



Pharmaceutical Biology >

Volume 44, 2006 - [Issue 5](#)



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# Antiulcer Activity of the Root Bark of *Oroxylum indicum*. Against Experimental Gastric Ulcers

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Pages 363-370 | Accepted 21 Mar 2006, Published online: 07 Oct 2008

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Keywords:

## Oroxylum indicum

Oroxylum indicum has been selected for its medicinal properties, stomach ailments, coughs and colds, and fever. It is also used as one of the ingredients of the traditional Ayurvedic medicine, "Dashamula." It is also known as "Bharangi" in Sanskrit, "narayan" in Hindi, and "so for" in English. It is a diuretic, stem bark, and chrysin, this plant has bark of C. activity.

of *Oroxylum indicum*. and its different fractions on experimentally induced gastric ulcer models.

## Materials and Methods

## Procurement of plant material and extraction procedure

The fresh root bark of *Oroxylum indicum*. was collected in January 2005 from Vanaushadhi Ektrikaran Udyan, Ahwa, Dang Forest, Gujarat, India. The authentication of this plant was established by the taxonomist of Gujarat Ayurved University, Jamnagar, India, and a voucher specimen (404) was deposited in the Department of Pharmacognosy and Phytochemistry, L. M. College of Pharmacy, Ahmedabad, India. The root bark was sun-dried and powdered to 60 mesh. The powder of root bark after defatting with petroleum ether (0.32% w/w) was dried and then moistened with ammonia solution and extracted with chloroform (0.78% w/w), ethyl acetate (1.52% w/w), and n.-butanol (1.68% w/w), successively. The dried fractions were stored in an air-tight borosil glass container until further use.

## Drugs and chemicals

# Animal

The diagram illustrates a mouse experimental setup for circadian rhythm studies. A mouse is shown in a dark environment, with a circular inset showing a close-up of its head and eyes. The mouse is positioned on a platform, and a vertical line indicates the timing of light/dark cycles. The text 'Wistar-Kyoto' is visible on the left, and 'chow diet' is visible on the right. The diagram is labeled 'Figure 1' at the bottom.



the rats were monitored for growth, health status, and food intake capacity to be certain that they were healthy. Utmost care was taken to ensure that animals were treated in the most humane and ethically acceptable manner. The animals were sacrificed with an overdose of ether anesthesia after the completion of the experiments. The stomachs were removed, opened along the greater curvature, washed with saline, and examined using a 6.4 binocular magnifier. Lesions were assessed by two unbiased observers.

## Methodology

The animals were divided into following groups of six.

- Group I (control): Rats received only aqueous suspension of 1% CMC vehicle with respect to the individual ulcerogenic procedure.
- Group II (drug treatment): Rats received the following treatments: 50% alcohol extract, petroleum ether, chloroform, ethyl acetate, and n.-butanol extracts (100–300 mg/kg, p.o.).
- Group III: Rats received standard omeprazole (20 mg/kg, p.o.) 1 h before the ulcerogenic procedure.

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# Statistical analysis

The results were expressed in terms of mean±SEM. The significance of difference between mean values for the various treatments was tested using one-way analysis of variance test (ANOVA test) followed by Tukey's multiple range tests (Bolton, [1997](#)) wherever applicable to assess statistical significance of difference between the groups.

## Results

### Ethanol-induced gastric mucosal damage

Alcohol extract and the different fractions (300 mg/kg) showed a significant reduction in the ulcer index when compared with the control group, and results were comparable with the omeprazole-treated rats ([Table 1](#)). Reduction in the ulcer index was found to be maximum with both the n.-butanol (99.5%) and petroleum ether (96.0%) fractions at 100 mg/kg dose level as compared with control and omeprazole (99.5%) treatment ( [Table 2](#)).

Table 1. Effect of different extracts (300 mg/kg, p.o.) of Oroxy in rat

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and reduced GSH levels were also observed, and the results were comparable with those of omeprazole treatment (Table 3).

Table 3. Effect of different extracts of *Oroxylum indicum*. (p.o.) on lipid peroxidation and antioxidant enzymes against ethanol-induced gastric mucosal damage.

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Pylorus-ligation gastric ulcer model

The petroleum ether, n.-butanol fractions, and omeprazole pretreated rats showed significant reduction in the ulcer index when compared with the control group (Table 4).

Table 4. Effect of active fractions (100 mg/kg, p.o.) of *Oroxylum indicum*. on pylorus-ligated gastric ulcer model.

