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ANTI-INFLAMMATORY ACTIVITY OF WHOLE PLANT OF *POLYGALA ROSMARINIFOLIA* WIGHT & ARN (POLYGALACEAE)

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ABSTRACT

In the present study, *Polygala rosmarinifolia* whole plant was extracted with ethanol and evaluated for anti-inflammatory activity in rats using a carrageenan induced paw edema method. Ethanol extract exhibits potent anti-inflammatory activity at 200mg/kg at 3rd hr after administration is compared with reference standard drug, Indomethacin. Observed pharmacological activity in the present study provides scientific validation of ethnomedicinal use of this plant in treating acute inflammation.

INTRODUCTION: Inflammation is a bodily response to injury, infection or destruction characterized by heat, redness, pain, swelling and disturbed physiological functions. Inflammation is a normal protective response to tissue injury caused by physical trauma, noxious to inactivate or destroy the invading organisms, to remove the irritants and set the stage for tissue repair. It is triggered by the release of chemical mediators from injured tissue and migrating cells [1].

The commonly used drug for management of inflammatory conditions are non-steroidal anti-inflammatory drugs, which have several adverse effects especially gastric ulcers [2]. Natural products have contributed significantly towards the development of modern medicine. The attention of pharmacologists throughout the world has been focused on finding out safer and potent anti-inflammatory drug. The natural products today symbolize safety in contrast to the synthetic drugs that are regarded as unsafe to humans and environment. So, people are returning to the natural products with the hope of safety and security [3].

Polygala was traditionally used by Americans to treat snake bites [4] and as an expectorant to treat cough and bronchitis. *Polygala* is considered as a powerful tonic [5] than can help to develop the mind and aid in creative thinking.

To our knowledge no report on the effect of *Polygala rosmarinifolia* whole plant on experimental inflammation. This study was therefore undertaken to evaluate the effects an ethanol extract of whole plant of *Polygala rosmarinifolia* on anti-inflammatory activity in carrageenan induced rat paw edema.

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MATERIALS AND METHODS:

Plant Material: The mature plants of *Polygala rosmarinifolia* were collected from Vadavalli, Coimbatore, Tamil Nadu, India. The plant was identified with the help of local flora and authenticated in Government of India, Botanical Survey of India, Southern Circle, Coimbatore, Tamil Nadu, India.

Preparation of plant extract for Anti-inflammatory activity: The dried whole plants of *Polygala rosmarinifolia* were powdered in a Wiley mill. Hundred grams of plant powder was packed in a Soxhlet apparatus and extracted with ethanol. The ethanol extract was concentrated in a rotary evaporator. The concentrated ethanol extract was used for anti-inflammatory activity.

Animals: Adult Wistar Albino rats of either sex (150-200g) were used for the present investigation. Animals were housed under standard environmental conditions at temperature (25±2^{o}C) and light and dark (12:12 h). Rats were fed with standard pellet diet (Goldmohur brand, MS Hindustan lever Ltd., Mumbai, India) and water *ad libitum*.

Acute Toxicity Study: For toxicity studies, six Albino rats of either sex were administered orally with the test substance in the range of 100-2000 mg/kg and the mortality rates were observed after 72h. The ethanol extract of *Polygala rosmarinifolia* exhibiting no mortality at 2000 mg/kg dose was considered as LD_{50} cut off dose (safe dose). So 1/20 and 1/10 of that were selected (100 and 200 mg/kg) for the experiment as sub maximal and maximal dose.

Anti-Inflammatory Activity:

Carrageenan induced Hind Paw Edema: Albino rats of either sex weighing 150-200 grams were divided into four groups of six animals each. The dosage of the drugs administered to the different groups was as follows. Group I - Control (normal saline 0.5 ml/kg), Group - II - *Polygala rosmarinifolia* (100 mg/kg and 200 mg/kg, p o.), Group III – Indomethacin (10 mg/kg, p.o.). All the drugs were administered orally. Indomethacin served as the reference standard anti-inflammatory drug.

After one hour of the administration of the drugs, 0.1 ml of 1% W/V carrageenan solution in normal saline was injected into the sub plantar tissue of the left hind paw of the rat and the right hind paw was served as the control. The paw volume of the rats were measured in the digital plethysmograph (Ugo basile, Italy), at the end of 0 min., 60min., 120min., 180min., 240min., 360min., and 480min. The percentage increase in paw edema of the treated groups was compared with that of the control and the inhibitory effect of the drugs was studied. The relative potency of the drugs under investigation was calculated based upon the percentage inhibition of the inflammation.

Percentage inhibition:

$$\frac{\text{Control (\% increase in paw volume in 3}^{rd}\text{ hour) - Test (\% increase in paw volume in 3}^{rd}\text{ hour)}}{\text{Control (\% increase in paw volume in 3}^{rd}\text{ hour)}} \times 100$$

Statistical Analysis: The data were analyzed using student's t-test statistical methods. For the statistical tests a *p* values of less than 0.01 and 0.05 was taken as significant.

