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AN EVALUATION OF EMBLICAOFFICINALIS (INDIAN GOOSEBERRY) FOR ITS ANTIULCER ACTIVITY

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ABSTRACT

Background: Peptic ulcer is a serious medical problem because of its frequency, chronicity, complications and expense. It is a reflection of the sustained stress of civilization and represents a constant challenge to the medical practitioner. Emblicaofficinalis has been used in Ayurveda for the treatment of dyspepsia, colic, hyperacidity etc. It may serve as an alternative to conventional therapies with their accompanying side effects.

Objective: To evaluate the aqueous extract of Emblicaofficinalis for its antiulcer activity.

Methods: The antiulcer activity of aqueous extract of Emblicaofficinalis was screened by

- Aspirin induced mucosal damage by modified method of Hemmati et al.
- Chronic alcohol induced gastritis by method of P.B. KarMahapatra et al.

Results: The aqueous extract of Emblicaofficinalis (20mg/kg) has significantly reduced ulcer index in both models. As Emblicaofficinalis is a rich source of Vit C which is an antioxidant, it probably owes its antiulcer effect to its free radical scavenging activity.

Key words: Antiulcer activity, Emblicaofficinalis, peptic ulcer, gastric cytoprotection, ulcer index.

INTRODUCTION

"Dyspepsia in its many forms has been mankind's companion since the advent of bad cooking, overindulgence and anxiety" [1]

Dyspepsia occurs in 40% of the population annually and leads to primary care consultation in 5% and endoscopy in 1% [2].Peptic ulcer disease is present in 5-15% of patients with dyspepsia.[3]Peptic ulcer affects all economic strata and is a serious medical problem because of its frequency, chronicity, complications and expense..The high incidence and chronicity of the illness, as well as the suffering and decreased ability to work associated with it, has made peptic ulcer an important public health problem.

The cause of ulceration of the mucosa of the upper gastro intestinal tract is yet to be completely understood. The concept of a balance between the aggressive capacities of acid plus pepsin and the defensive mechanisms of mucin is indicated. An ulcer is thought to develop when the equilibrium is disturbed either by enhanced aggressiveness or by lessened mucosal resistance[4]. Of late, the concept has now changed from chemical PH to microbial HP (PH-acidity, HP-Helicobacter pylori). Helicobacter pylori has been accepted as an important contributor to the causation of chronic gastritis, dyspepsia, peptic ulcer etc.[5]

Even though a wide range of drugs are available for treatment of peptic ulcers, many of these drugs do not fulfill all the requirements as many side effects are noted[6]. The ever increasing number of etiological agents and the inefficiency of the existing therapeutic substances has been a perpetual source of stimulation for research in this field.

Man since time immemorial has been using herbs or plant products as medicines for the treatment of disease. It is observed that plants have vast potential to biosynthesis chemicals (active principals) during adaptation to environmental stress and this source should be exploited to get useful medicines to fight against diseases[7].

Emblicaofficinalis is used in the Ayurvedic system of medicine in the treatment of dyspepsia, colic, hyperacidity, flatulence and other gastro intestinal

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maintained with regular feeds and fasted for 24 hours (only water was allowed) before each experiment. These rats were randomly categorized into four groups of six rats each.

Group A- Placebo group of rats treated with 2ml of 2% gum acacia.

Group B- Rats were treated with 40% alcohol-1ml

Group C- Rats were treated with the test drug E.O-20 mg/kg and after 1 hour-40% alcohol 1ml.

The treatment was continued for seven days and the animals were sacrificed on the 8th day.

Group D- Rats were treated with 1 ml of 40% alcohol for 7 consecutive days and from the 8th day onwards were treated with aqueous extract of Emblicaofficinalis (20 mg/kg) for another 7 days and sacrificed on the 15th day .

