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JASMINUM GRANDIFLORUM LINN. ROOTS' EFFECTS IN GASTRIC MUCOSAL ULCERS

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ABSTRACT
In traditional medicine, *Jasminum grandiflorum* L. (Family: Oleaceae) is used to treat ulcerative stomatitis, skin conditions, wounds, and ulcers. The hydroalcoholic extract of *Jasminum grandiflorum* L. root was tested for its anti-ulcer properties using albino mice that were given acute stomach ulcer models created by pylorus ligation and ethanol. To evaluate the antiulcer efficacy, researchers examined the effects of an oral root extract of *JG* L. (100 & 200 milligram/kg) on the amount of gastric juice, free acid, gastric pH, total acid, and ulcers caused in pylorus ligated mice. Compared to the conventional medicine ranitidine (50 mg/kg), there was a substantial ($P < 00.01$) reduction in the ulcerative lesion indices that is dose-dependent created by Eth. + pyloric ligation induced acute gastric ulcer models in albino mice. Mice's stomach fluid pH increased, free acid, total acid, and gastric fluid volume decreased, all indicating the anti-secretory and perhaps anti-ulcer effects of *JG* L. root.

Keywords: pyloric ligation, *Jasminum grandiflorum*, antiulcer.

INTRODUCTION

A prevalent clinical condition known as Peptic Ulcer Disease (PUD) affects one in ten persons at some time in their lives.[1] The term "peptic ulcer disease" (PUD) describes the mucosal rupture of the upper gastrointestinal tract brought on by acid-peptic digestion. This leads to the formation of ulcers that extend past the muscularis mucosae and into the submucosa.[2] The jejunum, oesophagus, Meckel's diverticulum, and heterotrophic mucosa of the stomach can also be impacted. Generally, it manifests effects on the stomach and the duodenum in the small intestine.[3] The ulcer may be five millimetres to several centimetre in size. On the other hand, erosions are superficial, limited to the mucosa, and smaller than 5 mm[4]. In our therapeutic practice, PUD is still one of the most common disorders that we treat clinically.[5] A growing number of synthetic and herbal medications are being developed to treat peptic ulcers, providing better and more innovative solutions.[6]

The herbal remedies promise to treat a number of illnesses linked to the organs, including gastric ulcers, reflux disease, neurasthenia, oedema, sciatica, heat boils, cardiac asthma, nausea, constipation, and the body's removal of toxins.[7] Native to Asia, Kashmir, Afghanistan, and Persia, Jasminum grandiflorum Linn. is an important medicinal plant that is grown in India and can be found wild in the subtropical The Western Ghats, the Nilgiris, the North-West Himalayas, France, Italy, Japan, China, India, the country of Morocco, and Egypt.[8] It is discovered that the plant primarily elaborates flavonoids, triterpenoids, secoiridoid, and their glycosides.[9] Terpene compounds, tiny molecules, and long-chain aliphatic alcohols and esters have all been identified. Using Gas chromatography and Gas chromo. /mass spectrometry to analyse the chemistry of Jasminum grandiflorum, the following major constituents were found: the phytol (10.9%), methyl linoleate (2.8%), a compound of benzyl benzoate (20.7%), geranyl linalool (3.0%), isophytol (5.5%) and linalool (8.2%).[10] The goal of current reasearch was to examine the anti-ulcer properties of the hydro-alcoholic root extract of J. grandi. in albino mice that had acute stomach ulcers caused by ethanol+ pylorus ligation. [11,12]

METHODS AND MATERIALS

Authentication of Plant

J. grandiflorum root was taken from a neighbouring place in Prayagraj, Chhota Baghara. The Botanical Survey of India (BSI), Prayagraj, Government of India, certified Jasminum grandiflorum. The specimen was authenticated by Mr. Vinay Ranjan, Scientist-E and Head of Office, BSI Central Regional Centre, Prayagraj 212002, following the collection of *Jasminum grandiflorum* roots. A specimen has been deposited at the Botanical Survey of India, Prayagraj, with voucher number SIP/2024/051.

Following the extraction of the roots, the plant material was separated from the adhering soil particles, and the roots were meticulously removed and cleaned.[13] The roots were then mechanically ground and shade dried, and the powder that was left over was put through a number of tests and analyses.

