

EVALUATION OF ANTIULCER ACTIVITY OF THE FLOWERS OF *PUNICA GRANATUM* EXPERIMENTAL ANIMALS

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ABSTRACT

Punica granatum L. (Punicaceae), commonly called pomegranate, is a shrub growing in the warm valleys and outer hills of the Himalayas and cultivated throughout India. The plant has been used in traditional system of medicine as antiulcerogenic, antidiarrhoeal, antiworm, anticancer and neuroprotective drug.

KEYWORDS: *Punica granatum*, Gastric ulcer, Ethanol ulcer, Aspirin, pylorous, lignation, ulceration.

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INTRODUCTION

Punica granatum is mainly used in Unani system of medicine. It shows antiviral, antimalarial and diuretic effects and is used to treat haematuria, haemorrhoidal flux, leucorrhoea, passive haemorrhage and ulcers. Gastric lesions were induced by alcohol and aspirin in rats. The parameters of the study were determination of ulcer index. Peptic ulcer disease (PUD) encompassing gastric and duodenal ulcer is the most prevalent gastrointestinal disorder. The pathophysiology of PUD involves an imbalance between offensive and defensive factors (mucin, prostaglandin, bicarbonate, nitric oxide and growth factors). Peptic ulcer is referred to a group of ulceration disorders of the upper gastrointestinal tract which showed participation of acid and pepsin in their pathogenesis. Although our present knowledge and etiology of peptic ulcer is incomplete, but studies in human and experimental animals indicate that acid and pepsin are crucial for the development of the peptic ulcer. The presence and absence of peptic ulcer is determined by the delicate interplay between gastric acid secretions. The precise mechanism by which the normal stomach and duodenum resist the corrosive effects of acid-pepsin has not been determined. Peptic ulcer is a world-wide disease. It has been reported with different frequency from all parts of the world. .

Despite much advancement in the fields of science and medicine ulcers are increasing day by day. There are various factors which contribute to ulcer formation. Hurry, worry and curry are the main cause of ulcer. The

present rate of ulcer formation is 10% of all adult males. The male to female ratio for duodenal ulcer varies from 4:1 to 2:1 in different communities whilst that for gastric ulcer is 2:1 or less. Disturbances of gastrointestinal functions are responsible for various illnesses and discomforts in human beings. Over the past few decades there has been a surge in research activity aimed towards the development of effective and safer antiulcer drugs both synthetically and from natural resources. Although there are many products used for the treatment of gastric ulcer including antacid and antihistaminics. Most of these drugs produce several adverse reactions such as arrhythmias, impotence, gynaecomastia and haematopoietic changes¹. Thus, there is a need for more effective and less toxic antiulcer agents. Plant extracts are some of the most attractive sources of new drugs and have been shown to produce promising result for the treatment of gastric ulcer^{2,6}. The flowers of *P. granatum* are reported to possess antioxidant activities⁴. The present study has been carried out to evaluate the antiulcer activity of *Punica granatum*.

MATERIAL AND METHODS

Plant Material

Punica granatum flowers were procured from Khari Baoli and authenticated by Prof.M.P. Sharma, Department of Botany, Faculty of Science, Jamia Hamdard, New Delhi.

Animals

Albino rats of wistar strain, used in the experiments, were obtained from Central Animal House Jamia

Hamdard. The animals were kept under standard laboratory condition 28 ± 1 °C. The animals were fed with standard diet. Healthy albino rats of either sex (180-200 g) were divided into three groups of six animals each group. The same quantity of food in the form of pellets was given to all animals. Plant extract was administered in the form of suspension. The extract fractions were tested for their antiulcer activity in two experimental activities, alcohol induced ulcer and aspirin induced ulcer models. The parameters for assessment were the determination of ulcer index in both the animal model.

Preparation of extract

The dried plant material (500 g) was crushed thoroughly and extracted exhaustively with alcohol in a Soxhlet apparatus. The solvent was removed under reduced pressure to get a dark viscous mass (10.8%) The alcoholic extract (1.75 kg) was fractionated to obtain water soluble (WS, 63 g) and water insoluble (WIS, 28 g).

MATERIAL AND METHOD

Ethanol induced ulcer

Three groups of six albino rats were tested for 24 hrs following water ad libitum. The total alcoholic extract 500 mg/kg suspended in the vehicle (10% v/v, tween 80 in distilled water), was administered orally in a volume of 10 ml/kg. The toxicant (negative control) animal received the same volume of vehicle. After 30 min, ulceration was induced by administration of 50% ethanol (5 ml/kg, orally). The animals were sacrificed after one hr of administration of 50% ethanol⁵. The stomachs were removed and opened along the greater curvature to determine the ulcer index as given below.

