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Effect of Bark Extract and Gum Exudate of *Commiphora Caudata* on Aspirin Induced Ulcer in Rats

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ABSTRACT

Commiphora caudata is used in Indian folk medicine as an antiulcerogenic agent. Despite of its promising use, there has been no scientific report present regarding its antiulcer activity. Therefore, this study was designed to evaluate the antiulcer activity of bark extract and gum exudate of *commiphora caudata* on aspirin induced ulcer in rats. Acute toxicity study was performed and 200 mg/kg was selected as an effective dose. Four groups of Albino Swiss rats were included in this study. Aspirin suspended in 0.5 % carboxymethyl cellulose (CMC) was given orally to group 1 rats as a negative control group. Group 2 and group 3 animals received methanolic extract and gum exudate of *commiphora caudata* respectively. Sucralfate was given orally to group 4 animals as a positive control. The methanolic extract of *commiphora caudata* has been found to reduce total acidity as much as by sucralfate. However, it has not changed the fluid secretion. The gum preparation not only reduced the total acidity but also considerably reduce the gastric fluid secretion. In case of ulcer score sucralfate, methanolic extract and the gum have produced the low ulcer score compared to aspirin. Increased gastric mucosal protective mechanism by bark extract and gum exudate is probably due to the presence of some active principles present in the plant. However, further investigations are required to elucidate their exact mechanism of anti-ulcer activity.

Keywords: *Commiphora caudata*, bark extract, gum exudate, antiulcer, sucralfate, aspirin.

INTRODUCTION

Peptic ulcers are believed to develop because of increased gastric acid and pepsin secretion, a reduced mucosal defense or a combination of these two abnormalities. The predisposing factors for peptic ulceration include *Helicobacter pylori* infection, non-steroidal inflammatory drugs, stress (1), cigarette smoking, alcohol(2), and diseases(3). Numbers of drugs including proton pump inhibitors, prostaglandin analogs, histamine receptor antagonists, cytoprotective agents, systemic and non-systemic antacids are available for the treatment of peptic ulcers. Unfortunately, most of these drugs confer simpler to severe side effects like arrhythmias, gynaecomastia,

entero chromaffin like cell (ECL), hyperplasia and haemopoietic changes. Moreover withdrawal of these leads to rebound hyper acidity (4). Thus, there is a need to search an indigenous drug with fewer side effects to have a better and safer alternative for the treatment of peptic ulcer. Recently wide spread efforts have been made to identify antiulcer drug from plant sources. Hence, crude plant products might be promising on long-term basis for the treatment of peptic ulcer by their local protective action as long as the triggering factors are present without many side effects. Various plant products have been screened for their antiulcer activity from time to time. Some of them are *parkia biglandulosa*(5), *Gossypium abborbeum*(6), *Morus alba*(7), and *Gymnosporia rothiana*(8).

One of the *Commiphora* species, an aqueous solution of the gum resin of *Commiphora molmol* reported to possess antiulcer activity against ethanol and indomethacin induced ulcer in rats (9).

Commiphora caudata (Wight & Arn) Englor belongs to Burseraceae family, widely distributed in India and Srilanka(10). Various parts of the plant were reported to possess various biological activities such as antiviral, antispasmodic, cytotoxic, hypothermic activity(11), anticarcinogenesis effect(12), antioxidant (13) and anti-acne (14) properties. Despite of these reports knowledge of pharmacological properties of *Commiphora caudata* is limited and screening studies are necessary to reveal the medicinal properties of the plant. Therefore, the present has been aimed to investigate the antiulcer effect of bark and gum exudate of *Commiphora caudata* on aspirin induced ulcer in rats.

MATERIALS AND METHODS

Plant material

The bark and gum exudate of the plant were collected from Namakkal, Tamilnadu, India. The plant was authenticated by botanical survey of India, Coimbatore, India. The voucher specimen (COG-18) has been at pharmacognosy department for future reference.

Preparation of methanolic extract of stem bark

The bark was shade dried at room temperature and pulverized. The coarse powder obtained from the stem bark of the plant *Commiphora caudata* was packed in Soxhlet apparatus and extracted with methanol for 48 hours. The extract was concentrated, dried under pressure, placed in a desiccator and used for the pharmacological experiment.

