Available online at www.sciencedirect.com
ScienceDirect
Journal of Ethnopharmacology 110 (2007) 464–470
Journal of ETHNO-PHARMACOLOGY
www.elsevier.com/locate/jethpharm

Antiulcer and *in vitro* antioxidant activities of *Jasminum grandiflorum* L.

M. Umamaheswari *, K. Asokkumar, R. Rathidevi, A.T. Sivashanmugam, V. Subhadradevi, T.K. Ravi

Department of Pharmacology, College of Pharmacy, Sri Ramakrishna Institute of Paramedical Sciences, Coimbatore 641044, India

Received 24 February 2006; received in revised form 30 September 2006; accepted 12 October 2006
Available online 21 October 2006

Abstract

The study was aimed at evaluating the antiulcer and antioxidant activities of 70% ethanolic axtract of leaves of *Jasminum grandiflorum* L. (JGLE). The leaves of *Jasminum grandiflorum* L. (Family: Oleaceae) is used in folk medicine for treating ulcerative stomatitis, skin diseases, ulcers, wounds, corns—a hard or soft hyperkeratosis of the sole of the human foot secondary to friction and pressure (Stedman's Medical Dictionary, 28th ed. Lippincott Williams & Wilkins, Philadelphia. p. 443), etc., Antiulcerogenic activity of JGLE (100 and 200 mg/kg, b.w., orally) was evaluated employing aspirin + pylorus ligation (APL) and alcohol (AL) induced acute gastric ulcer models and ulcer-healing activity using acetic acid-induced (AC) chronic ulcer model in rats. Both the antisecretory and cytoprotection hypothesis were evaluated. The antioxidant activity of JGLE has been assayed by using *in vitro* methods like 2,2-diphenyl-1-picrylhydrazylhydrate (DPPH) assay, reductive ability, superoxide anion scavenging activity, nitric oxide scavenging activity and total phenolic content, in order to explain the role of antioxidant principles in the antiulcerogenic activity of the extract. There was a significant ($P < 0.01$) dose-dependent decrease in the ulcerative lesion index produced by all the three models in rats as compared to the standard drug famotidine (20 mg/kg, b.w. orally). The reduction in gastric fluid volume, total acidity and an increase in the pH of the gastric fluid in APL rats proved the antisecretory activity of JGLE. Additionally, JGLE completely healed the ulcer within 20 days of treatment in AC model as evidenced by histopathological studies. Like antiulcer activity, the free radical scavenging activities of JGLE depends on concentration and increased with increasing amount of the extract. These results suggest that leaves of *Jasminum grandiflorum* possess potential antiulcer activity, which may be attributed to its antioxidant mechanism of action.

Keywords: *Jasminum grandiflorum* L. (Oleaceae); Gastric ulcer; Antiulcer; Antioxidant

1. Introduction

Peptic ulcer is one of the major gastro-intestinal disorders, which occur due to an imbalance between the offensive (gastric acid secretion) and defensive (gastric mucosal integrity) factors (Hoogerwerf and Pasricha, 2006). Consequently, reduction of gastric acid production as well as re-inforcement of gastric mucosal production has been the major approaches for therapy of peptic ulcer disease. As a result, more and more drugs, both herbal and synthetic are coming up offering newer and better options for treatment of peptic ulcer. The type of drugs varies from being proton-pump inhibitor to H_2 antagonist or a cyto-protective agent. At the same time, each of these drugs confers simpler to several side effects like arrhythmias, impotence, gynaecomastia, enterochromaffin-like cell (ECL), hyperplasia and haemopoeitic changes (Akthar et al., 1992). There are evidences for the participation of reactive oxygen species in the etiology and pathophysiology of human disease, such as neurodegenerative disorders, inflammation, viral infections, autoimmune gastrointestinal inflammation and gastric ulcer (Repetto and Llesuy, 2002). Drugs with multiple mechanism of protective action, including antioxidant activity, may be highly effective in minimizing tissue injury in human diseases. It has been demonstrated that many drugs and formulations possess potent antioxidant action and are effective in healing experimentally induced gastric ulcers (Dhuley, 1999; George et al., 1999; Goel and Sairam, 2002). *Jasminum grandiflorum* L. (Family: Oleaceae) exhibit a wide ecological range and found extensively all over India. The leaves of *Jasminum grandiflorum* are used in the treatment of odontalgia, fixing loose teeth, ulcerative stomatitis, leprosy, skin diseases, ottorrhoea, otalgia, stangury, dysmenorrhoea, ulcers, wounds and corns (Warrier et

* Corresponding author. Tel.: +91 9842927699.
E-mail address: umasaravanaprakash@gmail.om (M. Umamaheswari).

0378-8741/$ – see front matter © 2006 Elsevier Ireland Ltd. All rights reserved.
doi:10.1016/j.jep.2006.10.017

al., 1995). The leaves of this species have a distinction of being used in Indian folk medicine for treating ulcers. Literature suggests the use of this plant as a diuretic and spasmolytic agent, which is given during childbirth (Somanadhan et al., 1998; Lis-Balchin et al., 2002).

