Hepatoprotective Activity of *Launaea Intybacea* against CCl_4–induced Hepatic Injury in Rats.

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Summary

Objectives: To evaluate the hepatoprotective activity of ethanolic extracts of *Launaea Intybacea* against CCl_4 induced hepatic injury in rats.

Methods: In hepatotoxic rats, liver damage was studied by assessing parameters such as Alkaline phosphate (ALP), GOT, GPT, Glucose, Cholesterol and total protein concentration in blood.

Results: Hepatic damage is evidenced by rise in the level of alkaline phosphate, GOT, GPT, Glucose, Cholesterol and total protein. Liver shows a tendency to attain near normalcy in animals co-administered with *Launaea Intybacea*.Values of normal rats for GOT, GPT, alkaline phosphate, serum glucose, serum Cholesterol and total protein are 157.89±19.31, 92.24±4.46, 147.75±9.07, 146.44±11.55, 72.14±5.1, 5.65±0.6, in IU/L respectively. Where as in CCl_4 treated rats values rose to 247.06±14.26, 184.4±12.11, 171.33±11.39, 180.47±6.92, 73.61±2.59, 3.29±1.38 in IU/L respectively. Silymarin treated rats GPT, Alk-PO_4, serum-glucose, serum cholesterol and total protein levels Values reduced to0.53±0.03, 148.75±20.18, 179.83±15.91, 141.33±7.37, 190.9±18.15, 61.11±7.30, 6.43±0.70 in IU/L respectively. While in plant extract administered rats GOT, GPT, alkaline phosphate, Glucose, Cholesterol and total protein are 149.84±10.20, 129.34±14.20, 138.58±6.50, 192.10±11.6, 70.52±3.16, 3.21± 0.38 in IU/L respectively attained near normal values. There is no significant change in bilurubin of normal rats (0.525 ±0.03), CCl_4 treated rats (0.49±0.03), silymarin treated rats (0.53±0.03) and Launaea Intybacea treated rats 0.5±0.05). All these values are expressed as means ± S.D.

Conclusion: *Launaea Intybacea* has potent Hepatoprotective activity against CCl_4 induced liver damage in rats.

***Keywords*:** Hepatoprotective*; Launaea Intybacea;* Silymarin, CCl_4

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Introduction

Launaea Intybacea belongs to the family Asteraceae. This plant found in India in all seasons. Local name of plant is Pathri. The leaves and root parts of this plant has been traditionally used as a folk remedy for the treatment of Jaundice, blood purifier, lactagogue, in Maharastra, India, especially by the tribal peoples of western ghats. Work on other plants of Asteraceae family like *Chamomile recutita* [1], *Wedelia paludosa* [2], *Carduus acanthoides* and *Nutans* [3], Have reported to posses clinically useful hepatoprotective activity but research on other family member having genus Launaea have not done before this. At present, one of the plant-derived medicine approved for use in liver cirrhosis and alcoholic liver diseases is silymarin. There are number of studies which conclude the efficacy of silymarin in these conditions [4]. Silymarin is a mixture of flavonolignans from the fruits of *Silybum marianum* that has been known since ancient time and recommended in traditional European and Asian medicine mainly for the treatment of liver disorder [5]. Therefore in the present study silymarin was used as positive control to compare the efficacy of *Launaea Intybacea a*gainst CCl_4-induced hepatotoxicity.

Materials and Methods

Plant

Launaea Intybacea plant is collected from the fields in and around Ahmednagar (District), Maharastra, India and authenticated by the Botanical Survey of India, Pune. A voucher specimen is deposited in the Department of Chemistry in Sangamner College, Sangamner.

Extraction

Leaves and roots dried at 40^0C and pulverized were extracted with 70% ethanol at room temperature for 72h and dried at 60^0C to give a yellow coloured residue. A portion of the residue was dissolved in distilled water, filtered and dried to determine the amount of the water-soluble fraction in the residue. Prior to the experiment residue was dissolved in a saline/Cremophor (0.025%v/v) solution and diluted to desired concentration to give a water-soluble fraction (AFSC).

Animals

Wistar rats of either sex, weighing 150–250 g, were used. Animals were housed under controlled conditions of temperature (25 ± 2^0C) and photoperiod 12-h light/dark and fed with standard rodent pellet diet with tap water ad libitum.

Induction of hepatic injury

Hepatic injury was induced in rats by subcutaneous administration of a single dose of 0.1 ml/kg $CC1_4$ mixed with 0.5ml liq. Paraffin on the 7th day, 2 h after the last treatment [6]. Animals were grouped as follows:

Normal Control group: Treated with vehicle (0.5ml,liq.paraffin i.p.) on first day. Followed by 2ml D/W daily for 7 days.

CCl_4 control group: Treated with 0.1ml/kg CCl_4 in 0.5ml. Liq.paraffin i.p. Followed by 2.0ml D/M water oral dose daily for 7 days.

CCl_4 Recovery group: Treated with 0.1ml/kg CCl_4 in 0.5ml. Liq.paraffin i.p on first day, Followed by 2.0ml D/M water oral dose daily for 7 days.
Silymarin control group: Treated with 0.1ml/kg CCl_4 in 0.5ml. Liq.paraffin i.p. and 0.001g/kg silymarin daily for 7 days.
Plant extract group: Treated with 0.1ml/kg CCl_4 in 0.5ml. Liq.paraffin i.p.and 0.1g/kg plant extract dose daily for 7 days.
On day 9, 48 h after $CC1_4$ administration, blood sample of each animal was taken from abdominal aorta under pentobarbitone anesthesia (35 mg/kg i.p.) and serum cholesterol [7], GOT, GPT, Bilirubin [8], serum glucose, total protein [9] and alkaline phosphates [10] were evaluated.

