INTERNATIONAL RESEARCH JOURNAL OF PHARMACY

www.irjponline.com ISSN 2230 – 8407

Research Article

EVALUATION OF ANTI-INFLAMMATORY ACTIVITY OF ETHANOL EXTRACT OF *POLYGALA JAVANA* DC. WHOLE PLANT

Madasamy Alagammal[1], Koilpitchai Paulpriya[2], Veerabahu Ramasamy Mohan [2]*

[1]Government Siddha Medical College, Palayamkottai, Tamil Nadu, India

[2]Ethnopharmacology unit, Research Department of Botany, V.O.Chidambaram College, Tuticorin-628008, Tamil Nadu, India

Article Received on: 09/06/12 Revised on: 20/07/12 Approved for publication: 03/08/12

*Veerabahu Ramasamy Mohan, Ethnopharmacology unit, Research Department of Botany, V.O. Chidambaram College, Tuticorin-628008, Tamil Nadu, India Email:vrmohanvoc@gmail.com.

ABSTRACT

The study was intended to evaluate the anti-inflammatory activity of the whole plant of *Polygala javana.* The anti-inflammatory activity study was carried out by using Carrageenan induced paw edema. The ethanol extract of whole plant of *Polygala javana* was injected at different doses such as 100 and 200 mg/kg body weight and the study was compared with standard drug Indomethacin (10mg/kg). The extract exhibited significant anti-inflammatory activity, which supports the traditional medicinal utilization of the plant.

Keywords: *Polygala javana,* anti-inflammatory, paw edema.

INTRODUCTION:

Inflammation is considered as a primary physiologic defense mechanism, that helps body to protect itself against infection, burn, toxic chemicals, allergens or other noxious stimuli. An uncontrolled and persistent inflammation may act as an etiologic factor for many of these chronic illnesses[1]. Although it is a defense mechanism, the complex events and mediators involved in the inflammatory reaction can easily be induced[2].The side effect of the currently available anti-inflammatory drugs pose a major problem during their clinical uses[3,4]. Therefore, the development of newer and more potent anti-inflammatory drugs with lesser effects is necessary.

Polygala was traditionally used by Americans to treat snake bites[5] and as an expectorant to treat cough and bronchitis. *Polygala* is considered as a powerful tonic[6] than can help to develop the wind and aid in creative thinking. Up to our knowledge, there are no report on the effect of *Polygala javana* whole plant on experimental inflammation. This study was therefore undertaken to evaluate the effects of ethanol extract of whole plant of *Polygala javana* on anti-inflammatory activity in carrageenan induced rat paw edema.

MATERIALS AND METHODS

Plant Material

The whole plant materials of *Polygala javana* were collected from Scott Christian college campus, Nagercoil, Kanyakumari District, 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 plant materials of *Polygala javana* were powdered in a Wiley mill. Hundred grams of whole 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^{0}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 200-2000 mg/kg and the mortality rates were observed after 72h. The ethanol extract of *Polygala javana* 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.

Antiinflammatory 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 IV – Indomethacin (5 mg/kg, p.o.), Group - II and III - *Polygala javana* (100 mg/kg and 200 mg/kg, p.o.). All the drugs were administered orally. Indomethacin served as the reference standard antiinflammatory 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

Control (% increase in paw volume in 3rd hour) - Test (% increase in paw volume in 3rd hour) / Control (% increase in paw volume in 3rd hour) X100

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 javana* 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 javana* significantly inhibited rat paw edema at 3rd hr post-carrageenan which were 32.45% and 58.79% for 100 and 200mg/kg of ethanol extract of *Polygala javana* respectively. The effect was compared to the activity produced by standard drug Indomethacin at 3rd hr after administration (67.11%).

DISCUSSION

Carrageenan-induced edema has been commonly used as an experimental animal model for acute inflammation and is believed to be biphasic. The early phase (1 to 2h) of the Carrageenan model is mainly mediated by histamine, serotonin and increased synthesis of prostaglandins in the damaged tissue surroundings. The late phase (3h) is sustained by prostaglandin release and mediated by bradykinin, leukotrienes, polymerphonuclear cells and prostaglandins produced by tissue macrophages[7,8]. In the present study, the percentage inhibition of inflammation after 3rd h of Carrageenan infection were 32.45% and 58.79% respectively at 100 mg|kg and 200 mg/kg dose level as compared to that of 10 mg/kg of Indomethacin (67.11%). The results were statistically significant (p<0.01) [9] found that the injection of Carrageenan into the rat paw induces the liberation of bradykinin, which later induces the biosynthesis of prostaglandins and other autacoids, which are responsible for the formation of the inflammatory exudates[9]. Besides, in the Carrageenan induced rat paw edema model, the production of prostanoids has been released through the serum expression of Cox-2 by a positive feedback mechanism[10]. PGE_2, a powerful vasodilator, synergizes with other inflammatory vasodilators such as histamine and bradykinin and contributes to the redness and increased blood flow in areas of acute inflammation. Therefore, it is suggested that, the mechanism of action of these extracts may be related to histamine and prostaglandin synthesis inhibition.