Preparation of the gum

A deep incision was made on the stem bark. In the next day, from the incised bark the crude gum was collected and dried in sunlight for 2 to 3 days. It was powdered and extracted with petroleum ether; the marc obtained was dissolved in water. To this aqueous solution, acetone was added and pure gum was precipitated. This is kept aside for 12 hours. Then the supernatant liquid was decanted and the precipitate was dried under pressure and used for the pharmacological experiment.

Animals

Healthy Albino Swiss rats (20–25 g) of either sex were used for the study, obtained from the central animal house. After one week of acclimatization, the animals

were used for further experiments. The animal care and use committee of this university in accordance with the guidelines for care and use of laboratory animals approved the experimental protocol.

Acute toxicity (LD_{50}) test

The animals were divided into six groups of eight in each were fasted for 18 hours with water ad libitum before the drug administration. Six doses were selected in a dose ranging from 50, 100, 200, 400, 800 and 1600 mg/kg body weight as a geometrical increment. Doses of the extract selected for the study were suspended in 0.5 % carboxy methylcellulose (CMC) and were administered orally to the animals of each group. Each group of animals were placed in separate cage and observed for 72 hours for mortality. The observations of pilot study of the methanolic extract of *commiphora caudata* showed no mortality upto 1600 mg/kg. By trial and error method, the dose 200 mg/kg was selected. Because, the other lower doses produced lesser effect as compared to the dose of 200 mg/kg and no further increase in beneficial effect was observed by further increase in the dose. In the same way, acute toxicity studies were performed for the gum exudate and the same results were obtained. The dose 200 mg/kg was selected for the gum exudate as like methanolic extract.

Anti-ulcer activity

Aspirin plus pylorus ligation model

Aspirin was suspended in 0.5% CMC and administered orally in the dose of 200 mg/kg for non-fasted rats once daily for five days. To the first group of animals vehicle was administered orally 30 minutes before aspirin administration. Methanolic extract of *commiphora caudata* suspended in 0.5% CMC was administered orally in the dose of 200 mg/kg to the respective treatment groups 30 minutes before each aspirin treatment. The gum was dissolved in sufficient quantity of water with the dose of 200 mg/kg and administered to the another group of an animals before aspirin treatment. On the sixth day, immediately after aspirin treatment pylorus ligation was performed under ether anaesthesia on 18 hours fasted rats water almost ad libitum. Four hours after pylorus ligation, the animals were sacrificed by giving overdose of ether. The oesophagus was ligated above the cardiac orifice. The stomach were removed and opened along the greater curvature, the gastric contents were collected. The tissues were rinsed with 1 ml of distilled water and added to the collected gastric contents. Each solution was measured and centrifuged at 1000 rpm for 10 minutes. 1 ml of the supernatant liquid was diluted with 9 ml of distilled water.

Table 1. Effect of bark extract and gum exudate of Commiphora caudata on acidity against aspirin + pylorus ligated ulcer in rats

Parameters	Aspirin (200 mg/kg)	Methanolic extract (200 mg/kg)	Gum (200 mg/kg)	Sucralfate (200 mg/kg)
Volume of gastric content (in ml)	8.4 ± 0.05	6.0 ± 0.08 ⁺	2.5 ± 0.06 [*]	7.3 ± 0.16
Total acidity (meq/l)	39.0 ± 0.15	23.0 ± 0.28 ⁺⁺	21.0 ± 0.13 ^{**}	21.5 ± 0.42
Ulcer score	3.0 ± 0.05	1.6 ± 0.05 ⁺⁺⁺	1.4 ± 0.32 ^{***}	1.5 ± 0.02

Significant difference compared to aspirin +P < 0.001, ++P < 0.001, +++P < 0.001, *P < 0.001, **P < 0.01 and ***P < 0.01.

Significant difference compared to sucralfate +P < 0.001, ++P < 0.05, +++P < 0.1, *P < 0.001, **P < 0.1 and ***P < 0.5.

The solution was titrated against 0.1 N sodium hydroxide using phenolphthalein as an indicator. This procedure was followed for control, aspirin and drug treated animals. The volume of sodium hydroxide required corresponds to total acidity. Acidity was calculated as

$$\frac{\text{Volume of NaOH} \times \text{Normality} \times 100}{0.1} \text{ meq/l/100g}$$

Each stomach was examined using a magnifying lens and the ulcers were scored according to the severity in arbitrary unit(15).

