

Anti-inflammatory Activity of the Methanolic Extract of *Cinnamomum sulphuratum* Barks

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Abstract

In the present study, anti-inflammatory activity of the methanolic extract of *Cinnamomum sulphuratum* bark was investigated in Albino rats for carrageenan induced rat hind paw oedema using *in-vivo* experimental animal model. A 200mg dose of extract inhibited 71.43% of the carrageenan-induced oedema formation, while Ibuprofen inhibited 70.23%. The extract showed dose dependent anti-inflammatory activity, which was found to be statistically significant at $p < 0.001\%$.

Key Words: *Cinnamomum sulphuratum*; Lauraceae; barks; extracts; anti-inflammatory activity.

Introduction

Inflammation is caused by a variety of stimuli including physical damage, UV irradiation, microbial invasion and immune reactions. The classical key features of inflammation are redness, warmth, swelling and pain. Inflammation cascades can lead to the development of diseases such as chronic asthma, rheumatoid arthritis, multiple sclerosis, inflammatory bowel disease and psoriasis. Many of these diseases are debilitating and are becoming increasingly common in our aging society. Out of these, rheumatoid arthritis and osteoarthritis are the major inflammatory diseases affecting people world wide. Rheumatoid arthritis is an inflammatory condition that usually affects multiple joints. It affects 0.3-1.0% of the general population and is more prevalent among women in developed countries. Osteoarthritis, which is characterized by loss of joint cartilage that leads to pain and loss of function primarily in the knees and hips, affects 9.6% of men and of women aged more than 60 years. Increases life expectancy and aging populations are expected to make osteoarthritis the fourth leading cause of disability by the year 2020. The plant-based medicines initially dispensed in the form of crude drugs such as tinctures, teas, poultices, powders, and other herbal formulations, now serve as the basis of novel drug discovery (Gautam and Jachak, 2007).

Spices have been used for years in daily life to treat disease all over the world. The bark and the leaves of *Cinnamomum* species (Family Lauraceae) are commonly used as spices in home kitchens and their distilled essential oils or synthetic analogs are used as flavoring agent in the food and beverage industry (Jham et al. 2005). According to Maridass and Victor, (2008) seven *Cinnamomum* species such as *C. walaiwarensense*, *C. travancoricum* and *C. malabattrum*, *C. riparium*, *C. sulphuratum*, *C. filipedicellatum* and *C. wightii* were used for treating wounds, fever, intestinal worms, headaches and menstrual problems. Although traditionally known, some recent scientific studies have shown antimicrobial activity of essential oils of *Cinnamomum cassia*, *C. osmophloeum* and *C. zeylanicum* (Tiwari and Tiwari,1997; Ferhout et al. 1999; Mastura et al. 1999; De et al.1999; Chang et al. 2001).

Cinnamomum sulphuratum Nees, an evergreen tree up to 8.5m tall is distributed mainly in the Southern Western Chats of South India. Phytochemical screening of barks and leaves have been reported by several authors, like isolation and identification of a linalool-type (Nath et al.,1994), citral and cinnamaldehyde (Baruah *et al.*,1999), methyl cinnamate-type (Baruah et al.,2001) and cinnamaldehyde-type (Baruah *et al.*,2002). Since there is no report on the pharmacology of *C. sulphuratum*, in the present study, anti-inflammatory effect of methanolic extracts of the bark of this plant was evaluated by carrageenan-induced paw edema tests in rat.

Materials and Methods

The barks of *Cinnamomum sulphuratum* was collected from Inzhikuzhi, Tamil Nadu during May/June 2007, and were identified by Dr. U. Manikandan, SPKCES, Manonmaniam Sundaranar University, Alwarkurichi, Tamil Nadu. A voucher specimen has been deposited at Animal Health Research Unit, St. Xavier's College (Autonomous), Palayamkottai, South India.

Extraction and Preliminary Phytochemical Identification

250gm of dried and powdered barks was extracted with methanol in Soxhlet apparatus for 8hrs. The methanolic extracts were evaporated to dryness under vacuum evaporator, and the residue was obtained. Preliminary phytochemical screening of methanol extract of bark was carried out for the detection of anti-inflammatory compounds, using standard chemical tests (Maridass, 2006).

Toxicity assessment

Albino rats (75-85g) received per oral (*p. o.*) the crude extracts of *C. sulphuratum* barks (25, 50, 100, and 200mg/ kg⁻¹) and an equivalent dose of vehicle was administrated to the control group. Both test and control groups (5 animals each) were observed for 24h under normal environmental conditions, with free access to food and water.

Anti-inflammatory evaluation

All experimental protocols have been approved by the Institutional Animal Ethics Committee prior to the conduct of the experiments. In carrageenan- induced paw oedema model, groups of rats were orally administered with the methanolic bark extracts (25, 50, 100 and 200mg/kg, body weight), Ibuprofen (10mg/kg) or saline, 1hr before administration of an intradermal injection of carrageenan (0.1 ml of a 1% in 0.9% saline), into the plantar surface of the right hind paw. The paw volume up to a fixed mark at the level of lateral malleolus, was measured by recording the volume displacement by digital plethysmometer, just before, and three hours after the injection of carrageenan. The average percent of increase in paw volume of each group was calculated, and compared with that of the control (saline) and Ibuprofen groups.

Statistical Analysis

The data was analysed statistically using the unpaired Students test to discover the difference. The minimum level of significance was fixed at $p < 0.001$.

Results and Discussion

The toxicity in methanol extract of *Cinnamomum sulphuratum* was observed upto 500mg/kg in albino rats. The percentage inhibition of carrageenan-induced oedema formation by selected four concentrations of methanolic extract of *C. sulphuratum* bark has been shown in Table -1. At a dose of 200mg/kg dose of extract produced 71.43% inhibition, while the Ibuprofen produced 70.23% inhibition in case of the carrageenan-induced oedema ($P < 0.001$).

The anti-inflammatory effect showed by methanolic extract of *C. sulphuratum* bark (200mg/kg) was found to be more than that of Ibuprofen. The extract showed dose dependent anti-inflammatory activity, which was found to be statistically significant at higher concentration in acute carrageenan induced rat paw oedema model. These results were significant when analysed statistically. The crude methanol extract showed the presence of triterpenoids and phenolic groups. Hence, the results of the present investigation show that the triterpenoids and phenolic constituents of the crude methanolic extract of *C. sulphuratum* are active for the anti-inflammatory activity. Further work is currently in progress to isolate and identify the pure phenolic compounds and triterpenoids in our laboratory.

Table 1. Effect of bark extracts of *C. sulphuratum* on carrageenin induced rat paw oedema.

Group	Treatment	Dose (mg/kg, p.o.)	Mean oedema volume \pm SE (ml)	Inhibition of oedema (%)
1	Control	10 ml/kg	0.84 \pm 0.007	-
2	Extract (I)	25	0.75 \pm 0.005	10.71
3	Extract (II)	50	0.65 \pm 0.008	22.61
4	Extract (III)	100	0.56 \pm 0.006	33.33
5	Extract (IV)	200	0.24 \pm 0.004	71.43*
6	Ibuprofen (V)	10mg/ml	0.25 \pm 0.004	70.23

* $p < 0.001$ as compared to control group.
Values are mean + SE ; n = 5 in each group.

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