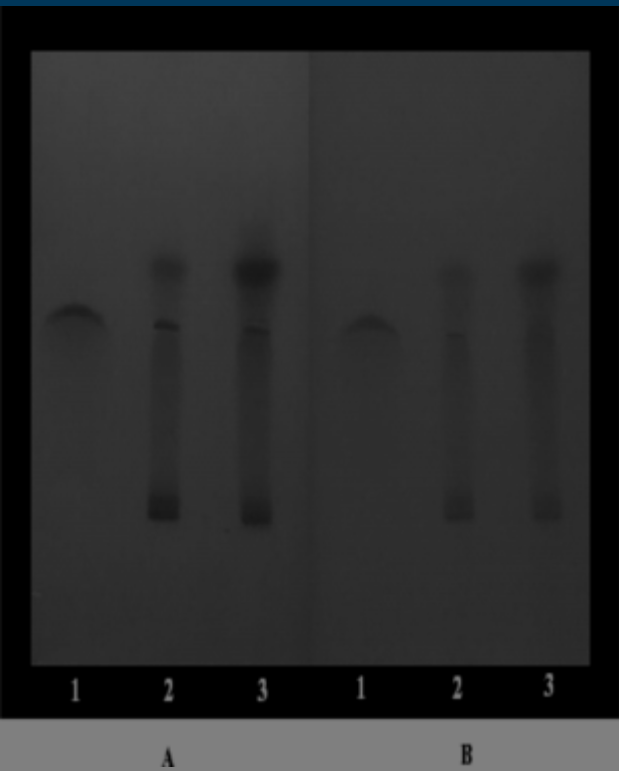
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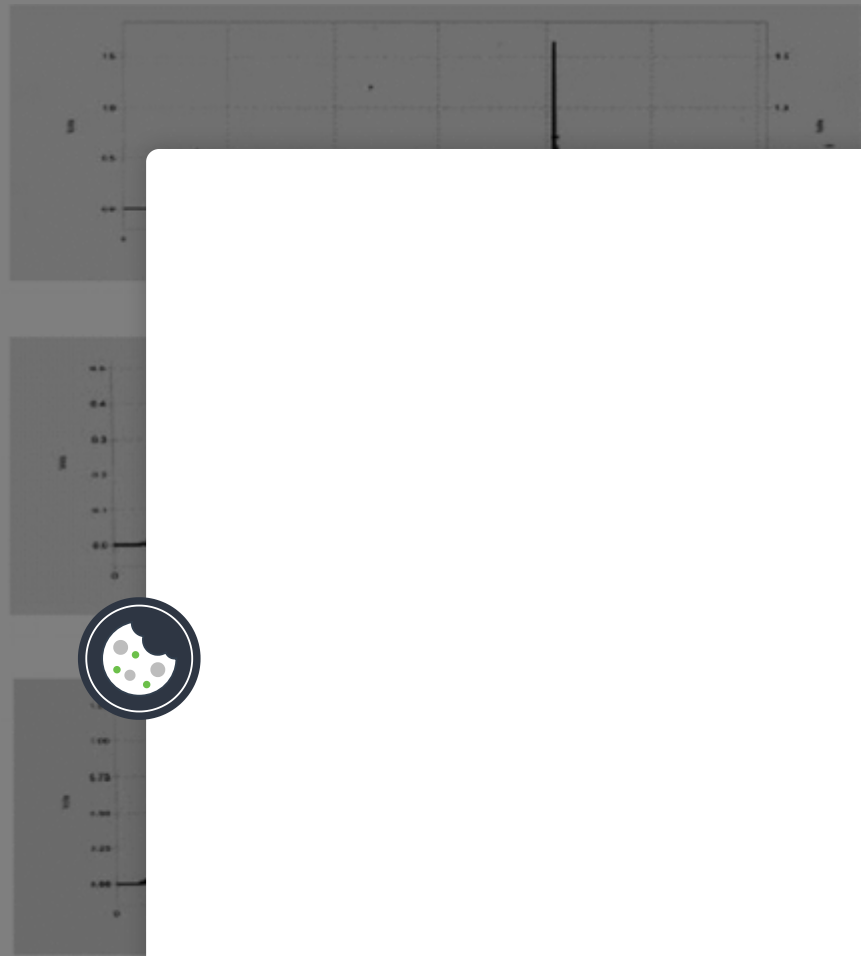






