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Evaluation of anti-inflammatory activity of Jasminum sessiliflorum extracts

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ABSTRACT

Medicinal plants are important resources for the development of novel anti-inflammatory agents. Synthetic anti-inflammatory drugs have several adverse effects. Medicinal plants have numerous bioactive phytoconstituents that are safer as well as better substitutes for the prevention and management of various diseases and disorders. The ethanolic and ethyl acetate extracts of *Jasminum sessiliflorum* were evaluated for their potential as anti-inflammatory agents in vivo by inducing paw edema in rats using carrageenan. The anti-inflammatory activity of the reference drug was compared with the extracts of *Jasminum sessiliflorum*. The extracts on screening indicated the presence of phyto-constituents such as phenolics, terpenoids, flavonoids, alkaloids, and saponins. The study established significant anti-inflammatory nature of the *Jasminum sessiliflorum* extracts in a manner which is dose-dependent. The results indicate that both the extracts of *Jasminum sessiliflorum* possess anti-inflammatory activity of significance and can be used in the development for novel anti-inflammatory moieties.

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INTRODUCTION

The body produces inflammation as a result of any trauma or physical injury. The features of inflammation are characterized by heat, pain, redness of the skin, swelling and function loss (Ferrero-Miliani *et al.*, 2006). The pathway of inflammation ranges from changes in the flow of blood, the synthesis of pro-inflammatory mediators, (Dassoler *et al.*, 2004) vascular permeability increase and the destruction of tissues (Lacaille-Dubois and Wagner, 1996). Lymphocytes, phagocytes, the injured cells, blood proteins and mast cells are the common sources of mediators in inflammation. Most important inflammatory mediators include bradykinins, tumor necrosis factor-α, serotonins, interleukin-6, histamine, leukotrienes, phospholipase, nitric oxide, lipoxygenases and cyclooxygenase 2. Acute and chronic are the two stages of the process of inflammation. The acute inflammatory pathway is initiated in a few minutes after damage to the tissue, which is marked by the changes in blood vessels characteristics, fluid and proteins leakage and white blood cell gathering for a short period (Lacaille-Dubois and Wagner, 1996). NSAID drugs are prescribed most commonly for conditions of inflammation. This is due to their effectiveness in the alleviation of pain, inflammation, fever and rheumatic disorders. Several disadvantages and adverse effects are associated with their frequent use.

To overcome the toxicity hazards involved with NSAIDs, the development of new drugs with anti-inflammatory activity becomes a necessity. The screening of medicinal plants have been consistently done for various pharmacological activities (Milgate and Roberts, 1995). This is due to the fact that sev-

eral biological compounds were present in medicinal plants with less undesirable effects. The potential for anti-inflammatory activity was seen in several plants. Thus, a wide variety of active constituents were seen in medicinal plants that can function as a source for the development of newer anti-inflammatory agents.

The plant, *Jasminum sessiliflorum* (Family: Oleaceae), is a climbing shrub with a smooth stem and minutely pubescent branchlets. The present investigation was done to evaluate the potential of both the extracts of *J.sessiliflorum* as anti-inflammatory agents and to act as the initial process towards the discovery of efficient anti-inflammatory agents of plant origin.

MATERIALS AND METHODS

Collection of plant materials

The plant *J. sessiliflorum* (Family: Oleaceae) were collected from Tirunelveli district, which is located at Tamilnadu, India. The plant was identified and authenticated by Mr. Chelladurai, Research officer-Botany, Central council for research in Ayurveda and Sidha, Government of India. After authentication, the fresh, healthy plants of *Jasminum sessiliflorum* was dried properly for three weeks in the shade and then segregated and powdered with the aid of a mechanical grinder. The powdered form of the species was stored in containers that were airtight.

Preparation of extracts

The plant *Jasminium sessliflorum* was successively extracted using a soxhlet assembly, by using various solvents such as petroleum ether, chloroform, ethyl acetate and ethanol (order of increasing polarity). Hot percolation method was employed to obtain the aqueous extract. The concentration of the extracts was done with the aid of rotary vacuum evaporator. The dried weight of the material was used to calculate the percentage yield after the weighing of the extract produced with each solvent (Lee *et al.*, 2009).

Animals

Animals used were albino rats of the Wistar strains. The animals weighing between 180-220gm were used for this experimental setup. They were provided with standard laboratory diet and also water ad libitum. All the experiments were approved by the Institutional Animal Ethics Committee. The experiments were carried out according to the guidelines of Control and Supervision of Experiments on Animal (CPCSEA), Government of India.

Acute toxicity study

Toxicity evaluation carried out was as per the accepted international protocol under OECD guidelines 423 in Wistar albino rats.

