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Anti-Inflammatory Activity of Aqueous And Ethanolic Extracts of *Potentilla Anserina* Linn

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ABSTRACT

This study was taken up to assess the aqueous and ethanol extracts of whole plant of *Potentilla anserina* Linn for anti-inflammatory activity in rats by Formalin induced paw oedema method. Animals were divided into 6 groups of 6 rats. Groups 1 and 2 served as Formalin induced control and standard (Diclofenac 5 mg/Kg, i.p.) respectively. Groups 3 and 4 were treated, orally with aqueous extract of *Potentilla anserina* Linn of 100 and 400 mg/kg b.w, respectively. Groups 5 and 6 were administered, orally with ethanol extract of *Potentilla anserina* Linn of 100 and 400 mg/kg b.w, respectively. The paw volume was measured at 0, 1, 2, 3 and 4 hr after Formalin injection. The actual edema volume was calculated. The data was expressed as mean ± S.E.M. The statistical analysis was done by means of ANOVA followed by Dunnett's post hock test. The aqueous and ethanol extracts of whole plant of *Potentilla anserina* Linn produced significant reduction of edema in the rats. Ethanol extract of whole plant of *Potentilla anserina* Linn revealed significant anti-inflammatory activity.

Keywords: *Potentilla anserina* Linn, inflammation, formalin, edema.

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INTRODUCTION

Inflammation is a body defense mechanism which eliminates or limits the spread of the injurious agent. It serves to destroy, dilute, or wall off the offender and sets into motion a series of events that try to heal and reconstitute the damaged tissue[1]. Non-steroidal anti-inflammatory drugs (NSAIDs) make up one of the largest groups of drugs used for pain and inflammation. Currently available anti-inflammatory agents are associated with unwanted side effects- gastrointestinal damage and have their own limitations[2]. Plants which are reported to have anti-inflammatory activity include *Punica granatum*[3], *Tecoma stans*[4], *Polyalthea longiflora*[5], *Ficus religiosa*[6], *Curcuma longa* L[7], *Aloe vera*[8], *Gmelina asiatica*[9], *Caesalpinea pulcherrima* Linn[10], *Sida rhombifolia*[11], *Butea frondosa*[12], *Vitex leucoxylon* Linn[13], *Ricinus communis*[14], *Hedychium spicatum*[15], *Desmodium gangeticum*[16], *Argyreia speciosa*[17], *Randia dumetorum*[18], *plantago major* L[19], *Broussonetia papirifera*[20] etc. There is a growing interest in the pharmacological evaluation of various plants used in Indian traditional systems of medicine[21]. Thus the present investigation was carried out to evaluate the anti-inflammatory potential of aqueous and ethanol extracts of whole plant of *Potentilla anserina* Linn. It is used as astringent, anti-inflammatory, antispasmodic, haemostatic, and for treating diarrhoea, leucorrhoea, dysmenorrhoea, arthritis, cramps, kidney stones and bleeding piles. It is also used as mouth wash in pyrrhoea, gingivitis and sore throat[22].

MATERIALS AND METHOD

Plant material and Preparation of extracts: [23]

The whole plant of *Potentilla anserina* Linn (Rosaceae*)* was collected from Tirupati, India and was authenticated by Dr. K. Madhava Chetty, Sri Venkateshwara University, Tirupati, India. The authenticated aqueous and ethanolic extracts of whole plant of *Potentilla anserina* Linn were obtained from "Green Chem", Bangalore-560071. The percentage yield of extracts is as below: *Potentilla anserina* Linn*;* Aqueous: 19% w/w, Ethanol 12% w/w.

Qualitative phytochemical investigation of aqueous and ethanolic extracts of *Potentilla anserina* Linn [(Aq(PA), E(PA)]**:**[24,25]

The extracts were screened for the presence of various phytoconstituents like alkaloids, glycosides, carbohydrate, tannins – phenolic compounds, proteins, amino acids, fats, oils, flavonoides, saponins and steroids etc

Methodology:

Formalin induced paw oedema[26, 27]

Albino rats (Wistar strain) of either sex weighing between 180-200gm body weights were selected for the experimental study. They were divided into six groups of six animals each. Group 1 rats served as Formalin control (0.1ml of 2% v/v, s.c, hind paw), group 2 rats received standard drug Diclofenac 5 mg/Kg, b.w, i.p., group 3 and 4 rats were administered, orally with aqueous extract of *Potentilla anserina* Linn of 100 and 400 mg/kg b.w, respectively. Group 5 and 6 rats were administered, orally with ethanol extract of *Potentilla anserina* Linn of 100 and 400 mg/kg b.w, respectively. After 1 hr 0.1 ml of 2% v/v Formalin was injected into sub plantar region of right hind paw. The paw volume was measured at 0, 1, 2, 3 and 4hr after Formalin injection. The left paw volume was measured initially at 0 hr for all the groups which gives the normal paw volume. The difference between the left and right paw values gives the actual edema volume which was compared with Formalin control. The inhibition of inflammation was calculated using the formula,

$$\% \text{ inhibition} = 100\ (1-Vt/Vc),$$

Where 'Vc' represents edema volume in control and 'Vt' edema volume in group treated with test extracts.

STATISTICAL ANALYSIS:

The data was expressed as mean ± S.E.M. The statistical analysis of results was done by means Analysis Of Variance (ANOVA) followed by Dunnett's post hock test. The P value < 0.05 was considered statistically significant.

