

EVALUATION OF ANTI- INFLAMMATORY ACTIVITY OF *IPOMOEA FISTULOSA* LINN.

JAIN RUCHI\*, JAIN NILESH AND JAIN SURENDRA

The aim of present study was to assess the anti-inflammatory activity of methanolic and petroleum ether extracts of *Ipomoea fistulosa* leaves. Anti-inflammatory activity was screened by formalin (0.1%) induced rat paw edema method in albino mice. The mature green leaves of *Ipomoea fistulosa* were collected and authenticated. Extractions of dried leaves were carried out with 100% methanol and petroleum ether in soxhlet apparatus. For screening of anti-inflammatory activity, the extracts were administered orally once daily at a dose of 50 and 100 mg/kg with CMC. Animals were divided into six groups of 4 animals each. Group 1 served as control and group 2 as reference standard (diclofenac sodium 20 mg/kg), group 3 and 4 animals were treated with 50 mg/kg and 100mg/kg methanolic extract respectively and group 5 and 6 animals were treated with 50 mg/kg and 100 mg/kg petroleum ether extract respectively. The petroleum ether extracts caused significant decrease in paw edema in 24-hour observation. Anti-inflammatory activity may be due to the presence of b-sitosterol. Dose dependent activity may be attributed to high concentration of phyto b-sitosterol.

**Keywords :** Anti-Inflammatory, Ipomoea Fistulosa, Carboxy Methyl Cellulose.

## INTRODUCTION

The plant *Ipomoea fistulosa* Linn. (Besharam, Behaya) is a large, diffuse or straggling shrub with milky juice, leaf ovate cordate, entire, acuminate, flower large campanulate, pale rose, pink or light violet in lax, dichotomously branched axillary and terminal, pedunculate cymes; Fruits glabrous capsule; Seed silky, belonging to family Convolvulaceae.<sup>1-3</sup> It is well distributed in India and found particularly in Chhattisgarh and Madhya Pradesh.<sup>4-6</sup> The plant is commonly known as Besharam, Behaya and used for skin troubles successfully. The milky juice of Beshram is used for the treatment of Safed Dag (Leucoderma).<sup>7</sup> The juice is collected and applied externally on affected parts, anti-inflammatory. It is used to decrease the teratogenic effect resulting from cyclophosphamide.<sup>8</sup> Aqueous extract of *Ipomoea fistulosa* shows neuromuscular blocking activity.<sup>9</sup> It used as aphrodisiac, purgative and cathartic.<sup>10</sup> The leaves of *Ipomoea fistulosa* contain 1-3 flavonol glycosides and Ergine (D-Lysergic acid amide).<sup>11</sup> Polyhydroxylated alkaloids were isolated from the leaves, flowers and seeds.<sup>12</sup> Chromatographic separation of the leaf extract resulted in the isolation of swainsonine, 2-epilentiginosine, calystegines B (1), B (2), B (3) and C (1) and N-methyl-trans-4-hydroxy-l-proline and beta sitosterol.<sup>13-15</sup> After exhaustive literature survey it was aimed to screen the anti-inflammatory activity of the leaves of *Ipomoea fistulosa* Linn.

## MATERIALS AND METHODS

## Plant material and preparation of extract

The leaves of *Ipomoea fistulosa* Linn. were collected from

Bhopal, Madhya Pradesh. The plant authenticated by comparing with the herbarium voucher specimen deposited at C.D.R.I. Lucknow. The material was air dried under shade, powdered mechanically and stored in airtight containers. About 1.0 kg of the powdered material was subjected to soxhlation with 100% methanol and petroleum ether for 24 hr in batches of 250 gm each. The extracts were pooled together and concentrated in vacuum using rotary flash evaporator.

