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Investigation of anti-inflammatory activity of ethanolic extract of *Aconitum Napellus Linn* against carrageenan induced paw edema in rats

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ABSTRACT

The Indian herbal medicine is evaluated by comprehensive activity of research on herbal plant species and their therapeutic principles in the whole world. In traditional and modern medicine, the medicinal plants are used which have shown their potential in possessing potent bioactive compound. A large number of populations suffer due to various reasons from rheumatoid arthritis of unknown inflammation. The present work is to investigation of anti-inflammatory activity of herbal extracts of *Aconitum Napellus Linn* against carrageenan induced paw edema in rats. *Aconitum Napellus Linn* plant extracts used in traditional medicine was investigated for their anti-inflammatory potential against adjuvant carrageenan induced inflammation. Maceration method was used for preparing ethanolic extract. In adjuvant carrageenan induced inflammation, orally administered extracts (100 mg/kg), inhibited the acute as well as chronic inflammation. The ethanolic herbal extract of plant under investigation showed potent anti-inflammatory activity. The anti-inflammatory activity of the extracts was compared to reference drug, diclofenac (10 mg/kg).

Keywords: Anti-inflammatory, Paw edema, *Aconitum napelluslinn,* Maceration.

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INTRODUCTION

Inflammation is a defence mechanism in the body. The immune system identifies unwanted pathogens, injured cells and irritants and it starts the healing process. The symptom of inflammation includes pain, warmth, swelling, redness and palpabal tenderness. The vascular permeability is increased and inflammatory mediators are generated in process of inflammation. The process of inflammation also shows destruction of body tissue and alteration of blood flow, cycloxygenase-2, nitric oxide, histamine, serotonin, bradykinins and lipoxygenase. The non-steroidal anti-inflammatory drugs (NSAIDs) such as naproxen, indomethacin, ketoprofen, and diclofenac are the most commonly used conventional medicinal products in the treatment of inflammation. The long-standing use of NSAIDs is linked with severe effects on the gastrointestinal tract, kidney, and CVS (Tripathi., K.,D., 2010). Herbal drugs are now a days is gaining popularity due to lesser side effects, low cost, easy availability, effective pharmacological response. *Aconitum Napellus Linn*. (Bachnag) is used traditionally to manage inflammation. For the scientific investigation on exploration of herb *Aconitum Napellus Linn* in order to develop effective herbal remedy to treat inflammation the present study was designed.

MATERIALS AND METHODS

Collection and preparation of plant materials:

Aconitum napellus Linn. (bachnag) (Fruit), was purchased from Shri Akhand Aushadhi Bhandar, Indore (M.P.). The collected crude drug *Aconitum napellus* (Bachnag) was identified and authenticated on the basis of microscopic and macroscopic characters at the Department of Botany and voucher specimen SCOPE/ins./64/L and SCOPE/ins./64/K have been submitted at the herbarium of the Department of Pharmacognosy of the college for further reference.

The plant material was air dried and for the size reduction mechanical grinder was used to get course powder used for the further experimentation. The powders were then passed through sieve #40 and stored in an air tight container for material was further use.

Extraction

The powered material was subjected to extraction using alcoholic solvent (ethanol) for 3 days. The ethanolic extracts

were prepared using maceration. Then the extract was filtered and concentration was done using rotary evaporator and was subsequently defatted to get the dried extract yielding (5g of herbal extract) and which was stored in refrigerator for further experiments. To carry the pharmacological investigation, the extracts was allowed to dissolved in 0.1 % Tween-80 in normal saline solution and to 200 mg/kg concentrations is prepared for carrying out the pharmacological test.

Experimental design

Laboratory animals: Rats (200-250 gms.) of either sex were used in experiments. The experimental animal was kept in quarantine area for their acclimatization and then transferred to animal house. The animal house was maintained with standard conditions of light as 12 hour day light and 12 hour dark along with humidity conditions of 35-60% humidity was maintained. The polyvinyl cages that do not have more than 6 animals in each cage, was housed. Standard rat pellet diet and water ad libitum was given as animal feed. Institutional Animal Ethical Committee approved the experimental protocol. Every experimental procedure followed animal ethical norms.

For anti-inflammatory, the animals were divided into 3 groups.

1) First group serve as control treated with 0.9% w/v saline solution
2) Second group serves as standard treated with diclofenac sodium.
3) Third group treated with herbal extract of *Aconitum Napellus Linn*..

