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Research Article

ANTIULCER ACTIVITY OF *MIMUSOPS ELENGI* BARK EXTRACTS AGAINST SEROTONIN INDUCED ULCER IN RATS

Dabadi Prakash[1]*, B.C. Koti[2], Tikare Vijay[3], Chandrakala[4], Manjuntha S.Katagi[1]
[1]Bapuji Pharmacy College, Davanagere, Karnataka, India
[2]K.L.E Colleges of Pharmacy, Hubli, Karnataka, India
[3]Maratha Mandal's College of pharmacy, Belgaum, Karnataka, India
[4]DRM Science College, Davangere, Karnataka, India

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*Prakash Dabadi, Lecturer**,** Dept of Pharmacology, Bapuji College of Pharmacy, Davanagere 577004, Karnataka, India E-mail- pakku100@rediffmail.com

ABSTRACT
Ethnobotanical knowledge of medicinal plants is some of the most prominent sources of new drugs and has shown potential results for the treatment of gastrointestinal disorders. In order to establish the pharmacological basis for the ethno medicinal use of *Mimusops elengi* Linn. In gastrointestinal affections, the effect of bark extracts of *Mimusops elengi* family Sapotaceae was evaluated in serotonin induced ulceration (20mg/kg) in albino rats. Antiulcer activity was evaluated by measuring ulcer index and percentage of ulcer healing. The alcoholic extract (200mg/kg) and Petroleum ether extracts (200mg/kg) of bark of *Mimusops elengi* showed significant antiulcer activity as evidenced by the data obtained. The present finding suggests that the alcoholic extract of *Mimusops elengi* bark have antiulcer property in albino rats.
KEYWORDS: *Mimusops elengi*, Gastric antiulcer, Serotonin.

INTRODUCTION

Peptic ulcer is a common disease of the upper gastro-intestinal tract occurring in about 5-10% of the world's population[1]. The etiology of the disease appears to be multifactor. The imbalance between the various aggressive and defensive factors such as acid pepsin secretion, parietal cells, mucosal barrier, mucous secretion, cellular regeneration and endogenous protective agents influence the gastric ulcer. Gastric and duodenal ulcers are common pathologies that may be induced by a variety of factors, such as stress, smoking, nutritional deficiencies and noxious agents, including non-steroidal anti inflammatory drugs[2].

The ulcerogenic effect of 5-hydroxytryptamine (5-HT) and its precursor, 5-hydroxytryptophan (5-HTP) on the stomach of experimental animals has been reported by many investigators.[3,] After large doses of 5-HT the lesions are confined to glandular areas and take the form of necrosis of the mucosa, erosions and ulcers.[4] Serotonin induced ulcerations are indistinguishable from restraint-induced stress ulcerations in the rat[1] and it has been proposed that endogenous serotonin may be a mediating humoral factor in the production of stress ulcers. Moreover, a precursor of serotonin, 5hydroxytryptophan has been shown to disrupt the gastric mucosal barrier resulting in back diffusion of hydrogen ion. Therefore reduction of gastric acid production as well as protection of gastric mucosa has been the major approaches for treatment of peptic ulcer[5].

Mimusops elengi Linn commonly known as Bakul is a small to large evergreen tree found all over the different parts of India. It is cultivated in gardens as an ornamental tree. A large glabrous evergreen tree which is 12-15 meter height, with a compact leafy head, short erect trunk and smooth bark.[6,7] Photochemical review shows the presence of phytochemical constituents like alkaloids, tannin, saponins, taraxerol, β-sitosterol[8], querrcitol[9], lupeol[10] and mixture of triterpenoid saponins[11,12], steroidal saponin, β-sitosterol ect., in the bark *of mimusops elengi*. In traditional medicine, *Mimusops elengi* bark used as a diuretic, dental disease, burning sensation, ulcer, cardiac diseases, fever, astringent and aphrodisiac.[6,7] In the treatment of various ailments includes cardiotonic, alexipharmic, stomachic, cures biliousness, anthelmintic diseases of the gums and teeth and astringent activity[7]. There are reports available regarding the activity of *Mimusops elengi* bark against ethanol induced, Pylorus legated and water immersion plus stress gastric ulcer models[13]. It also shows calcium channel blocking[14], antimicrobial[15], antibacterial[15], anthelmintic[16] and hypotension activities[14].