Reagents and Chemicals

Suspension of 0.5% Na^+ Carboxy methyl cellulose (CMC) and saline were chosen as the vehicles to prepare the suspension of extract test dose & the reference medication. Ranitidine (50 milligram/kg) was the standard drug. Ethanol was used for inducing ulcers in the mice.[14]

Preparation of Extract of *Jasminum grandiflorum* root

Fresh roots were gathered, mechanically broken down, and dried in the shade.[15] Using a mechanical shaker and 500 ml of hydroalcoholic (30% aqueous + 70% ethanol) solvent, about 100 g of the root powder were extracted over the course of four hours at room temperature by the process of maceration. The extract was vacuum-dried at 40 ◦C.[16]

Phytoconstituent Screening

The crude extract underwent phytochemical screening to look for secondary metabolites like glycosides, alkaloids, saponins, flavonoids, terpenes, and tannins.[17,7,18]

Experimental animals

Both sexes of albino mice (25–30 grams) were purchased from Ms. Chakraborty Enterprises in Kolkata, West Bengal, India, and housed in the laboratory house of the Pharmacology Deptt. of the Shambhunath Institute of Pharmacy in Prayagraj. They were acclimatized in a 12 hrs light and 12 hrs dark cycle at a room temperature of 25 ± 1.5°C. They were fed pellets and have unlimited access to water. The research was performed between 0900 hrs and 1500 hrs. The mice were cared for in accordance with CCSEA norms, and the experimental procedure was authorized by the IAEC (Approval No. SIP/IAEC/003/03/24), dated March 18, 2024.

Acute toxicity Study

This study evaluated the acute toxicity of a hydroalcoholic extract of *J. grandiflorum* roots in mice. Twelve healthy, nulliparous, non-pregnant female mice, aged between 8 to 12 weeks, kept in four groups.[1] The four hours before the dosing, the mice were not given any food. *J. grandiflorum* root extract was administered orally to groups 2, 3, and 4, at doses of 50, 300, and 2000 milligrams/kg, whereas gp. 1 received 5 milligrams/kg of the extract.[16] The mortality rate was noted daily, and any signs of toxicity were looked for in the mice. The estimated LD50 of the root extract was calculated by comparing the number of deaths with predetermined LD50 cut-off values.[19]

Grouping and dosing of animals for screening of anti-ulcer activity

A total of thirty Albino mice were split up into five distinct groups comprising six mice each. Except the vehicle group, all the groups will receive ethanol as an inducing agent of ulcer for 7 days before performing the protocol of the study.
Group I: Vehicle treated group (0.5%CMC)
Group II: Disease control (Ethanol 75%, 4ml/kg + pyloric ligation)
Group III: Standard (Ranitidine, 50mg/kg + pyloric ligation)
Group IV: Test 01 (Extract of *J. grandiflorum* root 100mg/kg + pyloric ligation)
Group V: Test 02 (Extract of *J. grandiflorum* root 200mg/kg + pyloric ligation)

Anti-ulcer test

The above protocol was followed for 7 days. Animals in every group were given ethanol orally from days 5 to 7, two hours after the corresponding medication treatment was administered. After receiving their prescribed drug, the animals in each group were given an 18-hour fast before exposing to chloroform. The pyloric ligation was carried out. Following a four-hour pyloric ligation, all groups' animals were sacrificed, and the stomach contents were gathered.[20] Measurements were made of pH and total gastric volume, which is given as millilitre/100gm b.w. The titrimetric method using 0.1N NaOH was used to determine the free acid and total acid concentration.[16] Furthermore, by stretching the stomach to a higher curvature, the ulcer index was calculated, and scores ranged from 0-3, representing the adversity of the ulcers (normal stomach = 0, red coloration = 0.5, spots of ulcer less than 3 = 1, spots 3 to 5 = 2, and ulcer spots > 5 = 3).
From the aforementioned scoring, the Ulcer Index (**UI**) was then estimated as:

$$\mathbf{UI = UN + Us + Up \times 10{-}1}$$

UN= avg. of no. of ulcers/animal
Us = mean severity of score of ulcers
Up = % of animals having ulcer.
Percentage ulcer protection was calculated as follows:

$$\text{Percentage ulcer protection} = 1 - \left(\frac{\text{Ulcer index for test agent}}{\text{Ulcer index for negative control}}\right) \times 100$$

Statistical analysis

GraphPad Prism version 5.02 analysed the study results, it was then presented as mean ± SEM. The mean differences were analyzed using one-way analysis of variance (ANOVA). A notable level of $p <$ 00.05 was deemed acceptable.