Anti-inflammatory studies

The anti-inflammatory potential of the *J.Sessiliflorum extracts* were evaluated by inducing paw edema in rats by using carrageenan. The rats were divided into different groups of 4 animals each.

Group, I rats were given normal saline and marked as a negative control. Group II animals were given carrageenan (1%w/v) in saline in the sub planter region of the right hind paw. Rats in Group III were given Indomethacin (10 mg/kg, bw) and considered to be the standard group. Rats from Group IV and V were administered two doses of ethyl acetate extract of *J.Sessiliflorum* (200 and 400 mg/kg bw). Group VI and VII were given two doses of Ethanolic extract of *J.Sessiliflorum* (200 and 400 mg/kg bw). The introduction of 0.1 ml, 1% carrageenan suspension in saline solution into the right hind paw was done after 1 hr. The paw circumference was measured at an interval of 4 hours (Liu *et al.*, 2012). Vernier calipers were used to measure the paw perimeter. The anti-inflammatory potential was calculated by using the formula:

$$\%\ inhibition\ of\ edema\ = \frac{T - T_0}{T}\ x\ 100$$

where T is the thickness of paw in control group; T_0 is the thickness of paw edema in the test compound treated group.

Statistical analysis

The anti-inflammatory potential was presented as the Mean increase in paw diameter with permitted standard deviation. One way ANOVA method was used to analyze the results obtained. Statistically, differences were considered at $P < 0.05$ as compared to control

RESULTS AND DISCUSSION

The treatment with ethyl acetate and ethanolic (200 and 400 mg kg^{-1}) extracts, as well as indomethacin reference drug (10 mg kg^{-1}) inhibited remarkably the paw edema in rats induced by the introduction of carrageenan. The reduction was measured at regular interval and presented in Table 1. The results were significant in comparison to the control. Inducing of edema by carrageenan is believed to be biphasic and has been the mostly widely used model for acute inflammation. The early stage of the model is mainly initiated by mediators such as histamine, serotonin and increased synthesis of

Table 1: Effect of ethyl acetate and ethanolic extracts of *J.sessiliflorum* on Paw Edema In Rats Induced by Carrageenan

Treatment	Dose (mg/kg, p.o.)	Mean increase in paw volume (ml)	% Decrease in paw volume
Normal control	10ml/kg saline	0.96 ± 0.07	————
Toxic control	0.1 ml, 1% carrageenan	3.33 ± 0.24*a	———–
Standard control	10mg/kg Indomethacin	1.30 ± 0.13**b	60.96%
Treatment control	Treatment control Ethyl acetate extract *J. sessiliflorum* 200mg/kg	1.52 ± 0.20*b	54.35%
Treatment control	Treatment control Ethyl acetate extract *J. sessiliflorum* 400mg/kg	1.48 ± 0.18*b	55.55%
Treatment control	Treatment control Ethanol extract *J. sessiliflorum* 200mg/kg	1.43 ± 0.16**b	57.05%
Treatment control	Treatment control Ethanol extract *J. sessiliflorum* 400mg/kg	1.36 ± 0.12**b	59.15%

Values were presented as mean ± SEM; Values were compared by applying ANOVA, which is followed by Newman-Keul's multiple range tests; * Values are different significantly from the normal control G_1 at P<0.01

prostaglandins (Vinegar *et al.*, 1982). The late-stage is maintained by the release of prostaglandin and sustained by leukotrienes, bradykinin, and prostaglandins. The anti-inflammatory potential demonstrated by both the extracts focus on the presence of some biologically significant phyto-chemicals (Lastra and Villegas, 2005). The modest dose-dependent anti-inflammatory activities were presented by both the extracts (Liu *et al.*, 2012). The flavonoids present in the extracts could be the reason of the improved effect exhibited by the extracts. It has been noted that considerable anti-inflammatory activity were exhibited by the presence of flavonoids, both in vitro and in vivo (Vinegar *et al.*, 1969). Variety of mechanisms mediated by flavonoids were considered responsible to prevent and attenuate inflammatory responses.

CONCLUSION

The ethanolic and ethyl acetate extracts of *J.sessiliflorum* exhibited appreciable anti-inflammatory potential on paw edema induced by the introduction of carrageenan in rats. The extracts of *J.sesiliflorum* showed dose-dependent anti-inflammatory potential. Results produced were comparable to the reference drug, indomethacin. The extracts of *J.sessiliflorum* could be, therefore used as an alternative source for the introduction of anti-inflammatory agents. The present study confirms scientifically and supports the use of *J.sessiliflorum* in the management of inflammation.

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