The above facts of folklore use as well as review of literature shows positive correlations in relation to antiulcer activity of *Mimusops elengi* L. There is a paucity of information about effect of *Mimusops elengi* on 5-HT induced gastric ulcer model. Hence the present work has been designed to investigate the effect of *Mimusops elengi* on gastric ulcer activity in albino rats.

MATERIALS AND METHODS

The stem barks of *Mimusops elengi* Linn, family Sapotaceae were collected from mature trees grown locally. The bark of the plant was identified and confirmed by Dr.B.D.Huddar, Head of Botany Department, Shri Kadasiddheshwar Arts College and H.S Kothambri Science Institute, Hubli. After authentication, the plant material was shade dried, until free from moisture. Then, they were subjected to size reduction to get coarse powder of desired particle size.

Preparation of the extract

The powdered material was subjected to successive extraction in a Soxhlet apparatus using solvent petroleum ether (40-60°C) and alcohol. The concentrated extract was then taken in a China dish and evaporated on a thermostat controlled water bath till it forms a thick paste. This thick mass was kept for vacuum drying in desiccators till it become free from moisture. It is further concentrated for future studies.

Test animals

Wistar albino rats of either sex weighing between 150-250 gm were used for the study. They were kept in the departmental animal house at 25±2°C and relative humidity 44 - 56%, light and dark cycles of 10 and 14 hrs respectively for one week before and during the experiments. Animals were provided with standard rodent pellet diet and the food was withdrawn 18–24 hrs before the experiment and water is allowed ad libitum. All animal procedures have been approved and prior permission from the Institutional Animal Ethical Committee was obtained as per the prescribed guidelines.

Acute toxicity study

Approval of the Institutional Animals Ethical Committee was obtained prior to the experiment on animals. Acute toxicity tests were performed on albino mice of either sex weighing between 20-30 gm following OECD Guidelines. The animals were fasted over night prior to the experimental procedure. The Up and Down method was adopted.

Serotonin induced gastric ulcers [17.]

The Wistar albino rats were randomly assigned into 5 groups of 6 animals each. Serotonin creatinine sulphate (20 mg/kg) is administered subcutaneously to rats (24 hr fasted). Alcoholic extract and Petroleum ether extract of *Mimusops elengi* or Ranitidine or control vehicle is administered orally 30 min prior to serotonin injection. The animals were sacrificed after 18 hr, their stomachs were removed, and the ulcer index was determined.

Statistical analysis

The results are expressed as the mean ± S.E.M. The results obtained from the present study were analyzed using one-way ANOVA followed by Dunnett's multiple comparison tests. Data was computed for statistical analysis by using Graph Pad PRISM Software.

RESULTS

Acute toxicity study

Approval of the Institutional Animals Ethics Committee was obtained prior to experimentation on animals. Acute toxicity studies were carried out prior to evaluating each of the extracts for Gastric antiulcer activities employing the Up and down method. One tenth of the lethal dose was considered as the therapeutic dose. Hence $1/10^{th}$ of the dose was taken as effective dose for both the extracts to evaluate antiulcer activity. The results are shown in Table 1.

Serotonin induced gastric ulceration in rats

The ulcer index and ulcer protection results are shown in Table 2 and Graph 1 and 2 by the control serotonin, ranitidine (20mg/kg), alcoholic extract and petroleum ether extract of *Mimusops elengi* (200mg/kg) is (2.750 ± 0.309), (1.500 ± 0.288), (1.00 ± 0.258) and (1.750 ± 0.309) respectively. The percentage protection for ranitidine is 45.45%, alcoholic extract 63.63% and petroleum ether extract 36.00%. The results are statistically significant by ANOVA test. From the above results, when compared with ranitidine, alcoholic extract and petroleum ether extract *Mimusops elengi* showed significant effect on serotonin induced ulcer model. Alcoholic extract of *Mimusops elengi* is shown more significant effect as compared to ranitidine treated group.

