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Research Article

HEPATOPROTECTIVE ACTIVITY OF *PORTULACA OLERACEA* LINN. ON EXPERIMENTAL ANIMAL MODEL

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ABSTRACT

The objective of this study was to investigate the hepatoprotective activity of the ethanolic extract of whole plant of *Portulaca oleracea* against CCl_4 induced hepatotoxicity in rats. Silymarin was given as reference drug methods:-the material was dried in shade; they were powdered and extracted with ethanol. Preliminary petrochemical tests were done. Rats were divided into five groups. The assay results were presented as mean and standard error of mean for each group. The hepatoprotective activity of the ethanol extract was assessed in CCl_4 induced hepatotoxic rats. Alteration in the levels of biochemical markers of hepatic damage like serum total bilirubin, SGPT, SGOT and ALP were tested in both CCl_4 treated and untreated groups. They showed that significant hepatoprotective effects were obtained against liver damage induced by CCl_4 in wistar albino rats. Histopathological studies also confirmed the hepatoprotective nature of the extract.

Keywords: *Portulaca oleraceae*, Hepatoprotective activity, CCl_4, Silymarin.

INTRODUCTION

Liver is one of the largest organs in human body & the chief site for intense metabolism & excretion. So it has a surprising role in the maintenance, performance & regulating homeostasis of the body. It is involved with almost all the biochemical pathways to growth, fight against disease, nutrient supply, energy provision & reproduction [1].

Liver diseases such as jaundice, cirrhosis & fatty liver diseases are very common & large public health problem in the world[2]. Jaundice & hepatitis are two major hepatic disorders that account for a high death rate[3-4]. There is no rational therapy available for treating liver disorders & management of liver diseases is still a challenge to the modern medicine. The modern medicines have little to offer for alleviation of hepatic ailments whereas most important representatives are of phytoconstituents[5-7]

Portulaca oieracea Linn. belonging to the family Portulaceae is locally known as "Nuneer". It is a wild herb & is used by tribal healers of Kupwara district of Kashmir Valley to treat liver diseases. In the present study, the hepatoprotective activity of *Portulaca oleracea* Whole plant against CCl_4 & silymarin induced liver damage in wistar albino rats is reported.

MATERIALS & METHODS

Plant material & preparation of the extract

The whole plants of *Portulaca oleracea* were collected from Humpora, Kupwara district, J&K. They were authenticated by Dr. P.N Shrivastava, Botany department, S.S.L Jain P.G College Vidisha (M.P) & a voucher specimen has been deposited in the departmental laboratory for further references. The plants were shade- dried & powdered 40-60 mesh size was extracted successively with hexane, petroleum ether, chloroform & ethanol using Soxhlet apparatus as per Kokate. The extracts were concentrated using rotary vacuum evaporator. The dried extracts were stored in airtight container & placed in refrigerator.

Animals

Wistar albino rats (150-200g) were used in the study. They were maintained at standard husbandry conditions. The animals were fed with standard rodent diet & provided water *adlibitum*. The experiment was approved by Institutional Animal Ethics Committee (Reg. No. 804/ 03/CA/CPCSEA).

Preliminary Phytochemical screening

All extracts obtained were screened for the presence of phytoconstituents by using the qualitative tests[8-9].

Assessment of hepatoprotective activity

The rats were divided into five groups containing six each used for the study. Group Ist served as control & received the vehicle. Group 2nd received I.P. of CCl_4 for ten days. The standard drug, silymarin was administered to group 3rdanimals for 14 days. While, group fourth & fifth were treated with crude extract of the plant. The CCl_4, silymarin & the extracts were administered concomitantly to the respective group of animals[10].

Biochemical estimation

Rats were sacrificed one hour after administration on 14th day. The blood was collected by carotid artery under mild ether anaesthesia; serum was collected by allowing the blood samples to coagulate for 30min. at 37^{0}C followed by centrifugation (3000 rpm for 15 min.) & subjected for determination of biochemical parameters like total bilirubin[11], SGPT, SGOT[12] & ALP[13].

