EVALUATION OF ANTIULCEROGENIC ACTIVITY OF METHANOL EXTRACTS OF BRASSICA OLERACEA VAR. CAPITATA RUBRA ON ALBINO RAT GASTRIC ULCERATION

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ABSTRACT

Objective: To investigate the antiulcerogenic activity of methanolic extract of Brassica var. capitata rubra in albino rats.

Methods: To evaluate the antiulcer activity by pyloric ligation models experimentally induced gastric ulcer by ranitidine (10 mg/kg) subcutaneously. The parameters taken to assess antiulcer activity were free acidity, total acidity, volume of gastric juice, PH, ulcer score, and ulcer index.

Results: The methanolic extract of Brassica oleracea var. capitata rubra in the dose of 0.50 mg/kg produced significant antiulcer activity. The control animals had ulcers and hemorrhagic streaks, whereas in animals administered with extracts of B. oleracea there was a significant reduction in ulcer index (p<0.05).

Conclusion: This study concluded that methanol extract of B. oleracea var. capitata has healing property of gastric ulcers in albino rats.

Keywords: Brassica, Methanol extract, Antiulcer activity, Pyloric ligation model.

INTRODUCTION

A peptic ulcer is the most common gastrointestinal disorder in clinical practice. Prolonged use of synthetic antiulcer drugs leads to adverse drug reactions. Hence, search for new antiulcer agents that retain therapeutic efficacy and are devoid of drug reactions lead to the usage of natural medicine [1]. Brassica oleracea belongs to Brassicaceae or Cruciferae family comprised approximately 3500 described species apportioned among 350 genera including cauliflower, broccoli, kohlrabi, kale, cabbage, and Brussels sprouts.

Vegetable collection
Red cabbage (B. oleracea var. capitata rubra) was collected from local markets of Virudhunagar, Tamil Nadu, India, and was authenticated by Dr. B. Karunai Selvi, Assistant Professor, Department of Botany, V. V. Vanniaperumal College for Women, Virudhunagar, Tamil Nadu, India. The vegetable was washed thoroughly under running tap water to remove dirt and then shade dried at room temperature for a week. They were ground into fine particles after drying and kept in closed container.

Extraction and sample preparation
About 10 g of ground sample of B. oleracea was weighed and homogenized with 100 ml of methanol. The crude preparation was left for 72 hrs in shaker at room temperature. The extract obtained by cold extraction was then concentrated by evaporating the solvent at room temperature.

Animal model
Wistar rats of either sex weighing between 130 and 170 g were procured from animal house of Sankaralingam Bhuvaneswari College of Pharmacy (Regd. No. 622/02/C/CPSEA) used for this study. They were maintained under standard conditions (28±2°C, 55-60% relative humidity) and fed a standard diet for rats and given water ad libitum.
Antilulcer activity

The animals were starved overnight and the first group of animals was given saline orally - 5 ml/kg (control), second was injected ranitidine – 10 mg/kg subcutaneously and the next two groups were given different concentrations of extract (T₁ = 0.25 mg/kg and T₂ = 0.50 mg/kg) orally. The rat was anesthetized with anesthetic ether. After 15 minutes of injection, pyloric ligation was performed. The rat was secured on the operating table. An incision of 1 cm length is given in the abdomen just below the sternum. The stomach was exposed. Passed a thread around the pyloric sphincter and applied a tight knot. While putting the knot care should be taken so that no blood vessel is tied along the knot. While putting the knot the abdomen wall was closed by putting the sutures. Cleaned the skin from any blood spots and bleeding. The solution was titrated further, till it regained pink color. The total volume of sodium hydroxide was noted which corresponds to the free acidity. The solution was noted with the help of pH meter. The solution was titrated against 0.01 N sodium hydroxide using Topfer’s reagent as indicator. For the therapeutic strategies of gastroduodenal ulcer disease, it is important to find antioxidant compounds that are able to inhibit the gastric acid secretion, boost the mucosal defense mechanisms by increasing mucosal production, and stabilizing the surface epithelial endogenous defense mechanisms [18].

We chose methanol extract for further pharmacological study in antilulcer activity. The methanolic extract of B. oleracea var. capitata rubra in the dose of 0.50 mg/kg produced significant antilulcer activity. The control animals had ulcers and hemorrhagic streaks, whereas in animals administered with extracts of B. oleracea there was a significant reduction in ulcer index (p<0.05). The results of antilulcer activity are tabulated in Table 1 and diagrammatically represented in Plate 1.

Acidity (mEq/100 g) can be expressed as:

\[ \text{Acidity} = \text{Volume of sodium hydroxide} \times \text{normality} \times 100 / 0.1 \]

Acidity was detected and estimation of hydrochloric acid and total acidity in gastric fluids). The end point is the appearance of orange color. The volume of sodium hydroxide was noted which corresponds to the free acidity.

The solution was titrated further, till it regained pink color. The total volume of sodium hydroxide which corresponds to the total acidity was noted [16].