Selection of dose of extracts: One dose of 100 mg/kg of aqueous extract of *Aconitum napellus Linn* was selected on the basis of literature survey for anti-inflammatory activities (Winter et al., 1962)

Table No. 1:- Treatment and dose of extract

S.No.	Groups	Treatment	Dose	No. of animals
1.	**Control**	Saline Solution	0.9% w/v	6
2.	**Standard**	Diclofenac Sodium	10 mg/kg	6
3.	**Test**	*Aconitum napellus* (Bachnag)	100 mg/kg	6

Treatment Design

- Group 1:- Normal control (Carrageenan 1% w/v)
- Group 2:- Standard control (Diclofenac 10mg/kg)
- Group 3:- Herbal extracts (Ethanolic) of *Aconitum Napellus Linn* (100mg/kg)

Pharmacological evaluation of ethanolic extract of plant for anti-inflammatory activity

Experimental model used in the present study:

Carrageenan induced paw edema: The anti-inflammatory nature of the herbal extracts (ethanolic extract of *Aconitum napellus Linn*, 100mg/kg) was assessed by the carrageenan-induced light hind paw oedema method (Winter et al., 1962; Saha et al., 2007). Rats were divided in three groups. Make a mark on the paws just beyond Tibia-tursal junction. In the left hind paw of the legs, sub-plantar injection of 0.1 ml of 1% (w/v) suspension of carrageenan in normal saline was used to produce acute inflammation. Animals were treated with test herbal extract (ethanolic) of *Aconitum napellus Linn* (100mg/kg) and Diclofenac in a dose of 10 mg/kg body weight induced by oral feeding cannula 1 hour before the carrageenan injection as per average body weight (Winter et al., 1962). 1 % w/v carrageenan (0.1 mL) was administered as injection into the left hind paw of all rats. Swelling of carrageenan treated paw was measured at 15, 30, 45, 60, minutes using Plethysmometer (Peekay scientific glassware). At the beginning paw volume was measured by mercury displacement method in Plethysmometer. Percent inhibition of test drug was determined comparison with vehicle control (100%).

Table No 2:- Effect of *Aconitum napellus Linn.* on carrageenan induced rat paw edema

	Average Body Weight (g)	Treatment	Average Paw volume (ml) as measured by mercury displacement by Plethysmograph meter			
			0 hr	1 hr	2 hr	3 hr
1	200g	Control	0.24	0.35	0.48	0.59
2.	200g	*Aconitum napellus Linn.*	0.15	0.25	0.33	0.48
3.	200g	Standard	0.13	0.20	0.29	0.36

Table No.3: percentage inhibition of paw volume by *Aconitum napellus Linn.* In carrageenan induced rat paw edema

S.N.	Average Body Weight (g)	Treatment	% Inhibition of paw volume at different time interval			
			0 hr	1 hr	2 hr	3 hr
2.	200g	*Aconitum napellus Linn.*	37.5	28.571	31.25	18.644
3.	200g	Standard	45.833	42.857	39.583	38.98

RESULT

The result of anti-inflammatory activity for carrageenan induced paw oedema of the herbal ethanolic extract of *Aconitum napellus Linn* (100mg/kg) revealed promising activity by reducing the paw volume in comparison of the control group. But activity of the extract was less than drug Diclofenac treated group.

In the inflammatory responses histamine, serotonin, prostaglandin are the major mediator of the inflammation. The anti-inflammatory response of *Aconitum napellus Linn.* extract may be because of the inhibition of cyclooxygenase which in turns inhibits prostaglandin biosynthesis that cause anti inflammatory effect. Further investigations are necessary to determine and characterize the bioactive compounds responsible for the anti-inflammatory activity of the plant. The present study provides the scientific evidence for the anti-inflammatory activity of herbal ethanolic extract of *Aconitum napellus Linn* (100mg/kg) and substantiate the conventional usage for inflammatory disorders.

DISCUSSION AND CONCLUSION

The present study shows that the herbal ethanolic extract of *Aconitum napellus Linn*, has a potent anti-nociceptive effect against carrageenan induced acute oedema and may work by inhibiting the mediators involved in inflammatory responses like prostaglandin, bradykinin (Mossa et al., 1995). The present research suggests that *Aconitum napellus Linn* possess potent anti-inflammatory activity but the investigation on active principle responsible for the pharmacological activity need to be done to get the complete profile of the drug. These potent compounds can be further utilized to formulate a new potent anti-inflammatory formulation and can be effective in acute inflammatory disorders.

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