Histopathological studies

The livers were excised quickly & fixed in 10% formuline & stained with haematoxylin & eosin, then observed under microscope for degeneration, fatty changes, necrotic changes & evidence of hepatotoxicity.

Statistical Analysis

The results were expressed as Mean±SEM. Statistical analysis was performed with one- way analysis variance (ANOVA) followed by student's *t* test. P< 0.05 was considered to be statistically siginificant[14].

RESULTS

Preminalry phytochemical screening

The various phytoconstituents present in different extracts were furnished in table 1.

Biochemical parameters

Rats treated with CCl4 showed a significant hepatic damage as observed from elevated serum level of hepato specific enzymes as well as severe alteration in different liver parameters. SGPT, SGOT, ALP & total bilirubin in serum were increased in CCl^4 intoxicated control animals[15]. Treatment with the ethanolic extract of *Portulaca oleracea* caused significant protection against CCl_4 induced increase in SEL (Serum Enzyme Level) & bilirubin in a dose responsive manner.

Histopathological examination

Histopathological profile of liver sections of control group showed normal cellular architecture with distinct hepatic cells, sinusoidal spaces

& central vein (figure 1). Group 2nd animals exhibited disarrangement of normal hepatic cells with intense centrilobular necrosis, vacuolization of cytoplasm & fatty degeneration (figure 2). The liver sections of the rats treated with silymarin & ethanolic extract of *Portulaca oleracea* followed by CCl_4 intoxication showed a sign of protection as it was evident by the absence of necrosis & vacuoles (figure 3.4 & 5)

Table 1: **Priminalary phytochemical screening of different extracts of *Portulaca* oleracea**

Type of Constituents	Hexane extract	Petroleum ether extract	Chloroform extract	Ethanol extract
Steroids	P	P	P	A
Flavonoids	A	A	P	P
Carbohydrates	P	A	A	P
Alkaloids	A	A	A	A
Triterpenes	P	P	P	P

P- Present & A- absent

The results for the effect of *Portulaca oleracea* on Serum enzymes, SGPT, SGOT, ALP, & total biliruubin are shown in table `2

Table 2: **Effect of ethanolic extract of *Portulaca oleracea* on biochemical parameters in CCl_4 induced hepatic injury in wistar rats.**

Treatment	Dose (mg/kg)	SGPT(IU/L)	SGOT(IU/L)	ALP(mg/dl)	Total Bilirubin (mg/dl)
Normal control	-	43.14± 1.75	37.65±0.57	155± 3.87	0.60±0.02
CCl4 treated	-	207.20± 3.5	338± 2.8	193.50±8.5	0.85±0.06
Silyarmin + CCl 4	100	43.74± 0.33	41.26±0.25	183.50±0.55	0.40±0.01
Ethanol extract+ CCl4	40	129.85± 0.36	153.25±0.30	185.50±0.41	0.73±0.01
Ethanol extract +CCl4	80	125.20±1.26	129.38± 0.48	187.30± 0.40	0.61±0.10

*Values are expressed as Mean ± SEM (n=6)

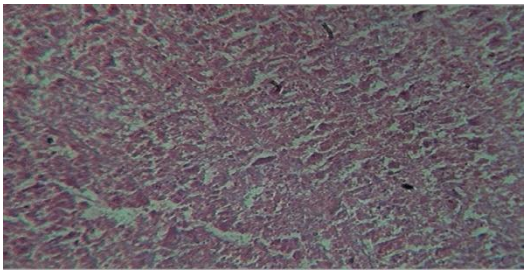

Fig. 1: Liver tissue of normal Control group, Treated group (H & E, 100x)

