ESTIMATION OF THE ANTI-INFLAMMATORY POTENTIAL OF ACTIVE METABOLITES OF PHRAGMITES KARKA IN CARRAGEENAN INDUCED PAW EDEMA MODEL IN RATS

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Abstract

Inflammation is an immune response and it's an underlying symptom of many auto-immune diseases and several which are not related with the immunity. Inflammatory mediators like interleukins, TNF- α and prostaglandins are the responsible chemical entities which induces the inflammation. Majorly two Cyclooxygenase isoenzymes are the core reason behind the stimulation of these inflammatory mediators. Current research is carried out on the herbal aspect to treat the condition of the inflammation. P. karka is the drug which contains number of phytoconstituents which are responsible to possess anti-diabetic activity. Useful in the treatment of retinopathy, angiopathy, nephropathy and neuropathy. Current research was carried out on the Albino wistar rats as an experimental subjects for carrageenan induced paw edema model which is the key finding criteria for the current research. Priorly presence of all the chief chemical constituents of the test plant were confirmed by the different identification methods and afterwards the quantitative analysis was carried out by using HPTLC method by using different mobile phases and the detection was carried out by the UV-spectrophotometer. At the end of the study the paw volume was measured and the data was like drug extract shows 0.43±0.001and 0.25±0.004 for the concentration 25 mg/kg and 50 mg/kg respectively. Phenylbutazone was used as a standard anti-inflammatory agent for the current research. All the results of the current study suggest that P. karka possess the anti-inflammatory activity and confirmation of the objective can be justify by the carrageenan induced paw edema model.

Keywords: Phragmites karka, Anti-inflammatory activity, Carrageenan, Paw edema, Phenylbutazone

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1. Introduction

Inflammation is a reaction of living tissues towards injury, and it comprises systemic and local responses [1]. In spite of our dependence on modern medicine and the tremendous advances in synthetic drugs, a large number of the world populations (80% of people) cannot afford the products of the western pharmaceutical industry and have to rely upon the use of traditional medicines, which are mainly derived from plant material. The fact is well recognized by the WHO which has recently compiled an inventory of medicinal plants listing over 20 000 species. The family Apocynaceae consists of several important medicinal plants with wide range of pharmacological, biological activities and interesting phytochemical constituents. The main action of anti- inflammatory agents is the inhibition of Cyclooxygenase enzymes which are responsible for the conversion of Arachidonic acid to prostaglandins [2]. Inflammatory markers are used in clinical applications to indicate normal versus pathogenic biological processes, and assess responses to therapeutic interventions. Inflammatory markers may be predictive of inflammatory diseases [3]. Two COX isozymes are encoded in the human genome, COX-1 and COX-2. COX-1 is expressed in nearly all organs and cells but is most prominent in the stomach and in platelets, whereas COX-2 is an inducible, inflammation-specific isoform and regulates the synthesis of prostaglandins during inflammation [4]. NSAIDs drugs prevent the release of prostaglandins through the inhibition of cyclooxygenase (COX) by covalently modifying the enzyme or by competing with the substrate for the active site [5]. Methanolic extract of the aerial plant parts of Phragmites karka (Family: Poaceae) and its petroleum ether and carbon tetrachloride fractions were investigated for bioactivities in Swiss-albino mice, namely, analgesic, central nervous system (CNS) depressant, hypoglycemic, and antidiarrheal activity [6].

2. Material & Methodology

Plant collection and authentication:
Plant was selected and collected as per the ethno-botanical survey and the authentication of plant was done by the botanist. Herbarium of plants were submitted to the specimen library of Safia college of arts and science, peer gate Bhopal and authenticated by Dr. Zia Ul Hasan, Professor and head of department of Botany, Safia college of arts and science, Peer gate Bhopal. The specimen voucher no. of Phragmites karka is Saffia/239/17.
Extraction procedure:
Phragmites karka leaves collected, washed with distilled water. Dried Phragmites karka leaves were grind to powder form and stored in a tightly sealed container. The Soxhlet apparatus and method was used for extraction. The Soxhlet thimble was filled with the powdered leaves and inserted into the Soxhlet. One liter of 70% ethanol was filled into the Soxhlet main chamber and attached to the Soxhlet apparatus, which was heated until the solvent vapour filled the main chamber. The solvent vapour then condensed and dripped back down into the chamber containing the Phragmites karka leaf extract [7].
In-vivo study:
Animal: Albino wistar rat (n=24 animals)
Chemicals: 1% solution of Carrageenan, Phenylbutazone (15 mg/kg), Test drug extracts (25 mg/kg and 50 mg/kg)
Instrument: Plethysmometer.