Alcohol was fed to rats in the morning on empty stomach. Rats were sacrificed by ether overdosing and stomach was dissected out. . Stomach was cut open along the greater curvature. Mucosa was washed under slow running tap water. Ulcers were examined under a magnifying glass.Ulcers were scored as per the following modified arbitrary scoring system of Bhargavaet al.[13]

Normal stomach=0

Congestion and/or shedding of epithelium = 10

Petechial and/or frank haemorrhaghes = 20

One or two ulcers = 30

Three or more ulcers = 40

Perforated ulcers = 50

Ulcer index was calculated for each group by the method of **Sunitha and Devdas**.[14] Then histomorphological study was carried out after staining with hematoxylin and eosin.

Ulcer Index

$$\text{Arithematic mean the intensity in a group} + \left\{ \frac{\text{Ulcer positive number} \times 2}{\text{Total number of rats}} \right\}$$

In each group the total score, mean score, standard deviation, standard error of mean, p value, ulcer index and ulcer incidence were calculated.

The results were subjected to students T test.

RESULTS

In Aspirin induced gastric mucosal damage

In the control group when aspirin (600 mg/kg) was used alone, the total score was 13, ulcer index was 3. 83 ± 0.31 and ulcer incidence was 83.33%.

When Ranitidine (20 mg/kg) with aspirin (600 mg/kg) was used the total score was 5, ulcer index 1.16 ± 0.31 and ulcer incidence was 16.66% .When compared to the control group, it was statistically significant at $P < 0.02$.

When Emblicaofficinalis (20 mg/kg) with aspirin (600 mg/kg) was used the total score was 8, ulcer index was 1.99± 0.21, ulcer incidence was 33.33%. When compared to the control group, it was statistically significant at $P < 0.05$.

When Emblicaofficinalis (50 mg/kg) with aspirin (600 mg/kg) was used the total score was 10, ulcer index was 2.99, ulcer incidence was 66.66%. When compared to the control group, it wasnot statistically significant.

In Chronic alcohol induced gastric mucosal damage.

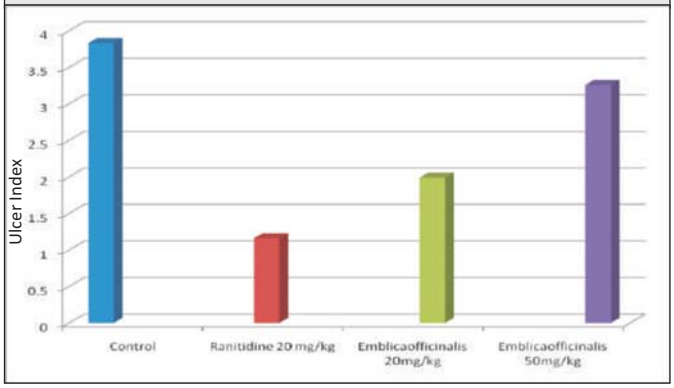
In **Group A** there was no change in the gastric mucosa.

In **Group B**, (ethanol 40% -1 ml for 7 days) the total score was 170, ulcer index was 29.63 and ulcer incidence was 66.66%.

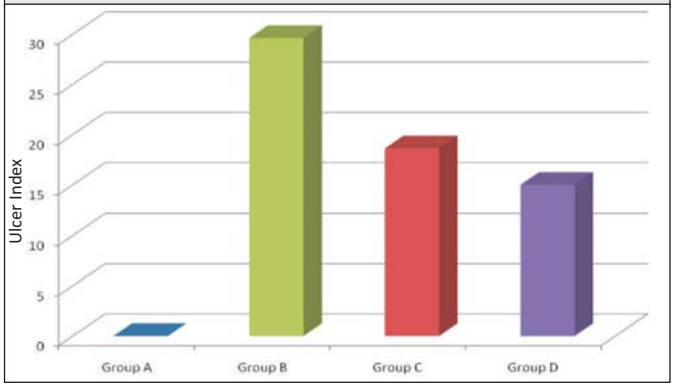
In **Group C**, when E.O (20 mg/kg) was administered orally for 7 days followed (after 1 hour) by ethanol 40%- 1 ml.Total Score was 110,ulcer index was 18.63±3.14,ulcer incidence was 16.66% When compared with Group B it was statistically significant at $P< 0.05$.

In **Group D,** when E.O (20 mg/kg) was used for 7 days after the rat was pretreated for 7 days with 40% alcohol-1ml.Total score was 90, ulcer index was 15±2.24, ulcer incidence was 0.When compared to Group B it was statistically significant at $P<0.01$.