EROSIONS	SCORE
1 mm or less	1
1 mm to 2 mm	2
More than 2 mm	3

The overall score was divided by a factor 10, which was designed as the ulcer index.

Ethanol (96%, v/v) - induction of gastric ulcer in rats

The WS (400 mg/kg) and WIS (100 mg/kg body weight) were given orally in a volume of 10 ml /kg. Two different groups of animal of control groups received the same volume vehicle. After 30 min, experimental lesions were induced by ethanol (96%, v/v 5 ml/kg). The animals were sacrificed, the stomach removed, opened and ulcer lesion was quantified.

Aspirin -induced ulcer

Adult albino rats were fasted for 36 hrs with water ad libitum prior to the experiment and divided into three groups of six animals each. Different groups of animals received (alcoholic extract- 500 mg, WS -400 mg/kg and WIS -100 mg/kg) suspended in vehicle (10 % tween 80

in distilled water) in a volume of 10 ml /kg orally. The same volume of the vehicle was given to the animals of control group. After 30 min aspirin (500 mg/kg) suspended in 10% tween 80 in water was administered orally to all the animals and four hrs later, the animals were sacrificed, stomach removed and opened along the greater curvature to determine the ulcer index.

RESULTS AND DISCUSSION

The present study was undertaken to evaluate the antiulcerogenic activity of the flowers of alcoholic extract *Punica granatum* against aspirin induce ulcer and alcohol induce ulcer. Oral pretreatment with *P.granatum* flower alcoholic extract (500 mg/kg) for 24 hrs protected against the alcohol induce ulcer damage induced by 50% ethanol (5 ml/kg body weight). The WS (400 mg/kg) and WIS (100 mg/kg body weight) were given orally 10 ml/kg. Adult albino rats were fasted for 36 hrs with water ad libitum prior to the experiment and divided into three groups of six animals each. Different groups of animals received (alcoholic extract 500 mg, WS 400 mg/kg and WIS 100 mg/kg) suspended in vehicle (10 % tween 80 in distilled water) in a volume of 10 ml /kg orally. The same volume of the vehicle was given to the animals of control group. After 30 min aspirin (500 mg/kg) suspended in 10% tween 80 in water was administered orally to all the animals and four hrs later, the animals were sacrificed, stomachs were removed and opened along the greater curvature to determine the ulcer index.

The alcoholic extract of the flowers of *P.granatum* inhibited 63.23 % [Table-1] of the ethanol-induced gastric lesions in rats. Water soluble fraction exhibited significant reduction of the ethanol-induced gastric ulcer in rat and it was up to 84.70 % [Table-1]. However, water soluble portion of the flowers showed slight inhibition up to 14.11 % [Table-1] of the gastric ulcer. The alcoholic extract presented 54.5 % [Table-2] inhibition of the aspirin-induced gastric lesions in rats. The water soluble and water insoluble fractions of the extracts showed significant reduction of the aspirin-induced gastric ulcers in rats which were 86.07 % [Table-2] and 78.48 % [Table-2], respectively. Ethanol induced gastric lesions can possess gastric mucosal membrane protective action. The protective effect of the flower extract of *Punica granatum* against the gastric damage may be due to their action against 5-lipoxygenase pathway. The cytoprotective action probably stimulates the prostablandin synthesis, which in turn protects the gastric mucosa.

In aspirin induced gastric ulcer model the ethanol extracts of *Punica granatum* flowers reduced the gastric ulcer index thus showing the antisecretory mechanism involved in the extracts for their antiulcerogenic activity.

Peptic ulcer is a worldwide disease. It is generally more common in male adults and in low socio-economic group of people. Though its incidence has been checked to a greater extent in the western community. It is becoming more common in many developing countries including India. This is due to exposure of the population to its predisposing and etiological factors are so high that it is very difficult to avoid such incrimination. Gastrointestinal disorders have been attributed to various causes, viz., stress, hormones, synthetic drugs, alcohol, smoky and ingestion of certain foods. It has been postulated that the basic cause of peptic ulcer may be imbalance between the rate of acid and pepsin secretion in gastric juice and the degree of protection afforded by the gastroduodenal mucosal barrier⁶.