Statistical analysis
All values are expressed as means ±S.D. The results were calculated and subjected to analysis of variance (ANOVA) followed by Student's t-test. P values <0.05 were considered significant [11].

Results

Food consumption and weight gain
We observed that food consumption and weight gain significantly increased in-group III animals as compared to other groups. In-group II rats there was a lesser weight gain as compared to group I animals.(Table-1)

Table 1 Effect o*f Launaea Intybacea* ethanolic extract on body weight

Groups	Body weights of rats (g)#						
	1st Day	2ndDay	3rd Day	4th Day	5th Day	6th day	7th Day
Normal control	160.9± 3.2	161.33± 3.3	161.5± 3.5	162± 3.6	162.9± 3.2	163.9± 4.2	164.5± 2.6
CCl_4 control	155.1± 4.2**	146.2± 4.6*	140.2± 5.0**	135.0± 5.0*	130± 5.1**	127.5± 4.5*	122.9± 5.0**
CCl_4 recovery	154.1± 5.0*	156.5± 4.5**	158.5± 4.8***	158.9± 5.0*	159.2± 5.2**	160.1± 3.2**	160.2± 4.3**
Silymarin control	158.1± 3.2***	160.2± 9.0***	161.1± 6.2**	161.5± 7.5***	162.0± 8.0***	162.5± 3.2***	163.0± 3.6***
Plant extract control	161.5± 4.3**	162.25± 3.2**	162.8± 2.5**	163.1± 2.6**	163.2± 3.2**	163.7± 2.6**	163.9± 2.1***

N=6 #Values are expressed as mean of ± S.D.***P <0.001, **P <0.01, *P <0.05 in comparison to Normal control group.

Serum marker enzymes

All the marker enzymes, *viz.*, AST, ALT, ALP and GGT registered enhanced activity in CCl_4-treated rats as compared to control group (Table 2). In MEC co-administered group, the levels of these enzymes were found retrieving towards normalcy.

Table 2 Effect o*f Launaea Intybacea* ethanolic extract on CCl_4-induced liver damage in rats

Groups	BILI	GOT	GPT	Alk-PO_4	Serum Glucose (mg/dl)	Serum cholesterol (mg/dl)	Total protein
Normal control (Group-I)	0 525 ± 0.03	157.89± 19.31	92.24± 4.46	147.75± 9.07	146.44± 11.55	72.14± 5.16	5.65± 0.6
CCl_4 control (Group-II)	0.49± 0.03	247.06± 14.26**	184.4± 12.11***	171.33± 11.39	180.47± 6.92	73.61± 2.59	3.29± 1.38**
CCl_4 Recovery (Group-III)	0.53± 0.02	217.98± 27.35*	155.83± 12.61***	171.33± 20.69	222.73± 14.8*	71.79± 6.2	2.26± 0.20***
Silymarin (Group-IV)	0.53± 0.03	148.75± 20.18**	179.83± 15.91***	141.33± 7.37***	190.9± 18.15	61.11± 7.30	6.43± 0.70
Plant extract Group-V)	0.54± 0.05	149.84± 10.20*	129.34± 14.20*	138.58± 6.50***	192.10± 11.6**	70.52± 3.16	3.21± 0.38*

N=6

Values are expressed as mean of ± S.D.

***P <0.001 as compared to group II, **P <0.01 as compared to group II

*P <0.05 as compared to group II

Other biochemical parameters

The total protein concentration of the serum and liver was lesser in Group II animals, when compared with normal control, and it attained an almost normal value in group III rats. The level of total lipids, triglycerides and cholesterol in serum as well as liver recorded significant increment in CCl_4- administered rats as compared to those of group I. All these biochemical changes showed signs of returning towards the normalcy in-group III animals. There was a significant decline in the concentration of phospholipids in liver tissues of CCl_4-treated rats as compared to normal control. In group III animals phospholipid concentration attained normalcy. (Table 3)

Table 3 Effect *Launaea Intybacea* ethanolic extract on liver weight and volume

Groups	Liver Weight[#] (gm)	Liver Volume[#] (ml)
Normal control	6.32± 0.05	7.95± 0.05
CCl_4 control	7.752± 0.04 **	11.01± 0.07***
CCl_4 Recovery	7.269± 0.06**	9.05± 0.07***
Silymarin control	6.63± 0.09***	8.45± 0.05**
Plant extract control	6.07± 0.10**	7.75± 0.12**

N=6 [#]Values are expressed as mean of ± S.D.***P <0.001, **P <0.01, *P <0.05 in comparison to Normal control group.

Discussion

Carbon tetrachloride is one of the most commonly used hepatotoxin. It is well documented that carbontetrachloride is biotransformed under the action of cytochrome P-450 in the microsomal compartment of liver to trichlomethyl radical which readily reacts with molecular oxygen to form trichloromethyloeroxy radical [12]. This free radical in the presence of oxygen may cause peroxidation of lipid on target cell resulting in extensive damage [13]. Administration of $CC1_4$ (0.1 ml s.c.) to rats produced hepatotoxicity showed by significant increase in the serum levels of GOT, GPT and alkaline phosphate in comparison to control group. Also total protein levels were significantly decreased to 3.29g/dl in CCl_4 control groups from the level of 5.65g/dl in normal control group as shown in the Table 1. Ethanolic extract of *Launaea Intybacea* given at dose 0.1g/kg not only prevented the rise in serum level of GOT, GPT, alkaline phosphates but also improved serum lipid profile. The results are well comparable with silymarin (standard drug) treated group [14]. In conclusion, the results of present study show that *Launaea Intybacea* has potent hepatoprotective activity against carbontetrachloride induced liver damage in rats. Further investigation is in process to determine the exact phytoconstituent(s) responsible for hepatoprotective effect.

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