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ANTI-INFLAMMATORY ACTIVITY OF BARK EXTRACT OF *SESBANIA SESBAN* (L) MERR.

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ABSTRACT

As the plant *Sesbania sesban* is used in the traditional medicine for the treatment of some ailment, it is very essential to standardize it for its use as a drug. This study was intended to evaluate the anti-inflammatory activity of bark extract of *Sesbania sesban* with the help of different animal models. Colony-bred adult Wistar rats (150–200 g) were used for anti-inflammatory activity. Methanol extract and petroleum ether extract of bark (250 mg/kg, i.p.) produced significant ($P<0.05$) inhibition of paw edema as compared to the control.

INTRODUCTION

Sesbania sesban is a short-lived shrub upto 8m tall, a small perennial tree which belongs to the family *Fabaceae.* Phytochemicals are natural chemicals that are produced by plants. They are non-nutritive but are needed by plants for purposes such as disease and pathogen defense and control. They display different biological activities such as anti-oxidant, anti-inflammatory, anti-cancer and anti-bacterial activities. *Sesbania sesban* bark is useful in ulcers, leucorrhoea, vitiated conditions of pitta, anaemia, bronchitis, tumours, dysentery inflammations, cirrhoses of the liver and hypertention.

Traditionally the plant is used in the treatment of inflammatory rheumatic conditions, diarrhea, in excessive menstrual flow, to reduce enlargement of spleen and in skin diseases. Ethnomedicinal information suggests that *Sesbania sesban* is traditionally used as anti-inflammatory. Inflammation of lungs and airways is one of the symptoms in asthma. Anti-inflammatory and analgesic drugs play a significant role in the treatment of asthma by providing relief from the inflammation and pain of the airways. Hence, objective was to check the anti-inflammatory potential of plant.

MATERIAL AND METHODS

Plant material:

Bark of plant *Sesbania sesban (L) Merr.* was collected from Hatti village in Dhule district of Maharashtra and later on authenticated by Mrs. J. Jayanthi, Head of the department, Botanical Survey of India, Pune, where herbarium voucher specimen No. (RKC-1) has been deposited.

Extraction and isolation

Dried and powdered bark of *S. sesban* was extracted successively with various solvents viz. petroleum ether, chloroform, and methanol in Soxhlet extractor. Extracts were concentrated by vacuum distillation and then dried in open air to produce respective extracts.

Animals

Colony-bred adult Wistar rats (150–200 g) were used for anti-inflammatory activity. The animal had free access to food and water, standard pelleted laboratory animal diet (Godrej Agrovet Ltd. Mumbai, India) was provided *ad libitum* during acclimation and study period. The animals were kept at temperature 20° – 25° C and relative humidity 30 – 70 %. The cycle of 12-hour light and 12 hour dark was maintained. The experimental protocol was approved by institutional animal ethical committee.

Drugs and Chemicals

The following drugs and chemicals were used. Drugs: Ibuprofen (Taj Pharmaceutical, India) and carrageenan purchased from a commercial source. **Chemicals:** Petroleum ether extract of bark, chloroform extract of bark and methanol extract of bark of *Sesbania sesban* and 5% Tween 80 (Merck) solution in distilled water as vehicle.

Assessment of Antiinflammatory activity

Antiinflammatory activity was evaluated using carrageenan-induced hind paw edema method (Winter et al., 1962; Pandey et al., 2012). Wistar rats of either sex were divided into five groups of six animals each. The first group served as control and received only vehicle (10% Tween 80 in distilled water), and the second group was administered standard drug ibuprofen (50 mg/kg, i.p.). The animals of the third to fifth groups were treated with petroleum ether extract of bark, chloroform extract of bark and methanol extract of bark of *Sesbania sesban* (250 mg/kg, i.p., each), respectively. All the extracts and standard drug were dissolved in the vehicle. After 30 min of the above treatments, 0.05 ml of 1%w/v carrageenan in saline was injected into the subplantar tissue of the left hind paw of the animals. The degree of paw edema of all the groups was measured plethysmometrically at 0, 1, 2 and 3 hrs. after the administration of carrageenan to each group; 0 min readings are the initial paw volume of animals.

