



EVALUATION OF EFFECT OF AQUEOUS EXTRACT OF *PORTULACA OLERACEA* LINN. LEAVES IN ACUTE INFLAMMATION

Pharmacology

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ABSTRACT

In the present study, the anti-inflammatory activity of aqueous extract of *Portulaca oleracea* (POE 200, 400 and 600mg/kg) was studied using carrageenan induced paw oedema in albino rats. The mean increase in paw volume was recorded. POE produced significant ($p < 0.01$) anti-inflammatory activity when compared to the control. The anti-inflammatory action of POE can be attributed to its flavonoid contents which are known to act through inhibition of prostaglandin biosynthesis. However, the test drug at maximum dose (600mg/kg) was found to be less effective than the standard drug, aspirin (100mg/Kg).

KEYWORDS

Portulaca oleracea, Aspirin, Carrageenan, Flavonoids.

INTRODUCTION:

Pain and inflammation remains one of the world's major health problems¹. Inflammation is a normal protective response to tissue injury caused by trauma, noxious chemicals or microbiological agents. The typical characteristics of inflammation are redness, swelling, heat and pain². Anti-inflammatory drugs constitute about half of analgesics, remedying pain by reducing inflammation as opposed to opioids which affect the CNS to block pain signaling to the brain. NSAIDs which stands for Non Steroidal Anti-inflammatory drugs are one among the most popular medications worldwide. Some of the common NSAIDs are Aspirin, Ibuprofen, Naproxen. NSAIDs prevent prostaglandins from being synthesized reducing or eliminating the inflammation and pain. Prolonged use of NSAIDs as in diseases with chronic inflammatory response often causes severe side effects, including cardiovascular and gastrointestinal complications³. Hence, there is need to focus on the scientific exploration of novel potent analgesic and anti-inflammatory drugs without considerable side effects from natural sources. According to WHO estimation, about 80% of the population in developing countries relies on herbal medicines at least for their primary health care⁴. Traditional Indian medical systems such as Ayurveda and Unani rely heavily on plant products⁵. North-east region of India is an abode of various medicinal plants which are utilized by local tribes for the treatment of their ailments. The folklore claim of the inhabitants should be scientifically verified with regard to better utility of the medicinal plants from this regions⁶. *Portulaca oleracea* Linn. (Portulacaceae), known as common Purslane is an annual succulent herb found abundantly all over the valley of Manipur in moist damp habitats. Plant extract is used for the treatment of boils, inflammations, ulcers and liver disease^{7,8,9,10}. The plant contains flavonoids, alkaloids and antioxidants^{11,12,13}. It has been reported to possess hypoglycaemic¹⁴, antiulcer¹⁵, hepatoprotective¹⁶ and anticonvulsant¹⁷ properties. Furthermore, it has been reported that polysaccharides isolated from *Portulaca oleracea* show different biological activities such as anticancer, antioxidant, anti-inflammatory and immunity enhancing properties¹⁸. In view of the importance of the medicinal plants as the potential source of cheaper, safer and effective remedies for treating diseases and the traditional use of *P.oleracea* extract (POE) in various disorders, the present study was undertaken with special emphasis on the study of the anti-inflammatory activity of its aqueous extract.

MATERIAL AND METHODS:

Plant Materials

The fresh aerial parts of *Portulaca oleracea* Linn. were collected from local botanical garden during the months of June-July. The plant was identified and authenticated by department of Botany Manipur

University where a voucher specimen MUH No.3419 was deposited for further references.

Preparation Of Plant Extract

The plant materials were cleaned and dried under shade. Then the leaves were separated and powdered by a mechanical grinder and stored in air tight container for future use. 38 gm powder of dried leaves was extracted with distilled water using a Soxhlet apparatus¹⁹. The brownish extract obtained was evaporated, shade-dried, scraped out, weighed and stored in glazed porcelain jar for future use. The yield was 35.2%.

Experimental Animal

Healthy albino rats of either sex weighing between 100-200 gm were used throughout the present investigation. Animals were kept for 3 days under laboratory conditions before the experimental work. Animals were fed with standard pellet diet and water ad libitum and maintained at 24-28°C temperature and 12 hours day and night cycle.

Acute Toxicity Testing

No adverse effect or mortality was detected in mice upto 3 g/kg, p.o. of the aqueous extract of *Portulaca oleracea* Linn. during 24 hrs observation period.

Experimental Procedure:

The rats were divided into five groups with six animals in each group. The drugs were suspended in 1% gum acacia and administered orally in a volume of 1 ml/100 g body weight of animals. 2% gum acacia was used as control (Group A), *P.oleracea* (200 mg/kg) (Group B), *P.oleracea* (400 mg/kg) (Group C), *P.oleracea* (600 mg/kg) (Group D) and Aspirin (100 mg/kg) (Group E) as standard.

Carrageenan Induced Paw Oedema In Albino Rats.

