RESEARCH ARTICLE

ANTIINFLAMMATORY ACTIVITY OF AQUEOUS LEAF EXTRACT OF *BLUMEA MOLLIS*

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ABSTRACT:

Traditionally, *Blumea mollis* leaves are used for inflammation. The present study was carried out to evaluate the anti-inflammatory of aqueous leaf extract of *Blumea mollis* in two different experimental models, carrageenan and formalin induced paw edema in male wistar rats. Diclofenac potassium is used as standard drug. The test and standard drugs are given 1 hr after subplantar injection of Carrageenan (1%w/v) and formalin (1%v/v). The inflammation is peak at 3hr. The paw volume is measured at 3rd and 6th hour using mercury plethysmometer. In our study, *Blumea mollis* (200 mg/kg, p.o.) significantly ($p<0.001$) reduced the edema induced by carrageenan in all three phases of inflammation.

KEYWORDS: *Antiinflammatory, Blumea mollis, Aqueous extract, Carrageenan and Formalin.*

INTRODUCTION:

Phytochemical studies on the essential oil of B. mollis showed the presence of alkanes n-triacontane, n-hentriacontane, 2,3-dimethoxyp-cymene, chrysanthanone, 2,4,5-trimethoxyallylbenzene, methyl-5-isopropyl-1,2-methycyclopentane carboxylate and caryophylleneoxide[1].

The antibacterial activity of the leaf essential oil of *Blumea mollis* was assayed against 14 clinically isolated bacterial strains on Muller–Hinton Agar medium and Muller–Hinton Agar medium with 5% sheep blood. The essential oil had promising antibacterial activity against all the bacterial strains tested[1]. The essential oil from the leaves of *Blumea mollis* was extracted and the chemical constituents and the larvicidal against Culex quinquefasciatus effects studied[2].

Leaves of *Blumea mollis* are traditionally used for hepatoprotective activity and anti-inflammatory. However, there is no scientific observation confirming these activities hence the present investigation is designed to explore the effect of *Blumea mollis* herbal extract for anti-inflammatory and hepatoprotective activity in different experimental models of hepatotoxicity in rats.

MATERIALS AND METHODS:

ACUTE TOXICITY STUDIES[3,4]:

The acute toxicity was determined male albino Wister rats by fixed dose method of OECD Guide line No. 420 given by CPCSEA. Groups of 6 rats were administered test drug by oral route in the range of 300-2000 mg/kg and mortality was

observed after 24 hr. The doses were found to be safe. For the study two doses were selected, 200 mg/kg body weight and 50 mg/kg body weight (1/10th, 1/40th of the maximum safe dose).

ANTIINFLAMMATORY ACTIVITY:

1. **CARRAGENAN INDUCED INFLAMMATION[5,6,7]**

Wistar albino rats of either sex were divided into four different groups each containing six animals, the animals were marked individually. Food was withdrawn 12 hours prior to drug administration till completion of experiment.

The test and standard drugs were given after 60 minutes of 0.1ml of 1% w/v carrageenan injection into sub plantar region of the left paw.

Animals were divided into different groups (each contains 5 rats) as follows.

Group A	Received drug vehicle 1% sodium CMC
Group B	Received Carrageenan (1% w/v, i.p)
Group C	Received standard drug Diclofenac potassium at the dose of 10mg/kg[8]
Group D	Received low dose (50 mg/kg) of aqueous leaf extract of *Blumea mollis*.
Group E	Received low dose (200 mg/kg) of aqueous leaf extract of *Blumea mollis*.

The paw volume was measured by dipping the foot in the mercury bath of the plethysmograph up to the anatomical hairline on lateral malleolus and compared with control animals, which received only the vehicle. Measurement was done immediately before, third and sixth hour following Formalin injection.

2. FORMALIN INDUCED INFLAMMATION

Experimental procedure[9]:

Wistar albino rats of either sex were divided into four different groups each containing six animals, the animals were marked individually. Food was withdrawn 12 hours prior to drug administration till completion of experiment.

The test and standard drugs were given after 60 minutes of 0.1ml of 1% v/v Formalin injection into sub plantar region of the left paw.

Animals were divided into different groups (each contains 5 rats) as follows.

Group A	Received drug vehicle 1% sodium CMC
Group B	Received Formalin solution (1% w/v, i.p)
Group C	Received standard drug Diclofenac potassium at the dose of 10mg/kg
Group D	Received low dose (50 mg/kg) of aqueous leaf extract of *Blumea mollis*.
Group E	Received low dose (200 mg/kg) of aqueous leaf extract of *Blumea mollis*.

