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Original Article

Evaluation of hepatoprotective activity of *Gynandropsis gynandra*

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ARTICLE INFO

Article history:
Received 2 August 2013
Accepted 28 August 2013
Available online 2 October 2013

Keywords:
Gynandropsis gynandra
Antioxidant
Hepatoprotective
Carbon tetrachloride

ABSTRACT

Aim: The present study was carried out to evaluate the hepatoprotective activity of different extracts of *Gynandropsis gynandra*.
Methods: The different extracts of *G. gynandra* at doses 100, 200 and 400 mg/kg b.w. were tested for their hepatoprotection against carbon tetrachloride (CCl_4) induced liver intoxication in rats.
Results: The extracts of *G. gynandra* showed a dose dependent hepatoprotection activity. Among all the extracts, methanolic extract produced maximum hepatoprotection (71.45%) at a dose of 400 mg/kg.
Conclusion: The results of the present investigation indicate that all the extracts of *G. gynandra* possess hepatoprotective activity and this effect was may be due to the presence of various chemical constituents.

1. Introduction

There has been an increasing awareness in the recent years in ethno biological studies, both on the traditional medicine and particularly on tribal medicine.[1] The claims of therapeutic efficiency and the lack of toxicity of many plants have been scientifically proved in the recent years. There are, however a large number of plants of questionable value among the vast repertory of indigenous drugs. It will be a worthwhile exercise if one tries to select the best out of them. There are a large number of plants, which have to be examined thoroughly for useful activity.[2] In view of the potential use of medicinal plants as a source of alternative medicine in many diseases, folklore and claims made by the people in different countries

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0974-6943/$ – see front matter
http://dx.doi.org/10.1016/j.jopr.2013.08.026

for *Gynandropsis gynandra*.[3–6] Now, the present work has been undertaken to evaluate the hepatoprotective activity of different extracts of the selected plant.

2. Materials and methods

2.1. Plant material and preparation of extract

Gynandropsis gynandra was collected at Marteru region, A.P., India and authenticated by Prof. M. Venkaiah, Department of Botany, Andhra University. Freshly collected plant material was dried under shade and was made into coarse powder. Coarse powder of *G. gynandra* was extracted separately with 70% v/v ethanol, methanol, ethyl acetate and hexane using a Soxhlet apparatus. The extracts thus obtained were dried under reduced pressure at a room temperature not exceeding 40 °C to get the extracts.

2.2. Drugs and chemicals

Carbon tetrachloride (CCl_4), riboflavin, deoxyribose, carrageenan and silymarin were purchased from Sigma Chemicals, USA. Serum glutamate pyruvate transaminase (SGPT), Serum Glutamate Oxaloacetate Transaminase (SGOT), Serum Alkaline Phosphatase (ALP) and Serum Total Bilirubin (T. Bil) assay kits were purchased from Span diagnostics Ltd, Gujarat, India. All other chemicals used were of analytical grade.

2.3. Animals

Adult albino Wistar rats (National Institute of Nutrition, Hyderabad, India) of either sex weighing 150–200 g were used in the studies. The animals were maintained under standard laboratory conditions at an ambient temperature of 23 ± 2 °C having 50 ± 5% relative humidity with 12 h light and dark cycle. The use and care of the animals in the experimental protocol has been approved by the local Institutional Animal Ethics Committee (Regd. No. 516/01/A/CPCSEA) following the guidelines of the Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), Government of India.

2.4. Acute toxicity study

The acute toxicity study was conducted for hydroalcoholic, methanolic, ethyl acetate and hexane extracts of *G. gynandra* as per OECD (Organisation for Economic Co-operation and Development) guidelines 420 (OECD.2001).

2.5. Quantification of phenolic and alkaloidal content

2.5.1. Total phenolic content

Total phenolic content was determined using the Folin–Ciocalteu reagent[7] using standard gallic acid calibration curve, measure the concentration of phenolic content in gallic acid total equivalents using unit's mg/gm (GAE).[8]

2.5.2. Total alkaloidal content

The Fazel Shamsa et al, 2008 method using atropine calibration curve, measure the concentration of alkaloid content in atropine equivalents using unit's mg/g.[9]

2.6. Free radical scavenging activity

2.6.1. Superoxide radical scavenging activity

Superoxide scavenging activity[10] of the plant extracts was determined by McCord & Fridovich method, which depends on light induced superoxide generation by riboflavin and the corresponding reduction of nitroblue tetrazolium.[11]

2.6.2. Hydroxyl radical scavenging activity

Hydroxyl radical scavenging activity was measured by studying the competition between deoxyribose and the extracts for hydroxyl radicals generated from the Fe^{2+}/EDTA/H_2O_2 system (Fenton reaction). The hydroxyl radical attacks deoxyribose, which eventually results in the formation of thiobarbituric acid reacting substances (TBARS).[12]

2.6.3. DPPH radical scavenging activity

The scavenging activity for DPPH free radicals was measured according to the procedure described by Braca et al, 2003.[13,14]

2.7. Hepatoprotective activity against carbon tetrachloride induced hepatotoxicity

In the present work hepatoprotective activity of different extracts of *G. gynandra* were tested against carbon tetrachloride (CCl_4) induced hepatotoxicity by measuring biochemical enzymes (SGOT, SGPT, ALP and T. BIL). An increase in the enzymes levels of these biochemical parameters is a sensitive index of hepatic damage. The standard and test group animals were treated with 50 mg/kg dose of silymarin and 100, 200, 400 mg/kg doses of different extracts of *G. gynandra* for 6 days. On 6th day, 1 h after treatment with standard drug and selected plant extracts, the animals were intoxicated with CCl_4 in liquid paraffin (1:1 v/v, 0.75 ml of CCl_4/kg, i.p.). Serum was separated by centrifugation at 37 °C and used for estimation of various biochemical parameters. Biochemical parameters like Serum Glutamic Oxaloacetic Transaminase (SGOT) and Serum Glutamic Pyruvic Transaminase (SGPT), Serum Alkaline Phosphatase (ALP), Serum Total bilirubin (T. Bil) were estimated by using commercial reagent kits in autoanalyzer (RM4000, Biochemical systems International, Italy).[15–18]

3. Results

3.1. Acute toxicity study

Acute toxicity studies in mice revealed that the extracts up to 2000 mg/kg produced no sign of toxicity or mortality.

3.2. Phytochemical screening

Qualitative phytochemical screening for different extracts of *G. gynandra* revealed the presence of steroids, terpenoids,