Experimental design:

Table 1: Animal allocation as per the groups of the experiment

Sr. No.	Experimental group (treatment)	No. of animals
1	Disease control (Carrageenan)	6
2	Standard control (Phenylbutazone)	6
3	Test 1 group (25 mg/kg extracts)	6
4	Test 2 Group (50 mg/kg extracts)	6

Experimental procedure:

- Weigh the subject animals accurately.
- Marked both of the hind paws of the animal right paw will be the standard non-inflamed paw and left will be the test paw for each group.
- Measured the paw volume of the animals before the dosing of any chemical (phlogistic agent and/or treatment reagents) by using digital plethysmometer.
- Treated the animals with the treatment reagents (phenylbutazone and/or test drug extracts) by s.c. route.
- After 30 min. inject 0.1 ml of 1% (w/v) carrageenan solution in the hind paw of the animals of every group.
- Measured the paw volume of every animal after the interval of 15, 30, 60 and 120 min [8].

Statistical analysis:

Results were presented as mean ± SEM; Data were analyzed by using ANOVA to observe the variability in all the groups; $p<0.05$ was considered significant.

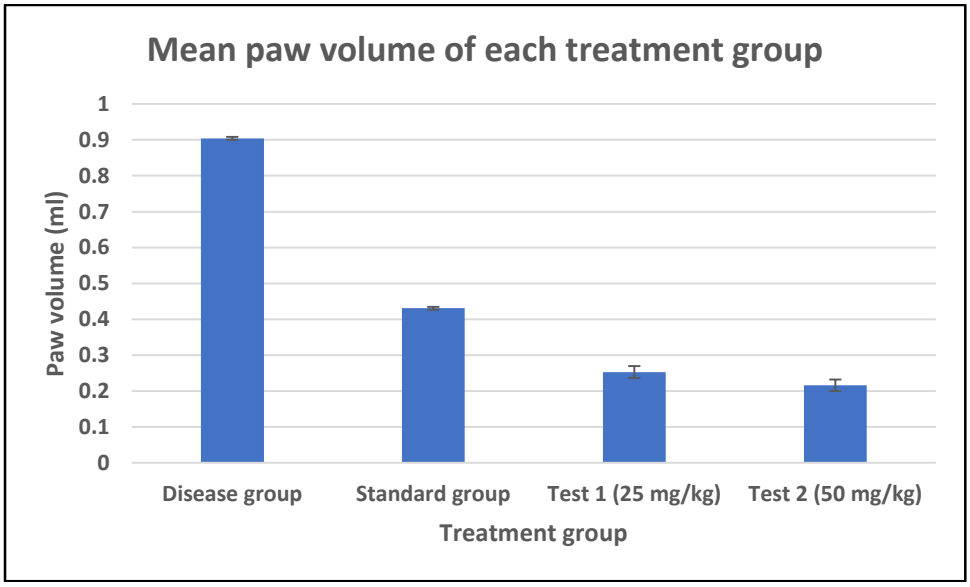
3. Results

In-vivo data of the experiment:

Table 2: Statistical data of the paw edema model

Sr. No.	Treatment Group	Paw volume (mean)	Std. deviation	±SEM
1	Disease group	0.904	0.0100	0.00408
2	Standard group	0.431	0.0100	0.00408
3	Test 1 (25 mg/kg)	0.253	0.0400	0.0163
4	Test 2 (50 mg/kg)	0.216	0.0400	0.0163

Graphical interpretation:



The differences in the mean values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference ($P = <0.001$). The paw volume of Disease group was found to be 0.904 ± 0.00408 which is significantly different than Test 1 group (25 mg/kg) 0.253 ± 0.0163 and Test 2 group (50 mg/kg) 0.216 ± 0.0163 that gives the clear evidence of the anti-inflammatory activity of the test drug.

4. Conclusion

The present results suggest that Phragmites karka suppresses the first phase of carrageenan-induced paw edema, thus, confirming an NSAID-like property. The present studies showed that Phragmites karka have anti-inflammatory properties. Carrageenan-induced rat paw edema model is a suitable test for evaluating anti-inflammatory drugs, which has frequently been used to assess the anti-edematous effect of the drug. Carrageenan is a strong chemical use for the release of inflammatory and proinflammatory mediators (prostaglandins, leukotrienes, histamine, bradykinin, TNF-α, etc.).

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