The paw volume was measured by dipping the foot in the mercury bath of the plethysmograph up to the anatomical hairline on lateral malleolus and compared with control animals, which received only the vehicle. Measurement was done immediately before, third and sixth hour following Formalin injection.

CALCULATION:

The percentage inhibition of paw edema was calculated by using the following formula :

$$\% \text{ inhibition of paw edema} = \frac{Y_t - Y_0}{Y_0} * 100$$

Where,

Y_t =Paw thickness at time t (3^{rd}, 6^{th} hr)

Y_0=Paw thickness at 0 hr (before injection)

STATASTICAL ANALYSIS:

The significance of difference among the groups was assessed using one way analysis of varience (ANOVA) followed by tukey multiple comparision test between the data of control and treated groups. The values expressed as Mean±SEM $p<0.001$ were considered significant.

RESULTS:

CARRAGEENAN INDUCED PAW OEDEMA:

The results of carrageenann induced paw oedema for anti-inflammatory activity of *Blumea mollis* is represented in Table . It was found that high dose of *Blumea mollis* (200mg/kg, p.o) significantly inhibited the oedema formation induced by carrageenan in a dose dependent manner. At high dose of 200mg/kg, *Blumea mollis* exhibited maximum inhibitory effect on paw oedema at 6hr. The results are comparable to standard drug diclofenac potassium (10mg/kg, p.o).

Treatments	3 hr	6 hr
Normal Control	0.6±0.054	0.6±0.054
Carragenann control	2.24±0.120	2.32±0.106
B.M – 50	1.9 ± 0.173^{ns}	$1.74\pm0.153^{**}$
B.M – 200	$1.64\pm0.103^{**}$	$1.5\pm0.089^{***}$
Silymarin	$1.08\pm0.153^{***}$	$0.9\pm0.044^{***}$

Values are Mean±SEM. $^{***}p<0.001$, $^{**}p<0.01$, $^{ns}p>0.05$ Vs Carragennan group.

FORMALIN INDUCED PAW OEDEMA :

The results of Carrageenan induced paw edema for anti-inflammatory activity of *Blumea mollis* is represented in Table . It was found that high dose of *Blumea mollis* (200mg/kg, p.o) significantly inhibited the edema formation induced by carrageenan in a dose dependent manner. At high dose of 200mg/kg, *Blumea mollis* exhibited maximum inhibitory effect on paw edema at 6hr. The results are comparable to standard drug diclofenac potassium (10mg/kg, p.o).

Treatments	3 hr	6 hr
Normal Control	0.796±0.005	0.796±0.005
Formalin Control	1.414±0.010	1.652±0.010
B.M – 50	1.394±0.007^{ns}	1.376±0.006***
B.M – 200	1.196±0.005***	1.186±0.007***
Silymarin	1.26±0.004***	1.098±0.003***

Values are Mean±SEM. $^{***}p<0.001$, $^{ns}p>0.05$ Vs Formalin group.

DISCUSSION:

Carragenann and formalin induced hind paw oedema are the standard experimental models of acute inflammation. It is the phlogistic agent of choice for testing anti-inflammatory drugs as it is not known to be antigenic and is devoid of apparent systemic effects. Moreover, the experimental model exhibits a high degree of reproducibility. The development of oedema in the paw of the rat after injection of formalin and carrageen is a biphasic event. Inflammation induced by formaldehyde is biphasic, an early neurogenic component is mediated by substance P and bradykinin followed by a tissue mediated response where histamine, 5-HT, prostaglandins and bradykinin are known to be involved[10]. The initial phase of the oedema is due to the release of histamine and serotonin and the oedema is maintained during the plateau phase by kinin like substance and the second accelerating phase of swelling due to the release of prostaglandin like substances[11].

Inhibition of oedema observed in various inflammatory models induced experimentally in the present study may, therefore be attributed to the ability of the *Blumea mollis* to inhibit various chemical mediators of inflammation like histamine and 5-HT during the initial phase. In our study, *Blumea mollis* (50, 200 mg/kg, p.o.) significantly ($p<0.001$) reduced the edema induced by carrageenan in all three phases.

The results indicate that *Blumea mollis* (200mg/kg p.o.) inhibits inflammation. The anti-inflammatory activity of *Blumea mollis* may be attributed to the inhibition of the following mechanism; inhibition of the chemical mediators of inflammation; inhibition of biosynthesis of prostaglandins; stabilization of lysosomes or involvement of adrenergic mechanism.

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