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PharmTech

International Journal of PharmTech Research
CODEN (USA): IJPRIF ISSN : 0974-4304
Vol.2, No.4, pp 2243-2245, Oct-Dec 2010

# Anti-inflammatory Activity of Isradipine

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**Abstract**: Calcium ions play an important role in the synthesis and release of chemical mediators of inflammation. Increased calcium influx potentiates inflammatory process via calcium channels. Inhibiting calcium influx by calcium channel blockers may reduce the inflammation events. Therefore the present study was designed to evaluate anti-inflammatory effect of Isradipine on carrageenin induced paw edema method by using Plethysmograph and Zeitlin apparatus. The inflammation was produced by injecting freshly prepared 0.1 ml of 1%w/v carrageenin suspension in sub plantar region of right hind paw of the animal. Diclofenac sodium 20mg/kg; ip and Isradipine 100, 200 and 400µg/kg, ip were administered 30 min before induction of edema. Paw volume was measured at 0 hour and 3 hour after the injection of carrageenin. Isradipine shown significant dose dependent anti-inflammatory activity. The anti-inflammatory action of Isradipine may be due to inhibition of lipooxygenase pathway

**Key words:** Anti-inflammatory Activity, Isradipine.

## Introduction:

Inflammation is involved in the pathogenesis of various diseases[1]. Calcium ions play an important role in the synthesis and release of chemical mediators of inflammation. Increased calcium influx potentiates inflammatory process via calcium channels. Inhibiting calcium influx by calcium channel blockers may reduce the inflammation events. Calcium channel blockers such as diltiazem, verapamil, nicardipine and nifedipine were evaluated for anti-inflammatory activity[2, 3&4]. Hence the present study is designed to evaluate anti-inflammatory effect of Isradipine on carrageenin induced paw edema method.

## Materials and Methods:

### A. By using Plethysmograph:[5]

Albino rats weighing 150-200g were selected. The animals were divided into five groups containing 6 in each and labeled I-V. Group I served as control. Group II was treated with standard drug (Diclofenac sodium 20mg/kg; ip ) whereas other groups III, IV and V were treated with different doses of Isradipine 100, 200 and 400µg/kg respectively. Edema was produced by injecting freshly prepared 0.1 ml of 1 % w/v carrageenin suspension in sub plantar region of right hind paw of the animal. The volume of hind paw edema was measured by Plethysmograph. Paw volume was measured at 0 hour and 3 hour after the injection of carrageenin. Drug pretreatment was given 30 min before the injection of carrageenin. The percentage inhibition of edema was calculated.

### B. By using Zeitlin apparatus:[6]

Albino rats weighing 150-200g were selected. The animals were divided into five groups containing 6 in each and labeled I-V. Group I served as control. Group II was treated with standard drug (Diclofenac sodium 20mg/kg; ip) whereas other groups III, IV and V were treated with different doses of Isradipine 100, 200 and 400µg/kg respectively. Edema was produced by injecting freshly prepared 0.1 ml of 1 % carrageenin suspension in sub plantar region of right hind paw of the animal. The thickness of hind paw edema was measured by Zeitlin apparatus. Thickness

of hind paw was measured 0 hour and 3 hour after the injection of carrageenin. Drug pretreatment was given 30 min before the injection of carrageenin. The percentage inhibition of edema was calculated.

**Statistical Analysis:**

The values were expressed as mean ± SEM. Statistical analysis was performed by Student's t test. P<0.001 was considered significant when compared with control.

**Results:**

Carrageenin induced increased the hind paw volume compared to control and Isradipine of 400µg/kg, 200µg/kg and 100µg/kg showed significant reduction in inflammatory edema produced by carrageenin .

## Discussion:

Although calcium channel blockers are usually preferred in the treatment of cardiovascular diseases, calcium ion takes part in a plenty of functions in the body. Calcium ion plays a critical role in the formation and secretion of a wide variety of chemical mediators, and calcium channels are targets for a variety of neurotransmitters, neuromodulators and drugs[7]. In inflammation, arachidonic acid metabolites are the most important mediators. In the cell, calcium ion increases the lipooxygenase products by activating 5-lipooxygenase enzyme and eicosanoid synthesis by activating cytosolic phospholipase A2[8&9]. It is well established that arachidonic acid is metabolized both by cyclooxygenases and lipooxygenases[10]. Carrageenin induced paw edema was taken as prototype of exudative phase of inflammation. The development of edema is biphasic. The initial phase is attributable to the release of histamine, serotonin and kinins in the first hour after injection of carrageenin. A more pronounced second phase is related to the release of prostaglandins like substances in two to three hour. Therefore the anti-inflammatory action of Isradipine may be due to inhibition of lipooxygenase pathway[11].

**Table 1: Evaluation of anti-inflammatory activity of Isradipine by Plethysmograph**

| Group | Treatment | Dose | Increase in paw volume after 3 hr | % of anti-inflammatory activity |
|---|---|---|---|---|
| I | Control | ---- | 0.218±0.01 | ---- |
| II | Diclofenac sodium | 20mg/kg | 0.112±0.01* | 89.83 |
| III | Isradipine | 400µg/kg | 0.128±0.004* | 76.27 |
| IV | Isradipine | 200µg/kg | 0.138±0.002* | 67.80 |
| V | Isradipine | 100µg/kg | 0.158±0.013** | 50.85 |

*** P<0.001, **P<0.01 vs. control**

**Table 2: Evaluation of anti-inflammatory activity of Isradipine by Zeitlin apparatus**

| Group | Treatment | Dose | Increase in paw volume after 3 hr | % of anti-inflammatory activity |
|---|---|---|---|---|
| I | Control | ---- | 2.66±0.03 | ---- |
| II | Diclofenac sodium | 20mg/kg | 1.34±0.03* | 84.61 |
| III | Isradipine | 400µg/kg | 1.38±0.07* | 82.05 |
| IV | Isradipine | 200µg/kg | 1.6±0.10* | 57.69 |
| V | Isradipine | 100µg/kg | 1.76±0.04* | 42.31 |

***P<0.001 vs. control**

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