

# Preliminary phytochemical and antiulcer studies of *Hibiscus rosa sinensis* Linn. root extracts

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The antiulcer activity of various extracts of *Hibiscus rosa sinensis* roots was evaluated in pyloric ligation induced gastric ulcer in albino rats. The root extracts were prepared by cold maceration process with petroleum ether, alcohol and water separately. The preliminary phytochemical screening of *H. rosa sinensis* revealed the presence of sterols, glycosides, proteins, mucilage and flavonoids. Oral administration of aqueous and alcohol extracts (250 and 500 mg/kg) of *H. rosa sinensis* roots were evaluated for antiulcer activity and compared with the standard drug, lansoprazole (8 mg/kg). From the results, it can be concluded that the aqueous extract of *H. rosa sinensis* roots (500 mg/kg) showed highly significant ( $P < 0.001$ ) dose-dependent antiulcer activity. These results lend scientific support for the plant as folk medicine.

**Keywords:** *Hibiscus rosa sinensis*, antiulcer activity, pyloric ligation, maceration

## INTRODUCTION

*Hibiscus rosa sinensis* L. (Malvaceae) is an annual or perennial herbaceous bush and has several forms with varying colors of flowers. It is native to China and grown widely as an ornamental plant throughout India. The flowers are considered emollient, and an infusion of the petals is used as a demulcent and refrigerant drink in fevers;<sup>[1]</sup> its decoction is given in bronchial catarrh<sup>[2]</sup> in India. Previous studies show that the plant possesses anti-complimentary, anti-diarrhetic and anti-phlogistic<sup>[3]</sup> activities. The leaves and flowers have been found to be effective in the treatment of heart disorders;<sup>[4]</sup> used as an anti-spermatogenic and androgenic,<sup>[5]</sup> anti-tumor,<sup>[6]</sup> anticonvulsant,<sup>[7]</sup> anti-diabetic<sup>[8]</sup> and anti-ulcer<sup>[9]</sup> activities and also as a hair growth promoter.<sup>[10]</sup> The root of *Hibiscus rosa sinensis* is traditionally used for the treatment of ulcer among the Kani tribes in Kanyakumari district, Tamil Nadu, India. No reports are available on the antiulcer activity of *H. rosa sinensis* roots. Hence, the present study focuses on the scientific investigation of antiulcer activity of *H. rosa sinensis* roots.

## MATERIALS AND METHODS

### Plant Material

The roots of *H. rosa sinensis* were collected from Kallukoottam, Kanyakumari district, Tamil Nadu, India, in the month of July, 2003. The plant was

authenticated by Dr. P. Jayaraman, M.Sc., Ph.D., Director, Plant Anatomy Research Center, Chennai, Tamil Nadu, India. A voucher specimen of the collected plant was deposited in the Herbarium of S. B. College of Pharmacy, Sivakasi, Tamil Nadu, India (voucher specimen No: SBCPVSM/6/H3). These were dried as quickly as possible in a good air draft or in shade and stored in airtight glass jars until use.

### Preparation of Extract

The dried, powdered roots of *H. rosa sinensis* (1000 g) were extracted by cold maceration<sup>[11,12]</sup> method with petroleum ether, alcohol (70%) and water separately for six days. The extracts were concentrated under vacuum on rotary evaporator (Buchi, USA) and then dried in lyophilizer (Labconco, USA) under reduced pressure<sup>[13]</sup> and obtained 13.2, 28.3 and 43.29 g of extracts respectively.

### Phytochemical Investigation

The preliminary phytochemical studies<sup>[14]</sup> were conducted for the above extracts of *H. rosa sinensis* roots to find out the presence of various phytoconstituents. The results of preliminary phytochemical investigation are shown in Table 1. The extracts were made as a 2 % suspension with CMC for further studies.

### Animals

Healthy adult albino rats (100-150 g) of either sex were selected from the animal house of S.B. College of Pharmacy, Sivakasi, Tamil Nadu. They were kept in the departmental animal house under the conditions of light (14 h light/10

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h dark) at  $27\pm 2^\circ\text{C}$  and relative humidity 44-56%, for one week before and during the experiments. They were fed with pellet diet (Hindustan Ltd., Bangalore, India) and water was allowed to have *ad libitum*. All animals were handled according to the guidelines for investigations of experimental pain in conscious animals.<sup>[15]</sup> The experimental protocol was approved by the Institutional Animal Ethical Committee (CPCSEA and IAEC No. SBCP/ F8 (f)/325(a)).

### Antiulcer Activity

All the extracts of *H. rosa sinensis* roots were screened for antiulcer activity by pyloric ligation method<sup>[16,17]</sup> in rats. The animals were divided into eight groups ( $n=6$ ) and made to fast for 18 hours. Group I served as control and received vehicle. Group II-VII received petroleum ether, alcohol and aqueous extract (250 and 500 mg/kg/p.o.) respectively. Group VIII received the standard drug, lansoprazole (8 mg/kg/p.o.).<sup>[18]</sup> Four hours after the pyloric ligation, the animals were sacrificed by decapitation. Then the stomach was cut open along the greater curvature and the inner mucosal membrane was examined for ulcer lesions, ulcer score<sup>[19]</sup> and the parameters like gastric volume, pH, free acidity and

total acidity were determined and compared with control.