RESULT AND DISCUSSION

Phytochemical screening of plant extract

The phytochemical composition of the hydroalcoholic extract of Jasminum grandiflorum root is summarized in Table 1. The extract contains phenolics, tannins, alkaloids, flavonoids, terpenes, and sterols, among other phytochemicals.

Table 01: Phytochemical investigation of JG root extract

Sn. No.	Phytochemicals	Hydroalcoholic extract of JG
1	Alkoloid	+
2	Sterols	+
3	Flavanoids	+
4	Carbohydrates	+
5	Tannin	+
6	Saponins	-
7	Proteins	-

Anti-ulcer activity

The findings show that the mice pre-treated with *Jasminum grandiflorum* root extract and ranitidine had significantly lower pH, total acid, gastric juice volume, and UI. On comparing with the vehicle-treated group, the UI and acid parameters (pH, total acidity, and stomach volume) increased remarkably ($P < 0.01$ and $P< 0.050$) in the EPL group of animals. When *Jasminum grandiflorum* root extract was administered, the ulcer index remarkably decreased ($P <0.010$) in a dose-dependency manner. In further evidence of its antisecretory action, the extract markedly decreased the stomach volume, raised

the pH of the stomach fluid, and decreased the total acidity. Overproduction of stomach acid or decreased production of stomach mucosa cause peptic ulcers. Ulcers caused by ethanol+ pylorus ligation (EPL) arise from increased acid-pepsin build up as a result of pylorus obstruction and following mucosal digestion. *J. grandiflorum* is previously used in traditional medicine to heal wounds, ulcers, and ulcerative stomatitis.

Table 02: Effect of different treatments in UI in ethanol +PL induced ulcer

Groups	Treatments and doses	UI	% ulcer protection
I	Vehicle (0.5% CMC sol.)	10.75±0.58	-
II	Ranitidine (50mg/kg)	13.84±0.91	50.80%
III	Ethanol (8ml/kg)	28.13±1.16	-
IV	Root extract (100mg/kg)	18.40±0.74	34.59%
V	Root extract (200mg/kg)	16.87±0.5	40.04%

Table 03: Effect on gastric vol. using ethanol+ PL mice.

Treatments and doses	Gastric vol. (ml/100g)	Acidity (free) mEq/100g (4 hr)	Acid (total) mEq/100g (4hr)
Vehicle (0.5% CMC sol.)	2.9 ±0.64	5.03± 0.88	13.75± 0.56
Ethanol (8ml/kg)	8.6 ±1.37	19.27± 0.74	41.32± 0.21
Ranitidine (50mg/kg)	3.5 ±0.19	5.47± 0.67	12.90± 0.18
Root extract (100mg/kg)	4.7 ±0.33	8.65± 0.43	19.65± 0.44
Root extract (200mg/kg)	3.7 ±0.70	6.03± 0.31	14.60± 0.03

With n = 6 in each group, the study-data is represented in mean ± S.E.M.
P<00.05 and P<00.01, against the group that received aspirin treatment (one-way ANOVA)

CONCLUSION

The data analysed in this study underscores therapeutic potential of *Jasminum grandiflorum* root extract in the management of ulcers. Through its demonstrated anti-ulcerogenic properties, the extract has shown promising efficacy in ameliorating ulcerative conditions. Moreover, its ability to enhance mucosal defence mechanisms and inhibit inflammatory pathways suggests it as a promising natural alternative or adjunct to conventional ulcer therapies.[6,21] Further research into the specific bioactive compounds and their MOA is to elucidate the medicinal uses of *Jasminum grandiflorum* root extract in clinical settings.[22] Ultimately, these findings provide a solid foundation for exploring its broader applications in gastroenterology and potentially improving patient outcomes in ulcer treatment.[23]

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