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## EXTRACTS FROM "*PERISTROPHE BICALYCVLATA*" AERIAL PARTS HAVE ANTI-INFLAMMATORY PROPERTIES IN VIVO

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### ABSTRACT

*Peristrophe bicalyculata* (Acanthaceae) can grow to a height of 60–180 cm and is almost everywhere in Africa, Afghanistan, and India. In Gujarati, it's frequently referred to as kali aghedi and in Sanskrit, as kakjangha. The herb is utilized for ear and eye therapies as well as its antibacterial (tuberculostatic) and anti-snake poisoning properties. At dosages of 75mg/Kg, 150mg/Kg, and 200 mg/Kg, the effectiveness of petroleum ether, acetone, and methanolic extracts of aerial parts of "*Peristrophe bicalyculat*" to reduce inflammation in rat paw edema produced by carrageenan was examined. They significantly and dose-dependently inhibited the swelling of the rat paws caused by carrageenan.

**Keywords: Peristrophe bicalyculata; Anti-inflammatory; Carrageenan**

### 1. INTRODUCTION

The immune system's biological response, inflammation can be brought on by several things, including pathogens, harmed cells, and toxic substances. Acute or chronic inflammation responses caused by various factors can affect vital organs such as the heart, pancreas, liver, kidney, lung, brain,

digestive tract, and reproductive system, potentially leading to tissue disorders or diseases. However, untreated acute inflammation can develop into chronic inflammation, which can lead to a nuseveralonic inflammation disorders [1].

The annual herb *Peristrophe bicalyculata* (Acanthaceae), also called Kakjangha in Sanskrit and kali aghedi in Gujarati [1] and also called “The goddess of mercy” [3]. One of the traditional medicines is recommended in case of TB [2]. *Peristrophe paniculata* is a traditional medicinal plant with a variety of medicinal applications [4]. It is a valuable medicinal and pharmacologically active herb [5].

Up to 60-180 cm tall, *Peristrophe bicalyculata* can be found practically everywhere in India, Afghanistan, and Africa. The chemical makeup of the dried aerial parts revealed the presence of 35-hydroxynonatriacontanal and 14-methyl-tritriacont-14-en-15-ol [6]. It belongs to the Acanthaceae family [7]. Traditional uses of its leaves include treating bacterial infections, eye and ear conditions, and treating dangerous insect stings and bites [8]. Recently, it was also shown that the methanolic leaf extract had anticonvulsant and anti-diabetic properties [9]. The Ayurvedic Formulary lists several preparations that either contain the root, the seed, or the entire herb [10]. Indian cultures have utilized the plant as a pesticide, antinematode, and treatment for gout and liver conditions [11]. Traditional healers cure several skin issues with the entire plant. Its effects on hypolipidemia, which have been linked to protection against cardiovascular disease, were found to exist

[12]. Due to many therapeutic plants' natural origins, affordability, and absence of side effects, there has recently been an increase in interest in improving their biological benefits [13].

A study was conducted on a rat model with type 2 diabetes mellitus produced by a high-fat diet and low-dosage streptozocin. The study also aimed to investigate the potential impact of methanolic leaf extracts from *Peristrophe bicalyculata* on memory and learning.

The paste of this plant is used in Uttar Pradesh to treat sprains and broken bones. It also has a range of other reported medicinal properties, including being an analgesic, anti-inflammatory, and antibiotic, among others.

Several plants share the common name of Kakjangha, including *Peristrophe bicalyculata*, *Leea hirata* (from the Vitaceae family), *Leea macrophylla* (also from the Vitaceae family), and *Vitex penduncularis* (from the Verbenaceae family). After some controversy, it has been confirmed that *Peristrophe bicalyculata* is the true Kakjangha. This plant contains several components, including volatile oil (from the herb), pentunidin-3-rhamnoglucoside (from the flower), sterols, fatty acids (from the stem and root), free amino acids, and free sugars [14].

After reviewing the literature, it was found that there are no reports on the anti-

inflammatory effects of petroleum ether, acetone, or methanol extracts of the aerial parts of "*Peristrophe bicalyculata*". Thus, the purpose of this study is to confirm the anti-inflammatory properties of these extracts using a rat model of paw edema induced by carrageenan.

The objective of this study was to investigate the anti-inflammatory properties of extracts from the aerial components of *Peristrophe bicalyculata*. This was done by conducting an experiment on rats to induce paw edema using carrageenan.

