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Original Research Article

ANTI-INFLAMMATORY POTENTIAL OF AERIAL PARTS OF *SENNA ITALICA SSP MICRANTHA* (BRENAN) LOCK. (CAESALPINIACEAE)

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Abstract: The present study is intended to evaluate the anti-inflammatory activity of the methanolic extract of aerial parts of *Senna italica* ssp *micrantha*. The anti-inflammatory activity study is carried out by using carrageenan induced rat paw edema. The methanol extract of aerial parts of the *Senna italica* ssp *micrantha* is injected at different doses such as 250 and 500 mg/Kg body weight and the effect is compared with standard drug Indomethacin (10mg/Kg). This study established the anti-inflammatory potential of the plant *S.italica* ssp *micrantha.*

Keywords: Anti-inflammatory, paw edema, *S.italica* ssp *micrantha*,

Introduction: Inflammation is considered as a primary physiological defense mechanism that helps body to protect itself against infection, burn, toxic chemicals, allergens or other noxious stimuli. An uncontrolled and persistent inflammation may act as an etiologic factor for many of these chronic illness[1]. Although it is a defence mechanism, the complex events and mediators involved the inflammatory reaction can induce, maintain or aggravate many diseases[2].Steroidal and non steroidal drugs have an obvious role in the treatment of inflammatory diseases, but due to their toxicity, can be used over short periods. Prolonged use of Non-Steroidal Antiinflammatory Drugs (NSAID) is also associated with reverse side effects[3]. Consequently there is a need to develop new antiinflammatory agents with minimum side effects. Many plants have long been recognized as important sources of therapeutically treatment for inflammatory diseases[4].

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The *Senna italica* ssp *micrantha* is a ethanomedicinal shrub belongs to the family Caesalpiniaceae. It is mostly distributed in Southern Ethiopia and Omalia southwards to Namibia, Botswana, Zimbabwe and Mozambique and it has been introduced to India too. In India it is distributed in Andra Pradesh, Gujarat, Kerala, Karnataka, Maharastra, Punjab, Rajasthan and Tamil Nadu. *Senna italica* is traditionally used to as purgative,and to treat stomach complains, fever, jaundice, veneral diseases, biliousness and skin problems such as burns and ulcers[5].

To present knowledge, no reports on the effect *Senna italica* ssp *micrantha* on experimental inflammation is available. This study is therefore undertaken to evaluate the effects of mehanolic extracts of the aerial parts of *S.italica* ssp *micrantha* on anti inflammatory activity in carrageenan induced rat paw edema method.

Materials and Methods

Plant Material: The plant *Senna italica* ssp *micrantha* is collected from Thoothukudi district, Tamil Nadu. The plant is identified and authenticated by Botanical Survey of India, Southern circle Coimbatore as *Senna italica* ssp *micrantha* (Brenan) Lock (Caesalpiniaceae). Voucher specimen (SMCH-33527) was preserved in Research Department of Botany, St.Mary's College (Autonomous), Thoothukudi.

Preparation of plant extract for anti-inflammatory activity: The aerial part of *S.italica* ssp *micrantha was* powdered in a mechanical grinder. . 100gm of plant powder was packed in a soxhlet apparatus and extracted with methanol[6]. The methanol extract is concentrated in a rotary evaporator. The concentrated methanol extract was used for anti-inflammatory activity.

Animals: Adult Wistar Albino rats of either sex 200-250gm body weight were used for the present investigation. They were housed under standard environmental conditions at temperature (25±20°C) and light and dark (12:12 h). Rats were fed with standard pellet diet (Sai Durga Animal Feeds, Bangalore, India) and water *ad libitum*.

Acute toxicity study: Acute oral toxicity study was performed as per OECD-423 guidelines (acute toxic class method), albino rats (n=6) of either sex selected by random sampling were used for acute toxicity study (OECD, 2002). The animals were kept fasting for overnight and provided only with water, after which the extracts were administered orally at 5mg/Kg body weight by gastric incubations and observed for 14 days. If mortality was observed in two out of three animals, then the dose administered was assigned as toxic dose. If mortality is observed in one animal, then the same dose was repeated again to confirm the toxic dose. If mortality was not observed, the procedure was repeated for higher doses such as 50, 100 and 2000 mg/kg body weight.

