

EVALUATION OF ANTI-INFLAMMATORY POTENTIAL OF AQUEOUS EXTRACT OF ROOT BARK OF *STEREOSPERMUM SUAVEOLENS DC.*

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ABSTRACT

The Root Bark of plant *Stereospermum suaveolens DC.* Was traditionally used for the treatment of pains and inflammations. The present study was carried out using carrageenan-induced paw edema method in wistar adult rats. The dried root of plant was subjected to the maceration for 24 hrs. The aqueous extract was tested for preliminary phytochemical studies. It was found that the *Stereospermum suaveolens DC* revealed the presence of alkaloids, steroids, flavonoids, and phenolic compounds. The aqueous extract at 125mg/kg was showed significantly inhibited edema and produced the significant ($p < 0.05$) anti-inflammatory effects. Carrageenan induced edema model is biphasic and significant activity in dose 125mg/kg seen as compared to 250mg/kg, 500mg/kg of aqueous extract. The mean of percentage inhibition is 23.74 which were found to be higher at 125mg/kg dose as compared with mean of percentage inhibition at 250mg/kg and 500mg/kg which was found to be 14.44 and 19.71 respectively. The observed pharmacological activity provide the scientific basis to support traditional claims as well as, exploring some new and promising leads.

Keywords: Anti-inflammatory activity, Carrageenan-induced paw edema, Root bark aqueous extract, *Stereospermum suaveolens DC.*

INTRODUCTION

The widespread use of herbal remedies and healthcare preparations, such as those described in ancient texts like the Vedas and the Bible have been traced to the occurrence of natural products with medicinal properties¹. Man has been using herbs and plants products for combating diseases since times immemorial. The Indian subcontinent is enriched by a variety of flora-both aromatic and medicinal plants. The World Health Organization is now actively encouraging developing countries to use herbal medicine which they have been traditionally used for centuries². Anti-inflammatory are the agents pain-relieving drugs reduce swelling and inflammation³. Inflammatory diseases are accompanied by the chronic release of cytokines which may be involved in increased tissue injury⁴. *Stereospermum suaveolens DC* is a medicinal tree species native to India, Bangladesh and Myanmar. The Bignoniaceae family having about 100 genera with 800 species are known for their antimicrobial and antiprotozoal properties⁵. Inflammation is a localized reaction of the living body against an irritant (injurious agent) caused by release of chemicals from tissues and migrating cells, most strongly implicated are the prostaglandins, leukotrienes, histamine, bradykinin, and more recently, interleukin-1 and platelet activating factor in an attempt to destroy, dilute or wall off that irritant⁶. Traditionally root is used in the remedies of diseases like in "kapha", and "amlapitta", inflammations, heating, dyspnoea, body ache, vomiting, eructation, piles, acidity, diarrhoea, gonorrhoea, loss of taste, malaria and other fevers. It is reputed for its antipyretic property and is also useful in excessive thirst, cough and asthma^{7, 8, 9, 10}. Report on the plant Anti hyperglycemic and antioxidant¹¹. Antiulcer and gastroprotective.¹² Anti-inflammatory effects of ethanol extract of bark¹³ and analgesic and antipyretic activities¹⁴. An extensive literature survey does not reveal anti-inflammatory activity of roots of plant. So the present study was undertaken to investigate the anti-inflammatory activity of aqueous extract of roots of *Stereospermum suaveolens DC.*

MATERIALS AND METHODS

Drug and its Authentication

The fresh roots of *Stereospermum suaveolens DC.* Were collected from Rahuri Dist.-Ahmednagar (Maharashtra); were authenticated by Dr.P.G.Diwakar. Joint Director, Botanical survey of India, Pune, Voucher number kharat-1

Extraction

After authentication fresh roots were collected in bulk, washed under running tap water to remove adhering dust, dried under

shade and powdered with the help of a mechanical grinder. The coarse powdered material was macerated in distilled water: chloroform (9:1) to form an aqueous extract. The extract was concentrated to a small residue (5 gm)¹⁵.

Preliminary Phytochemical Screening

The dried aqueous extract was subjected to Preliminary Phytochemical Investigations for the identification of secondary metabolites by utilizing standard methods of qualitative test analysis¹⁶.

Animals Used

Adult wistar rats of both sexes weighing between 200-250 g were used for the study. The animals were kept under standard husbandary conditions and water ad libitum throughout experiment period. All animal experiments were carried out in accordance with the guidelines of CPCSEA. The study has received the institutional animal ethical committee approval for conducting anti-inflammatory activity.

Acute Toxicity Study

The acute toxicity of aqueous extracts of *Stereospermum suaveolens DC* Root Bark was determined in mice. OECD guideline No.423; was adopted for the study. One fourth, one eighth and one sixteenth of LD₅₀ cut off (2000 mg/kg) values taken as screening dose.

