Libyan Agriculture Research Center Journal International 3 (2): 60-63, 2012
ISSN 2219-4304

DOI: 10.5829/idosi.larcji.2012.3.2.1103

Hepatoprotective Effect of *Cichorium intybus* on Paracetamol Induced Liver Damage in Albino Rats

[1]Kiran Butt, [1]Sana Yunas and [2]Romana Maqsood Sheikh

[1]Institute of Molecular Biology and Biotechnology, The University of Lahore, Pakistan
[2]Department of Biochemistry, Azra Naheed Medical College, Lahore, Pakistan

Abstarct: The present study was aimed to evaluate the hepatoprotective potential of *Cichorium intybus* (Kasni) leaf extract on paracetamol (acetaminophen) induced liver damage (hepatotoxicity) in albino rats. Total 32 albino rats were included in the present study and divided into four groups A, B, C and D, each group consisting of 8 rats. Group A served as a control group. Hepatotoxicity was induced in Group B, C and D by administering paracetamol at a dose of 640mg/kg body weight. After the induction of liver damage as evidenced by significant increase in serum liver enzymes, alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP) levels and decrease in level of total proteins (TP), Group C and Group D were treated with *Cichorium intybus* extract at doses of 200 and 400mg/kg body weight. Both drugs showed protective activity against hepatic damage but *Cichorium intybus* leaf extract at a dose of 400mg/kg body weight exhibited remarkable anti-hepatotoxic activity. Results of this study clearly demonstrate that *Cichorium intybus* holds hepatoprotective activity against acetaminophen induced liver damage in rats.

Key words: *Cichorium intybus* · Paracetamol · Albino rats · Liver enzymes · Hepatoprotective effect

INTRODUCTION

Hepatic disease is a major health problem worldwide. A group of synthetically prepared drugs have been formulated to help prevent the liver disorders but many of these drugs may confer potent side effects. As an alternative therapeutic approach, herbal treatment is considered as the most effective and safest option for curing liver pathologies [1].

Liver is a major site of metabolic activities. Damage or injury done to liver may transform this to malfunctional state which can be diagnosed with disturbed serum enzyme level [2]. Herbal extracts of several plants like *Cardus aeanthoides*, *Cichorium natans*, *Cichorium intybus*, *Fumaria Asepalae* and *F. vailantin*, *Gentiana Olivieri* and *Plantago lanceeolata* have been studied for their hepatoprotective effects [3]. *Cichorium intybus* is a perennial herb and has been investigated for its potent hepatoprotective activity [4].

Esculentin, a compound present in *Cichorium intybus* and *Bougainvilla speactabilis* has been observed for its protective effects against paracetmol and carbontetrachloride induced liver damage [5]. The study in hand was designed to explore the hepatoprotective effect of *Cichorium intybus* on paracetamol induced liver damage in albino rats.

MATERIALS AND METHODS

This research work was conducted at the Institute of Molecular Biology and Biotechnology, The University of Lahore, Lahore, Pakistan.

Collection of Plant Material: The aerial parts of *Cichorium intybus* were collected from the local market. Preparation of Extract: The leaf extract of Cichorium intybus was prepared according to the method of [6]. The therapeutic doses of the extract selected were 200mg/kg and 400mg/kg b.w.

Grouping of Animals: Thirty-two albino rats (*Rattus norvegicus*) with initial weight 150-200g were selected for the present study and divided into four groups A, B, C and D, 8 rats in each group. Group A served as a control group. Group B, C and D were test or treated groups. The animals were housed in steel cages under controlled

Corresponding Author: Kiran Butt, Institute of Molecular Biology and Biotechnology, The University of Lahore, Pakistan.

Laboratory conditions. They were maintained on standard chick starter diet and were provided with water ad-libitum.

Induction of Hepatotoxicity: Group B, C and D were administered paracetamol at a dose of 640mg/kg body weight for the induction of hepatotoxicity. Time period for the induction of hepatotoxicity was seven days. Blood was collected, centrifuged at 3000 rpm for 10 minutes and subsequently serum was separated. For the assessment of hepatic function, the levels of serum liver enzymes viz. aspartate amino transferase (AST), alanine aminotransferase (ALT) and alkaline phosphatase (ALP) and total protein (TP) contents were estimated using enzymatic kits provided by Randox company.

Evaluation of Hepatoprotective Effect of Plant Extract: After the induction of hepatotoxicity, group C and D were treated with therapeutic doses of *Cichorium intybus* extract i.e. 200 and 400mg/kg body weight respectively.

Statistical Analysis: All the collected data thus obtained was statistically evaluated by ANOVA using SPSS. P>0.05 was considered as significant value. All the results were expressed in mean ± standard deviation (SD).

