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**Vrushali Neve**  
Konkan Gyanpeeth College of  
Pharmacy and Research  
Institute, Karjat, Maharashtra,  
India

**Priyanka Bandivadekar**  
Konkan Gyanpeeth College of  
Pharmacy and Research  
Institute, Karjat, Maharashtra,  
India

**Poonam Patil**  
Konkan Gyanpeeth College of  
Pharmacy and Research  
Institute, Karjat, Maharashtra,  
India

**Pritam Kutal**  
Ideal College of pharmacy,  
Kalyan, Maharashtra, India

**Correspondence**  
**Vrushali Neve**  
Konkan Gyanpeeth College of  
Pharmacy and Research  
Institute, Karjat, Maharashtra,  
India

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## Innovation development and standardization of Novel Herbal Formulation

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### Evaluation of anti-inflammatory activity of Ethanolic extract of fruit of *Psoralea Corylifolia* Linn

Vrushali Neve, Priyanka Bandivadekar, Poonam Patil and Pritam Kutal

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#### Abstract

*Psoralea Corylifolia* Linn is well known traditional medical plant used for various treatment. It has anti-inflammatory activity. Little research has been done to study anti-inflammatory activity of psoralen fruit in which inflammation was induced in rat by using egg white. Edema to paws has taken as index of anti-inflammatory activity. Egg white cause inflammation and edema.

**Keywords:** Psoralen corylifolia, Inflammation, Egg white, Edema

#### Introduction

*Psoralea corylifolia* Linn belonging to Fabaceae family is an important endangered plant that has been therapeutically used to treat different pathological manifestations since ages. It is commonly known as Bakuchi in Sanskrit. It is widely distributed and an important part of therapeutics in Ayurveda and in Chinese medicines.<sup>2</sup> It has some usage in Ayurveda with the name Kushtanashini. It has cardiogenic, vasodilator, pigmentor, antitumor, antibacterial, cytotoxic, and anti-helminthic properties and locally used for alopecia, inflammation, leukoderma, leprosy, psoriasis, and eczema. So far, about a hundred bioactive compounds have been isolated from seeds and fruits, and most important compounds identified belongs to coumarins, flavonoids, and meroterpenes groups. Additionally, it is involved in the formation and regulation of bone. Psoralens are naturally occurring furanocoumarins used in photochemotherapy of several skin diseases.<sup>4</sup> *Psoralea corylifolia* grows 50–90 cm tall and is an annual plant. It has pale-purple flowers. Its corolla is pale purple. Flowers one-seeded fruits. The most distinctive feature is the occurrence of minute brown glands which are immersed in surface tissue on all parts of the plant which give it a distinctive and pleasant fragrance.<sup>8</sup> *Psoralea* is from the Greek 'psoraleos' meaning 'scabby' and refers to the appearance given to the plants by the small glands which cover them; *corylifolia* comes from the similarity of the leaves to those of *Corylus*, a genus of trees in the northern regions of the world and common in Sweden. *P. corylifolia* extract contains a number of chemical compounds including flavonoids (neobavaisoflavone, isobavachalcone, bavachalcone, bavachinin, bavachin, corylin, corylifol, corylifolin and 6-prenylnaringenin), coumarins (psoralidin, psoralen, isopsoralen and angelicin) and meroterpenes (bakuchiol and 3-hydroxybakuchiol). In inflammation-stimulated macrophages, components of *Psoralea* may have anti-inflammatory effects. Although the anti-inflammatory effects cannot be isolated to one component. 12A variety of other components (Psoralidin, Corylifol A, Bavachinin, Isobavachalcone, Neobavaisoflavone) have shown an ability to reduce NO production in LPS-stimulated macrophages with a potency in the range of 17-29mm (IC<sub>50</sub> values) alongside reduced cytokine release secondary to macrophage activation.

#### Materials and Methods

**Plant:** The Plant material *Psoralea corylifolia* was collected from the local region of Aurangabad.

**Animals:** Experimental animals (Swiss Albino Mice and Wistar Rats) of either sex were

purchased from National Toxicology Centre, Pune.

### Methodology

Extract obtained after removing the solvent was subjected to preliminary phytochemical screening and these extract evaluated for anti-inflammatory activity.

Stock solution was prepared fresh on each day of experiment. Naive, healthy, Albino Swiss mice and Wistar rats: The experimental animals were maintained in our animal house (12:12 dark: light cycle), with adequate ventilation, hygienic conditions maintained on normal pelleted diet and water *ad libitum*.

A group of six animals were housed in polypropylene cage of 26X19X13 and 42X27X13 cm on paddy husk bed and covered with stainless steel wire mesh 28X20.5 cm with provision for water and feed

### Solvent Extraction

The plant was collected and air dried in shade, under normal environmental condition and then subjected to size reduction to get coarse powder. The powdered material was charged in the Macerator using ethanol as solvent. The extracts were then concentrated. The concentrated extract was evaporated on an environmental condition to dryness. The Percentage yield was found to be 14.10gm.

