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Anti inflammatory Activity of a Siddha Herbal Drug Sengathaari Root Bark (SRB) Decoction in Experimental Rats

K. Vennila* and R. Pattarayan²

*Lecturer, ² Former Head of the Paediatrics Department,
National institute of Siddha, Chennai, (TN) - India

Abstract

Siddha is the indigenous system of Medicine practiced in South India especially in TamilNadu. The Siddha system is dealing with natural system of medicines, with fewer side effects and for this reason it is still thriving steadily as living science even amidst the more advanced modern medical science. Inflammation is a local response of living mammalian tissues to injury. It is a body defense reaction in order to eliminate or limit the spread of injurious agent. In the present investigation, Sengathaari Root bark decoction was prepared as per the method given in siddha text and studied for anti-inflammatory activity in experimental rats. In the present study, the sengathari root bark was evaluated for its anti-inflammatory activity by carrageenan induced rat paw edema model and cotton pellet granuloma method of inflammatory response. In the present study the drug sengathaari root bark was found to possess good anti-inflammatory active both in acute and chronic models in experimental rats.

Key-Words: *Sengathaari*, *Capparissepia*, Siddha formulation, anti inflammatory activity

Introduction

Inflammation is a local response of living mammalian tissues to injury. It is a body defense reaction in order to eliminate or limit the spread of injurious agent ¹. There are various components to an inflammatory reaction that can contribute to the associated symptoms and tissue injury. Edema, leukocyte infiltration, and granuloma formation represent such components of inflammation. Though, it is a defense mechanism. The complex events and mediators involved in the inflammatory reaction can induce or aggravate many reactions ².

According to the WHO report, about 70–80% of the world's population rely on nonconventional medicine mainly from herbal sources in their primary health care ^{3,4}. Especially, its demand is increasing day by day in developing countries where the cost of consulting a physician and price of medicine are beyond the limit of most people ⁵. These drugs are anti-inflammatory and used to ease pain in various conditions including: arthritis, muscle, and ligament pains.

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Tamilnadu. The Siddha system is dealing with natural system of medicines, with fewer side effects and for this reason it is still thriving steadily as living science even amidst the more advanced modern medical science. There is an overall shift towards herbal medicines from modern medicine and the standardization part of herbal medicine became mandatory for the acceptance of the drug by modern scientific community⁶.

Sengathari known as *Capparissepia* is indicated for Eczematous disorders, Allergic disorders, Kaba diseases, Mahavadham in siddha system of medicine. In the present investigation, Sengathaari Root bark decoction was prepared as per the method given in siddha text and studied for anti inflammatory activity in experimental rats.

Material and Methods

Procurement of Raw drug

The raw drug Sengathaari root bark was procured from M/s Gopal Aasan Country drug store, Nagercoil, Tamilnadu, India.

Authentication of Raw drug

The raw drug Sengathaari root bark was authenticated by Dr. D. Aravindhan, Assistant Professor of Medicinal Botany, National Institute of Siddha, Chennai, Tamil Nadu, India.

* Corresponding Author

E.mail: drvennila2@gmail.com

Purification of Raw drug

The impurities like stone, sand were removed from the root bark and then sauted in an iron vessel and dried in sunlight for a day.

Procedure for the Preparation of SRB decoction

The Sengathaari root bark decoction was made by adding 25 gms of Sengathaari Root Bark coarse powder with 480 ml of water and was boiled till the water reduced to 1/8 of its original quantity. The Sengathaari Root Bark coarse powder was kept in a clean, dry, airtight glass container.

Route of administration : Oral

Dose : 60 ml twice a day

Duration : 6 Days

Indication : Eczematous disorders,

Allergic disorders,

Kaba diseases, Mahavadham.

Reference : PatharthaGuna Vilakam⁷

Animal ethical clearance

The study protocol has got approval from Institutional Animal Ethical Committee of KMCH college of Pharmacy, Coimbatore, India (KMCRET/MD(S)/08/2014-15) and the studies were conducted at the department of Pharmacology of same college.

Preparation of test samples

25 g of coarse powdered root bark of Sengathaari was boiled in 500 ml of water and reduced to 50 ml decoction. 1 ml constitutes the extract of 500 mg Sengathaari root bark (SRB). For each time, freshly prepared SRB decoction was made.

Experiment animals husbandry

Male and female Wistar Albino rats (120- 160 g) were obtained from the animal house of Sri Venkateshwara Enterprises, Bangalore and maintained in the animal house of KMCH of Pharmacy, Coimbatore. Animals were housed in individually in polypropylene cages in a ventilated room (air cycles: 15/min; 70:30 exchange ratio) under an ambient temperature of 22±2°C and 40–65% relative humidity, with a 12-h light/dark artificial photoperiod. The animals received RO water *ad libitum* and fed with Rodent pellet purchased from Sri Venkateshwara Enterprises, Bangalore.