RESULTS

All the results are shown in Table 1, 2 and 3. Significant increase in liver enzymes viz. AST, ALT and ALP while decrease in TP levels was observed in groups B, C and D (treated with paracetamol) in comparison to group A (control). These disturbances clearly demonstrate the occurrence of hepatic damage. The treatment with plant extract at a dose of 200 mg/kg b.w. resulted in significant reduction of liver enzymes and elevation of TP in group C and D. The dose 400mg/kg b.w. was proved more effective in its hepatoprotective action as evidenced by remarkable reduction in liver enzymes and increase in TP levels.

Table 1: Cichorium intybus versus serum asparate aminotransferase (AST) levels (IU/L).

Groups	Day 0 (Baseline levels)	Day1 (After induction of hepatotoxicity)	Day7 (After Treatment)	Day14 (After Treatment)	Day21 (After Treatment)	P-Value
Group A (Control)	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	
	30.75±0.70	31.62±0.91	32.25±0.70	31.37±1.06	31.25±1.16	.983**
Group B (Paracetamol)	30.87±0.64	62.00±1.06	63.00±1.51	61.50±1.19	60.62±0.74	.000*
Group C (Paracetamol + *Cichorium intybus,* 200mg/kg body weight.)	30.87±0.83	61.37±0.91	61.00±0.75	50.75±0.88	40.87±0.83	.000*
Group D (Paracetamol + *Cichorium intybus,* 400mg/kg body weight.)	30.87±0.83	62.00±0.92	57.62±1.30	47.12±1.24	31.00±.092	.000*

*Significant as P<0.05 and **Non-significant as P>0.05.

Table 2: Effect of Cichorium intybus on serum alanine aminotransferase (ALT) levels (IU/L).

Groups	Day 0 (Baseline levels) Mean±SD	Day1 (After induction of hepatotoxicity) Mean±SD	Day7 (After Treatment) Mean±SD	Day14 (After Treatment) Mean±SD	Day21 (After Treatment) Mean±SD	P-Value
Group A (Control)	31.62±0.91	31.62±0.91	31.37±1.06	32.25±0.70	32.25±0.70	0.743**
Group B (Paracetamol)	32.12±1.24	61.12±1.12	63.00±1.51	62.25±1.83	61.37±1.06	.000*
Group C (Paracetamol + Cichorium intybus, 200mg/kg)	31.62±0.91	63.37±1.40	71.50±1.3	52.25±1.28	44.75±1.75	.000*
Group D (Paracetamol + Cichorium intybus, 400mg/kg)	31.75±1.03	62.37±1.06	57.62±1.30	47.12±1.24	33.12±1.45	.000*

*Significant as P<0.05 and ** Non-significant as P>0.05.

Table 3: Effect of Cichorium intybus on serum alkaline phosphatase (ALP) levels (IU/L).

Groups	Day 0 (Baseline levels) Mean±SD	Day1 (After induction of hepatotoxicity) Mean±SD	Day7 (After Treatment) Mean±SD	Day14 (After Treatment) Mean±SD	Day21 (After Treatment) Mean±SD	P-Value P-Value
Group A (Control)	31.62±0.91	31.62±0.91	31.37±1.06	32.25±0.70	32.25±0.70	0.743**
Group B (Paracetamol)	32.12±1.24	61.12±1.12	63.00±1.51	62.25±1.83	61.37±1.06	.000*
Group C (Paracetamol + Cichorium intybus, 200mg/kg)	31.62±0.91	63.37±1.40	71.50±1.3	52.25±1.28	44.75±1.75	.000*
Group D (Paracetamol + Cichorium intybus, 400mg/kg)	31.75±1.03	62.37±1.06	57.62±1.30	47.12±1.24	33.12±1.45	.000*

*Significant as P<0.05 and ** Non-significant as P>0.05.

Table 4: Effect of Cichorium intybus on serum total protein (TP) levels (g/dL).

Groups	Day 0 (Baseline levels) Mean±SD	Day1 (After induction of hepatotoxicity) Mean±SD	Day7 (After Treatment) Mean±SD	Day14 (After Treatment) Mean±SD	Day21 (After Treatment) Mean±SD	P-Value
Group A (Control)	6.40±0.07	6.33±0.09	6.20±0.07	6.33±0.09	6.40±.075	.209**
Group B (Paracetamol)	6.33±0.10	6.20±0.07	5.86±0.09	5.81±0.08	5.95±.092	.000*
Group C (Paracetamol + Cichorium intybus 200mg/kg)	6.42±0.07	6.33±0.09	5.65±0.07	5.95±0.09	6.33±.091	.000*
Group D (Paracetamol + Cichorium intybus, 400mg/kg)	6.40±0.07	6.20±0.07	5.68±0.08	6.10±0.07	6.40±.075	.000*

Significant as P<0.05 and ** Non-significant as P>0.05.