## 2. MATERIALS AND METHODS

### 2.1 Plant Materials:

In the month of October, 2 kg of new aerial parts of "*Peristrophe bicalyculata*" were collected from Adipur in the Kutch region. It was found by contrasting the literary characters described. The voucher samples were submitted to the A.R. College of Pharmacy in Vallabh Vidyanagar under the reference number ARGH11/08.

### 2.2 Preparation of Extracts:

A mechanical grinder was used to turn dried aerial portions of "*Peristrophe bicalyculata*" into a fine powder. Petroleum ether was used to remove the plant powder, while methanol and acetone were used to extract the marc.

### 2.3 Drug and Chemicals:

All other materials were of analytical quality and the drug Dexamethasone Sodium was bought from Umiya Sales in Ahmedabad.

### 2.4 Animals:

The Wistar strains of male albino rats (weighing 150–250 Kg) were purchased from Cadila Pharma Ltd. in Ahmedabad, Gujarat, India. They were kept in cages made of propylene. The animals were kept in typical habitat settings with unrestricted access to food and water. The CPCSEA and the IRB gave their approval to each experimental protocol. Registration number 365/01/ab/CPCSEA was used.

### 2.5 Anti-inflammatory Activity:

We conducted a study to evaluate the anti-inflammatory properties of an extract (made from petroleum ether and methanol) using an assay that induced paw edema in rats through carrageenan. We administered doses of 75 mg/kg and 200 mg/kg of the extract to a group of six rats, while another group of rats received dexamethasone sodium treatment (1 mg/kg p.o.) and another group remained untreated (control group). After waiting for 30 minutes, we injected 0.1 ml of a solution containing 1% carrageenan and 1% sodium CMC into the sub-plantar tissue of the left hind paw. Then we marked the paw with ink at the level of the lateral malleolus and applied mercury up to that point. We used plethysmography to measure the linear volume of the paw right after injection. We repeated this measurement at 1, 3, 4, and 6 hours, and finally at 24 hours after the challenge. We calculated the percentage increase in paw volume after 3 or 6 hours compared to the volume

immediately following the irritant injection for each animal [14].

### 2.6 Statistical Evaluation:

For each trial, we calculated the average difference in value between the animals that received treatment and the control group. To determine the difference between the control group and the rats treated with test extracts, we utilized one-way ANOVA for significance analysis. The values were presented as mean  $\pm$  SEM, and we considered  $P < 0.05$  as the threshold for significance.

### 3. RESULTS AND DISCUSSION

In **Table 1-3**, you can see the impact of different extracts from "*Peristrophe bicalyculata*" on carrageenan-induced paw edema. The extracts from the aerial parts of the plant, including petroleum ether, acetone, and methanol, were administered in doses of 75, 150, and 200 mg/Kg, p.o. In the acute inflammation model, these extracts effectively reduced paw edema in a dose-dependent manner. Both the test medication and the standard medication showed a noteworthy decrease in paw edema when compared to the control group. We conducted a study to determine the impact of petroleum ether, acetone, and methanolic extracts from the aerial part of "*Peristrophe bicalyculata*" on rat paw edema caused by carrageenan. You can see the graphical representation of the results in **Figure 1** (Petroleum Ether extract), **Figure 2**

(Acetone extract), and **Figure 3** (Methanol extract).

We conducted a test on the impact of petroleum ether, acetone, and methanolic extracts derived from the aerial part of "*Peristrophe bicalyculata*" on rat paw edema induced by carrageenan. The extracts were found to significantly and dose-dependently inhibit the edema, although the level of inhibition was lower compared to the commonly used medication, dexamethasone.

In this study, researchers tested three different doses of extracts from the "*Peristrophe bicalyculata*" plant. The results showed that the 200 mg/Kg p.o. petroleum ether extract, 200 mg/Kg b.w. acetone extract, and 200 mg/Kg p.o. the methanolic extract had the highest levels of inhibition on rat paw edema caused by carrageenan, with percentages of 90.57%, 87.23%, and 45.57% respectively (as shown in **Table 4**). These findings suggest that the extracts were effective in treating acute inflammation at the tested doses. The petroleum ether extract (200 mg/Kg p.o.) was found to have the best anti-inflammatory effects among all the extracts (as seen in **Figure 4**). Upon chemical examination, the petroleum ether extract was found to contain phytosterol, which may have contributed to its ability to significantly inhibit inflammation in rat hind paws caused by carrageenan. The acetone

extracts also contained phytosterol and demonstrated a strong anti-inflammatory effect. Further research is needed to investigate the therapeutic effects of these

extracts using different models and to extract and purify the phytosterol fraction for potential use as a medication.

