Available online at www.sciencedirect.com

SciVerse ScienceDirect

journal homepage: www.elsevier.com/locate/dit

Original Article

Evaluation of hepatoprotective potential of ethanolic extract of *Ixora pavetta* against isoniazid and rifampicin induced hepatotoxicity in rats

Gangavaram Jyothi Reddy [a,*], *Vara Prasanth Reddy* [b], *Mungura Sreepavani* [c], *Cuddapa Rajaram* [b], *Sadhu Nelson Kumar* [b], *Rupesh S. Kanhere* [b]

[a] *Department of Pharmacology, Sri Venkateswara College of Pharmacy, Chittoor 517127, A.P., India*
[b] *Department of Pharmacology, P. Rami Reddy Memorial College of Pharmacy, Kadapa 516003, A.P., India*
[c] *Department of Pharmacology, Government Polytechnic for Women, Kadapa 516003, A.P., India*

ARTICLE INFO

Article history:
Received 14 May 2013
Accepted 18 June 2013

Keywords:
Ixora pavetta
Isoniazid
Rifampicin
Silymarin
SGOT

ABSTRACT

Objective: The aim of present study was to demonstrate the hepatoprotective effect of ethanolic extract of *Ixora pavetta* (EEIP) against isoniazid and rifampicin induced hepatotoxicity in rats.
Method: Rats were divided into five groups each group containing 6 animals. All rats were treated with INH + RIF in saline water at the dose of 100 mg/kg b.w., p.o. to the experimental animals for 21 days. Group I served as control administered with distilled water. In order to study the effect of EEIP in rats, 200 mg/kg b.w. and 400 mg/kg b.w. of extracts were administered to the rats in group IV and V by oral route. Silymarin (2.5 mg/kg b.w., p.o.) was used as a standard drug in this study. After the course of treatment the animals were sacrificed and blood and liver samples were collected for biochemical and histopathological studies respectively.
Results: Biochemical parametric evaluation of both the standard and EEIP (200 mg and 400 mg/kg b. wt) treated rats showed significant decrease in SGOT, SGPT, ALP, Total Bilirubin, Direct Bilirubin, and Total cholesterol. And the level of Total protein was significantly increased in both standard and EEIP treated rats when compared to toxic control group rats. The changes in biochemical parameters were supported by histological profile.
Conclusion: It is concluded that the ethanolic extract of *Ixora pavetta* protects against rifampicin and Isoniazid-induced oxidative liver injury in rats.

1. Introduction

Hepatotoxicity may be defined as any damage or injury to the liver caused by a drug, chemical or other agent. Liver is the key organ regulating homeostasis in the body. It is involved with almost all the biochemical pathways related to growth, fight against disease, nutrient supply, energy production and reproduction. Due to its unique metabolism and close

* *Corresponding author*. Tel.: +91 8977951992.
E-mail address: jyothi.reddy992@gmail.com (G. Jyothi Reddy).
0975-7619/$ – see front matter
http://dx.doi.org/10.1016/j.dit.2013.06.007

relationship with the gastrointestinal tract, the liver is susceptible to injury from drugs and other substances. 75% of blood coming to the liver arrives directly from gastrointestinal organs and then spleen via portal veins which bring drugs and xenobiotics in near-undiluted form thus the liver is an important target of the toxicity of drugs, xenobiotics and oxidative stress. More than 900 drugs, toxins and herbs have been reported to cause liver injury and drugs account for 20%–40% of all instances of fulminant liver failure. In the absence of reliable liver protection drugs in modern medicine, a large number of medicinal preparations are recommended for the treatment of liver disorders and quite often claimed to offer significant relief. Attempts are being made globally to get scientific evidences for these traditionally reported herbal drugs. This scenario proves a severe necessity to carry out research works related to hepatotoxicity.