DISCUSSION

Serotonin induced ulcer model

An attempt has been made in the present study to evaluate the antiulcer activity of alcoholic and petroleum ether extract of *Mimusops elengi* bark. Peptic ulcers are caused due to increase in gastric acid or decrease in gastric mucosal protection mechanism. Potent antiulcerogenic and ulcer-healing drugs are act via decreasing offensive factors or of increasing the defensive factors[5]. Their astringent action can help precipitating micro proteins on the ulcer site. Therefore in this work we have studied antiulcerogenic activity of *Mimusops elengi* bark in serotonin induced ulcer model. The review of literature revels that some saponins such as glycyrrhizic acid of liquorice and their triterpene derivatives, i.e. carbenoxolone[18] have been found to

promote ulcer healing by forming protective mucus barrier on the gastric mucosa. Since the bark extract contains mainly saponins and flavonoids, the antiulcer activity observed in the present study could be attributed to these constituents. The mechanism of anti ulcer activity of the *Mimusops elengi* extract may be due to the presence of saponins, terpenoids[19,] querrcitol[9], lupeol[10], taraxerol, β-sitosterol[7] glycoside and tannins which prevent ulcer development due to their protein precipitating effects.

Serotonin induced ulcer is generally thought to arise from a disturbance of gastric mucosal microcirculation. Pretreatment of animals with Ranitidine, Alcoholic and Petroleum ether extract of *Mimusops elengi* suppressed the gastric ulcers by improving local microcirculation may be due to anti serotonergic effect. Alcoholic extract of *Mimusops elengi* significantly reduced ulcer index compared with serotonin and the same extract showed more significant effect as compared with ranitidine and petroleum ether.

CONCLUSION

The present section summarizes the antiulcer activity of *Mimusops elengi* bark extracts on Serotonin induced ulcer model. *Mimusops elengi* bark having a tremendous potential deserves a special attention to emerge as a milestone for medical science of this millennium due to its safety profile and can be a potent natural and safe alternative to conventional antiulcer treatment. This plant showed significant anti-ulcer activity which is evident by the data obtained. The ulcer healing effects of *Mimusops elengi* bark extracts was confirmed by the cytoprotective property of the gastric mucosal damage and promotes the ulcer healing by improving the mucosal microcirculation in serotonin induced ulcer model. The *Mimusops elengi* bark extracts have significant antiulcer activity, the alcoholic extract being more potent. Further, investigation needed by observing its effects in other ulcer models like chronic models, duodenal ulcer models and Diuretic activity.

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Table 1: The therapeutic dose of various extracts used for Pharmacological activity

Extract	Dose
Alcoholic extract	200mg/kg body weight, orally
Petroleum ether extract	200mg/kg body weight, orally

Table 2: comparison of extract of *mimusops elengi* treated in serotonin Induced rats

Sl. No.	Treatment	Ulcer index (mean ± SEM)	% Ulcer protection
1	Serotonin(control)	2.750 ± 0.309	0.00 %
2	Ranitidine	1.50 ± 0.288*	45.45 %
3	Alcoholic extract of *Mimusops elengi*	1.00 ± 0.258**	63.63 %
4	Petroleum ether extract of *Mimusops elengi*	1.75 ± 0.309	36.00%
F df value		6.341 3, 20	
P value		<0.003	

Values are given as mean ± SEM for 6 rats in each group.
**p <0.01 when compared to Serotonin treated groups.
***p <0.001 when compared to Serotonin treated groups.

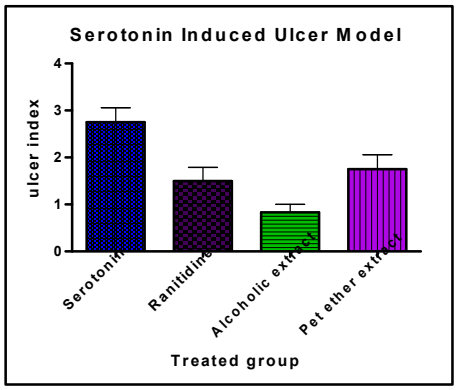

Figure 1: Graph of Ulcer Index in Treated Rats in Serotonin induced Ulcer Model

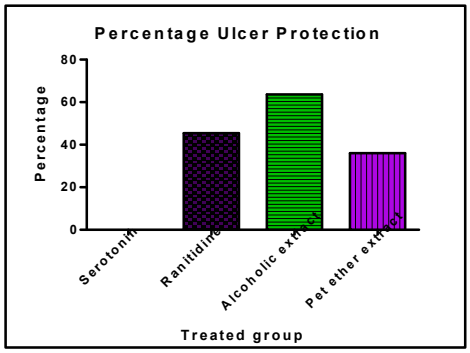

Figure 2: Graph of Percentage Ulcer Protection in Treated Rats in Serotonin.

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