**Table 1: Effect of *Peristrophe bicalyculata* Petroleum Ether Extract on Carrageenan Induced Rat Paw Edema**

Category	Paw Volume (ml) (Petroleum Ether)							
	30 minutes		1 Hour		3 Hour		6 Hour	
	ml	%I	ml	%I	ml	%I	%I	ml
Control	1.43±0.09	-	1.6±0.07	-	1.71±0.07	-	1.43±0.08	-
STD	1±0.07 <sup>#</sup>	22.03	0.7±0.05*	49.71	0.53±0.04	64.94	0.43±0.06*	95.36
75mg	1.23±0.08	10.36	1.06±0.08*	24.71	0.88±0.06	41.60	0.51±0.06*	82.03
150mg	1.2±0.05	15.46	0.98±0.07*	34.92	0.71±0.05	60.22	0.5±0.06*	85.46
200mg	1.18±0.09	18.90	0.93±0.09*	41.81	0.66±0.06*	67.18	0.46±0.05*	90.57

I = Inhibition, N=6 in each group. <sup>#</sup>P<0.05, \*P<0.001 compared to control

**Table 2: Effect Of *Peristrophe bicalyculata* Acetone Extracts on Rats Carrageenan Induced Paw Edema: -**

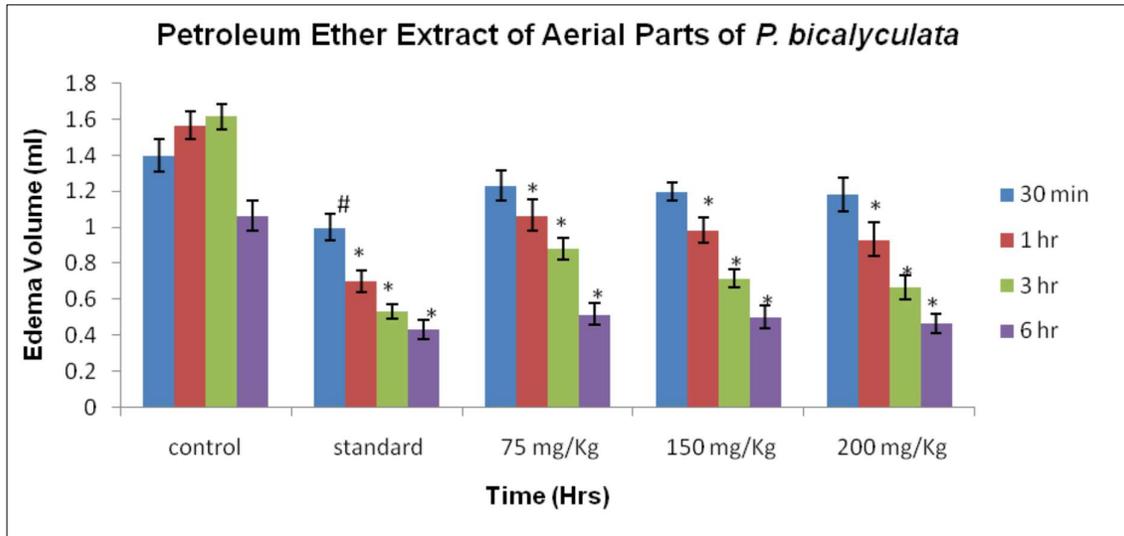
Category	Paw Volume (ml) (Acetone)							
	30 minutes		1 Hour		3 Hour		6 Hour	
	ml	%I	ml	%I	ml	%I	MI	%I
Control	1.4±0.08	-	1.56±0.02	-	1.61±0.03	-	1.06±0.04	-
STD	1±0.07*	22.03	0.7±0.05*	49.71	0.53±0.04	64.94	0.43±0.06*	95.36
75mg	1.16±0.11	3.80	0.9±0.06*	29.92	0.73±0.03*	48.56	0.63±0.04*	72.13
150mg	1.56±0.13	12.44	1.21±0.09*	35.57	0.98±0.09*	52.75	0.98±0.08*	80.78
200mg	1.5±0.02	15.57	1.08±0.07*	41.81	0.86±0.08*	58.85	0.86±0.06*	87.23