### Phytochemical evaluation of the extract:

1. Tests for Flavonoids (Shinoda, Lead Acetate-Alkaline solution tests)
2. Tests for Alkaloids (Dragendroff's, Mayer's, Hager's tests) (Wagner's test)
3. Tests for Saponin Glycosides (Foam test)
4. Test for Carbohydrates (Molish's test)
5. Test for Monosaccharide (Barfoed's test)
6. Tests for Proteins (Biuret, Millon's, Precipitation tests) (Xanthoprotein test)

### Pharmacological Evaluation

#### Egg White induced paw edema

The animals divided into two groups of 3-3 animals each. Into dorsal side of one hind paw of rat was injected subcutaneously 0.1ml fresh egg white, and into other 0.1 ml saline.

After 90 minutes the hind legs were removed at knee joint and weighed.

Difference in weight was measure of edema.

#### For Test substance

Arbitrary dose was given subcutaneously, and again 30 minutes later.

Immediately after latter injection, 0.1ml egg white was injected into hind paw. Every dose was tried in two group of 3 rats.

Smallest amount of test substance needed to diminish edema was determined by trial and error. Hind paw volume was measured using plethysmograph before injection at 1, 2, 3, 4, 5 h after egg white injection. The difference between paw volume readings gave actual edema volume. The percent inhibition of inflammation was calculated using formula:

$$\% \text{ inhibition} = 100(1 - V_t/V_c)$$

Where  $V_c$  represent edema volume in control group and  $V_t$  represent edema volume in the group treated with tested extract of *Psoralea Corylifolia* fruit

### Statistical analysis

Data were analyzed by one-way ANOVA for comparisons of groups.

### Results and Discussion

**Table 1:** Phytochemical evaluation of the extract

Sr. No.	Phytochemical test	Inference
1	Tests for Flavonoids (Shinoda, Lead acetate, Alkaline solution tests)	+
2	Tests for Alkaloids (Dragendroff's, Mayer's, Hager's tests) (Wagner's test)	+ -
3	Tests for Saponin Glycosides (Foam test)	+
4	Test for Carbohydrates (Molish's test)	+
5	Test for Monosaccharide (Barfoed's test)	+
6	Tests for Proteins (Biuret, Millon's, Precipitation tests) (Xanthoprotein test)	+ -

- Inflammation is response of living tissue to injury that involves cytokine release, extravasation of fluid, cell migration, tissue breakdown and repair.
- We observed that following administration of test drug *Psoralea corylifolia* fruit extract demonstrated significant (compared to vehicle treated group) dose dependent reduction in edema.
- Anti-inflammatory property of bavachinin of fruit of *psoralea corylifolia* have been studied in order to establish potential utility as therapeutic agent for treatment of inflammatory disease.

**Table 2:** Anti-inflammatory activity of test compound in egg white induced paw edema in rat

	Initial	1h	2h	3h	4h	5h	6h
Negative control	8.4+ 0.4	30+ 4.3	45+ 5.6	50.2+ 8.2	45.5+7.6	40.3+ 5.3	28.6+4.3
5mg/kg	8.2+0.5	28+ 4.2	40+ 5.5	42.1+ 6.4	32.5+ 7.4	28.3+ 6.2	16.2+ 3.7
10mg/kg	8.3+0.4	27.3+4.5	36+ 5.7	37.3+ 5.5	25.4+ 4.3	22.4+ 5.3	7.5+3.5
15mg/kg	8.4+0.3	27.2+4.7	34+ 5.8	30.3+ 6.3	18.3+ 6.9	16.4+3.3	4.7+2.2
psoralea colifolia extract	8.4+0.3	27.2+ 2.5	34+ 3.5	35.4+ 5.3	28.4+ 5.3	20.5+ 4.6	5.2+2.6

**Table 3:** Percentage inhibition of edema at time (h)

	1h	2h	3h	4h	5h	6h
5mg/kg	5.5	9.3	32.2	30.2	37.4	47.3
10mg/kg	8.6	17.3	36.4	42.4	46.3	75.4
15mg/kg	6.7	19.2	42.7	59.5	63.5	88.4
psoralea colifolia extract	9.8	20.4	37.1	25.3	54.3	79.6

## Discussion

Anti-inflammatory effect of psoralen corylifolia fruit in egg white induced rat paw edema is shown in Table no. 2 and percentage inhibition of inflammation is shown in Table no. 3. When egg white injected to treated group, it produced strong edema in rat paws, reaching maximum after 3h and decreases thereafter. The experimental groups with highest test dose 15mg/kg exhibited significant anti-inflammatory effect and with lower doses exhibited less inflammation than negative control but more than positive control. Percent inhibition at different time interval were not significantly different.

## Conclusion

From above study it was concluded that Fruit of Psoralea Corylifolia possess anti-inflammatory effect. As dose of test drug increases volume of edema decreases.

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