## Animals

Healthy albino mice of either sex, weighing between 150 g and 200 g were housed in polypropylene cages an air-conditioned area at 25 + 2°C in 10-14 hrs light dark cycle on normal food and water. The methanol and petroleum ether was devoid of any mortality or change in behavior up to 1.0 g/kg orally in albino mice. Based on this observation maximum dose of 50 mg/kg and 100mg/kg orally was used for acute treatment in following experiments. Animals were periodically weighed before and after experiments. Animals were divided into six groups of 4 animals each. Edema was induced by subcutaneous injection of formalin 0.1% concentration. For both extracts, group 1 served as control and group 2 as reference standard (diclofenac sodium 20 mg/kg). Group 3 and 4 animals were treated with 50 mg/kg and 100 mg/kg methanolic extract respectively and group 5 and 6 animals were treated with 50 mg/kg and 100mg/kg petroleum ether extract respectively. Animals were closely observed for any infection; those, which showed signs of infection, were separated and excluded from the study. An acute toxicity

\*Corresponding author: \* Shri Ravishankar College of Pharmacy, Bypass Road, Bhanpura, Bhopal (India)  
e-mail: jainruchi02@rediffmail.com

study was conducted for the extracts by the stair-case method.<sup>16</sup> Animal Ethics Committee of the institution approved the study protocol.

**Drug formulation**

The drug formulations were prepared from corresponding dose of petroleum ether and methanolic extracts with carboxyl methylcellulose.

of digital vernier calipers. Edema was induced by subcutaneous injection of 0.1 ml of 1% formalin in all mice into the plantar side of the right hind paw of all groups. The group 1 animals were left untreated and considered as the control and group 2 served as reference standard and treated with diclofenec sodium 20 mg/kg. Animals of group 3 and 4 were treated with 50 mg/kg and

**TABLE- 1 Acute antiinflammatory activity of ipomoea fistulosa extracts on formalin induced mice paw edema.**

S.No	Time	Mean of Anti-Inflammatory Response of the Extracts by Monitoring Mice Paw Diameter					
		Control (CMC 1 ml)	Standard (Dicl. sod. 20mg/kg)	Methanol extract (50mg/kg)	Methanol extract (100mg/kg)	Pet. ether extract (50mg/kg)	Pet. ether extract (100mg/kg)
1	0 min.	2.5±0.1	2.5±0.2	2.5±0.2	2.5±0.2	2.5±0.1	2.5±0.2
2	30 min.	4.3±0.2	3.8±0.1	4.3±0.3	4.2±0.2	4.2±0.2	4.3±0.1
3	60 min.	4.2±0.1	3.6±0.2	4.1±0.5	4.1±0.1	4.1±0.1	3.8±0.2
4	120 min.	4.1±0.1	2.8±0.2	4±0.3	4±0.2	4±0.5	3.6±0.1
5	180 min.	4±0.2	2.6±0.1	3.9±0.1	3.7±0.3	3.9±0.3	3.1±0.2
6	240 min.	3.9±0.3	2.5±0.3	3.9±0.1	3.6±0.3	3.9±0.2	2.8±0.1
7	1440 min.	3.9±0.2**	2.5±0.2*	3.8±0.2**	3.5±0.2**	3.8±0.1**	2.5±0.1*

Values are given in Mean±S.E.M of four mice in each group.

\*P<0.05, Significant as compared with control group. \*\*P<0.1, Non significant as compare to control.

**TABLE- 2 Percentage edema inhibition of mice pawedema by ipomoea fistulosa extracts.**

S.No	Time	% EDEMA INHIBITION					
		Control (CMC 1 ml)	Standard (Dicl. sod. 20mg/kg)	Methanol extract (50mg/kg)	Methanol extract (100mg/kg)	Pet. ether extract (50mg/kg)	Pet. ether extract (100mg/kg)
1.	0 min.	2.5±0.1	0%	0%	0%	0%	0%
2.	30 min.	4.5±0.2	15.5 %	4.4%	6.6%	6.6%	11.1 %
3.	60 min.	4.4±0.1	20 %	6.8 %	6.8 %	6.6 %	13.7 %
4.	120 min.	4.2±0.1	33.3 %	4.8 %	4.8 %	4.8 %	14.3 %
5.	180 min.	4.1±0.2	36.5 %	7.2 %	9 %	7.2 %	24.4 %
6.	240 min.	4.1±0.3	39 %	7.2 %	12.2 %	7.2 %	32%
7.	1440 min.	4.1±0.2**	39 %*	7.4 %**	14.7 %**	7.4 %**	39%*

Values are given in percentage of mean of four mice in each group.