The anti-inflammatory activity of the aqueous extract of *P.oleracea* was assessed by the method described by Winter CA et al, (1962)²⁰ with slight modification. Acute inflammation was produced by injection of 0.1 ml freshly prepared 1% carrageenan in 0.9% sodium chloride solution into sub-plantar region of the right hind paw of the rats, 1 hr after oral administration of drugs. The foot volume was measured by modified plethysmometric method immediately after and again three hours after carrageenan injection and the 'volume of oedema' was recorded as the difference between two readings²¹.

The percentage of anti-inflammatory activity was then calculated by

the formula described by Diniz et al. (1978)²² as follows:

$$\text{Percentage of inhibition} = \left(\frac{V_c - V_d}{V_c} \right) \times 100$$

Where, V_c = mean increase in paw volume in control group.
 V_d = mean increase in paw volume in drug treated group.

Statistical Analysis

All the data obtained from the study were analysed by the analysis of variance (ANOVA) followed by Dunnett's 't' test. A probability level of $P < 0.05$ was considered significant.

RESULTS AND DISCUSSION:

The aqueous extract of the *P.oleracea* leaves had significant anti-inflammatory property when compared with control ($p < 0.01$) as indicated in Table 1. In the present study aspirin (100 mg/kg) was used as the standard drug. The mean increase in paw volume after 3hr of the carrageenan injection in the control group was 0.36 ± 0.03 ml which corresponds to the findings 0.34 ± 0.06 ml of Khanna N K et al (1983)²³. The test drug at the doses of 200 mg/kg, 400 mg/kg and 600 mg/kg produced 27.7%, 30.5% and 36.1% inhibition of paw oedema compared to 55.5% inhibition produced by 100 mg/kg of the standard drug, aspirin as depicted in Fig.1. Carrageenan induced hind paw oedema is the standard model for screening of acute anti-inflammatory activity²⁴. Carrageenan is a natural product derived from red sea weeds belonging to the family of linear sulfated polysaccharide. It is not known to be antigenic, is devoid of any systemic effects and moreover, results are highly reproducible^{25,26}. The increase in percentage inhibition of paw oedema indicates that early phase of inflammation was effectively suppressed by the extract. The previous research showed that carrageenan induced oedema is a bi-phasic phenomenon, the first phase is attributed to the release of histamine, 5-HT and Kinins in the first hour; while the second phase is related to the release of prostaglandin like substances in 2-3 hours (Brooks PM and Day RO, 1991)²⁷. The knowledge of these mediators involved in different phases is important for interpreting mode of drug action. It is also known that NSAIDs like aspirin reduces inflammation, swelling and arthritic pain by inhibiting prostaglandin synthesis and/or production. Therefore, it appears that the phytochemicals like flavonoids and alkaloids present in the aqueous extract of dried leaves of *Portulaca oleracea* inhibits these mediators to account for its anti-inflammatory activity.

Table 1 - Effect Of *Portulaca Oleracea* On Carrageenan Induced Paw Oedema In Albino Rats.

Group	Drug dose	Mean increase in paw volume (in ml) after 3 hrs.	% inhibition of paw oedema
A (control)	2% Gum acacia in D/W, 10ml/kg	0.36 ± 0.03	-
B (test)	200mg/kg	$0.26 \pm 0.021^*$	27.7%
C (test)	400mg/kg	$0.25 \pm 0.14^*$	30.5%
D (test)	600mg/kg	$0.23 \pm 0.021^{**}$	36.1%
E (standard)	Aspirin, 100mg/kg	$0.16 \pm 0.021^{***}$	55.5%

Results were expressed in Mean \pm SEM, n=6 in each group. * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$ as compared to control.

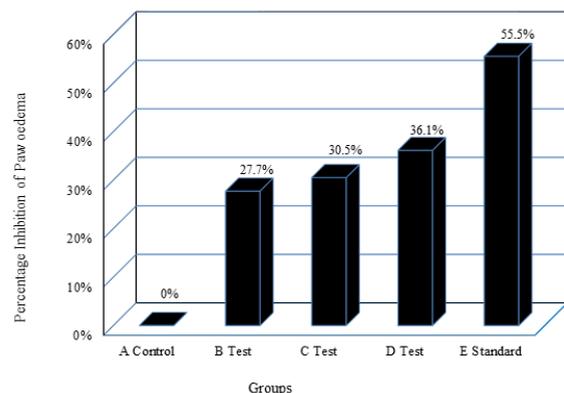


Fig. 1 Anti-inflammatory Activity Of Aqueous Extract Of *P.oleracea* On Carrageenan Induced Rat Paw Oedema.

CONCLUSION:

The present study reveals that the aqueous extract of the *P.oleracea* leaves has significant anti-inflammatory property. The results provide a scientific basis for the utilization of this herb in traditional medicine for the treatment of inflammatory disease. Further studies are needed to explore the exact active principle responsible for the observed anti-inflammatory activity.

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