Original Article

Histopathological Hepatoprotective Effects by Echinops Echinatus A Plant from Cholistan Desert

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ABSTRACT

Objective of study: Aerial parts of Echinops Echinotus (EE) were subjected to in vivo histological hepatoprotective study in order to validate its traditional use in hepatobiliary disorders, by native people of Cholistan desert, Pakistan.
Design of Study: Experimental study.
Place of study: The study was conducted at PCR lab Multan.
Materials and Methods: The animals were randomly divided into three groups, containing 10 rabbits in each group. Histological hepatoprotective effects of pre-treatment with aerial parts (ethanolic extract) of EE (500 and 750 mg/kg/day PO for 7 days) against CCl_4 (0.75 ml/kg, S/C) intoxicated rabbits were evaluated by liver histological observations. Silymarin (100 mg/kg/day PO for 7 days) was used as a standard hepatoprotective drug.
Results: CCl_4 intoxicated group had significant histological changes (marked fatty changes etc.) as compared to normal control group. However, EE extract produced significant histological hepatoprotective changes.
Conclusion: Therefore, the outcome of present study supports the traditional behaviour on hepatoprotective effects of Echinops Echinatus (aerial parts).
Key words: Ethinops Echinatus, Hepatoprotective.

INTRODUCTION

Cholistan desert is present on the eastern side of Punjab Province (Pakistan)[1]. The majority of plants grow in desert have therapeutic properties and native people utilize these plants to treat various diseases[2].
Echinops Echinatus commonly known as Kandesi Bhattar, Ont Katara is an herbaceons plant, widely distributed in desert regions of Pakistan. It root, leaves, fruit and bark are most commonly used parts[3]. In folk medicine, its root powder with honey is given as general tonic. Herb is used as liver stimulant[4].
Native people of cholistan desert use this plant in hepatobiliary disorders. However to best of our knowledge, no previous work has been published on histological protective on liver by this plant.
Present study was aimed to evaluate the histological hepatoprotective effects of EE against CCl_4 induced hepatotoxicity.

MATERIAL AND METHODS

Ethanol, CCl_4, formalin, xylene, paraffin wax, eosin, hematotoxylin and Canada balsam, all chemical of analytical grade were used.

Echinops echinatus was collected from cholistan desert and authenticated by toxanomist. Plant material was dried under shade, cut into small pieces and then subjected for grinding. For convenient administration, the dry extract was encapsulated after weighing.

Healthy rabbits of either sex (local bread) weighing from 1.5-2 kg were purchased from local market. The animals were maintained at standard housing conditions.

Hepatotoxicity was induced by subcutaneously by CCl_4 at a dose 0.75 ml/kg body weight. The animals were randomly divided into three groups, containing 10 rabbits in each. CCl_4 was injected 30 minutes after drug administration.

Animals were sacrificed and histological assessment was done according to standard methods[5]. The pathological changes of fatty liver and degenerations of liver cells were graded as under:-

Group-0 (normal):- Normal liver morphology; hepatocytes with round nucleus centrally with homogenous cytoplasm, flat endothelial cells around central vein and sinusoid.

Group-+1 (mild degree):- 1-2 hepatocyte rows around central vein showed; hepatic cell degeneration along with necrosis (loss of nucleus), less injury of endothelial cells around central vein, less fat vacuoles in hepatocytes.

Grade-+2 (moderate degree):- Some hepatocyte rows around central veins showed: swelling, intracytoplasmic vascular degeneration in centrilobular, midsonal and periportal aras endothelial cells around central areas endothelial cells around central vein more damage than level +1 more fat vacuoles in hepatocytes than level +1.

Grade-+3 (severe degree):- 3-4 hepatocyte rows around central vein demonstrated; hepatocyte degeneration and necrosis, degeneration cells including centrilobular, midzonal and periportal areas (diffuse intracytoplasic vascular degeneration), endothelial lining of central vein showed more cell damage, increased fat vacuoles in hepatocytes than level +2, marked focal necrosis.

The results were presented as mean + standard error of means (SEM). Multiple comparisons were performed by student's t-test. Difference were considered statistically significant when $P < 0.05$.

RESULTS

Histopathological changes after 24 hours of CCl_4 induced liver injury included fatty degeneration, hydropic degeneration, vacuole generation, microvascular steatosis and inflammatory cell infiltration. Administration of EE extract significantly preserved normal hepatocellular architecture from damaging effects of CCl_4 as compared silymasin.

DISCUSSION

According to phychochemical analysis, EE contains alkaloids, echinopsine, echinopsidine and echinozolinone etc. many flavonoids liked apigenin, echinacin and triterpenoids like tarazasterol, luperol, tannins, sugars, amino acids, phenols and steroids[6]. The flavonoids are well reputed for their anti-oxidant, free radical scavenges and anti-lipoperoxidation by scavenging reactive oxygen species[8]. Tannins and lignans are also well renowned for their hepatoprotective effects[9]. Moreover, alkaloids[10] and triterpenoids[11] also have hepatoprotective activity. So it is reasonable to think that the observed protective effects of EE extract might be due to the presence of these polyphenolic compounds (flavonoids, quercitin etc.), alkaloids, tannins, saponins and steroid among other plant constituents. Moreover, phenolic compounds amongst many other constituents have been shown to possess hepatoprotective and calcium antagonist activities and the presence of such constituents in extract, may be responsible activities observed in this study.

It is reported that the mice knocked out of CYP2E1 gene show resistance against CCl_4, induced hepatotoxicity and the level of reactive metabolites can be reduced by inhibition of CYP2E1 gene expression, consequently tissue injury is reduced[12]. In recent years, there has been an active search for the development of CYP_{450} inhibitors from natural products that may have therapeutic potential in prevention of liver damage. Tritepene acids, oleanolic acid and ursolic acid inhibit CYP_{450}[12]. So, the hepato-protective action of EE extract may be due to the presence of some of the above mentioned compounds which cause down regulation of CYP2E1 gene expression but it must be confirmed after a detail phytochemical analysis of the plant.

To be brief, the possible hepatoprotective mechanism of EE aerial parts ethanolic extract of CCl_4 induced liver injuries may be through one of actions prevention of process of lipid oxidation, free radical scavengers or down regulation of CYP2E1 gene expression.

CONCLUSION

It is concluded that study provides scientific root for the conventional use of Echinops Echinatus in hepatobiliary diseases in eastern system of medicine. Further studies should be carried out to determine the therapeutic index and exact mechanism of hepatoprotection offered by the plant.

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