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Anti-inflammatory activity of chloroform extract of aerial part of *Clerodendrum phlomidis* Linn.

R Vijayamirtharaj*, S Vincent[1], N Senthilkumar[2]

JKK Munirajah Medical Research Foundation College of Pharmacy, Ethirmedu, Komarapalayam 638183, Namakkal, Tamil Nadu, India.

ABSTRACT

The aim of the present study is to evaluate the effect of chloroform extract of aerial part of *Clerodendrum phlomidis linn* on acute inflammation and it justifies the traditional use of this plant in the treatment of various types of pains and inflammation was evaluated in Albino rat. The root, leaf, bark of this plant traditionally used as a bitter tonic, cure for diarrhea and worms, analgesic, aromatic, demulcent in gonorrhea etc. In Ayurveda it is used for inflammation, piles and tumors. The aerial part of *Clerodendrum phlomidis* extracted of chloroform at an oral dose of 200 and 400 mg/kg body weight exhibited significant anti-inflammatory activity when compared with control. The anti-inflammatory activity of chloroform extract of *Clerodendrum phlomidis* evaluated by carrageenin-induced paw edema method in Albino rats. In carrageenin-induced paw edema model, *Clerodendrum phlomidis* at doses of 200 and 400 mg/kg caused significant inhibition of paw edema by 34.02 %($p<0.001$) and 26.80% ($p<0.001$) respectively, 4 hours after carrageenin administration It is clearly evident from the study that an chloroform extract of *Clerodendrum phlomidis* exhibit significant anti-inflammatory effect in albino rats. Results of two doses are also comparable with standard drug (phenylbutazone). All the above results support the traditional uses of aerial part.

Keywords: *Clerodendrum phlomidis Linn*, rat paw edema, anti-inflammatory, phenylbutazone.

Corresponding author
EMail: vrmukeshved1@gmail.com

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INTRODUCTION

Inflammation is considered as a primary physiologic defense mechanism that helps body to protect itself against infection, burn, toxic chemicals, allergens or other noxious stimuli, an uncontrolled and persistent inflammation may act as an etiologic factor for many of these chronic illnesses [3]. Although it is a defense mechanism, the complex events and mediators involved in the inflammatory reaction can easily be induced [4]. The side effects of the currently available anti-inflammatory drugs pose a major problem during their Clinical uses [5]. Therefore, the development of newer and more potent anti-inflammatory drugs with lesser side effects is necessary.

Siddha system of medicine is one of the ancient system of Indian medicine most popularly practicing in Southern part of India especially Tamilnadu. In Tamil and Siddha medicine *Clerodendrum phlomidis* Linn. Is known as Thazhuthazhai, Thalangi, Thakkari and Vathamatakki. It is a plant from Verbaneceae family and it is leafy medium sized tree up to 6 meter in height. Throughout India it is present in plains often by fencings. It is distributed in India, Sri Lanka, Pakistan, Burma and Baluchistan. As per Siddha medicine it is useful for inflammation, nasal congestion, fever, joint disorders and tumors. The root, leaf, bark of this plant traditionally used as a bitter tonic, cure for diarrhea and worms, analgesic, aromatic, demulcent in gonorrhea etc. In Ayurveda it is used for inflammation, piles and tumors. The present work was under taken to evaluate anti-inflammatory activity of the extract of the aerial part [1, 2].

MATERIALS AND METHODS

Plant material

The aerial parts of the *Clerodendrum phlomidis* were collected from the foothill of Annavasal, Pudukkottai (DT), Tamilnadu in the month of June2010. The collected plant was identified and authenticated by a botanist Dr. P. Jayaraman, Director, Plant Anatomy Research Centre, Chennai. A voucher specimen (PARC/2010/574.) The collected aerial part were washed, and dried in the sun for about a Week. After drying the plant materials were kept in an oven at 40ºC to ensure completes drying. The dried plant parts were finally ground into coarse powder (2.5kg) and preserved in an airtight container for future use.

Extraction

The coarse powder (2.5 kg) was macerated with a solvent (6 L) of chloroform, at room temperature for 3 days with occasional shaking and stirring. The extract was then first filtered off through a two-folded fine cotton cloth and then with filter paper. The filtrate thus obtained was concentrated at 40ºC in a rotary vacuum evaporator to obtain a gummy, solid mass, which was subsequently defatted by the method mentioned earlier[7].

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Animals

Albino rats of either sex and of approximately the same age, weighing about 120-180 g were used for the study. They were housed in polypropylene cages and fed with standard chow diet and water ad labium. The animals were exposed to alternate cycle of 12 h of darkness and light each. Before each test, the animals were fasted for at least 12 h. The experimental protocols were subjected to the scrutinization of the Institutional Animal Ethics Committee and were cleared by the same.

Effect of *Clerodendrum phlomidis* extract on carrageen in induced rat paw edema

Screening for anti-inflammatory activity of chloroform extract of *Clerodendrum phlomidis* was done with a carrageen in induced paw edema model [8]. Administration of carrageenin in the sub-plantar region of rat's hind paw leads to the formation of edema *in situ* due to localized inflammation. About half an hour prior to the administration of carrageenin solution, experimental animals received test materials and standard anti-inflammatory drug at appropriate doses. The volume of rat paw was measured each hour up to four hours by means of mercury displacement method in traveling microscope assembly[6].The average percent increase in paw volume with time was calculated and compared against the control group. Percent inhibition was calculated using the formula,

$$\% \text{ inhibition} = \frac{Vc - Vt}{Vc} \times 10$$

Where Vc and Vt represent average paw volume of control and treated animals respectively.