Carrageenan induced acute hind paw inflammation

Wistar rats were divided into five groups of six rats each. Group 1 received 1 ml of distilled water, Group 2 received a standard drug Diclofenac sodium (10 mg/kg suspended in 1 ml of distilled water) orally whereas group 3, 4 and 5 received test samples at three dose levels viz., 500 mg/kg (Low dose), 1250 mg/kg (Intermittent dose) and 2000 mg/kg (High dose) of SRB decoction as oral. After above treatment acute paw oedema was developed in all rats by injecting 0.1 ml of

1% (w/v) Carrageenan solution prepared in normal saline in sub plantar region of the left hind paw of all rats⁸.

The volume paw was measured at 0, 1, 2, 3, 4, 5 and 6 h using digital Plethysmometer after the administration of Carrageenan. The percentage of paw edema inhibition calculated by the formula

$$\frac{A - B}{A} \times 100$$

Where, A denotes the mean increase in paw edema of Control group, B denotes the mean increase in paw edema of standard / test groups

Cotton pellet granuloma method

Wistar rats were divided into five groups of six rats each. Adsorbent cotton wool was cut into pieces weighing 20±1 mg and made into pellets. The pellets were then sterilized in a hot air oven at 120° for 2 h. The abdomen was shaved cleanly, swabbed with 70% ethanol and two sterilized cotton pellets were implanted subcutaneously, one on each side of the abdomen of the animal under light ether anaesthesia. After implantation, Group 1 received 1 ml of distilled water, Group 2 received a standard drug Dexamethasone (10 mg/kg suspended in 1 ml of distilled water) orally whereas group 3, 4 and 5 received test samples at three dose levels viz., 500mg/kg (Low dose), 1250 mg/kg (Intermittent dose) and 2000 mg/kg (High dose) of SRB decoction as oral. Test drugs were administered once daily throughout the experimental period of 7 days. On the 8th day after implantation, rats were anaesthetized with pentobarbital sodium. The pellets were dissected and dried at 60° for 24 h, weighed after cooling. The mean weight of the cotton pellets of the control group as well as of the test groups was calculated. The percentage inhibition of the dry and wet weight of the granuloma were calculated and compared⁹.

Results and Discussion

Medicinal plants have been source of wide variety of biologically active compounds for many centuries and used extensively as crude material or as pure compounds for treating various disease conditions¹⁰. Unlike allopathic medicines the plant drugs work in a synergistic way¹¹. The use of herbal medicines has become popular due to the toxicity and side effects of allopathic drugs. India with its biggest repository of medicinal plants in the world may maintain an important position in the production of raw materials either directly for crude drugs or as the bioactive compounds in the formulation of pharmaceuticals and cosmetics etc¹².

Plants have played a major role in ameliorating the human diseases. Many plants have been proved to be helpful in the inflammatory disorders. It is believed that current analgesia inducing drugs such as opiates and NSAIDS are not useful in all cases, because of their side effects like GIT irritation, liver dysfunction and much more. Large number of herbal species has been used traditionally or as folk medicines against inflammatory disorders. Many of them have been studied scientifically and proved to be beneficial anti-inflammatory agents¹³.

Concluion

In the present investigation anti-inflammatory activity of sengathari root bark was studied by using inhibition of carrageenan induced inflammation which is one of the most feasible methods to screen anti-inflammatory agents. Carrageenan-induced inflammation is a useful experimental model of acute inflammation for detecting orally active anti-inflammatory agents¹⁴. Edema formation in the rat paw is a biphasic response. The first phase is mediated through the release of histamine, serotonin, and kinins, whereas the second phase is due to the release of prostaglandin and slow reacting substances¹⁵. In this experiment the suppression of inflammation may be due to PG and kinin synthesis/release inhibition and antihistamine activities. The maximum inflammation is seen approximately three hours post the carrageenan injection, after which it begins to decline. The cotton pellet granuloma method has been widely employed to access the transudative, exudative and proliferative components of subacute inflammation. To conclude, in the present study the drug sengathari root bark possessed good anti-inflammatory active both in acute and chronic models in experimental rats.

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Table 1: Initial body weight of the wistar rats in five groups in Carrageenan induced acute hind paw inflammation

	Only Carrageenan	Carrageenan + STD	Carrageenan + Ext100mg/Kg	Carrageenan + Ext200mg/Kg	Carrageenan + Ext300mg/Kg
Body weight	123.667±39.1073	112.667±35.6405	116.833±36.9688	119.333±37.7807	116±36.7378

Values are expressed as the mean ± S.D. Statistical significance (p) calculated by one way ANOVA followed by dunnett's. ns- not significant **P< 0.05 calculated by comparing treated group with control group

Table 2: Effect of SRB decoction on carrageenan-induced paw edema in rats

Group	Mean paw volume before carrageenan injection	Paw Volume after induction with carrageenan						
		Increase in paw volume (ml) after carrageenan injection (mean ± SEM)/Percent inhibition of edema						
	0 min	30 min	1h	2h	3h	4h	5h	6h
Control	2.53±0.80	6.58±2.085	6.28±1.99	5.83±1.85	5.71±1.81	5.39±1.71	4.65±1.47	4.96±1.57
Standard	2.61±0.83	6.66±2.109	5.40±1.71	5.35±1.70	5.26±1.67	5.11±1.62	4.40±1.39	4.19±1.33
LD	2.36±0.76	6.007±1.91	5.38±1.71	5.24±1.67	5.16±1.63	5.39±1.70	4.40±1.39	4.57±1.46
MD	2.87±0.94	6.24±1.99	5.71±1.82	5.40±1.71	5.38±1.70	5.047±1.60	4.61±1.47	4.29±1.38
HD	2.64±0.84	6.06±1.92	5.59±1.77	5.22±1.66	5.11±1.62	4.99±1.58	4.22±1.34	3.86±1.23

