

INVESTIGATION ON ANTI INFLAMMATORY PROPERTY OF *BASELLA ALBA* LINN LEAF EXTRACT

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ABSTRACT

Medicinal plants play a prominent role in the new era of medicine. Numerous medicinal plants and their formulations are used for various disorders in ethno medical practices as well as in the traditional system of India. Inflammation is the complex biological response of vascular tissue to harmful stimuli such as pathogens, damaged cells, or irritants. The plant under investigation, *Basella alba* is called as Malabar climbing, puli shak, valchi baji, bachhali. In the present investigation an attempt was made to screen the anti inflammatory activity of *Basella alba* leaf in experimentally induced inflammations in rats. The aim was met by two methods, one is carrageenan induced paw edema and another is cotton pellet granuloma. *Basella alba* extract showed a significant activity at a dose of 500 mg/kg. From our study, it can be concluded that, *Basella alba* possesses a good anti inflammatory activity.

Keywords: *Basella alba*, Cotton pellet granuloma, Carrageenan, Phenyl butazone.

INTRODUCTION

Inflammation is the complex biological response of vascular tissue to harmful stimuli such as pathogens, damaged cells, or irritants¹. Inflammation is a protective attempt by the organism to remove the injurious stimuli as well as initiate the healing process for the tissue. Inflammation is not a synonym for infection². Even in cases where inflammation is caused by infection, the two are not synonymous; infection is caused by exogenous pathogens, while inflammation is one of the responses of the organism to the pathogen^{3, 4}. Medicinal plants play a prominent role in the new era of medicine. Numerous medicinal plants and their formulations are used for various disorders in ethno medical practices as well as in the traditional system of India. The plant under investigation, *Basella alba* is called as Malabar climbing, puli shak, valchi baji, bachhali. Composition of *Basella alba* includes Proteins, fat, carbohydrates, fiber, ash, calcium, vitamins, thiamine, riboflavin, niacin. Traditionally it is used as an antidote, aperient, astringent, demulcent, diuretic, febrifuge, laxative, rubefacient and the Juice of fruits used as a dye⁵. In the present investigation an attempt was made to screen the anti inflammatory activity of *Basella alba* leaf in experimentally induced inflammations in rats.

MATERIALS AND METHODS

Plant materials

The leaves of *Basella alba* were collected from fields in Kosigi, Kurnool District, Andhra Pradesh, India with the help of workers, during in the month of February 2010. The plant was botanically identified and authenticated by Dr. C. Venkataramaiah, Reader in botany, V R College, Nellore S.P.S.R. Nellore District of Andhra Pradesh, India and the same has been deposited as a voucher specimen (VCHS No. 1503) for future reference in the department of botany, VR College, Nellore, S.P.S.R. Nellore District, Andhra Pradesh, India.

Preparation of leaf extract

Fresh leaves were collected from the plant and washed with distilled water. The leaves were dried in shade. The powdered plant material was subjected to cold maceration process for 48 hrs using 50% ethanol and filtered to get extract. The extract was evaporated to dryness under vacuum. It is freeze dried to get powder product. The extract was mixed with 2% gum acacia to prepare suspension for oral use. And it was stored in cool place for further use.

Acute toxicity study

Acute toxicity study was performed according to OECD guideline 423. Animals were fasted prior to dosing, food but not water should

be withheld overnight. Following the period of fasting, the animals were weighed and extract was administered. Three animals are used for each step. The dose level of extract to be used as the starting dose is selected from one of the four fixed levels 500, 1000, 1500 and 2000mg/kg body weight. The starting dose level should be that which is most likely to produce mortality in some of the dose animals. After administration of test sample, the animals were observed continuously for first 4 hrs for behavioral changes and at the end of 24 hr for mortality rate if any.

Animals

Male Wister Albino rats are weighing 150-200 gm were obtained from the Saastra College of Pharmacy and Research Centre, Varigonda, Nellore. They were maintained at standard housing and fed with commercial diet provided with water ad libitum during experiment. The institutional animal ethical committee permitted to the study. Young adult male Wister rats weighing 150-200g were used which are Acclimatized to the laboratory conditions and maintained on standard laboratory rat feed and clean water. Rats were fasted for 12 hrs prior to experiment, while allowing access to water throughout the experiment. The experimental protocol was approved by the Institutional Animal Ethical Committee of Vagdevi College of Pharmacy And Research Centre, Brahmavedam, Nellore-524346.