Drug-induced liver injury may account for as many as 10 percent of hepatitis cases in adults overall, 40 percent of hepatitis cases in adults over fifty years old, and 25 percent of cases of fulminant liver failure. In Western countries, Paracetamol represents the first cause of all liver failures. But it accounts only for 25%–40% cases of fulminant hepatic failure.[1] Whereas, antitubercular drugs being the second common cause of drug induced hepatotoxicity cause, the risk of hepatotoxicity based on data from four prospective Indian studies was 11.5% compared with 4.3% in Western publications.[2]

Anti tubercular (AT) drugs are the commonest agents causing serious, clinically significant drug induced acute liver failure in India. Most commonly used AT drugs like isoniazid (INH), rifampicin (RIF) and pyrazinamide are hepatotoxic.[3,4]

The plant *Ixora pavetta* belongs to the family Rubiaceae was selected for the study. It is a small tree or evergreen shrubs, found in deciduous slopes and hills. The plant has been traditionally used for the treatment of urinary disorders, hepatotoxicity, dysentery ulcers etc.[5,6] The plant is constituted with flavanoids, saponins, phytosterols, and glycosides. The stem contains essential oil, resin, alkaloid, tannin, and a pectin principle.

Yet, no systemic pharmacological studies were reported to support its use in hepatotoxicity. Hence present study attempts to study hepatoprotective potential of ethanolic extract of *Ixora pavetta* (EEIP) against isoniazid and rifampicin induced hepatotoxicity in rats.

2. Materials and methods

2.1. Collection of plant material

The leaves and stem bark of the plant *Ixora pavetta* was collected from Utukur, Kadapa District, Andhra Pradesh. Authentified by Dr. K. Madhava Chetty, Department of Botany, Sri Venkateswara University, Tirupathi.

2.2. Preparation of the extract

The stem bark and leaves of the plant *Ixora pavetta was* collected, cleaned, dried and powdered in a grinder-mixer to obtain a coarse powder and then passed through 40 mesh sieve. About 500 g of powdered drug was extracted successively with ethanol by soxhlet apparatus. The extraction was carried out until the drug becomes exhausted. The solvents were recovered from their extract by distillation under reduced pressure. The dried extract thus obtained was kept in a desiccator and was used for further experiments.

2.3. Experimental animals

Healthy male Wistar rats weighing between 150 and 200 g were used for the study. The animals were housed in groups of six and maintained under standard conditions (27 ± 2 °C, relative humidity 44–56% and light and dark cycles of 10 and 14 h respectively) and fed with standard rat diet (Mysore feeds, Bangalore) and purified drinking water at libitum for 1 week before and during the experiments. All experiments and protocols described in present study were approved by the Institutional Animal Ethical Committee (IAEC) of P. Rami Reddy Memorial College of Pharmacy (1423/Po/11/CPCSEA).

2.4. Chemicals

Silymarin (Sigma), Isoniazid, Rifampicin and all other reagents used were of analytical grade. Diagnostic kits used in this study were procured from Span Diagnostics Ltd., India and Excel diagnostics Ltd., India.

2.5. Instruments

Maxilyzer, UV–Visible spectrophotometer (Analytical systems, model no: AUV 2060), electronic balance (Shimadzu, model no: DS-852 J), Colorimeter (Inco, model no: CL-157), homogenizer (Ever shine, model no: 607), centrifuge (Remi, model no: KKLO-9013).

2.6. Phytochemical screening

Phytochemical examinations were carried out for all the extracts as per standard methods. The results are shown in Table 1.

2.7. Pharmacological study

2.7.1. Acute toxicity studies

Acute oral toxicity study was performed as per OECD-423 guidelines (acute toxic class method).[6] Female Swiss albino mice weighing 20 to 30 g selected by random sampling technique were used for acute toxicity study. The animals were

Table 1 – Preliminary phytochemical screening.

S. no	Phytochemical constituents	*Ixora pavetta*
1	Alkaloids	+ ve
2	Glycosides	+ ve
3	Gums	– ve
4	Flavanoids	+ ve
5	Phenolic compounds	+ ve
6	Saponins	+ ve
7	Tannins	+ ve
8	Triterpinoids	+ ve

+ ve = present; – ve = absent.