- 0 (Normal) No ulcer
- 1 Isolated haemorrhagic spots
- 2 Dense haemorrhagic spots
- 3 Dense haemorrhagic spot and small ulcers
- 4 Large ulcer
- 5 Perforation

Statistical analysis

Statistical analysis was performed to find whether there is any significant difference between the groups. This is done by student's t-test and the results were tabulated (Table 1).

RESULTS

Volume of gastric content and acidity

The volume of gastric content and acidity decreased significantly in extract treated animals when compared to control treated animals. Extract showed decrease in total acidity. Sucralfate treated group showed decrease in total acidity than the control. The gum treated animal showed decrease in volume and acidity compared to aspirin and control. Significance was calculated statistically. The methanolic extract and gum has significant reduction of acidity and gastric content produced by aspirin (P<0.001). The actions are comparable to that produced by sucralfate. The results were shown (Figure 1, Figure 2).

Ulcer score

In aspirin and pylorus ligation control animal, ulcers with perforations and haemorrhagic spots were observed in various parts of the mucosa, the ulcer score was 3.0 ± 0.05 (Figure 4). Administration of methanolic extract

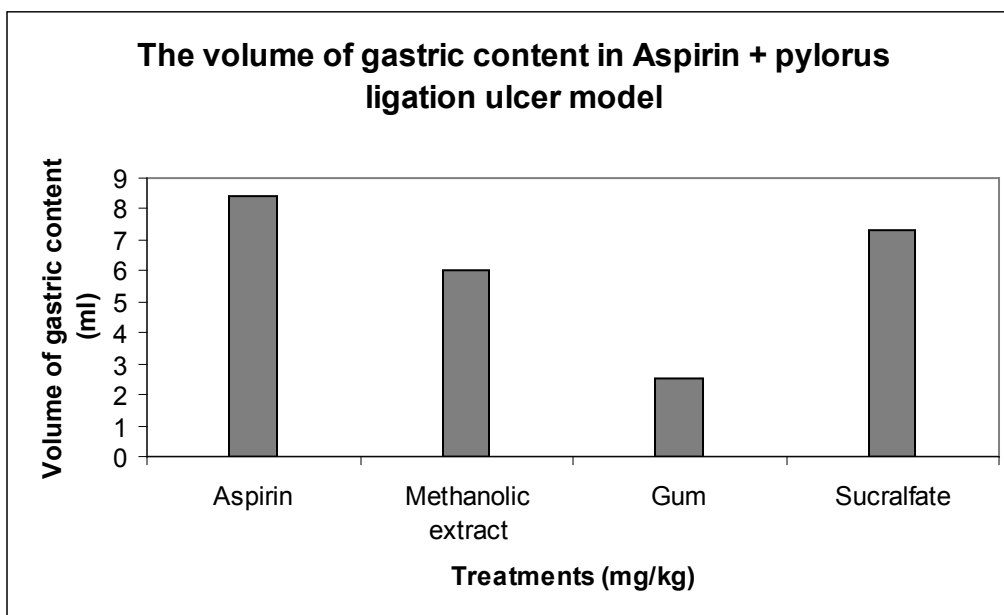


Figure 2: Effect of drugs on total acidity

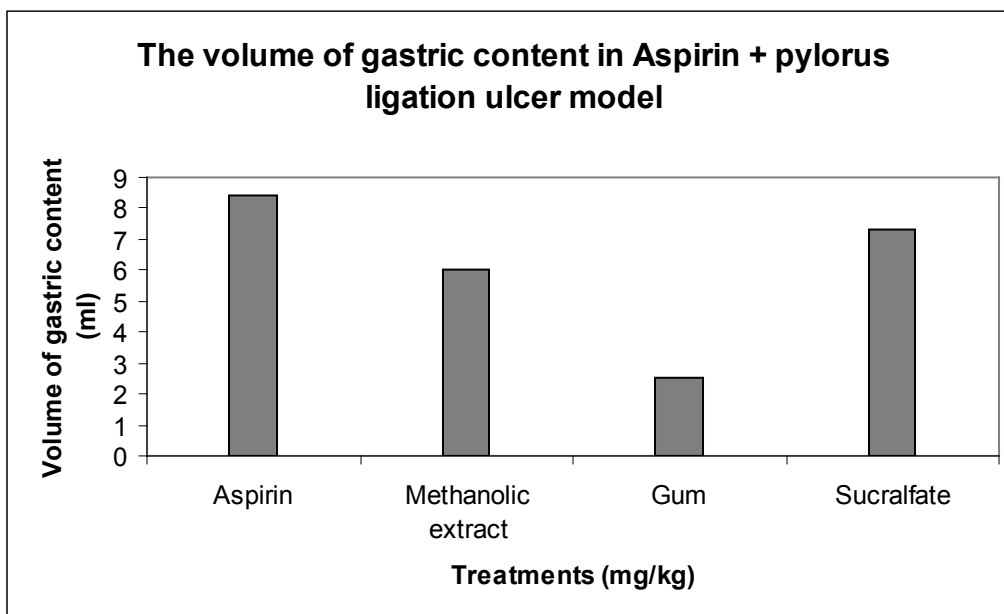


Figure 1: Effect of drugs on Gastric content

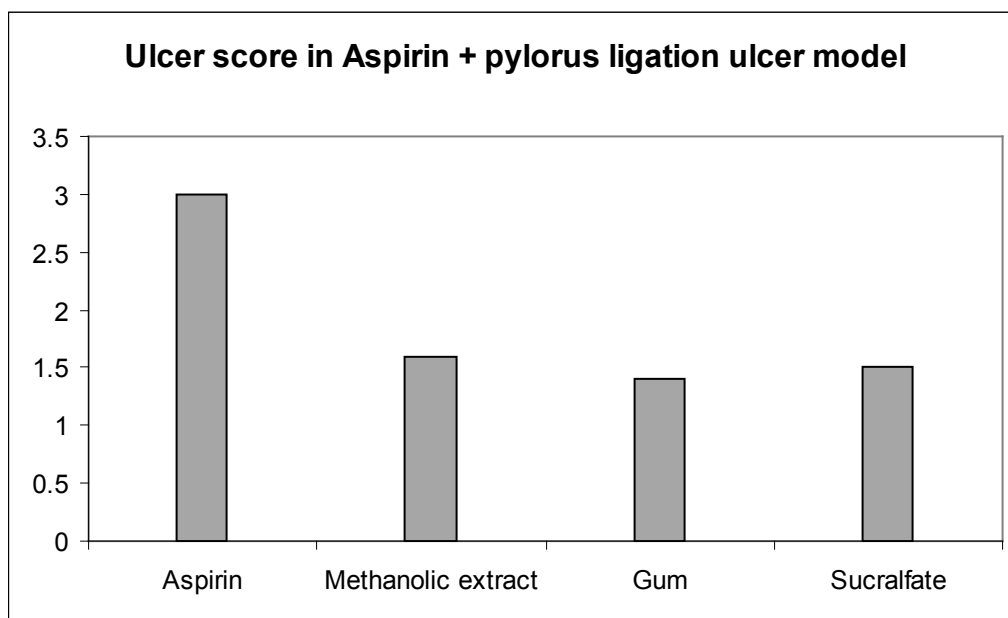


Figure 3: Effect of drugs on Ulcer score

(1.6 ± 0.05) (Figure 5) and gum exudate (1.4 ± 0.32) of *commiphora caudata* (Figure 6) showed significant decrease in ulcer. In sucralfate treated group (Figure 7), the ulcer score (1.5 ± 0.02) were reduced. Significance was calculated using statistical analysis and the results were shown (Figure 3).

DISCUSSION

The result of the present work shows both aspirin and sucralfate increase the gastric fluid secretion compared to

control. Where as the total acidity is increased by aspirin but reduced by sucralfate. The methanolic extract of *commiphora caudata* has been found to reduce total acidity as much as by sucralfate, but it has not changed the fluid secretion. In the case of ulcer score sucralfate, methanolic extract and the gum have produced low ulcer score compared to aspirin. The gummy exudate of *commiphora caudata* has profound ulcer healing property as compared to sucralfate.

