Original Article

Evaluation of Histopathological and Biochemical Hepatoprotective Potentials of Fagonia Bruguieri A Plant from Cholistan Desert

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ABSTRACT

Objective: Aerial parts of Fagonia Bruguieri (FB) (family, zygophyllaceae) were subjected to in vivo 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: This study was conducted at PCR lab Multan.

Materials & Methods: The animals were randomly divided into three groups, containing 10 rabbits in each group. Hepatoprotective effects of pre-treatment with aerial parts (ethanolic extract) of FB (500 and 750 mg/kg/day PO for 7 days) against CCl_4 (0.75 ml/kg, S/C) intoxicated rabbits were evaluated by serum biochemical parameters and 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 raised levels of SGOT, SGPT and ALP sTignificantly but TB level was not raised as compared to normal control group. FB extract (both doses of 500 and 750 mg/kg) showed hepatoprotection as obvious by significant reinstatement of levels of SGOT, SGPT and ALP while TB level was not changed significantly, when compared with CCl_4 intoxicated group. B_{oth} doses of FB extract were well comparable with silymarin. Histopathological examination of the liver tissue further corroborated these results.

Conclusion: Therefore, the conclusion of the present study supports the traditional believes on hepatoproptective effects of Fagonia Bruguieri (aerial parts).

Key words: Fagonia Bruguieri, Hepatoprotection, Carbon.

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].

Fagonia Bruguieri (family; zygophyllaceae) is one of those plants. it is an herbaceons plant and commonly known as “dhaman.dramaho”. In folk medicine, powder of the whole plant is used to spread on skin eruptions and boils. Bath of plant boiled in water is very useful in allergies and many other skin diseases[3]. Its decoction is also recommended in biolousness and hepatomegaly[4]. In case of skin eruptions, whole plant decoction is also recommended[3].

Native people of cholistan desert use this plant in hepatobiliary disorders.

Literature survey reveals that a very little work had been carried out on pharmacological activities of this plant. However, to the best of our knowledge, no previous work has been published on hepatoprotective competence of this plant.

The present study was aimed to evaluate the hepatoprotective activity of FB against CCl_4 induced hepatotoxicity.

MATERIALS AND METHODS

Ethanol, CCl4, formalin, diagnostic kits (SGPT, SGOT, ALP and TB), xylene paraffin wax, eosin, hematoxylin and Canada balsam. The subsequent chemicals were purchased from Merck, Darmstadt, Germany. Silymarin and pentothal sodium was obtained from Abbott Laboratories, Pakistan. Olive oil was from P. Sassp, Italy. All chemicals of analytical grade were used.

Severn rabbits per each group were selected for histological examination. Histological changes were graded as given below[5].

- Group-0 (Normal): Normal liver morphology; hepatocytes with round nucleus centrally with homogenous cytoplasm, flat endothelial cells around central vein and sinusoid.
- Grade-+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, midzonal and periportal 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; hepatocytic degeneration and necrosis, degeneration cells including centrilobular, midzonal and periportal areas (Diffuse intra-cytoplasmic vascular degeneration), endothelial lining aof central vein showed more cell damage, increased fate vacuoles in hepatocytes than level +2, marked focal necrosis.

RESULTS

Administration of CCl_4 (0.75 ml/kg, p.o.) produced a significant increase in serum enzyme levels, namely SGOT, SGPT and ALP. However, TB level was remained unchanged when compared with normal control. The postoperative action of FB aerial parts extracts on CCl_4 induced hepatotoxicity are summarized in table-1.

Table-1

Effects of ethanolic extract of FB (aerial parts) on rabbits serum biochemical parameters after CCl4 administration

Group	SGOT (iu/l)	SGPT (iu/l)	ALT (iu/l)	TB (mg/dl)	Liver damage (histological scores)
Normal control	40.69 ± 19.94	41.66 ± 23.35	264.5 ± 49.72	0.83 ± 0.22	0
CCl4 control	455.2 ± 37.12*	434.2 ± 34.30*	394.3 ± 29.56*	1.32 ± 0.20	+3
Silymarin control	176.5 ± 56.77*º	205.9±36.59*º	257.0 41.00º	1.01 0.42	+1
Test group-1	124.2 51.94º	265.7 52.43*º	273.3 30.82º	1.28 0.25	+1
Test group-2	223.0 58.90*º	278.0 54.09*º	216.745.31*º	1.78 0.19*	+1

Values are represented as mean ± SEM (n=10).

0 = Normal

+!= Mild

+2= Moderate

+3= Severe

* P 0.05 compared with normal control group

º P0.05 compared with CCl4 control group

DISCUSSION

Histological changes after 24 hours of CCl_4 induced liver injury included hepatocytes necrosis, inflammatory cell infiltration, fatty degeneration, hydropic degeneration, vadcuole generation and microvascular steatosis. Administration of silymarin (100 mg/kg) and FB extract (both doses at 500 and 750 mg/kg) significantly preserved the almost normal hepatocellular architecture from damaging effects of CCl_4.

CCl_4 induced acute hepatocellular damage is frequently used indicator to date for the assessment of hepatoprotective potential of drugs or medicinal flora and their extracts, both via in vivo and in vitro techniques[5].

According to phytochemical analysis, FB contains chiefly flavonol O-glycosides, predominantly kaempferol, quercetin, isorhamnetin, herbacetin, triterpenoid saponins, coumarins, many alkaloids and diterpenoids[6]. The flavonoids are well reputed for their antioxidant, free radical scavengers and anti-lipoperoxidant actions[7]. Similarly, cumarins are also well documented for their antioxidant and hepatoprotective actions[8]. Saponins inhibit lipid peroxidation by scavenging reactive oxygen species[9]. Moreover, alkaloids[10] and triterpenoids[11] also have hepatoprotective activity. Flavonoids and quercetin are very fine scavengers and also showed CCB activity and may possibly also have contributed toward hepatoprotective action[12]. So it is reasonable to think for a possible relation between the proposed hepatoprotective activity and CCB activity of FB ethanolic extract, due to the presence of these polyphenolic compounds among other plant constituents.

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[13]. 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}[14]. So, the hepatoprotective action of FB 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 phyto-chemical analysis of the plant.

To be brief, the possible hepatoprotective mechanism of FB 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 from the study provides scientific root for the conventional use of Fagonia bruguieri 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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