**Table 3: Effect of *Peristrophe bicalyculata* Methanolic Extract on Rat Paw Edema Caused by Carrageenan: -**

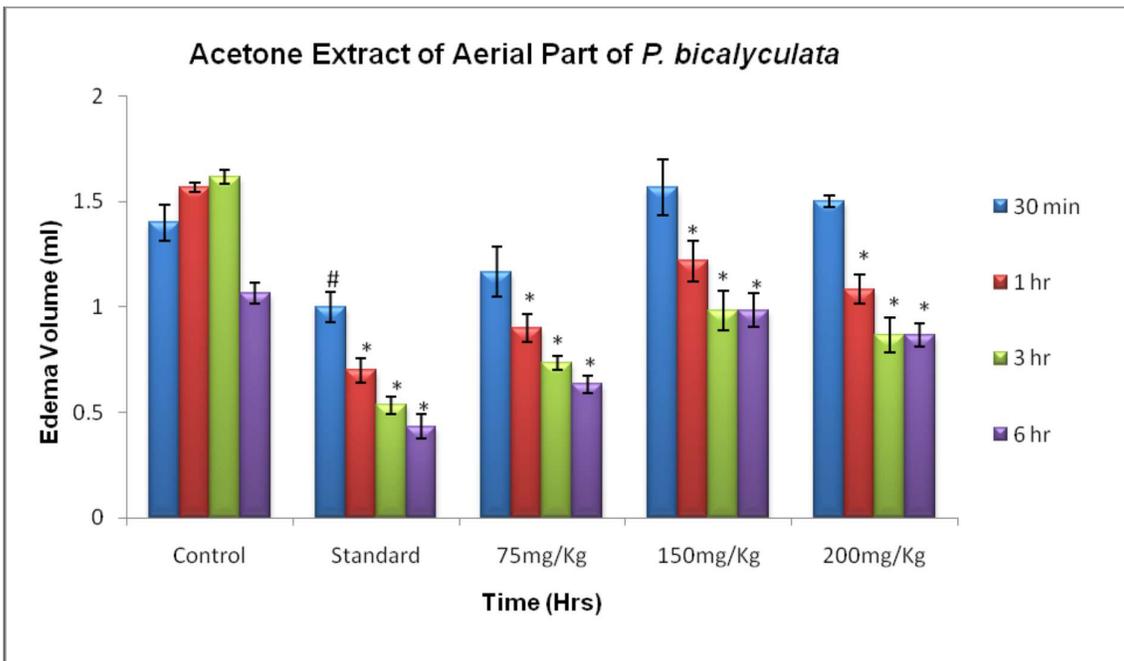
Category	Paw Volume (ml) (Methanol)							
	30 minutes		1 Hour		3 Hour		6 Hour	
	ml	%I	ml	%I	ml	%I	ml	%I
Control	1.4±0.08	-	1.56±0.02	-	1.61±0.03	-	1.06±0.04	-
STD	1±0.07*	22.03	0.7±0.05*	49.71	0.53±0.04*	64.94	0.43±0.06*	95.36
75 mg	1.36±0.05	4.11	1.26±0.04*	12.24	1.2±0.03*	17.75	1±0.06*	40.78
150 mg	1.43±0.05	-7.86	1.25±0.09*	8.26	1.03±0.11*	28.56	0.95±0.10*	40.46
200 mg	1.35±0.05	2.23	1.13±0.04*	21.81	1.03±0.04*	30.51	0.91±0.03*	45.57

**Table 4: % Inhibition at 6<sup>th</sup> Hour**

Quantity (mg/Kg, p.o.)	% Inhibition at 6 <sup>th</sup> Hour		
	Petroleum Ether	Acetone	Methanol
75mg/Kg	82.03	72.14	40.78
150mg/Kg	85.46	80.78	40.46
200mg/Kg	90.57	87.24	45.57



**Figure 1: Edema Volume (ml) vs Time (Hour)**  
Note: Each bar characterizes Mean±SEM, <sup>#</sup>P<0.05, <sup>\*</sup>P<0.001 compared to control



**Figure 2: Edema Volume (ml) vs Time (Hour)**  
Note: Each bar characterizes Mean±SEM, <sup>#</sup>P<0.05, <sup>\*</sup>P<0.001 compared to control