Bar Diagram showing the effect of Emblicaofficinalis on Aspirin induced mucosal damage



Bar Diagram showing effect of Emblicaofficinalis on Chronic alcohol induced mucosal damage



Group A-Control-2% Gum Acacia

Group B-40% Alcohol-1 ml(7days).

Group C-Emblicaofficinalis 20mg/kg+40% Alcohol 1 ml after 1 hour for 7 days.

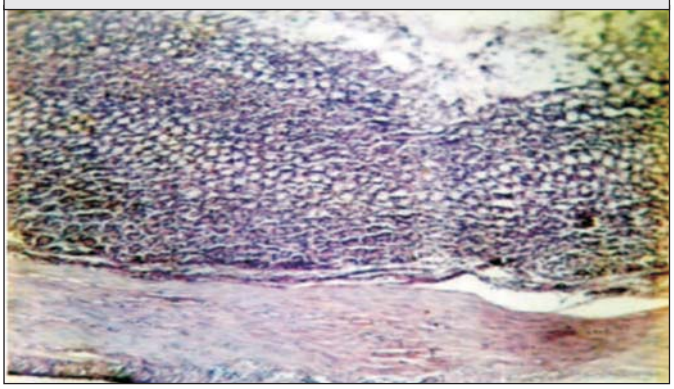
Group D-40% Alcohol 1 ml(7 days) +Emblicaofficinalis 20 mg/kg(7 days).

EmblicaOfficinalis (Indian gooseberry)

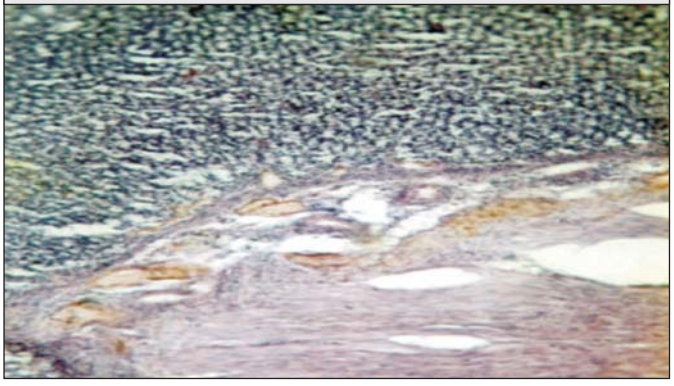
Normal rat's stomach

Ulcerated rat's stomach

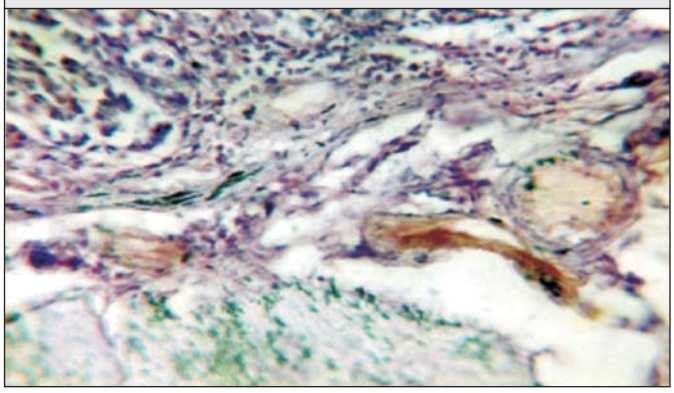
A slide of Group A rat-Normal gastric mucosa



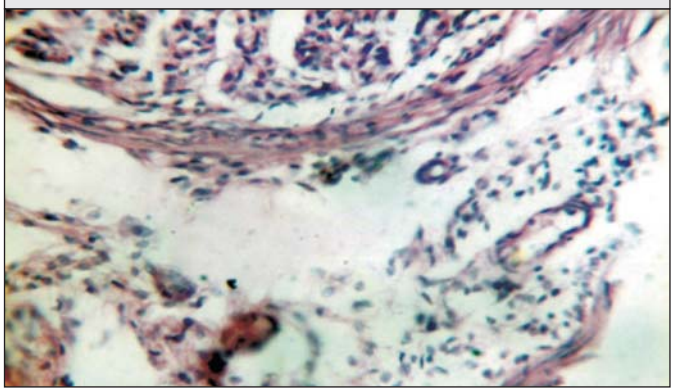
A slide of Group B rat-Plenty of proliferating blood vessels in the mucosa with dense chronic inflammatory infiltrate(HP)