GC-MS analysis of *Polygala javana* whole plant revealed the presence of Phytol, Ledene oxide-(I), Cedrandiol, 8s, 14- and 1H-Perimidine, 2,3- dihydro-2-(2,4,5-trimethoxyphenyl). These compounds may have the role in anti-inflammatory effects[11]. In the present study, the *in vitro* anti-inflammatory activity of *Polygala javana* whole plant can be attributed to the above chemical constituents. The effect may be due to the synergistic effect rather than single constituent. Further definitive studies are necessary to ascertain the mechanism and constituents behind its anti-inflammatory actions.

ACKNOWLEDGEMENT

The authors are thankful to Dr.R. Sampathraj, Honorary Director, Dr. Samsun Clinical Research Laboratory, Thiruppur for providing necessary facilities to carry out this work.

REFERENCES

1. Kumar V, Abbas AK, Faurto.N. Robbins and Cotran pathologic barks of disease 7th ed. philadelphia, Elsevier sarnders 2004; pp. 47-86
2. Sora, S., Baliut MJ, Arvijo, R, Esposito, RG, Pizza, C,Altinier, GA. Screening of the topical anti-inflammatory activity of some central American Plants. Journal of Ethnopharmacol. 2002; 8:211-215.
3. Mattison, N, Trimple, AG, Lasegna I. New drying development in the United States, 1963 through 1984. Clini Pharmacol Ther. 1998; 43: 290-301.
4. Das B.N, Saha A, Aahmad M, Anti-inflammatory activity of bark of *Xeronphis spinosa*. Bangladesh Journal Pharmacol. 2009; 4:76-79
5. McGuffin M, Hobbs C, Upton R (eds): American Herbal Products Association's Botanical Safety Handbook. Boca Raton, FL: CRC Press, 1997; p. 89.
6. Teeguarden R: *Radiant Health: The Ancient Wisdom of the Chinese Tonic Herbs*. New York: Warner Books, 1998; p. 194-95.
7. Chavan MJ, Wakke PS, Shinde DB, Ahalgeeic ,anti-inflammatory activities of 18-acctoxy-ent-leaur-16-ene from *Annona squamosa* L. barks. Inflammopharmacol. 2011; 19:111-115.
8. Olivera de Melo JO, Truiti MCT, Muscasa MN, Bolonheis SM, Dantas JA , Caparroz Asref SM *et al*. Antiinflammatory activity of crude extract and fractions of *Nectandra falcifolia* leaves. Biol Pharm Bull. 2006; 29:2241-2245.
9. Uero A, Naraba H, Ikeda Y, Usilarbi F, Murata T, Naramiya S *et al*.Intrinsic prostacyclin contributes to exudation induced by bradikinin or Carrageenan . A study on the Paw oedema – induced in ipreceptor-deficient mice. Life Science. 2000; 66:155-160.
10. Foyet HS, Abdou BA, Ponka R, Asongalem AE, Karntehowing P, Nastasa V. Effects of *Hibiscus asper* leaves extracts on Carrageenan induced oedema and complete Freund's adjuvant- induced arthritis in rats. Journal of cell Animal Biology. 2011; 5:69-75.
11. Alagammal M, Tresina P.S, Mohan V.R. GC-MS determination of bioactive components of *Polygala javana* DC. International Journal of Current Pharmaceutical Research. 2012; 4:42-44.

Table1: Percentage inhibition of paw edema exhibited of by whole plant extract of *Polygala javana*, in adult albino rats

Oedema 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	-
PJW extract (Group-II)	100	30.34±1.26	55.14±1.63	73.13±1.39	84.14±2.56	32.45
(Group III)	200	28.63±1.16	30.11±1.93**	46.33±2.16*	51.33±2.17**	58.79
Indomethacin (Group-IV)	10	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 edema induced control vs drug treated rats

Source of support: Nil, Conflict of interest: None Declared