DISCUSSION

In the present study, a significant rise in levels of serum aspartate amino transferase (AST), alanine amino transferase (ALT), alkaline phosphatase (ALP) and decrease in serum total protein levels were observed in hepatotoxicity induced groups (B, C and D) with paracetamol. These findings are in agreement with the research work reported by [7] where they observed high AST, ALT and ALP levels and low total proteins levels after Paracetamol administeration. Our reults are also in agreement with the findings of [8] who reported that administration of Paracetamol can increase the liver enzymes, AST, ALT and ALP due to induction of hepatic damage.

The treatment with *Cichorium intybus* at doses, 200 and 400mg/kg b.w. resulted in significant decrease in serum AST, ALT and ALP levels and rise in total protein (TP) levels which clearly depicts its hepatoprotective action. These findings are in agreement with the findings of [5] who described that Esculetin, a phenolic compound found in *Cichorium intybus* has possible protective effects against Paracetamol-induced hepatic damage in rats. A study by [9] demonstrated the hepatoprotective effect of alcoholic extract of seeds of Cichorium intybus.

The protective effect of the extract could be due to the presence of Flavonoids and their antioxidant effects as reported by [10]. *Cichorium intybus* extract exhibited Ca^{2+} channel blocking activities, hence this property may be partly responsible for the hepatoprotection [11]. The effective therapeutic dose of *Cichorium intybus* for lowering Paracetamol induced hepatotoxicity was found 400mg/kg in the present study as its administration exhibited better reduction in raised AST, ALT and ALP levels while elevation in decreased TP levels.

It can be inferred from the present study that *Cichorium intybus* extract at a dose of 400mg/kg b.w. is effective in mitigating the hepatotoxicity induced by Paracetamol.

REFERENCES

1. Venkateswaran, S., L. Pari, P. Viswanathan, P. Venugopal and V.P. Menon, 1997. Protective effect of Livex, a herbal formulation against erythromycin estolate induced hepatotoxicity in rats. J. Ethnopharmacol., 57(3): 161-167.
2. Girish, C., B.C. Koner, S. Jayanthi, K.R. Rao, B. Rajesh and S.C. Pradhan, 2009. Hepatoprotectve activity of six polyherbal formulations in paracetamol induced liver toxicity in mice. Indian J. Med. Res., 129(5): 569-578.
3. Aktay, G., D. Deliorman, E. Ergun, F. Ergun, E. Yeşilada and C. Cevik, 2000. Hepatoprotective effects of Turkish folk remedies on experimental liver injury. J. Ethnopharmacol., 73(1-2): 121-129.
4. Amin, G.R., 1991. Traditional Herbal Medicine in Iran, Vol:1 (in Persian), Ministry for Health Vice Chancellor for Research and Technology Publishers, Tehran., pp: 53.
5. Gilani, A.H., K.H. Janbaz and B.H. Shah, 1998. Esculetin prevents liver damage induced by paracetamol and CCL_4. Pharmacol. Res., 37(1): 31-35.
6. Sadeghi, H. and R. Yazdanparast, 2003. Effect of *Dendrostellera lessertii* on the intracellular alkaline phosphatase activity of four human cancer cell lines. J. Ethnopharmacol., 86: 11-14.
7. Rajesh, S.V., B. Rajkapoor, R.S. Kumar and K. Raju, 2009. Effect of Clausena dentata (Willd.) M. Roem. against paracetamol induced hepatotoxicity in rats. Pak. J. Pharm. Sci., 22(1): 90-93.
8. Schmidt, L.E. and K. Dalhoff, 2002. Concomitant overdosing of other drugs in patients with paracetamol poisoning. Br. J. Clin. Pharmacol., 53(5): 535-541.
9. Naseem, N., M.S.Z. Latif, M. Tahir, A.K. Naveed, M. Hassan and S. A. Malik, 2009. Hepatoprotective effect of Cichorium intybus Linn. (Kasni) extracts against carbon tetrachloride induced liver damage. J. Rawalpindi Medical College, 13(2): 53-55.
10. Madani, H., M. Talebolhosseini, S. Asgary and G.H. Naderi, 2008. Hepatoprotective Activity of *Silybum marianum* and *Cichorium intybus* against thioacetamide in rat. Pak. J. Nutri., 7(1): 172-176.
11. Gilani A.H. and K.H. Janbaz, 1995. Preventive and curative effects of Artemisia absinthium on acetaminophen and CCl4-induced hepatotoxicity. General Pharmacol., 26(2): 309-315.