

SHORT COMMUNICATION

ANTIULCER ACTIVITY OF *PONGAMIA PINNATA* LEAVES EXTRACT

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In the present work, evaluation of antiulcer potential of the methanolic extract of leaves of *Pongamia pinnata* was done against *in vivo* indomethacin-induced gastric ulcer using pylorus ligation method. All the doses of the leaf extract (100, 200 and 400 mg/kg) significantly ($P < 0.01$) reduced the ulcer index in this study.

Key words: *Pongamia pinnata*, Gastric ulcer, Pylorus ligation, Indomethacin, Ulcer index.

INTRODUCTION

In traditional medicine, treatment of ulcer has been intensified after the implication of *Helicobacter pylori* in the pathogenesis of most resistant ulcer. Gastric acid is produced by parietal cells (also called oxyntic cells) in the stomach. Parietal cells contain an extensive secretory network called canaliculi from which the gastric acid is secreted into the lumen of the stomach. These cells are part of epithelial fundic glands in the gastric mucosa (Siepler and Smith-Scott, 2005). The pH of gastric acid is 1.35 to 3.5 in the human stomach lumen, the acidity being maintained by the proton pump H^+/K^+ ATPase. The parietal cell release bicarbonate into the blood stream in the process, which causes a temporary rise of pH in the blood, known as alkaline tide (Marieb and Hoehn, 2010). It has been used in almost all the traditional systems of medicine viz. ayurveda, unani and sidha. From the ancient time, the tribal, rural and aboriginal people of our country commonly use *P. pinnata* herb in various disorders (Figure 1). Traditionally, herbs are used for the treatment of disease and disorders. Diabetic mellitus, a chronic disorder, is a major public health problem in the developed as well as developing countries caused by partial or complete insulin deficiency, resulting in hyperglycemia leading to acute and chronic complications. Synthetic drugs are likely to give serious side effects in addition

that they are not suitable for intake during conditions like pregnancy (Meera *et al* 2003).

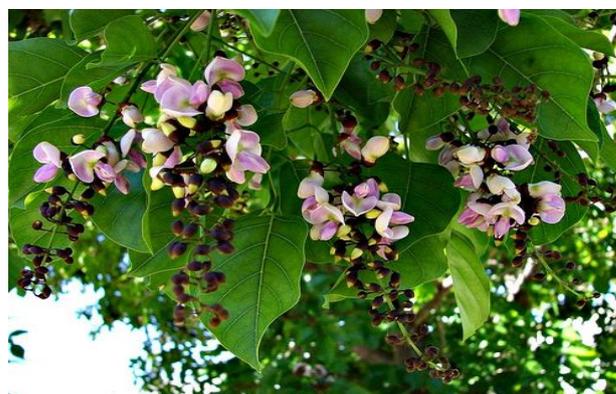


Fig. 1. Photograph of *Pongamia pinnata*

Most of the Tamil Nadu physicians of Ayurveda and Siddha use *Pongamia pinnata* to treat various kinds of diseases including diabetes mellitus (Shoba and Thomas, 2001). All parts of the plant have been used as a crude drug for the treatment of piles, skin diseases, itches, abscess, painful rheumatic joint wounds, ulcers, diarrhoea etc. Keeping in view medicinal properties of natural plants (Dahiya and Gautam, 2011; Zahid Hosen *et al* 2011; Jain *et al* 2011; Emran *et al* 2012; Chowdhury *et al* 2012), present investigation was directed toward the screening of *Pongamia pinnata* for its antiulcer properties.

MATERIALS AND METHODS**Collection of plants and preparation of extract**

The plant materials were washed thoroughly to remove dirt and shade dried at room temperature. The dried leaves were coarsely powdered (500 g) and extracted with methanol (ME) using Soxhlet apparatus. The extracts were concentrated under vacuum to obtain a dry residue. The percentage yield was calculated. This dry residue (5.46%) was diluted with saline for pharmacological studies.

