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Evaluation of *Hepatoprotective* Activity of Polyherbal Extract

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Abstract:

Plant extracts have long been used in traditional medicine for their potential health benefits, including hepatoprotection. This paper aims to consolidate and analyze the hepatoprotective activities of various plant extracts, highlighting their mechanisms and clinical relevance. Polyherbal extracts containing Curcuma longa and sida angustifolia exhibit promising hepatoprotective activities, supporting their use in managing liver diseases and promoting liver health. The diverse mechanisms of action underscore their potential as complementary therapies. Further clinical trials are necessary to validate these findings and establish standardized dosages and safety profiles

Keywords: Curcuma longa, Sida angustifolia, hepatoprotective, CCL4.

INTRODUCTION

Curcuma longa, commonly known as turmeric, has long been utilized in traditional medicine for its purported health benefits, including anti-diabetic and hepatoprotective properties. Recent studies suggest that its active compound, curcumin, may offer therapeutic potential for managing diabetes and protecting liver function.

Sida angustifolia, a traditional herbal plant, has been utilized in folk medicine for its various therapeutic properties. Recent interest has focused on its potential anti-diabetic and hepatoprotective effects. This study investigates the efficacy of Sida angustifolia in managing diabetes and protecting liver function. This work was aimed to determine hepatoprotective activity of polyherbal extract.

Materials and method:

According to information acquired from local vaidhyas and other practitioners of traditional medicine, the present study focuses on evaluating the hepatoprotective effect of polyherbal extract obtaind from rhizome of *Curcuma longa* and leaves of *Sida angustifolia.*

Collection & Authentication of Plant Material

Department of Botany, Monard University, identified and confirmed the leaves of the selected plant collected in and around the hamlet of gajiyabad. The sample was sent to the Monard University (MU/H/011/2021)

Preparation of the Drug's raw material for the Extraction Process

Using the appropriate part of plant, the extract was made. The plant's parts were gathered, dried in the shade, and both plant part coarsely powdered using a machine. For the extraction, the polyherbal powder was sieved through a No. 40 sieve and stored in an airtight container. (1966, Farnsworth et al.)

Pharmacological Research

Animals

Studies on acute toxicity were conducted using female Wistar albino rats weighing between 150 and 200 milligrams at a similar age. The Central Drug Research Institute in Lucknow provided these rats. They were given with a standard mouse pellet diet (Hindustan Lever Limited, Bangalore) and allowed access to water as required. They were housed in polypropylene enclosures. The rats were exposed to a cycle consisting of 12 hours of darkness and 12 hours of light. Prior to the experiment, the rats fasted for a minimum of twelve hours, and an institution's animal ethics committee examined and approved the experimental protocols. The experiment was also approved by the committee. According to the CPCSEA standards

Procedure

The technique required the selection and weighing of fasting female rats. To dose different extracts, a methodical approach was adopted. The beginning dose was established based on the expected onset of harmful effects, and the animals were observed for two weeks after administration. The preceding discussion serves as the foundation for determining the deadly doses.

Hepatoprotective Studies

Carbon Tetrachloride (CCl_4) Induced Hepatotoxicity

Principle

Toxic byproducts of drug metabolism include the reactive oxidative free radical intermediate CCl3O-, which is generated by cytochrome P450, and the nascent oxygen O-, which increases intracellular reactive Fe+2 ions, aldehyde, and GSH depletion, and binds calcium. Ca+2 sequestration

Chemicals & Reagents

Carbon tetrachloride, olive oil and silymarin

Experimental Design

Rats of both sexes were divided into six groups of six individuals. (n = 6) (Sangameswaran et al., 2008; Balakrishnan et al., 2011)