### Statistical Analysis

All the data are expressed as mean $\pm$ SEM. The values obtained for the above parameters in extracts were compared with control group using one-way ANOVA followed by Dunnett's test.<sup>[20]</sup> The values of  $P<0.01$  and  $P<0.001$  were considered to indicate a significant difference between the groups.

## RESULTS AND DISCUSSION

In the present study, the preliminary phytochemical investigation on extracts revealed the presence of carbohydrates, glycosides, sterols, saponins, proteins, triterpenoids, mucilages, flavanoids, tannins and phenolic compounds, which was reported [Table 1]. The results of oral administration of petroleum ether, alcohol and aqueous extracts of *H. rosa sinensis* roots at a dose of 250 and 500 mg/kg b.w. on different biochemical parameters in rats were represented [Table 2]. The different extracts used for this study showed the tendency to reduce the parameters like volume of acid, free acidity, total acidity and ulcer score. The aqueous extract showed highly significant ( $P<0.001$ ) reduction where as the alcohol extract showed significant ( $P<0.01$ ) reduction in all the parameters when compared with control. Petroleum ether extract was devoid of activity.

Previous studies on different plants reporting anti ulcerogenic activity were due to the presence of mucilage,<sup>[21]</sup> saponins,<sup>[22]</sup> tannins<sup>[23,24]</sup> and flavanoids.<sup>[25]</sup> The antiulcer activity of *H. rosa sinensis* may be due to the presence of phytoconstituents like mucilage, saponins, tannins and flavanoids present in this extracts.

## CONCLUSION

The study concludes that the aqueous and alcohol extracts of *H. rosa sinensis* roots possessed significant antiulcer activity in pylorus ligated rats at the dose of 250 and

**Table 1: Preliminary phytochemical constituents present in various extracts of *Hibiscus rosa sinensis* roots**

Chemical constituents	Pet. ether extract	Alcohol extract	Aqueous extract
Alkaloids	-	-	-
Sterols	+	+	-
Carbohydrates and glycosides	+	+	+
Fixed oils and fats	-	-	-
Tannins and phenolic compounds	-	+	+
Proteins	-	+	+
Triterpenoids	-	+	+
Saponins	+	-	+
Mucilages	+	-	+
Flavonoids	-	+	+

+Present, -Absent

**Table 2: Antiulcer activity of various extracts of *Hibiscus rosa sinensis* roots against pyloric ligation induced ulcer in rats**

Groups	Dose (mg/kg)	Volume of gastric content (ml)	pH	Free acidity	Total acidity (mEq / L)	Ulcer score
Control	-	7.32 $\pm$ 0.129	1.34 $\pm$ 0.084	94.24 $\pm$ 2.582	116.62 $\pm$ 1.732	3.12 $\pm$ 0.82
Petroleum ether extract	250	7.22 $\pm$ 0.14	1.54 $\pm$ 0.122	94.16 $\pm$ 2.246	116.48 $\pm$ 1.684	3.04 $\pm$ 0.76
	500	7.18 $\pm$ 0.18	1.50 $\pm$ 0.144	94.24 $\pm$ 2.198	116.96 $\pm$ 1.590	3.10 $\pm$ 0.78
Aqueous extract	250	3.53 $\pm$ 0.129**	4.78 $\pm$ 0.274**	23.86 $\pm$ 1.144**	28.26 $\pm$ 1.264**	0.78 $\pm$ 0.24**
	500	2.74 $\pm$ 0.420**	5.12 $\pm$ 0.224**	21.64 $\pm$ 1.246**	25.32 $\pm$ 4.224**	0.62 $\pm$ 0.24**
Alcohol extract	250	4.14 $\pm$ 0.129*	4.12 $\pm$ 0.129*	24.32 $\pm$ 1.108*	29.24 $\pm$ 1.294*	0.85 $\pm$ 0.25*
	500	3.62 $\pm$ 0.322**	4.66 $\pm$ 0.126**	22.24 $\pm$ 1.266*	26.82 $\pm$ 1.296*	0.74 $\pm$ 0.34*
Lansoprazole	8	2.36 $\pm$ 0.129**	5.46 $\pm$ 0.125**	19.42 $\pm$ 1.294**	23.44 $\pm$ 1.292**	0.52 $\pm$ 0.26**

Values are given as in mean $\pm$ SEM; (n=6) \*\* $P<0.001$ , \* $P<0.01$  considered for significance (ANOVA followed by Dunnett's test).

500 mg/kg/p.o, which was well compared with lansoprazole (8 mg/kg/p.o.). Thus it has been scientifically proven that these extracts possess enough potential as an anti ulcerogenic agent.

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