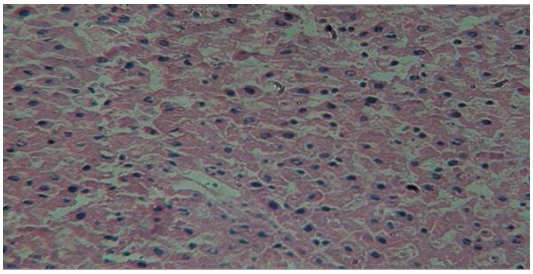

Fig. 2: Liver tissue of CCl_4 (H & E, 100X)

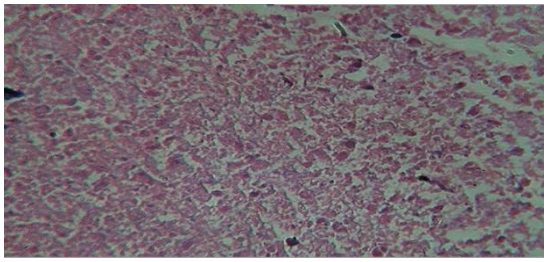

Fig. 3: Liver tissue of silymarin+ CCl_4 treated group (H& E, 100 X)

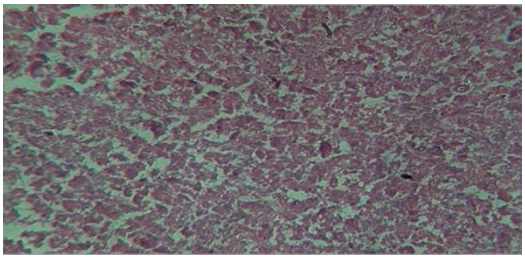

Fig. 4: Liver tissue of lower dose of ethanolic extract + CCl_4 treated group (H & E, 100X)

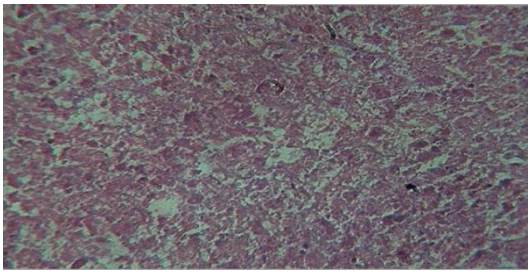

Fig. 5: Liver tissue of Higher dose of ethanolic extract + CCl_4 treated group (H & E, 100X)

DISCUSSION

Literature review revealed that in recent years, many studies have been undertaken with traditional medicines, in an attempt to develop new drugs for hepatitis [16]. In the present study, we used CCl4 model for liver damage induction to investigate whether the plant extract could decrease efficiently the toxicity produced by the hepatotoxicant [17]

The mechanism of hepatic damage by CCl_4 is well documented. CCl_4 is metabolized by CYP 450 enzyme system to trichloromethyl radical (CCl_3). This in turn reacts with molecular oxygen & gets converted to trichloromethyl peroxy radical. This radical forms covalent bonds with sulfhydryl group of several membrane molecules like GSH leading to their depletion & causes lipid peroxidation. The peroxidation initiates a cascade of reactions leading to tissue necrosis[18].

Ethanolic extract of Portulaca oleracea on Ethylene glycol and Amonium chloride induced Urolithiasis[19]. Secreening of Hepatoprotective and Antioxidant activity of alcoholic & aqueous extracts of *Boherhaavia diffusa* and *Anichilus carnosus*[20]. In the present study ethanolic extract of whole plant of *Portulaca oleracea* administered prophylactically exhibited significant protection against CCl_4- induced liver injury as manifested by the reduction in toxin mediated rise in serum level of SGPT, SGOT, ALP & total bilirubin in rats. The above are preliminary indications & further detailed studies are necessary to find out whether the action of the extracts is due to one or more of the above mentioned possible mechanism or not. Thus the extracts of *Portulaca oleraceae* seem to be useful in controlling hepatic injury in drug induced hepatotoxicity.

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