The methanolic extract has beneficial local protective action in peptic ulcer and reduces the gastric secretion,

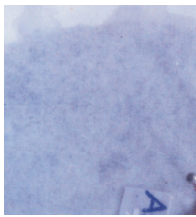


Figure 4: Stomach of Aspirin (200 mg/kg) treated animal

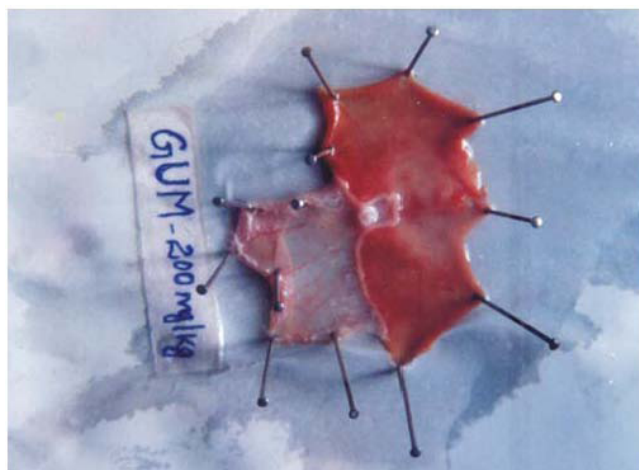


Figure 6: Stomach of Gum exudate of *Commiphora caudata* (200 mg/kg) treated animal

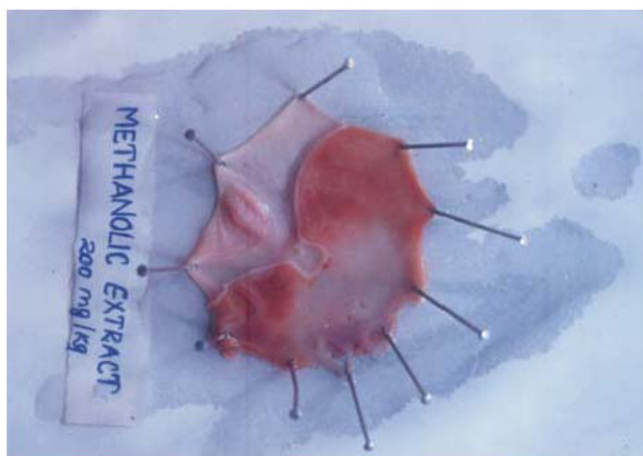


Figure 5: Stomach of Methanolic extract of *Commiphora caudata* (200 mg/kg) treated animal

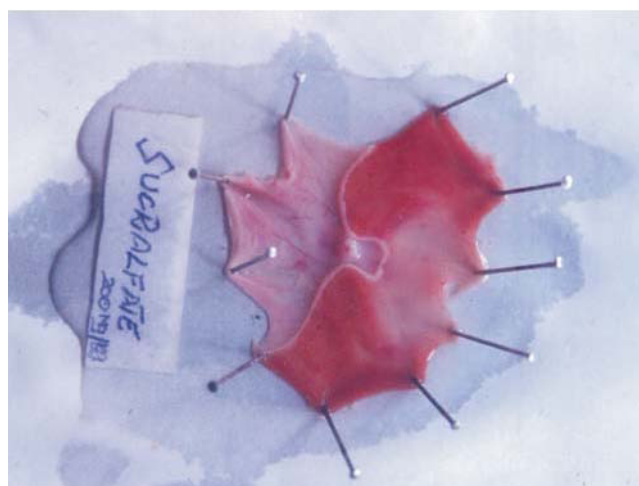


Figure 7: Stomach of Gum exudate of *Commiphora caudata* (200 mg/kg) treated animal

acidity and ulcer score. Therefore, it is of high therapeutic importance. The gum preparation although reduced the total acidity and fluid volume at the administered dose, which may likely interfere with the secretion of the normal digestive juice. Therefore, there is a possibility of causing impaction inside the lumen. So it may not be considered for the ulcer therapy inspite of its action as mucosal protectant. We can suggest that it may be possible to use plant extract as remedy to prevent ulcers. This study substantiated the scientific evidence in favour of its pharmacological use in peptic ulcer in folk medicine. In addition, this study suggested to isolate and to evaluate the active compounds present in this plant.

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