Statistical analysis

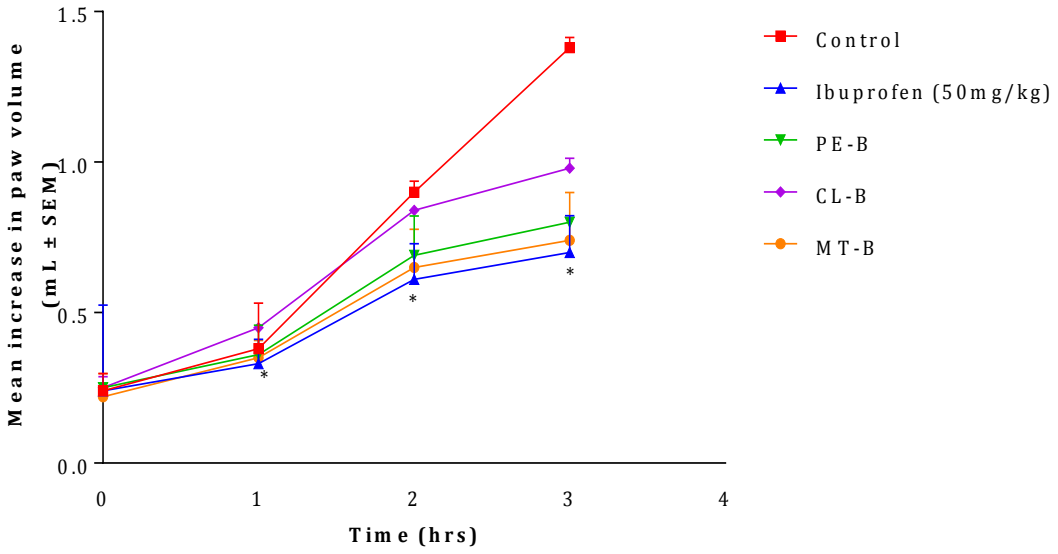
All the data is presented as mean ± SEM. Data was analyzed by one-way ANOVA followed by Dunnett's test. Prism Graph pad 7 was used for statistical analysis. $P<0.05$ was considered significant.

Table 1: Effect of various extracts of *bark of Sesbania Sesban* on carrageenan-induced rat paw edema.

Treatment	Mean increase in paw volume (ml ± SEM) Time (Hrs)			
	0	1 hr	2 hrs	3 hrs
Carrageenan (Control)	0.24 ± 0.14	0.38 ± 0.37	0.90 ± 0.09	1.38 ± 0.08
Ibuprofen (50 mg/kg, i.p.)	0.24 ± 0.70	0.33 ± 0.20*	0.61 ± 0.29*	0.70 ± 0.30*
PE-B	0.25 ± 0.04	0.36 ± 0.24*	0.69 ± 0.32*	0.80 ± 0.03*
CL-B	0.25 ± 0.09	0.45 ± 0.04	0.84 ± 0.02	0.98 ± 0.08
MT-B	0.22 ± 0.19	0.35 ± 0.14*	0.65 ± .0.31*	0.74 ± 0.39*

All the values are expressed as mean ± SEM; n = 6; *P < 0.05 significant compared to control.
Where, PE-B – Petroleum ether extract of bark; CL-B – Chloroform extract of bark; MT-B – Methanol extract of bark.

Figure 1 : Effect of various extracts of *Sesbania sesban* (250 mg/kg, i.p.) on carrageenan-induced rat paw edema.



All values are expressed as mean ± SEM; n=6, * P<0.05 significant compared to control.

Where, PE-B – Petroleum ether extract of bark; CL-B – Chloroform extract of bark; MT-B – Methanol extract of bark

RESULTS AND DISCUSSION

Anti-inflammatory activity

In the acute inflammation model i.e. carrageenan-induced rat paw edema method, Methanol extract and petroleum ether extract of bark (250 mg/kg, i.p.) produced significant (P<0.05) inhibition of paw edema as compared to the control. The activity of extracts was compared with standard drug ibuprofen (50 mg/kg, i.p.).

Carrageenan-induced edema is a biphasic response. The first phase is mediated through the release of histamine, serotonin and kinins, whereas the second phase is related to the release of prostaglandin and slow reacting substances which peak at 3 h (Vinegar et al., 1969). In case of analgesia, prostaglandins and bradykinins were suggested to play an important role in the pain process (Dray and Perkin, 1993). Some sterols and triterpenes are responsible for anti-inflammatory and analgesic activity (Singh et al., 1997). Methanol extract of bark and Petroleum ether extracts of bark of *Sesbania sesban* showed significant anti-inflammatory activity. Thus these extracts might be responsible for anti-inflammatory activity.

Airway obstruction/bronchoconstriction or airway hyper-responsiveness in asthma are believed to be a direct consequence of airway wall inflammation (Holt et al., 1999; Prasad et al., 2000). This proposed mechanism is consistent with previous findings that anti-inflammatory plant principles have shown to act through control of adrenocorticoid hormone and immunosuppression, respectively (Barik et al., 1992; Singh et al., 1997).

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