The objective of the present study was to investigate the antiulcer and antioxidant activities of the ethanolic extract of the leaves of *Jasminum grandiflorum* using various models.

2. Materials and methods

2.1. Plant material

Jasminum grandiflorum leaves were collected from Coimbatore district, Tamil Nadu, India, during the month of June 2005. The plant was identified and authenticated by Dr. G.V.S. Moorthy, Joint Director, Botanical Survey of India, Tamil Nadu Agricultural University, Coimbatore, India, where a voucher specimen (No. BSI/SC/5/23/05-06/Tech-240) of the plant has been kept in the herbarium.

2.2. Preparation of the extract

Fresh leaves were collected, shade-dried and powdered mechanically. About 60 g of the leaf powder were extracted with 600 ml of 70% ethanol by maceration at room temperature for 4 h using a mechanical shaker. The extract was dried at 40 °C under vacuum and the yield of the extract was 24%.

2.3. Phytochemical screening

Preliminary phytochemical screening of the powdered leaves was performed for the presence of alkaloids, phenolics, flavonoids, saponins, carotenoids, carbohydrates and glycosides (Khandelwal, 2004).

2.4. Animals

Albino rats of *Wistar* strain of either sex weighing between 150 and 200 g were used. They were housed in standard cages at room temperature (25 ± 2 °C) and provided with food and water *ad libitum*. The animals were deprived of food for 24 h before experimentation, but had free access to drinking water. The study was conducted after obtaining institutional ethical committee clearance bearing the number 817/04/ac/CPCSEA.

2.5. Drugs and chemicals

Aspirin was obtained from German Remedies Ltd., Mumbai, India and famotidine from Glenmark Pharmaceuticals Ltd., Mumbai. 2,2-Diphenyl-1-picrylhydrazyl hydrate and nitro blue tetrazolium were obtained from HiMedia Laboratories Pvt. Ltd., Mumbai, India. All other chemicals used in this study were obtained commercially and were of analytical grade.

2.6. Acute toxicity studies

Rats were kept overnight fasting prior to drug administration. A total of five animals were used which received a single oral dose (2000 mg/kg, b.w.) of *Jasminum grandiflorum* leaf extract (JGLE). After the administration of JGLE, food was withheld for further 3–4 h. Animals were observed individually at least once during the first 30 min after dosing, periodically during the first 24 h (with special attention during the first 4 h) and daily thereafter for a period of 14 days. Once daily cage side observations included changes in skin and fur, eyes and mucous membrane (nasal) and also respiratory rate, circulatory (heart rate and blood pressure), autonomic (salivation, lacrimation, perspiration, piloerection, urinary incontinence, and defecation) and central nervous system (ptosis, drowsiness, gait, tremors and convulsion) changes. Mortality, if any, was determined over a period of 2 weeks (OECD, 2002).

2.7. Selection of dose of the extract

LD_{50} was done as per OECD guidelines for fixing the dose for biological evaluation. The LD_{50} of the extract as per OECD guidelines falls under class four values with no signs of acute toxicity at 2000 mg/kg. The biological evaluation was carried out at doses of 100 and 200 mg/kg body weight.

2.8. Antiulcer activity

2.8.1. Aspirin + pylorus ligation-induced ulcer model

JGLE, aspirin and standard antiulcer drug, famotidine (Dharmani et al., 2005; Gupta et al., 2005) were prepared in 0.5% sodium carboxy methyl cellulose (CMC) suspension as vehicle and administered orally once daily at a volume of 10 ml/kg body weight. The animals were divided into four groups, consisting of six each. Group I received aspirin alone (200 mg/kg, p.o.). Groups II and III received JGLE orally at the doses of 100 and 200 mg/kg body weight respectively for 7 days. Group IV received famotidine orally at the dose of 20 mg/kg body weight for 7 days (Yesilada et al., 1997). From days 5 to 7, animals of all the groups received aspirin orally as an aqueous suspension at a dose of 200 mg/kg, 2 h after the administration of respective drug treatment (Goel et al., 1986; Venkataranganna et al., 1998). Animals in all the groups were fasted for 18 h after the respective assigned treatment and were anaesthetised with anaesthetic ether. The abdomen was opened by a small midline incision below the xiphoid process and pylorus portion of stomach was lifted out and ligated (Shay et al., 1945). Precaution was taken to avoid traction to the blood supply. The stomach was sutured with interrupted sutures. Four hours after pylorus ligation the rats were sacrificed and the stomach was removed. The gastric contents were collected, centrifuged and the volume of the supernatant was expressed as ml/100 g body weight. Free and total acidity were determined by titrating with 0.01N NaOH using Topfer's reagent and phenolphthalein as indicator (Parmar et al., 1984). The free and total acidity were expressed as μequiv./100 g/4 h. The stomach was then incised along the greater curvature and observed for ulcers. The number of ulcers was counted using a magnifying glass and the diameter of the ulcers were measured using vernier calipers. The following arbitrary scoring system (Dharmani et al., 2005) was used to grade the incidence and severity of lesions: (i) score 10 = denuded