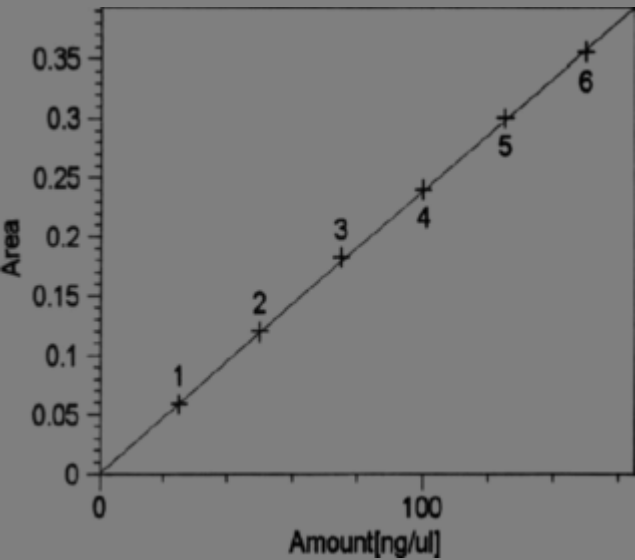
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Figure 2. HPLC chromatograms of active fractions and standard baicalein. (a) Standard baicalein, (b) petroleum ether fraction, (c) hydrolyzed n.-butanol fraction.



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Figure 3. Calibration curve of standard baicalein.



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Table 7. Percent of reference standard baicalein in active fractions of Oroxylum indicum..

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activity in this model along with alteration in antioxidant enzyme status. Preventive antioxidants, superoxide dismutase (SOD), and catalase (CAT) are the first line of defense against reactive oxygen species (Halliwell, [1995](#)). In addition, reduced glutathione (GSH) is a major low-molecular-weight scavenger of free radicals in the cytoplasm and an important inhibitor of free radical-mediated lipid peroxidation (Piper & Stiel, [1986](#)). It was observed in our study that the drug pretreatment resulted in significant reduction in MDA content, along with significant rise in SOD, CAT, and reduced GSH levels, suggesting their efficacy in preventing free radical-induced damage. The mechanism of antiulcer activity in this model, therefore, can be attributed to the free radical scavenging activity of this drug that in turn might lead to gastric cytoprotection.

Gastric acid and pepsin are important factors for the formation of ulcers in pylorus-ligated rats (Shay et al., [1945](#)). Increased synthesis of nucleic acids and metabolism of carbohydrates and other compensatory mechanism could also be responsible for the ulceration due to pylorus ligation (Robert et al., [1984](#)). We observed significant reduction in total acidity and pepsin activity along with significant increase in the gastric pH in drug-treated animals. Besides, there was a significant rise in mucin activity and mucus content. Therefore, it is suggested that the fractions suppressed the gastric damage caused by aggressive factors and cause increase in defensive factors in terms of

Preliminary studies showed that the fractions of the flavonoid compounds were purified by HPLC and identified as baicalin and baicalein. The baicalin and baicalein showed significant antiulcer activity (Ng et al., [2000](#)). Thus, the antiulcer activity of the fractions is attributed to the presence of baicalin and baicalein. Therefore, it is suggested that the fractions suppressed the gastric damage caused by aggressive factors and cause increase in defensive factors in terms of

Conclu

It is concluded that both the n.-butanol and petroleum ether fractions of *Oroxylum indicum*. possess significant antiulcer activity. There was an inhibitory effect on acid secretory mechanisms and free radical scavenging activity and a significant rise in gastric mucin activity. Further, with the help of HPLC-based profiling techniques, the antiulcer activity could be linked to a significant extent to the presence of baicalein in both fractions.

## Acknowledgment

The authors are thankful to GUJCOST for financial assistance by providing a minor research project scheme.

### Related Research Data

Mechanism of Antihepatotoxic Activity of Glycyrrhizin, I: Effect on Free Radical

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Source: Journal of Pharmacy and Pharmacology

Studies on the mechanism of ethanol-induced gastric damage in rats

Source: Gastroenterology

Antioxidant characterization

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Free radicals and lipid peroxidation in ethanol- or aspirin-induced gastric mucosal injury

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Lack of Correlation Between Mucus Gel Thickness and Gastric Cytoprotection in Rats

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The Role of Superoxide Anion in the Autoxidation of Epinephrine and a Simple Assay for Superoxide Dismutase

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Ethanol stimulates formation of leukotriene C4 in rat gastric mucosa

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Flavonoids of the leaves of *Oroxylum indicum* and *Pajanelia longifolia*

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Effect of ethanol on gastric mucosal cytoprotection in rats

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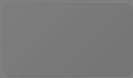


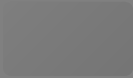
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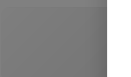
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