Carrageenan induced inflammation

The animals are divided into four groups six animals in each group. Group -I stands as control which receives vehicle i.e. 2% gum acacia. Group -II receive the standard drug Phenyl butazone 100 mg/Kg orally. Group -III receive *Basella alba* leaves extract 250 mg/Kg orally. Group-IV receives *Basella alba* leaves extract 500 mg/Kg orally. A mark was made on both the hind paws just beyond the tibia tarsal junction, so That every time the paw is dipped in the mercury column up to the marked level to ensure constant paw volume. After 1 hr of administration of the test or standard samples, 0.1ml of 1% carrageenan suspension (in normal saline) was injected into dorsal region of sub plantar surface of hind paw of rat subcutaneously with the help of 26 G needle. The initial paw volume of each rat was recorded before drug administration. The paw volumes were measured at the end of 0.5, 1, 2, 3 and 4 hrs using plethysmometer. Any change in paw volumes at different time intervals were noted. The average value of edema was calculated by taking the average of each group at different hours. Percentage inhibition of edema was calculated for each group with respect to its control group.

Percentage inhibition = $(A - B) \times 100/A$

Where A is the mean increase paw volume in rats treated with control and B is the mean increase in paw volume in rats treated with test drug^{6,7,8}.

Cotton pellet induced inflammation

Rats are divided into four groups six rats in each. Group -I stands as control which receives vehicle i.e. 2% gum acacia. Group -II receive the standard drug Phenyl butazone 100 mg/Kg orally. Group -III receive *Basella alba* leaves extract 250 mg/Kg orally. Group-IV receives *Basella alba* leaves extract 500 mg/Kg orally. Autoclaved cotton pellets 50±1 mg was implanted subcutaneously by incision on the back under ether anesthesia. Drugs were administered daily orally for 7 days. Animals were killed on 7th day and granuloma was dissected out, dried in the oven in 60° C for 24 hours and weighed. The percentage of inhibition of granuloma was determined.

The percentage of inhibition calculated by using following formula

$$\% \text{ inhibition} = \frac{C-T}{C} \times 100$$

Where, C → Dry weight of the cotton of control group animal

T → Dry weight of the cotton in the test group animals

The results were tabulated as percentage inhibition of granuloma^{9,10,11}.

Statistical Analysis

All the data was expressed as Mean ± SEM. Statistical significance between more than two groups was tested using one way ANOVA followed by the Dennett's test using computer based fitting program

(Prism graph pad version 5.0). Statistical significance was set accordingly.

RESULTS AND DISCUSSIONS

Extraction

About 3.45% w/w of the yield was obtained from the maceration of the *Basella alba* leaves.

Acute toxicity study

In acute toxicity study there was no behavioral changes up to 4 hours and no mortality was observed up to the end of 48 hours even at the maximum tested dose level of 2000mg/kg per oral as a result an effective dose of 250mg/kg and 500mg/kg body weight is taken for the present study.

Carrageenan induced inflammation

In the carrageenan induced inflammation, the animals treated with the plant extract has been shown a significant activity at 500 mg/kg dose (p<0.001) which was comparable with the standard drug. (Table No. 1 and 2) In view of the percentage inhibition also the plant was studied, in which the plant extract was found effective (Fig. No. 1).

Cotton pellet induced inflammation

In the cotton pellet granuloma technique, the animals treated with the plant extract have been shown a significant activity at 500 mg/kg dose (p<0.001) which was comparable with the standard drug (Table No. 3). In view of the percentage inhibition also the plant was studied, in which the plant extract was found effective. The effect of the extract was comparatively studied at different time intervals (Fig. No. 2).