RESULTS AND DISCUSSION:

The preliminary phytochemical screening of plant of *Potentilla anserina* Linn revealed the presence of Alkaloids, Saponins, Flavonoids, Glycosides, Tannins, Phenolic compounds and steroids. Carbohydrate and protein were absent which was noted from table 1.

In the rats administered with vehicle (Distilled water), the sub plantar injection of Formalin produced a local edema that increased progressively from 0.4333±0.030 ml after the first hour to reach a maximum 0.9417±0.056 within four hour. The extracts of *Potentilla anserina* Linn (100,400 mg/kg) from the third hour post formalin injection caused a dose dependent and significant ($P<0.001$) reduction of edema in the rats. Diclofenac (5mg/kg) produced a significant ($P<0.001$) decrease in edema at third and forth hour when compared with the Formalin treated group which was noted from table 2.

The advancement of allopathic medication shifted scientific and general peoples interest from conventional medicinal preparations. However, in recent years, a significant paradigm change has taken place. Attraction has re-focused in traditional medicine, simply because of the higher cost of

modern drugs, time and expenditure which is essential to bring a drug to market after proper clinical tests, severe side effects of a variety of modern drugs and drug resistance developing in both microorganisms and parasites. So researchers are currently taking an active interest in traditional medicinal preparations of native peoples, which are plant based[28] The reduction of paw volume was shown by the aqueous (100,400 mg/kg) and ethanolic extracts (100,400 mg/kg) of *Potentilla anserina* Linn (100,400 mg/kg). The ethanolic extract shows better activity when compared to aqueous extracts. The percentage inhibition of paw edema for *Potentilla anserina* Linn aqueous extract (100,400 mg/kg) was 49.42, 60.12 and etanolic extract (100,400 mg/kg) was 57.06, 63.63 respectively.

Phytochemical investigation of aqueous and ethanolic extracts of *Potentilla anserina* Linn have revealed the presence of various phytoactive constituents such as alkaloids, saponins, flavonoids, glycosides, tannins, phenolic compounds and steroids. Earlier studies indicate β-sitosterol[1], flavonoids[4], phenolic compounds[29], and tannins[30] may be responsible for anti-inflammatory activity. These plant extracts also contain the similar phyto constituents which was responsible for the activity.

Table 1. Qualitative phytochemical screening of [(AQ (PA) AND E (PA)]

Chemical tests	***Potentilla anserina* Linn**	
	Aqueous	Ethanol
I. Test for Triterpenoids /Steroids		
Liebermann Burchard Test	+	+
II. Test for Glycosides		
Keller Killiani Test	+	+
Legals test	+	-
III. Test for Saponins		
Foam test	-	+
IV. Test for Alkaloids		
Dragendorffs test	+	+
V. Test for Flavanoids		
Ferric Chloride test	+	+
Alkaline reagent test	+	+
Lead Acetate Solution test	+	+
VI. Test for Tannins/phenols		
$KMNO_4$ test	+	+
5% $FeCl_3$	+	+
VII. Test for Proteins		
Biuret test	-	-
VIII. Test for Free amino acids		
Ninhydrin Test	-	-
IX. Test for Carbohydrates		
Molischs test	-	-

X. Test for fat and oil		
Saponification test	+	+

- Negative; + positive

Table 2. Effect OF Aq(PA) and E(PA) On Formalin Induced Paw Oedema (Percentage Inhibition)

Groups	0 hour		1 hour		2 hour		3 hour		4 hour	
	Paw edema (ml) Mean ± SEM	% ROV	Paw edema (ml) Mean ± SEM	% ROV	Paw edema (ml) Mean ± SEM	% ROV	Paw edema (ml) Mean ± SEM	% ROV	Paw edema (ml) Mean ± SEM	% ROV
Control	0.4333 ± 0.030	-	0.675 ± 0.017	-	0.7833 ± 0.024	-	0.8667 ± 0.047	-	0.9417 ± 0.045	-
Diclofenac 5 mg/kg	0.3083 ± 0.023	-	0.395 ± 0.063***	41.69	0.4167 ± 0.058***	46.95	0.37 ± 0.061***	56.59	0.3117 ± 0.042***	68.94
Aq(PA) 100 mg/kg	0.3583 ± 0.030	-	0.5467 ± 0.0361$	19.15	0.56 ± 0.032**	27.92	0.5 ± 0.031***	41.56	0.47 ± 0.040***	49.42
Aq(PA) 400 mg/kg	0.345 ± 0.020	-	0.5 ± 0.048*	26.05	0.5167 ± 0.04609***	34.26	0.4083 ± 0.035***	51.58	0.37 ± 0.043***	60.12
E(PA) 100 mg/kg	0.3583 ± 0.020	-	0.52 ± 0.037$	22.42	0.5517 ± 0.035**	29.85	0.46 ± 0.070***	46.19	0.4 ± 0.065***	57.06
E(PA) 400 mg/kg	0.35 ± 0.018	-	0.4583 ± 0.047**	31.33	0.4867 ± 0.048***	37.47	0.4 ± 0.046***	53.56	0.3467 ±0.052***	63.63

n=6, values are mean ± S.E.M, one way ANOVA followed by Dunnet's post hoc test. Significance at *P<0.05,P<0.01,***P<0.001 v/s control. Aq (PA)-Aqueous extract of *Potentilla anserina* Linn. E (PA)- Ethanolic extract of *Potentilla anserina* Linn**

CONCLUSION:

Ethanol extract of whole plant of *Potentilla anserina* Linn possess anti-inflammatory potential.

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