\*P<0.05, Significant as compared with control group. s\*\*P<0.1, Non significant as compare to control.

**Anti-inflammatory activity**

The anti-inflammatory activity was performed as described by Turner 1965.<sup>17</sup> The Male or female albino mice with a body weight between 100 and 150 g were used. The animals were starved overnight. Animals were divided into six groups of 4 animals each weighed and numbered. The initial paw volume of each mice was taken with the help

100mg/kg methanolic extract respectively and group 5 and 6 animals were treated with 50 mg/kg and 100mg/kg petroleum ether extract respectively. The paw diameters of each group were measured in interval of 30 min with the help of vernier caliper. The drug formulations were prepared from corresponding dose of petroleum ether and methanolic extracts with carboxyl methylcellulose. The

percent inhibition of edema was calculated.

### Statistical Analysis

The data were analyzed by one-way ANOVA. According to this test, there was a significant difference between the drug treated groups and control at the level of  $P < 0.05$ . Results, expressed as Mean  $\pm$  SEM were evaluated using the t-test. Values of  $P < 0.05$  were considered statistically significant.<sup>18-19</sup>

### RESULTS

The present preliminary phytochemical investigation on *Ipomoea fistulosa* Linn. leaves reveals the presence of amino acids, steroids, flavonoids, alkaloids and tannins in methanolic and petroleum ether extracts. Hence we have taken methanolic and petroleum ether extracts of *Ipomoea fistulosa* Linn. leaves for evaluation of the anti inflammatory activity. The data depicted in table 1 showed that the methanolic extract at dose of 100 mg/kg had lesser activity than petroleum ether extract at dose of 100 mg/kg, which exhibits more significant anti inflammatory activity with decrease in paw edema, when compared to control. Petroleum ether extract at orally dose of 100 mg/kg showed significant reduction in the edema ( $P < 0.05$ ), faster rate of inhibition ( $2.5 \pm 0.1$ ), when compared with the control group ( $3.9 \pm 0.2$ ) of animals. But the animals treated with 50 mg/kg orally dosed showed moderate reduction in the edema ( $P < 0.1$ ) and slower rate of inhibition ( $3.8 \pm 0.1$ ). The methanolic extract at dose of 100 mg/kg had showed reduction in the edema ( $P < 0.1$ ), faster rate of inhibition ( $3.5 \pm 0.3$ ), when compared with the control group ( $3.9 \pm 0.2$ ) of animals. But the animals treated with 50 mg/kg orally dosed showed moderate reduction in the edema ( $P < 0.15$ ) and slower rate of inhibition ( $3.8 \pm 0.1$ ).

### CONCLUSIONS

The methanolic and petroleum ether extract of *Ipomoea fistulosa* Linn. is devoid of toxicity up to 1 g/kg in albino rats. The extract showed dose dependent anti-inflammatory activity, which was found to be statistically significant at higher concentration in acute formalin induced mice paw edema model. However, this activity was less potent as compared to diclofenac sodium. This activity appears to be significant in early phases of inflammation in which various biochemical's, viz. histamine, 5-HT, kinins are involved. The results were significant when analyzed statistically. Thus, extract shows anti-inflammatory activity at various acute phases of inflammation. Thus, anti-inflammatory property of *Ipomoea fistulosa* may be attributed to the phytoconstituents

present in it, which may be either due to their individual or additive effect that fastens the process of anti-inflammatory. Between the two extracts studied, the petroleum ether extract of *Ipomoea fistulosa* leaf was found to possess better anti-inflammatory activity. At this stage, it is difficult to say which component(s) of the extracts are responsible for this anti-inflammatory activity. However, further phytochemical studies are needed to isolate the active compound(s) responsible for these pharmacological activities.