Table 1: Result of leaf extracts of *Basella alba* on Carrageenan induced rat paw edema

Group	Dose mg/kg	Mean edema (Volume in ml)				
		30min	1hr	2 hr	3hr	4 hr
Control	-	0.23±0.01	0.36±0.04	0.79±0.13	0.66±0.04	0.7±0.13
Standard (Phenyl butazone)	100	0.17±0.02	0.21±0.03	0.29±0.06	0.31±0.03***	0.35±0.03
<i>B. alba</i> extract	250	0.15±0.03	0.23±0.05	0.30±0.06**	0.28±0.03	0.32±0.04
<i>B. alba</i> extract	500	0.17±0.02	0.18±0.02	0.32±0.04*	0.23±0.01**	0.27±0.03

All values are expressed as mean + SEM. *P<0.05, **P<0.01, ***P<0.001 in response to control.

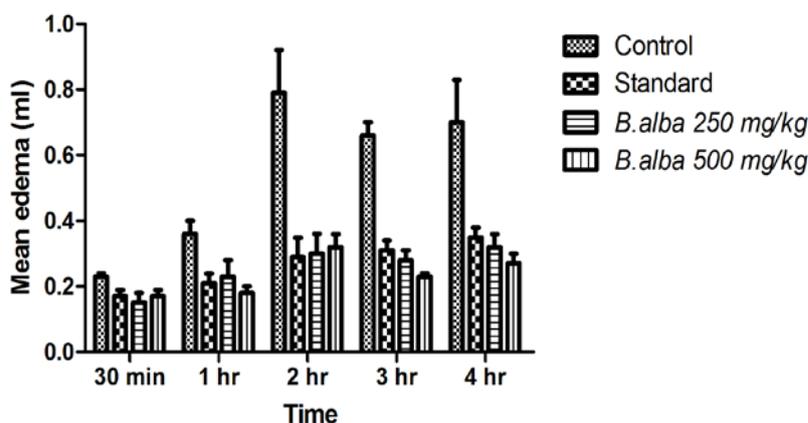


Fig. 1: Result of leaf extracts of *Basella alba* on Carrageenan induced rat paw edema

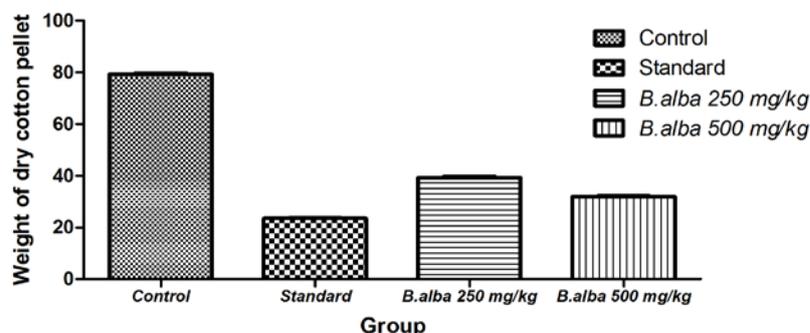
Table 2: Result of percentage inhibition of *Basella alba* on Carrageenan induced rat paw edema

Group	Dose (mg/kg)	30min	1hr	2hr	3hr	4hr
Standard	100	26	41	53	63	50
<i>B. alba</i> extract	250	34.7	50	62	60	58
<i>B. alba</i> extract	500	26	36	54.3	66.6	53.1

Table 3: Result of *B. alba* extract on inflammation of different treatment in sub acute inflammatory model in rats

Group	Dose	Weight of dry cotton pellet	Percentage of inhibition
Control (Group-I)	2% Gum Acacia	79.33±0.42	--
Standard	100 mg/kg orally	23.57±0.23***	70.7
Phenyl butazone			
<i>B. alba</i> extract	250 mg/kg orally	39.26±0.55	50.6
<i>B. alba</i> extract	500 mg/kg orally	31.93±0.40**	60.7

All values are expressed as Mean +SEM, *P<0.05, **P<0.01, ***P<0.001 in response to control.

Fig. 2: Result of *B. alba* extract on inflammation of different treatment in sub acute inflammatory model in rats

CONCLUSION

From the above obtained results, it can be concluded that the extract of *Basella alba* shows a significant anti-inflammatory activity which was demonstrated in above two methods from which it can be under stood that *Basella alba* showing a dose depending activity. There is an urgent need of developing therapeutic agents from the natural source. If the scientific data of anti inflammatory activity of *Basella alba* extract is validated using modern phytochemical and pharmacological methods, this can be stated that, *Basella alba* will promise a significant and effective anti inflammatory agent in future.

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