. Justifies the use of this plant in folk medicine for jaundice.

Table 2: Percentage protection of animals by test samples (CCl_4 Model)

Groups	SGOT (AST) %	SGPT (ALT)%	SALP %	Direct Bilirubin%	Total Bilirubin%
Ethanolic Extract 250mg/kg	63.92	66.98	60.06	50.71	63.03
Ethanolic Extract 500mg/kg	78.12	78.33	73.16	62.14	70.29
Aqueous Extract 250mg/kg	9.39	6.29	3.89	12.14	21.78
Aqueous Extract 500mg/kg	18.25	8.23	4.6	22.14	27.06
Isolated Compound 50mg/kg	44.48	46.14	47.20	40	51.15
Standard Silymarin 25mg/kg	82.53	88.05	87.42	75.71	83.16

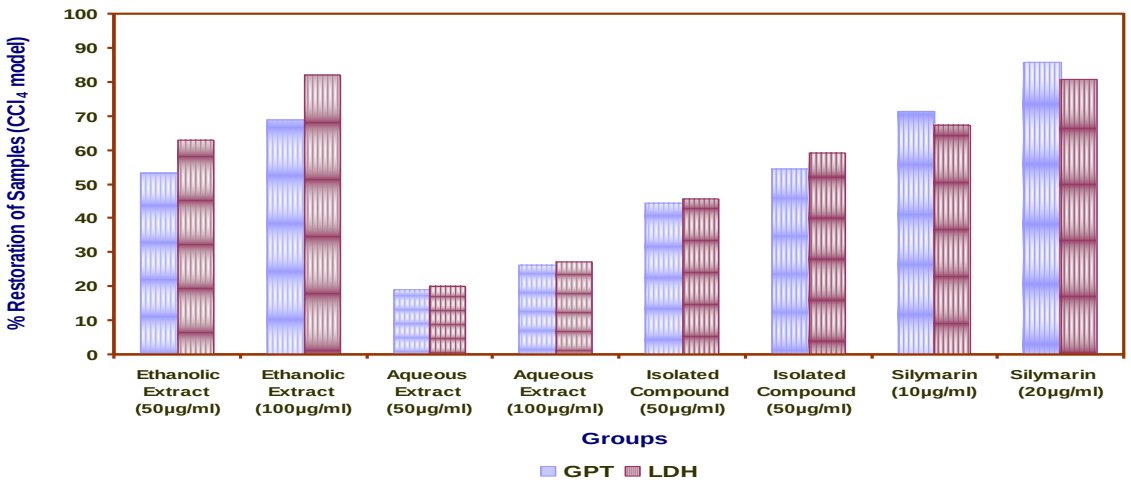

Figure 1: Percent restoration of isolated hepatocytes by test sample (CCl_4 Model)

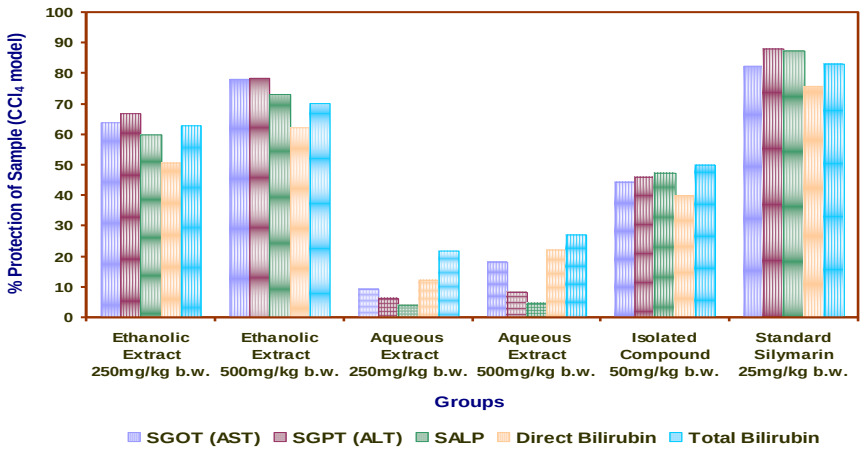

Figure 2: Percentage protection of animals by test samples (CCl_4 Model)

CONCLUSION:

Administration of ethanolic extract their isolated compound of *C. nurvala* stem bark showed significant hepatoprotective activity, which was comparable with the standard drug silymarin. Ethanolic extract and their isolated compound has demonstrated significant better results as compared to aqueous extract when biochemical parameters are taken into consideration.

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