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RESEARCH ARTICLE

Protective effect of Sharbat-e-Deenar against acetaminophen-induced hepatotoxicity in experimental animals

Arvind Kumar Shakya, Sangeeta Shukla

Arvind Kumar Shakya, Biochemistry Discipline, School of Sciences, Indira Gandhi National Open University, New Delhi-110068, India

Sangeeta Shukla, Department of Zoology, Jiwaji University, Gwalior 474011, Madhya Pradesh, India

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Correspondence to: Assistant Prof. Arvind Kumar Shakya, School of Sciences, Indira Gandhi National Open University, New Delhi-110068, India. arvind.kumar@ignou.ac.in

Telephone: +91-8447106178

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Abstract

OBJECTIVE: To investigate the effect of Sharbat-e-Deenar (SD) on acetaminophen (APAP)-induced hepatotoxicity in rat model.

METHODS: Albino rats were treated with SD at the doses of 1, 2 and 4 mL/kg, p.o. against hepatotoxicity after APAP (2 g/kg, p.o. once only) intoxication. The blood, tissue biochemical parameters and histopathological observation were performed. The

RESULTS: APAP exposure in rats significantly increased the level of biochemical parameters such as aspartate aminotransaminase, alanine aminotransaminase, lactate dehydrogenase, serum alkaline phosphatase, bilirubin, urea and creatinine into blood circulation which were reversed towards normal by SD therapy at all doses. The tissue biochemical parameters such as lipid peroxidation, reduced glutathione, adenosine tri-phosphatase and glucose-6-phosphatase were significantly restored after SD treatment against hepatotoxity. Histological analysis confirmed that SD-treated rats significantly alleviated of liver damage and reduced lesions caused by APAP intoxication. The biochemical changes are in good correlation with the histopathological observations.

CONCLUSION: On the basis of these results, it can be concluded that SD exerts hepatoprotective activity against APAP-induced liver injury.

Keywords: Sharbat-e-Deenar; Acetaminophen; Hepatitis, toxic; Hepatoprotection

INTRODUCTION

Human beings are exposed on a daily basis to toxic chemicals and pathogens, which cause serious health problems. Liver diseases are still major global health problem and are mostly associated with oxidative stress and tissue damage. Drug-induced liver damage is responsible for 50% all acute liver failures.[1] The liver is the major site of detoxification and the primary target of drug exposure in the body. Acetaminophen known as paracetamol is widely used as analgesic and antipyretic agent which is known to cause hepatotoxicity in human and laboratory animals.[2] Herbal plants play an important role in the management of liver diseases such as hepatitis, fibrosis, cirrhosis, acute necrosis, jaundice, fatty liver etc.[3] Herbal plants are using extensively day by day due to relatively safe, lesser side effects and alternative treatment in comparison of modern medicines. About 80% world population rely on traditional system of medicine for primary health care.[4]

However, herbal medicines are rapidly becoming popular in recent years as an alternative medicine, and there is a resurgence of interest in herbal medicines for the treatment of various human diseases including hepatic diseases. In India, several herbal medicines, their active constituents and formulations, are used in the treatment of a wide variety of clinical diseases and provide benefit to societies. However, the active phytochemical constituents of individual plant are insufficient to achieve the desirable protection. When combining of the multiple plants in particular ratio, it will provide maximum therapeutic effects and reduce the toxicity. However, there are a number of herbal formulations such as Jigrin,[5] Triphla,[6] Liv 52 and Livomyn,[7] Majoon-e-Dabeed-ul-ward[8] have been reported to have hepatoprotective efficacy against drug-induced liver toxicity.

In the present study, Sharbat-e-Deenar (SD) is a Unani Herbal formulation which are prepared mixing of eight medicinal plants (Table 1) and standardized according to the National Formulary of Unani Medicine (NFUM). Some medicinal plants of this formulation such as Cichorium intybu,[10] Rheum emodi,[11] and Rosa damascene,[12] have been reported to have antioxidant and hepatoprotective activity. Therefore, the present study was aimed to evaluate the hepatoprotective effects of SD against acetaminophen-induced hepatotoxicity in rats, which have not been reported yet.

MATERIALS AND METHODS

Drug and chemicals

Therapeutic agent, Sharbat-e-Deenar (SD) was procured by the Central Council for Research in Unani Medicine (CCRUM), New Delhi (INDIA). Silymarin (Sigma Aldrich Chemicals Pvt Ltd., Bangalore, India), APAP from Smith-Kline Beecham Pharma, (Batch No. 0103) and other reagents were used of analytical grade.

Animals

Female albino rats of Wistar strain [(160 ± 10) g] were used in this study. Animals were housed under standard husbandry conditions [(25 ± 2) ℃ tempressure, 60%-70% relative humidity, and 12 h photoperiod] and had access to standard rat feed and drinking water ad libitum. Animals were treated and cared in accordance with the guidelines recommended by Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA).

Preparation of doses and treatments

A suspension of APAP (2.0 g/5 mL/kg) was made in warm distilled water and administered orally to experimental animals.[13] SD is a semi liquid formulation prepared in distilled water [1, 2, 4 mL/5 mL/kg, post orally (p.o.)] were administered to the animals orally. Silymarin (50 mg/5 mL/kg, p.o.) was prepared in 1% gum acacia and used as positive control.[14]

Experimental design

Rats were divided into seven groups of six animals each and treated as follows: group 1: distilled water, control; group 2: SD (4 mL/kg, p.o.), treatment control; group 3: APAP (2 g/kg, p.o.) once only, experimental control; groups 4-6: APAP (as in group 3) + SD (1, 2, 4 mL/kg, p.o. respectively); group 7: APAP (as in group 3) + Silymarin (50 mg/kg, p.o.).

Animals were sacrificed 24 h after the last treatments; blood was collected and allowed to clot, and serum was separated at 2000 rpm for 20 min and stored at 20 ℃ in a deep freezer. Various blood, tissue biochemical parameters and histology were performed in serum and liver tissues.

Blood biochemical assay

Various biochemical parameters for assessment of the liver function markers like aspartate transaminase (AST); alanine transaminase (ALT),[15] and serum alkaline phosphatase (SALP); lactate dehydrogenase (LDH), bilirubin, and markers of kidney function test like urea and creatinine were measured in serum using diagnostic kits (E-Merck, Germany).

Tissue biochemical assay

Thio-barbituric acid reactive substance (TBARS) mea-

Table 1 Composition of Sharbat-e-Deenar

Unani name	Botanical name	Family name	Part used	Weight (g)
Post-e-bekh-e-Kasni	Cichorium intybus	Asteraceae	Root bark	170
Tukm-e-Kasoos	Cuscuta reflexa	Convolvulaceae	Seed	100
Tukm-e-Kasni	Cichorium intybus	Asteraceae	Seed	85
Guncha-e-Gul-e-Surkh	Rosa damascena	Rosaceae	Flower bud	85
Rewand chini	Rheum emodi	Polygonaceae	Root	60
Gul-e-Nilofar	Nymphaea alba	Nymphaeaceae	Flower	45
Gaozan	Borago officinalis	Boraginaceae	Leaves	45
Aab	Water	-	-	Q.S.
Qand Safaid	Sugar	-	A product from cane sugar	1200