Anti-inflammatory activity[7]

Carrageenan induced hind paw edema: Albino rats of either sex weighing 200-250 grams were divided into four groups of six animals each. The dosage of the drugs administered to the different groups was as follows. Group I - Control (normal saline 0.5 ml/Kg), Group – II and III aerial parts of *S.italica* ssp *micrantha* (250 and 500 mg/Kg, respectively), Group VI – Indomethacin (100mg/Kg). All the drugs were administered orally. Indomethacin served as the reference standard anti-inflammatory drug. After one hour of the administration of the drugs, 0.1 ml of 1% W/V carrageenan solution in normal saline was injected into the sub plantar tissue of the left hind paw of the rat and the right hind paw is served as the control. The paw volume of the rats were measured in the digital plethysmograph (Ugo basile, Italy), at the end of 0 min., 60min., 120min and 180mins. The percentage increase in paw edema of the treated groups was compared with that of the control and the inhibitory effect of the drugs was studied. The relative potency of the drugs under investigation was calculated based upon the percentage inhibition of the inflammation.

Percentage Inhibition = [(Vc-Vt)/Vc] ×100

Where,

Vt= Percentage difference in increased paw volume after the administration of test drugs to the rats

Vc= Difference of increased volume in the control groups.

Statistical analysis: The data are analyzed using student's t-test statistical methods. For the statistical tests a *p* values of less than 0.01 and 0.05 is taken as significant.

Result and Discussion: In the present study the anti-inflammatory activity of methanolic extract of aerial parts of *Senna italica* ssp *micrantha* had been established. Table 1 shows the anti-inflammatory activity of methanolic extracts of aerial parts of *Senna italica* ssp *micrantha*.The 500mg/Kg *S.italica* ssp *micrantha* exhibited

more significant anti-inflammatory activity in carrageenan induced paw oedema. *S.italica* ssp *micrantha* at doses of 250mg/Kg b.wt and 500mg/Kg b.wt caused significant inhibition of paw oedema by 79.78% and 84.81% respectively and the results were compared to Indomethacin (85.89%).

Table 1: Effect of methanolic aerial part extracts of *Senna italica* ssp *micrantha* on the Percentage of inhibition on the Carrageenan induced rat paw edema

Treatment	Edema volume (ml)					% Inhibition after 180 min
	Dose mg/Kg	0 min	60 min	120 min	180 min	
Group-I	Normal saline	34.24±1.54	78.54±1.98	104.65±2.11	129.50±1.89	-
Group II	250 mg/Kg	31.67±1.13	57.16±1.27*	26.59±1.68***	26.18±1.08***	79.78
Group III	500 mg/Kg	35.81±1.13	41.36±1.38**	26.59±1.68***	19.67±1.23***	84.81
Group IV	100 mg/Kg	33.48±1.92	38.16±1.27**	21.16±1.13***	18.26±0.96***	85.89

Each Value is SEM ± 5 individual observations * P < 0.05 ; ** P<0.01 *** P<0.001,Compared paw edema induced control vs drug treated rats

Group I : Normal Control: -Mouse given normal saline, intraperitonially (IP).

Group II : Carrageenan induced mice treated with *Senna italica* ssp *micrantha* extract at the dose of 250mg/Kg b.wt.

Group III : Carrageenan induced mice treated with *Senna italica* ssp *micrantha* extract at dose of 500mg/Kg b.wt.

Group IV : Carrageenan induced mice treated with indomethacin drug at the dose of 100mg/Kg b.wt.

Carrageenan induced inflammation is useful in detecting orally active anti-inflammatory agents[8]. Edema formation due to carrageenan in the rat paw is a biphasic event[9]. The early phase (1 to 2 hr) of the carrageenan model is mainly mediated by histamine, serotonin, and kinins whereas the second phase is related to the release of prostaglandin and slow reacting substances which peak at 3 hr[10]. Prostaglandin-E_2, a powerful vasodilator, synergizes with other inflammatory vasodilators such as histamine, bradykinin and contributed to redness and increased blood flow in areas of acute inflammation[11]. The significant (P< 0.001) suppressive activity of the methanol extract of aerial parts of *S.italica* ssp *micrantha* in late phase showed its potent anti-inflammatory effect.The results provides a scientific basis for the utilization of these herbs in traditional medicine for the treatment of wounds and other conditions that can cause inflammation.

Cyclohexanol, 3, 5-dimethyl-, stigmasterol, diazoprogesterone, phytol, 9, 12, 15-octadecatrienoic acid, methyl ester, (Z, Z, Z)-, á-sitosterol and lupeol were the phytocompounds with the anti-inflammatory activity reported by GC-MS analysis of this plant[11] (Jothi *et al.*, 2015). In the present study, the anti-inflammatory activity of aerial parts of *Senna italica* ssp *micrantha* could be attributed to the above chemical constituents. The methanolic aerial part extract of *S.italica* ssp *micrantha* could serve as an alternative in inflammatory therapy in managing inflammatory conditions or as complementary therapy thereby minimizing the side effect of these standard drugs.

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