Twenty-four experimental animals were randomly selected and divided into four groups denoted as Group I, Group II, Group III and Group IV, consisting of 6 mice in each group. Each group received a particular treatment i.e. control, positive control and the two doses of the extract. Prior to any treatment, each rat was weighed properly and the doses of the test samples and control Materials were adjusted accordingly. Group III and VI received the crude extract orally at the Doses of 400 and 200 mg/kg of body weight respectively. Group II received intraperitoneal Administration of phenylbutazone (PBZ) as standard anti-inflammatory drug at a dose of 100-mg/kg-body weight while Group I was kept as control giving 1% Tween 80 in normal Saline water. After one hour of drug administration, 0.1 ml of 1% (w/v) carrageenin solution in sterile saline solution was injected through26-gauge needle into the sub-planter surface of the right hind paw of each rat of every group. Paw volumes were measured up to a fixed mark by mercury displacement as viewed by traveling microscope at 1, 2, 3 and 4 hours after the administration of the standard drug and test extracts.

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Statistical analysis

Values reported are expressed as mean ± SE and analyzed for ANOVA followed by Student's t- test. A value of $p<0.001$ was regarded as significant.

RESULTS

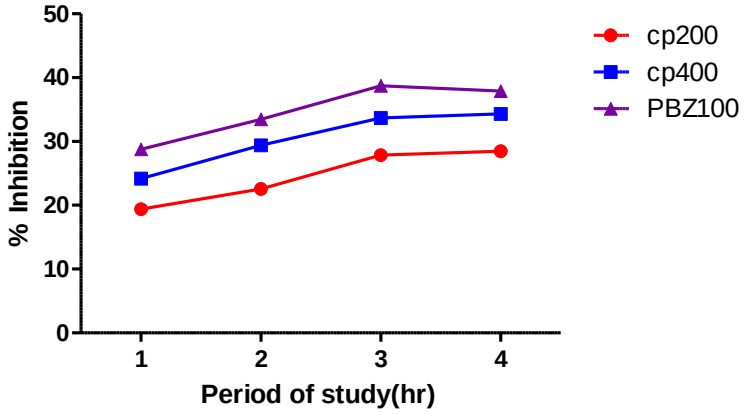
The anti-inflammatory activity of chloroform extract of *Clerodendrum phlomidis* evaluated by carrageenin-induced paw edema method in Albino rats. In carrageenin-induced paw edema model, *Clerodendrum phlomidis* at doses of 200 and 400 mg/kg caused significant inhibition of paw edema by 34.02 %($p<0.001$) and 26.80% ($p<0.001$) respectively, 4 hours after carrageenin administration (Table I and Figure 1).

Table 1: Measurement of hind paws volume (1,000) at different time in travels after the administration of the chloroform extract of aerial parts of *Clerodendrum phlomidis* linn.

Treatment (Dose, mg/ kg, p.o)	Edema volume (ml)			
	1st hour	2nd hour	3rd hour	4th hour
Control	69.7±17.002*	90.17±20.43	105.33±22.65	112±27.88
Cp 200	56.17±15.56	69.83±16.65	76±18.66	80.1±15.77
Cp 400	52.83±14.87	63.67±14.76	69.83±15.88	73.57±18.76
PBZ 100	49.65±12.44	60.00±15.43	64.55±17.34	69.57±16.56

a values are mean ± SE; n=6; *Significant at $p<0.001$

Figure 1: Anti-inflammatory activity of chloroform extract of aerial part of *Clerodendrum phlomidis* in carrageenin-induced rat paw edema model.



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DISCUSSION

It is clearly evident from the study that a chloroform extract of *Clerodendrum phlomidis* exhibit significant anti-inflammatory effect in albino rats. Results of two doses are also comparable with standard drug (phenylbutazone). All the above results support the traditional uses of aerial part.

The abdominal constriction response induced by acetic acid is a sensitive procedure to establish peripherally acting analgesics. The response is thought to involve local peritoneal cells and is mediated by the prostaglandin pathways [9]. The chloroform extract of *C. phlomidis* of showed significant anti nociceptive activity, indicating the presence of anti-inflammatory principles that might be intervening with the prostaglandin pathways. The carrageenan-induced paw edema in rats is believed to be biphasic [10]. The first phase is due to the release of histamine or serotonin, and the second phase is caused by the release of bradykinin, protease, prostaglandin, and lysosome [11]. Therefore, it can be assumed that the inhibitory effect of the chloroform extract of *C. phlomidis* on carrageenan-induced inflammation could be due to the inhibition of the enzyme cyclooxygenase, leading to the inhibition of prostaglandin synthesis.

The present study on chloroform extract of *C. phlomidis* has demonstrated that this plant has significant anti-inflammatory properties, and it justifies the traditional use of this plant in the treatment of various types of pains and inflammation.

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