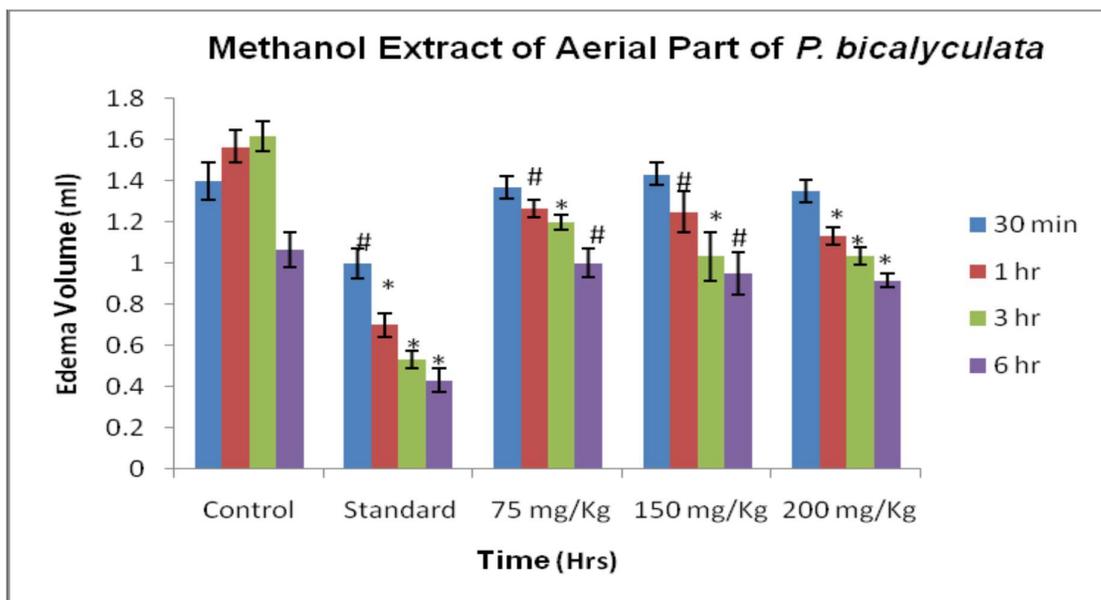


Figure 3: Edema Volume (ml) vs Time (Hour)  
 Note: Each bar characterizes Mean $\pm$ SEM, #P<0.05, \*P<0.001 compared to control

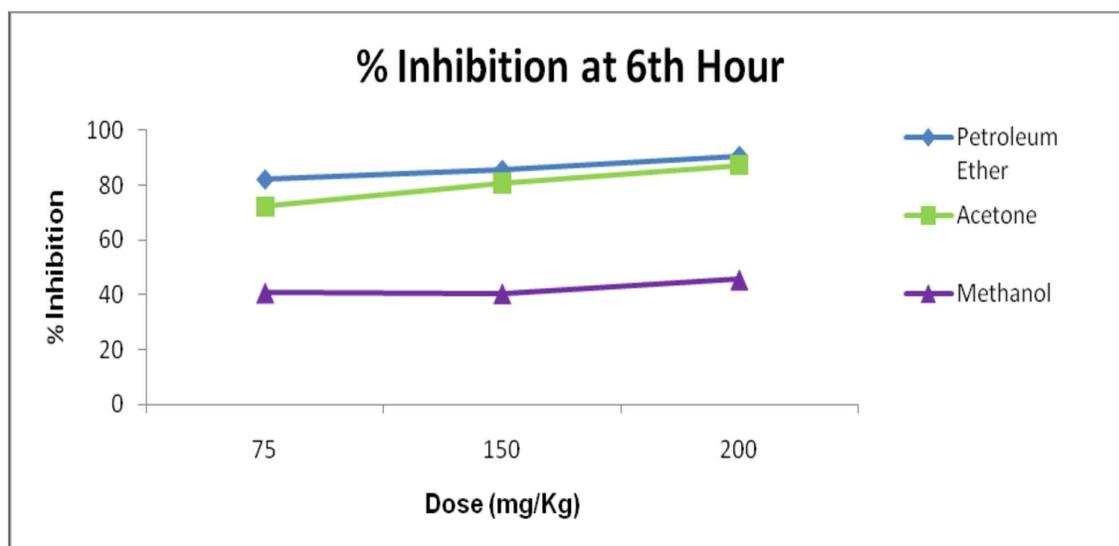


Figure 4: % Inhibition at 6th Hour for different Extracts

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#### 5. CONCLUSION

A raw paw edema model was used in the study to assess the anti-inflammatory effects of several extracts from *peristrophe bicalyculata* aerial parts. The extracts

showed dose-dependent inhibition of paw edema, with the petroleum ether extract showing the highest activity. The results suggest that *Peristrophe bicalyculata* extracts have potential therapeutic activity in acute inflammatory conditions. To extract and purify the key ingredients and examine their therapeutic efficacy in additional animals, more study is required. The authors thank their institution for supporting them in conducting the research.

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