Mean ulcer score for each animal was expressed as ulcer index. Gastric content was centrifuged at 1000 rpm for 10 minutes. pH of this solution was noted with the help of pH meter. The solution was titrated against 0.01 N sodium hydroxide using Topfer’s reagent as indicator. (It is dimethyl amino-azo-benzene with phenolphthalein and used for detection and estimation of hydrochloric acid and total acidity in gastric fluids). The end point is the appearance of orange color. The volume of sodium hydroxide was noted which corresponds to the free acidity. The solution was titrated further, till it regained pink color. The total volume of sodium hydroxide which corresponds to the total acidity was noted [16].

Acidity (mEq/l) can be expressed as:

\[ \text{Acidity} = \text{Volume of sodium hydroxide} \times \text{normality} \times 100 / 0.1 \]

For the therapeutic strategies of gastrodudenal ulcer disease, it is important to find antioxidant compounds that are able to inhibit the gastric acid secretion, boost the mucosal defense mechanisms by increasing mucosal production, and stabilizing the surface epithelial cells [24]. Natural products were considered as a rich source of compounds for drug discovery [25]. Therefore, by scavenging free radicals, antioxidants from plant sources may play an important role in gastric ulcer therapy [26]. In accordance with this report, methanolic extract showed the highest scavenging capacity for 2,2-diphenyl-1-picrylhydrazyl radical, superoxide radical scavenging activity recorded in our study [14]. Gastric acid oversecretion is one of the

RESULTS AND DISCUSSION

The plant B. oleracea var. capitata rubra was collected from local markets of Virudhunagar, Tamil Nadu. The material was dried underwater shade and then powdered. The dried powders of B. oleracea were extracted with methanol solvents using cold extraction. The extracts were allowed to evaporate to dryness.

<table>
<thead>
<tr>
<th>Drug and dose</th>
<th>Acidity (mEq/l)</th>
<th>Volume of gastric juice (ml)</th>
<th>pH of gastric juice</th>
<th>Ular score</th>
<th>Ulcer index (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Free acidity</td>
<td>Total acidity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>25.5±1.0</td>
<td>70.75±0.5</td>
<td>6.73±0.51</td>
<td>1.85±0.03</td>
<td>-</td>
</tr>
<tr>
<td>Normal saline 5 ml/kg</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Standard Ranitidine</td>
<td>11.25±0.96</td>
<td>23±0.82</td>
<td>4.85±0.31</td>
<td>4.37±0.24</td>
<td>80.5±1.0</td>
</tr>
<tr>
<td>10 mg/kg</td>
<td></td>
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<tr>
<td>BOME 10.25 mg/kg</td>
<td>19.25±0.5</td>
<td>52.5±1.0</td>
<td>5.88±0.40</td>
<td>4.16±0.04</td>
<td>61±1.0</td>
</tr>
<tr>
<td>BOME 2.50 mg/kg</td>
<td>11.75±0.5</td>
<td>34±0.82</td>
<td>4.55±0.21</td>
<td>4.39±0.36</td>
<td>74.25±0.55</td>
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</table>

Values are expressed as mean±SD (n=4). At 95% confidence interval *p<0.05 were considered significant. BOME - B. oleracea methanolic extract.
key pathogenic factors for gastric ulcer induction [27]. In this study, pyloric ligation model caused a significant increase in gastric juice discharge, total acidity, and marked peptic ulcer lesions. In consonance with the report of [28], gastric ulcer lesion recorded in this study may be due to inhibition of PG synthesis that induced gastric acidity, and consequently, stomach susceptibility to mucosal injury. Therapeutic agents of peptic ulcers generally depend on the inhibition of gastric acid secretion by histamine H2 antagonists [29,30]. Similar to our results, the most active subfraction of *Buchanania lanzan* ethyl acetate (BLE) exerted a significant dose-dependent decrease in the ulcerative lesion index produced by APL ulcer model in rats as compared to the standard drugs omeprazole (30 mg/kg, b.w orally) and ramitidine (32 mg/kg, b.w orally), respectively. The reduction in gastric fluid volume, total acidity, and an increase in the pH of the gastric fluid in APL treated rats prove the antisecretory activity of most active subfraction of BLE. The oral administration of most active subfraction (P4) of ethyl acetate fraction of methanolic leaf extract of *B. lanzan* Spreng produced significant antulcer activity [31]. The antulcer activity was investigated in *M. pudica*. Among the methanolic, chloroform and diethyl ether extracts, methanolic extract showed significant activity [21] which coincides with our results. 200 mg/kg methanolic extract was significant in the range p<0.001.

**SUMMARY AND CONCLUSION**

The methanolic extract of *B. oleracea* var. capitata rubra in the dose 0.50 mg/kg produced significant (p<0.05) antulcer activity. On the basis of the present results, it can be finally concluded that *B. oleracea* var. capitata rubra can be used as an effective herbal medicine for ulcer conditions. Hence, further research is required to isolate individual components, characterize the active phytochemical constituents responsible for the activity and formulation of a potent antulcer drug from *B. oleracea* var. capitata rubra.

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