### REFERENCES

1. Frey R. *Ipomoea carnea* sp. *fistulosa* (Martius ex Choisy) Austin: Taxonomy. Biology and ecology reviewed and inquired. 1995; 36(1): 21-48.
2. Compendium of Indian Medicinal Plant. Central Drug Research Institute. Publication and Information Directorate. New Delhi. 1979; 2: 390-391.
3. Indian Herbal Pharmacopoeia. Mumbai: Indian Drug Manufacture Association; 2002. P.498-99.
4. Ekka R Neeli, Dixit VK. Ethno-pharmacognostical studies of medicinal plants of Jashpur district Chattisgarh. Int Jour of Green Phar 2007; 1(1): 2-4.
5. Dwivedi SN. Traditional health care among the tribals of Rewa District of Madhya Pradesh with special reference to conservation of endangered and vulnerable specie. Econ Taxon Bot 1999; 23(2): 315-320.
6. Dwivedi SN. Ethnobotanical studies and conservation strategies of wild and natural resources of Rewa district of Madhya Pradesh. J Econ Taxon Bot 2003; 27(1): 233-244.
7. Varghese E. SVD. Applied Ethnobotany- A case study among the Kharias of Central India. New Delhi: Deep Publications; 1996.
8. Phillips O, Gentry AH, Reynal L, Wilkin P, Gulvez DCB. Quantitative Ethnobotany & Amazonian Conservation. Conser. Bio 1994; 8: 225-248.
9. Shrivastava S, Dwivedi S, Dubey D and Kapoor S, Traditional herbal remedies from Madhya Pradesh used as oral contraceptives- A field survey, Int. Jour. of Green Pha. 2007; 1(1): 18-22.
10. Ved GA, Kinhal K, Ravikumar MK, Vijaya S, Indresha JH. Threat Assessment and Management prioritization for Medicinal Plants of Chattisgarh & Madhya Pradesh. FRLNI. Bangalore. India; 2004.
11. Pankaj O. Major *Ipomoea* Species (Morning glories) of Chhattisgarh. India: Natural Occurrence. Traditional Medicinal Knowledge and Trade; 2003.
12. Maria de FA, Patricia F de F, Jose MBE. Synopsis of the plants known as medicinal and poisonous in Northeast of Brazil. Brazilian Journal of Pharmacognosy 2007; 17(1): 114-140.

13. Umar S, Junior P, Wichtl M. Isolation and identification of agroclavin and alpha-dihydrolysergol from leaves of *Ipomoea fistulosa*. 1980; 40(4): 328-332.
14. Dubey P, Khare N, Gupta PC. A new flavonoid glycoside from the leaves of *Ipomoea fistulosa*. *Curr Sci* 1982; 51: 351-352.
15. Haraguchi M, Gorniak SL, Ikeda K, Minami Y, Kato A, Watson AA, et al. Alkaloidal components in the poisonous plant. *Ipomoea carnea* (Convolvulaceae). *Journal of agricultural and food chemistry* 2003; 51(17): 4995-4998.
16. Jalalpure SS, Patil MB, Prakash NS, Hemalatha K, Manvi FV. Hepatoprotective activity of fruits of *Piper longum* L. *Indian J Pharm Sci* 2003; 65: 363-366.
17. Turner RA, Hebban P. *Analgesics: Screening methods in pharmacology*. Newyork: Academic Press; 1965. p. 100.
18. Kulkarni SK. *Handbook of Experimental Pharmacology*. 3rd Ed. New Delhi: Vallabh Prakashan; 1999. p.172-189.
19. Gurulingappa H, Hallur MS, Yogesh J, Madhavi S, Bhat SV. Antiinflammatory assays of various extracts of medicinal plants. *Indian J Pharm Sci* 2002; 64: 498-500.