Anti-inflammatory activity by acute method

Carrageenan induced rat paw edema¹⁷

In the present study animals were divided into five groups of six rats each. Group I was administered distilled water (5ml/kg) orally and served as control. Group II served as standard and received Ibuprofen (20mg/kg) orally. Group III, IV and V were given orally aqueous extract (125, 250 and 500 mg/kg; orally) of *Stereospermum suaveolens DC* roots respectively.

After 1 hr of administration of above dose all the rats were treated with 0.1ml of 1% suspension of carrageenan in normal saline was injected into the sub plantar region of left hind paw to induce edema. The paw volume was measured initially at 0, 1, 2, 3 hr after 0.1ml of carrageenan injection (1%) using digital plethysmometer (VJ-instruments). The difference between the initial and subsequent values gave the actual edema volume which was compared with control. The inhibition of inflammation was calculated using the formula % inhibition = $100 \left(\frac{V_t - V_c}{V_t} \right)$, where 'Vc' represents edema volume in control and 'Vt' represents edema volume in group treated with aqueous extract.

Statistical Analysis

Results were expressed as mean \pm SEM, (n=6). Statistical analysis were performed with one way analysis of variance (ANOVA) followed by Dunnett's multiple comparison test. P value less than < 0.05 was considered to be statistically significant. *P < 0.05, **P < 0.01 and ***P < 0.001, when compared with control and toxicant group as applicable.

RESULTS AND DISCUSSION

Preliminary Phytochemical Screening

The preliminary phytochemical investigation of aqueous extract of roots of *stereospermum suaveolens* DC. has revealed the presence

of alkaloids, carbohydrates, steroids, tannins, flavonoids and saponins.

Anti-inflammatory activity

The preliminary phytochemical screening indicates presence of Alkaloids, Tannins, Steroids, flavonoids and Saponins these Phytochemicals offer protection role in chronic diseases. Carrageenan induced edema model is biphasic and significant activity in dose 125mg/kg seen as compared to 250mg/kg, 500mg/kg of aqueous extract. The percentage inhibition is higher in 125mg/kg dose. This may be effective in early phase of carrageenan model of inflammation mediated by histamine, serotonin and increased synthesis of prostaglandins in damaged tissue surroundings.

Table 1: shows anti-inflammatory activity of aqueous extract of Roots of *Stereospermum suaveolens* DC.

Paw volume Groups	Time intervals in hrs.			
	0	1	2	3
Control (5ml/kg)	1.925 \pm 0.12	2.125 \pm 0.10	1.953 \pm 0.07	2.468 \pm 0.11
Std. Ibuprofen (20mg/kg)	1.643 \pm 0.07	1.520 \pm 0.02**	1.665 \pm 0.06	1.813 \pm 0.16
Aqueous extract(125mg/kg)	1.533 \pm 0.09	1.350 \pm 0.13***	1.855 \pm 0.18	1.655 \pm 0.21*
Aqueous extract (250mg/kg)	1.575 \pm 0.10	1.518 \pm 0.12**	1.868 \pm 0.15	2.316 \pm 0.12
Aqueous extract (500mg/kg)	1.495 \pm 0.11	1.583 \pm 0.07**	1.380 \pm 0.11*	2.425 \pm 0.19

Each value is mean \pm SEM, N=6, P < 0.05 Statistically significant value determined by One way ANOVA and followed by Dennett's Multiple comparison test (control with other groups).

Table 2: shows Percentage inhibition of paw edema by aqueous extract of Root Bark of *Stereospermum suaveolens* DC.

Aqueous extract Dose	Percentage inhibition				
	0hrs	1hrs	2hrs	3hrs	Mean
125mg/kg	20.36	36.47	5.2	32.94	23.74
250mg/kg	18.18	28.56	4.9	6.15	14.44
500mg/kg	22.33	25.50	29.33	1.7	19.71

CONCLUSION

The Aqueous extract of Root Bark of *Stereospermum suaveolens* DC showed significant Anti-inflammatory activity against carrageenan induced paw edema in rats. The Anti-inflammatory activity may be attributed to the presence of different phytoconstituents present in the plant root extract, especially steroids and flavonoids, which are found to act by reducing the release of inflammatory substance like prostaglandin there by reducing exaggeration^{18, 19}. Further detailed investigation needs to be underway to determine the exact phytoconstituents, which are responsible for the Anti-inflammatory activity and may provide deeper insight to the discovery of a potent drug for the treatment of inflammation. The inhibitory activity of the extract justified the use of the plant as a non-specific anti-inflammatory activity in folk medicine.

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