- Group I (Control) was administered water (5 ml/kg, p.o.) o.d. for nine days.
- Group II (-ve control) received water (5 ml/kg, p.o., o.d.) for nine days; on the seventh day, carbon tetrachloride (1 ml/kg in 50% v/v olive oil, s.c.) was delivered.
- Group III (positive control) received silymarin (25 mg/kg, p.o.) o.d. for nine days, while carbon tetrachloride (1 ml/kg in 50% v/v olive oil) was delivered subcutaneously on the seventh day.
- Groups IV recieived Polyherbal Hydroethanolic extract of Curcuma longa rhizome and Sida angustifolia leaves (PHHEECLSA 150 mg/kg, bw). On the seventh day, carbon tetrachloride (1 ml/kg in 50% v/v olive oil, s.c.) was administered subcutaneously.
- Groups V recieived Polyherbal Hydroethanolic extract of Curcuma longa rhizome and Sida angustifolia leaves (PHHEECLSA 300 mg/kg, bw). On the seventh day, carbon tetrachloride (1 ml/kg in 50% v/v olive oil, s.c.) was administered subcutaneously.
- Groups VI recieived Polyherbal Hydroethanolic extract of Curcuma longa rhizome and Sida angustifolia leaves (PHHEECLSA 500 mg/kg,bw, p.o.). On the seventh day, carbon tetrachloride (1 ml/kg in 50% v/v olive oil, s.c.) was administered subcutaneously.

Blood was collected from animals on the last day by puncturing the retro orbital plexus. Blood samples were allowed to coagulate at room temperature for 45 minutes. Serum

was separated by centrifugation at 2500 rpm at 30°C for 15 minutes and utilized for the estimation of various biochemical parameters (serum marker enzyme parameters (SGPT & SGOT) and biochemical parameters (Total bilirubin, ALP and Total protein)), whereas functional measures (sleep onset and duration) and morphological characteristics (liver weight and volume) were evaluated utilizing the methods described in the literature. Lowry et al., 1951; Reitman and Frankel, 1957; Kind and King, 1954; Amour et al., 1965; Lowry et al., 1951)

Results and discussion

Hepatoprotective Activity of *PHHEECLSA* in Carbontetrachloride (CCL_4) Induced Hepatotoxic rats

Effect of *Polyherbal Hydroethanolic extract of Curcuma longa rhizome and Sida angustifolia leaves (PHHEECLSA)* on Functional Parameters

All groups of animals tested fell asleep after receiving an intramuscular injection of thiopentone sodium (40 mg/kg). When CCl_4 was administered to rats, the beginning of sleep was significantly delayed (measured in seconds) and the total amount of time spent in sleeping was increased (measured in minutes).

Pretreatment with *Polyherbal Hydroethanolic extract of Curcuma longa rhizome and Sida angustifolia leaves (PHHEECLSA)* and silymarin, substantially improved sleep onset but dramatically reduced sleep duration in rats compared to a CCl_4 treatment group.

Table 1: Effect of*PHHEECLSA*on functional parameters In CCl_4Induced Hepatotoxic Rats.

Treatment/ Dose	Onset of sleep(Sec.)	Duration of sleep (Min.)
Normal	158.7 ± 4.10	105.4 ± 3.42
Induced (CCl_4)	76.14± 3.57*	277.5 ± 6.22*
Standard (Silymarin)	166.72±3.22***	137.2 ± 2.35***
PHHEECLSA 150 mg/kg	137.20± 3.40**	150.12 ± 5.80**
PHHEECLSA 300 mg/kg	141.01± 5.67 ***	165.8 ± 4.70***
PHHEECLSA 500 mg/kg	150.01±3.27 ***	168.8 ± 3.90***

Values are mean ± SEM, n = 6. (One way ANOVA Followed by Dunnette multiple comparisons test). Statistically significance of ** P<0.01, *** P<0.001, when compared with CCl_4 induced group and * P<0.05, when compared with normal group.

Conclusion:

In CCl_4induced hepatotoxicity, CCl_4 is metabolized in human cell(endoplasmic reticulum and mitochondria) with the formation of CCl3O-, the reactive oxidative free radical intermediate generated by cytochrome P450. The nascent oxygen O- resulting from lipoperoxidation causes an increase in intracellular reactive Fe+2 ions, aldehyde, GSH depletion, and calcium restoration. In addition to direct covalent contact, oxidative CCl3 O- causes degeneration of Ca+2 sequestrations. Failure to sequester leads in increased intercellular Ca+2, aggregation by proteolytic enzymes, and a rise in Fe+2 ions, which precipitates aldehyde cytotoxicity through lipid peroxidation. (Zimmerman,1976).

Compared to the normal control group, rats treated with hepatotoxicants exhibited a substantial slowdown in sleep initiation (seconds) and an increase in sleep length (minutes).

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