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Table1: Effect of alcoholic extract and various fractions of the flowers of *Punica granatum* on ethanol (96% U/V) induced gastric lesions in rats

Treatment	N	Dose (mg/kg)	Ulcer index (mm) mean ± S.E.	% inhibition
Toxicant (Ethanol) (negative control)	5	-	1.36 ± 0.231	-
Alcoholic extract	5	500	0.50 ± 0.1436	63.23
Toxicant (Ethanol) (negative control)	5	-	1.70 ± 0.24	-
Water soluble	5	400	0.26± 0.13	84.705
Wer insoluble	5	100	1.46 ± 0.21	14.117

Table2: Effect of alcoholic extract and various fractions of flowers of *Punica granatum* on aspirin induced gastric lesions in rats

Treatment	N	Dose (mg/kg)	Ulcer index (mm) mean ± S.E.	% inhibition
Toxicant (Aspirin) (negative control)	5	-	0.88 ± 0.17	-
Alcoholic extract	5	500	0.40 ± 0.13	54.545
Toxicant (Aspirin) (negative control)	5	-	1.58 ± 0.263	-
Water soluble	5	400	0.22± 0.08	86.075
Water insoluble	5	200	0.34 ± 0.160	78.481



Fig 1: Effect of alcoholic extract of flowers of *Punica granatum* on ethanol induced gastric ulcer in rat

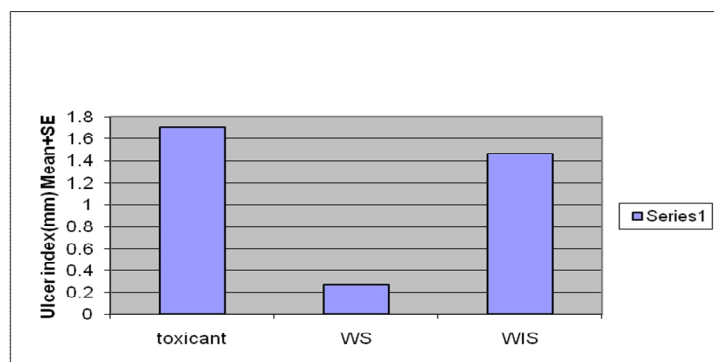


Fig 2: Effect of various fractions of *Punica granatum* on ethanol induced gastric ulcer in rat

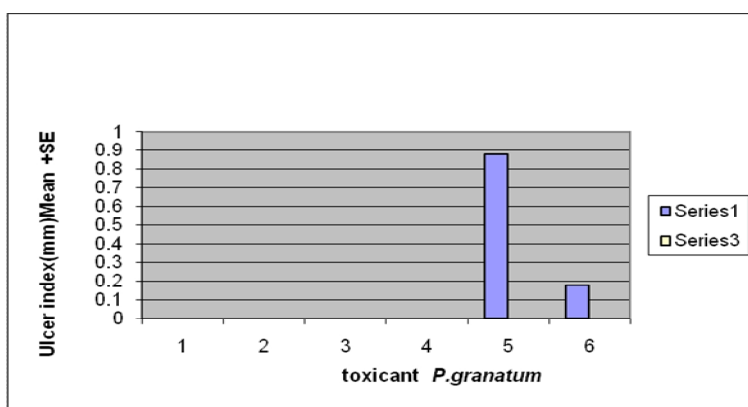


Fig 3: Effect of alcoholic extract of flowers of *Punica granatum* on aspirin induced gastric ulcer in rat

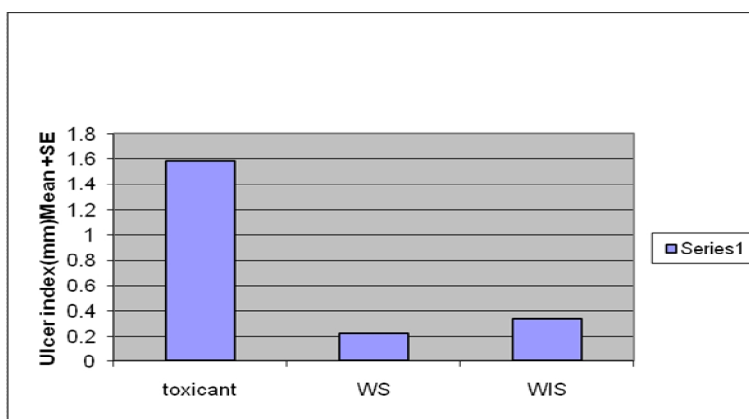


Fig 4: Effect of alcoholic extract of flowers of *Punica granatum* on aspirin induced gastric ulcer in rat

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