A slide of Group C rat-Presence of congestd blood vessels, sparse inflammatory infiltrate(HP)



A slide of Group D rat-Mild submucosal chronic inflammatory infiltrate(HP)



DISCUSSION

Peptic ulcer disease is a chronic condition characterised by frequent recurrences. Death from peptic ulcer disease is usually associated with bleeding, perforation or ends in surgery. An estimated 15,000 deaths occur each year as a consequence of peptic ulcer disease [15].

The direct and indirect costs of peptic ulcer disease – medical, social and economic are very high due to the chronic nature and prevalence of this condition.

There are a number of potent antiulcerogenic agents used in the treatment of peptic ulcers, but their use is associated with many side effects.[6]Many people in rural areas of the world depend largely on herbs for the treatment of several ailments. This is because medicinal herbs constitute indispensable components of traditional medicinal practice due to low cost, less side effects, easy access and ancestral experience. World Health Organization estimated that 80% of the world's population rely on herbs for their primary health care needs.[16]

Emblicaofficinalis has been used in traditional Indian medicines for centuries for the treatment of dyspepsia, colic, hyperacidity, diarrhea etc.The fruits ofEmbilica officinal are rich in tannins. The fruit contains two hydrolysable tannins. Emblicanin A and B, which have antioxidant properties.[17]

The test drug Emblicaofficinalis has been used in doses of 10 mg/kg to 50 mg/kg as an ethanolic extract for screening its antiulcer property in studies conducted by Mathew et al.[18]

Ethanol and aspirin induced gastric ulcer models have been widely used for evaluation of antiulcer activity.

Aspirin causes mucosal damage by interfering with prostaglandin synthesis, increasing acid secretion and back diffusion of H^+ ions.[19] The suppression of prostaglandin synthesis results in increased susceptibility to mucosal injury and alternately ulceration.[20] Reactive oxygen species play an important role is pathogenisis of mucosal damage caused by aspirin.[21]

Ethanol produces severe gastric hemorrhagic lesions.It increases superoxide anion and hydroxyl radical production and lipid peroxidation in the gastric mucosa. These and other metabolites react with other cellular components and promote enhanced oxidative damage.[22]

Emblicaofficinalis has good antioxidant activity[17,] hence it may inhibit tissue derived mediators which cause cellular necrosis. Phytoconstituents like flavonoids, tannins, terpenoids and saponins have been reported in several antiulcer literature as possible gastroprotective agents[23]. It is suggested that these compounds will be able to stimulate mucus, bicarbonate and prostaglandin secretion and counteract with deteriorating effects of reactive oxidants in the gastrointestinal lumen.[24]

Tannins may prevent ulcer development due to their protein precipitating and vasoconstrictor effects. Their astringent action can help precipitate microproteins on the ulcer site, thereby forming an impervious lining and

protects the underlying mucosa from toxins and other irritants[22] So Emblicaofficinalis because of presence of tannins and its antioxidant nature, it is a drug which can be regarded as having potential in treatment of peptic ulcer disease.

CONCLUSION

The aqueous extract of Emblicaofficinalis (Indian gooseberry) has shown a statistically significant ulcer protective effect against aspirin induced gastric mucosal damage in a dose of 20 mg/kg.

In the chronic alcohol induced gastritis model, Embilicaofficinalis has better ulcer healing effect than gastrocytoprotective effect at a dose of 20mg/kg.The mechanism of action of Emblicaofficinalis may be attributed to the presence of tannins and its free radical scavenging activity. Hence further explorations have to be made to determine the effectiveness of the drug and toxicity of the compound (to determine its safety). Further detailed analysis of the active principles of this plant are worth pursuing in this regard.

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