RESULTS: In the presents study, the anti-inflammatory activity of ethanol extract of *Polygala rosmarinifolia* whole plant was evaluated in Albino rats using carrageenan-induced rat paw edema (acute inflammation) method. **Table 1** shows that the anti-inflammatory activity of ethanol extract of whole plant of *Polygala rosmarinifolia* significantly inhibited rat paw edema at 3rd hr post-carrageenan were 49.29% and 60.40% for 100 and 200mg/kg of ethanol extract of *Polygala rosmarinifolia* respectively. The effect was compared to the activity produced by standard drug Indomethacin at 3rd hr after administration (67.11%).

TABLE 1: ANTIINFLAMMATORY ACTIVITY OF ETHANOL EXTRACT OF *POLYGALA ROSMARINIFOLIA* WHOLE PLANT

		Inflammation volume (ml)				% Inhibition after 180 min
Treatment	Dose mg/kg	0 min	60 min	120 min	180 min	
CONTROL (Group-I)	1% Saline solution	33.29±1.63	61.35±1.48	87.14±1.93	124.56±4.31	-
Group-II	100 mg/kg (LD)	31.96±1.93	30.22±1.17**	49.37±1.66*	63.16±1.21*	49.29
	200 mg/kg (HD)	28.88±1.07	31.16±1.94**	40.18±1.33**	49.32±1.93**	60.40
Group-III	10 mg/kg	27.13±1.63	32.84±1.16*	46.23±1.14*	40.96±1.68**	67.11

Each Value is SEM ± 5 individual observations * $p < 0.05$; ** $p<0.01$ Compared paw inflammation induced control vs drug treated rats

DISCUSSION: Inflammation is a common phenomenon and it is a reaction of living tissues towards injury [6, 7]. The carrageenan induced paw edema test is widely accepted as a sensitive phlogistic tool for investigating potential anti-inflammatory agents, particularly the non-steroidal type. The development of edema in the paw of the rat after the injection of carrageenan is due to the release of histamine, serotonin, prostaglandin and the like. Prostaglandin-E_2, a powerful vasodilator, synergizes with other inflammatory vasodilator such as histamine and bradykinin and contributes to the redness and increased blood flow in areas of acute inflammation [8, 9, 10, 11].

In the present study the extracts were tested at two different dose levels to know if they were dose dependent. From the results obtained the whole plant extract showed highly significant activity ($p<0.05$). At the different dose range used (100 and 200mg/kg), there was a significant differences, in their anti-inflammatory activity hence they were found to the dose-dependent. Phytol and 9-octadecenoic acid (z)-, phenyl methyl ester were reported in the ethanol extract of *Polygala rosmarinifolia* whole plant by GC-MS analysis [12]. These compounds may have the role in anti-inflammatory effect.

Further studies will be carried out to isolate and characterize other anti-inflammatory chemical constituents present in the ethanol extract of this plant.

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REFERENCE

1. Anonymous. *New medical dictionary*. New Delhi: Oxford and IBH Publishing Co. Pvt. Ltd. 2007. 376.
2. Tripathi KD. *Essential of medical pharmacology*. New Delhi: Jaypee Brothers Medical Publishers Ltd. 2008. 189.
3. Rach ehh MA, Yodaw PN, Cokani RH, Jain SM. Anti-inflammatory activity of *Benincasa hispid* fruit. *Int. J. Phar. Biosci* 2011. 2: 98-106.
4. Mc Guffin M, Hobbs C and Upton R (eds). American Herbal products Associations Botanical Safety Handbook. Boea Raton, FL; CRC Press. 1997, 89.
5. Teeguarden R. Radiant Health. The Ancient Wisdom of the Chinese Tonic Herbs 1998. New York : Warner Books. 194-195.
6. Mohamed STK, Azeem AK, Dilip C, Sankar C, Prasanth NV and Duraisami R. Anti-inflammatory activity of the leaf extracts of *Gendarursa vulgaris* Nees. Asian Pal.J.Trop.Biomed 2011. **4**: 147-149.
7. Tian YQ, Kou JP, Li LZ and Yu BY. Anti-inflmmatory effects of aqueous extracts from radix *Liriope muscari* and its major active fraction and component *Chim J Nat Med* 2011. **9** : 222-226.
8. Georgewill OA, Georgewill VO and Nwanknoala RNP. Anti-inflammatory effects on *Morninga oleifera* Lan extract in rats. *Asian pal.J. Trop. Med* 2010. **3** : 133-135.
9. Foyet HS, Abdon BA, Ponka R, Asongalem AK, Kamtchouinng P and Nastasa V. Effects of *Hibiscus aspra* leaves extracts on carageenan induced O edema and complete freund's adjusvant induced anthritis in rats. *J cell Anim Biol* 2011. **5**: 69-75.
10. Georgewell OA and Georgewell VO. Evaluation of the anti-inflammatory activity of extract of *Vernonia amygdalina. Amygdalina. Asian pal J. Trop Med* 2010. **3**: 150-151.
11. Yadav S, Arya V, Kumar S and Yadav JP. Anti-inflammatory activity of root, leaves and stem of *Dipteracanthus patulus* (Jarq.) Nees (Acanthaceae). *Asian Pal J. Trop. Biomed S* 2012. 187-S 191.
12. Alagammal M, Tresina soris P and Mohan VR. GC-MS analysis of *Polygala rosmarinifolia* Wight & Arm, J. App. Pharmac. Sci 2012. **2**:188-190.

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