Experimental animals

Albino wistar rats (180-230 g) of either sex were fed with a standard diet and water *ad libitum*. The animals were housed in spacious polypropylene cages bedded with rice husk. The animal room was well ventilated and maintained under standard experimental conditions (Temperature 27°C and 12 h light/dark cycle) throughout the experimental period. Animal experiments were carried out following the

guidelines of the animal ethics committee of the institute.

Evaluation method

The antiulcer activity of the crude methanolic extracts of *Pongamia pinnata* was evaluated using indomethacin 40 mg/kg in rats. The methanolic extracts were administered to different groups at 50, 100 and 200 mg/kg and 3% tween 80 (5 ml/kg) were received by control group. Sucralfate suspension (100 mg/kg body weight) served as the reference drug was given orally to standard group. After 30 min of administration, the ulcer was induced to all the groups by indomethacin (40 mg/kg). After 8 h, the rats were sacrificed and their stomachs were isolated. The greater curvature was separated from the stomach region and rinsed with tap water. Ulcer craters were observed and ulcer index were calculated (Parmar and Desai, 1993) by using the following formula:

$$\text{Ulcer Index} = \frac{\text{Mean ulcer index (control group)} - \text{Mean ulcer index (test group)}}{\text{Mean ulcer index (control group)}} \times 100 \quad (1)$$

$$\% \text{ Inhibition} = \frac{\text{Control ulcer index} - \text{Test ulcer index}}{\text{Control ulcer index}} \times 100 \quad (2)$$

RESULTS AND DISCUSSION

The results of antiulcer activity of methanolic extracts of *Pongamia pinnata* in the ulcer induced rats by indomethacin are summarized in **Table 1**. The antiulcer activity of different treated groups are expressed in **Figure 2**.

There was an absolute production of severe ulcers in all the rats using the methanolic extracts whereas an ulcer inhibition was

observed in all the treatment groups. Comparing the standard sucralfate suspension, suspensions with 50, 100 and 200 mg/kg doses of leaf extract of *Pongamia pinnata* showed more inhibition in dose dependent manner and among those, 200 mg/kg dose have 80% ulcer inhibition ($P < 0.01$) which was highest than other doses of extracts and the standard sucralfate suspension (51.4% inhibition in ulcer).

Table 1. Antiulcer activity of methanolic extract of *Pongamia pinnata* leaf extracts

Treatment	Dose	No. of animals	% animals	Mean ulcer index \pm SEM	% inhibition
3% Tween	5	6	100	3.5 \pm 0.6	–
Sucralfate	100	6	100	1.7 \pm 0.7	51.4
Methanol extract	50	6	100	1.4 \pm 0.5	57.1
Methanol extract	100	6	100	1.2 \pm 0.1	65.7
Methanol extract	200	6	100	0.7 \pm 0.2	80.7



Fig. 2. Antiulcer activity of different groups

The pathogenesis of ulcer remains controversial but its cause is known to be aggravated by an imbalance between the aggressive factors (*i.e.* acid and pepsin) and factors that maintain mucosal integrity (*i.e.* mucus, bicarbonate and prostaglandins (Berardi and Welage, 2005). The use of sucralfate in this study was due to its increasing prescription in ulcer patients in this country and specifically due to its non antisecretory but mucoprotective nature. It is known to act by several mechanisms which include physical protection of stomach, synthesis of prostaglandins and by stimulating mucus and bicarbonate secretion (Siepler and Smith-Scott, 2005). It has been documented to be effective in uncomplicated NSAID induced ulcers (Del Valle *et al* 2003; Laine, 2001; Wolfe *et al* 1999)

but it does not cure ulcers. The extracts produced a relatively potent antiulcer activity against methanol induced ulcer which may suggest that the plant possesses some cytoprotective actions against methanol induced ulcer. The dose dependent ulcer inhibition of *Pongamia pinnata* leaf extract further corroborates its possible cytoprotective actions in this model. The effect was more pronounced than those of sucralfate. The results of ulcer indicated were expressed as mean \pm SEM while ulcer inhibition expressed as a percentage. Differences in mean ulcer index in comparison with control was done using the one way ANOVA followed by Dunnett's multiple comparison with the statistical significance considered at and $P < 0.01$.

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