Values are expressed as the mean ± S.D. Statistical significance (p) calculated by one way ANOVA followed by dunnett's. ns- not significant **P< 0.05 calculated by comparing treated group with control group

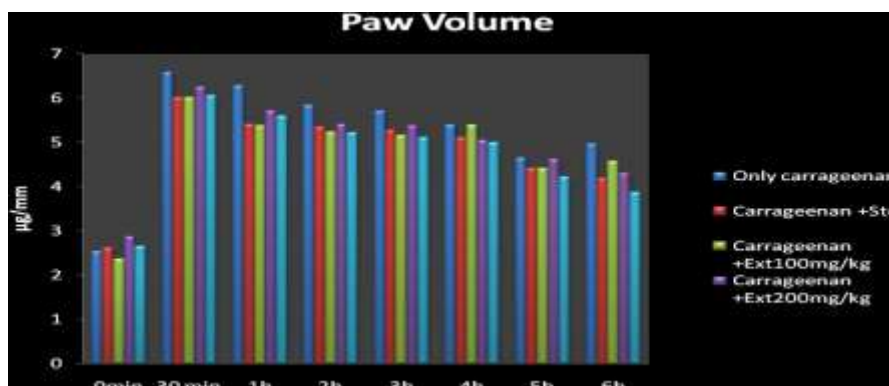


Fig. 1: Effect of SRB on carrageenan-induced paw edema in rats

Table 3: Initial body weight of the wistar rats among five groups in Cotton pellet granuloma method

GROUP	ONLY COTTON	COTTON + STD	COTTON + L.D	COTTON + M.D	COTTON + H.D
BODY WEIGHT	145.83±1.3	155.83±2.50	171.33±1.021	162±2.463	151±5.13

Values are expressed as mean ± SEM Statistical significance (p) calculated by one way ANOVA followed by dunnett's (n=6); ^{ns}p>0.05, *p<0.05, **p<0.01, ***p<0.001, calculated by comparing treated groupsTumor with control group.

Table 4: Initial dry cotton weight, wet cotton weight, final cotton dry weight of the wistar rats among five groups in Cotton pellet granuloma method

GROUP	ONLY COTTON	COTTON + STD	COTTON + L.D	COTTON + M.D	COTTON + H.D
Dry Cotton Weight	0.25±0	0.25±0	0.25±0	0.25±0	0.25±0
Wet Cotton Weight	0.73±0.18	0.50±0.081	0.46±0.049	0.518±0.079	0.44±0.027
Final Cotton Dry Weight	0.156±0.03	0.34±0.167	0.19±0.097	0.113±0.024	0.099±0.022

Values are expressed as mean ± SEM Statistical significance (p) calculated by one way ANOVA followed by dunnett's (n=6); ^{ns}p>0.05, *p<0.05, **p<0.01, ***p<0.001, calculated by comparing treated groupsTumor with control group.

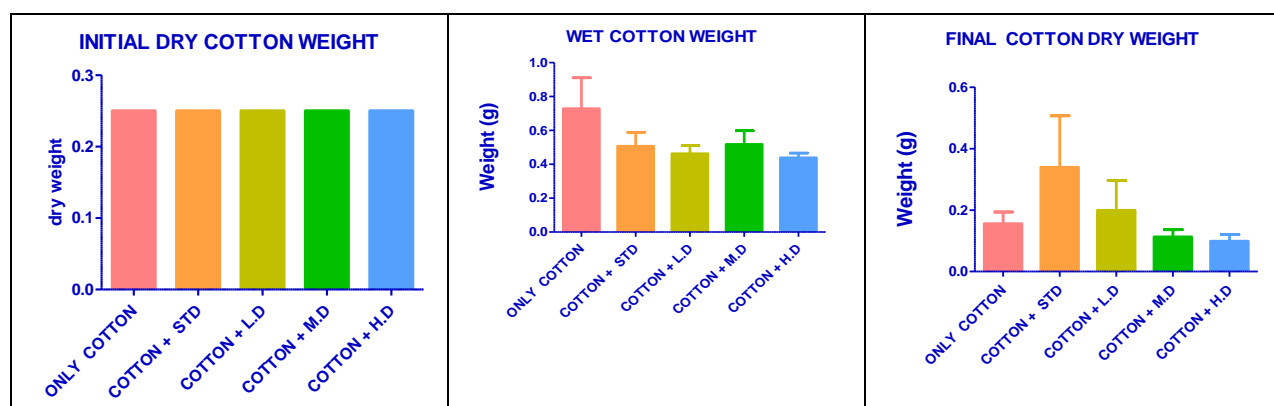


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