

EVALUATION OF ANTI INFLAMMATORY ACTIVITY OF FRESH TURMERIC POWDER(*Curcuma longa*) IN ACUTE INFLAMMATION

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ABSTRACT

Objective: To evaluate the anti-inflammatory activity of *Curcuma longa* (Turmeric) in experimentally induced acute inflammation in albino rats. **Methodology:** Albino rats (200-250gms) of either sex were randomly selected, divided into 3 groups (n=6): Control- vehicle 1ml; Standard- Indomethacin, 100mg/kg; Test group-Fresh Turmeric powder 300mg/kg. All drugs were suspended in gum acacia and were given orally 1 hour prior to induction of inflammation by phlogistic agent. Carrageenan induced- paw edema model was employed to screen the activity. **Results:** The Percent Inhibition of paw edema induced by carrageenan by Indomethacin and Turmeric are 62.31% and 54.78% respectively. Therefore, freshly prepared Turmeric powder showed 88% anti-inflammatory activity as that of standard Indomethacin. Results obtained are statistically significant ($p < 0.05$).

Conclusion: Fresh Turmeric Powder showed considerable anti-inflammatory activity in carrageenan induced paw edema model. This study also concludes consumption of fresh turmeric powder as it is without any type of extraction to reduce inflammation considerably. So, it can be considered as a promising anti-inflammatory agent for treatment of various disorders associated with inflammation.

Key words: *Curcuma longa*, Carrageenan, Anti-inflammatory, Edema.

INTRODUCTION

Inflammation is the basic host defence mechanism to overcome the invading pathogens and plays a major role in various acute and chronic illnesses¹. NSAIDs are one of the most widely used anti-inflammatory agents, which are associated with a wide range of adverse effects². There is a great need for safer and effective anti-inflammatory drugs for the treatment of inflammatory conditions which require long term therapy. Herbal medicines derived from plant extracts are increasingly utilized to treat a wide variety of clinical diseases. The

added advantages of indigenous medicinal treatment would include its complimentary nature to the conventional treatment making it safer.

Turmeric is a spice that comes from the root *Curcuma longa*, a member of the ginger family, Zingiberaceae³. In India, it has been used as a spice, food preservative and for its medicinal properties. Studies of turmeric have revealed numerous pharmacological activities including antioxidant, anti-inflammatory, antiparasitic, antimutagenic, anticancer, chemo protective, hepatoprotective, antimicrobial and antiviral properties^{4,5}. From the earlier studies, various extracts of turmeric have shown significant anti-inflammatory activity and is due to the component curcuminoids⁶. This study was carried to evaluate the anti inflammatory potential of fresh turmeric powder in acute experimental animal model.

MATERIALS AND METHODS

Preparation of test drug: Fresh turmeric powder was suspended in 2% gum acacia and administered to the albino rats.

Chemicals: Indomethacin (Sigma), Carrageenan (Sigma) and all other chemicals were of analytical grade.

Animals: Adult albino rats of either sex weighing between 200 to 250 gms were randomly selected from central animal facility, JSS Medical College, Mysore. Animals were housed in groups of 3 at an ambient temperature of 25+ 1o C with ad libitum access to food and water. The study protocol was approved by Institutional Animal Ethics Committee.

METHODS

Animals were randomly divided into 3 groups of 6 rats each. 1st group: Control (1ml of vehicle, 2% gum acacia suspension). 2nd group: Standard drug (Indomethacin 100mg/kg); 3rd group: Test drug (Fresh Turmeric powder 300mg/kg).

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Carrageenan Induced rat paw edema model^{7,8}:

In this method, rats were divided in 3 groups of six each and pretreated with drugs orally 1 hr

before the experiment. 0.05 ml of 1% Carrageenan was injected aseptically into the sub plantar surface of right hind paw of each rat. Paw edema was measured by mercury plethysmograph (UGO Basile, Italy) at '0' hour and at the end of '4' hours. The difference between the '0' and '4' hours gives the actual edema. Percent inhibition (protection) against edema formation was taken as an index of acute anti-inflammatory activity.

It was calculated by:

$$\text{The percent inhibition of edema} = 100 \times (1 - V_t / V_c)$$

Where, V_c = mean paw edema volume in the control group.

V_t = mean paw edema volume in the drug treated group.

STATISTICAL ANALYSIS

Results were expressed as mean \pm Standard deviation (SD). Statistical analysis was performed using one-way analysis of variance (ANOVA) followed by Scheffe's post hoc test. $P < 0.05$ was considered statistically significant. All the statistical methods were carried out through the SPSS for Windows (version 16).

RESULTS

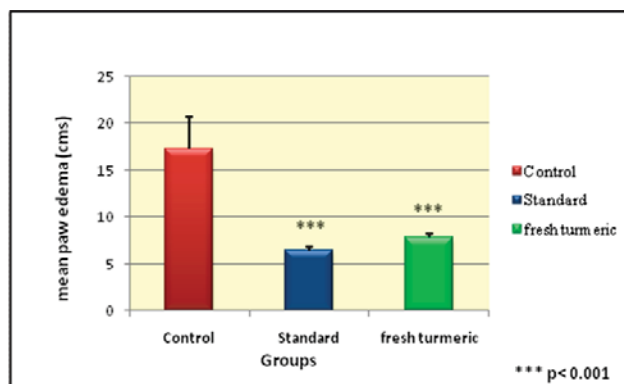
In Carrageenan induced rat paw edema, Fresh Turmeric powder and Indomethacin significantly ($p < 0.05$) inhibited carrageenan induced rat paw edema. The percent inhibition with Indomethacin and fresh turmeric powder were 62 % and 55 % respectively. Results are displayed in table 1 and figure 1.

Table-1:
Effect of drugs in Carrageenan Induced rat paw edema

Groups	n	Mean paw edema (cm) \pm SD	Percent Inhibition (%)
I. Control (1ml of vehicle)	6	17.25 \pm 3.48525	0.0%
II. Indomethacin (100mg/kg)	6	6.5 \pm 0.37417***	62.31%
III. Turmeric powder (300mg/kg)	6	7.8 \pm 0.38471***	54.78%

Values are expressed as mean \pm SD, n=6 animals per group, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ as compared to control (one-way ANOVA).

Figure 1: Bar diagram showing mean difference of drugs in paw edema (cms) between 0hr & 4hr in Carrageenan Induced rat paw volume.

**DISCUSSION**

Inflammation is the integral part of the body's defence mechanism. Acute inflammation is characterized by vasodilatation, exudation of plasma, release of various inflammatory mediators, cytokines, growth factors and emigration of leukocytes. While the features of chronic inflammation includes infiltration of mononuclear cells, proliferation of fibroblasts, blood vessels and increased connective tissue formation. Tissue infection is a prototype of inflammatory response. Anti-inflammatory drugs inhibit different stages of inflammation. Turmeric is one of the most frequently used drug in the traditional and folklore systems of medicine. Turmeric has been used in the treatment of respiratory diseases, liver disorders, rheumatism, diabetic wounds, anorexia, sinusitis, cold & flu symptoms⁹. The properties of turmeric are attributable to curcuminoid compounds (curcumin, desmethoxycurcumin and bisdesmethoxycurcumin) with curcumin being the main constituent¹⁰. In a previous study, chronic administration of curcumin at doses (30-60mg/kg) attenuated formalin induced paw edema¹¹. In another in-vitro study curcumin in the dose of (500 μ g/disc) has shown to potentiate antimicrobial action of cefixime, cefotaxime, vancomycin, suggesting the utilization of edible compound in combination therapy against staph aureus¹². Therefore the additional property of antimicrobial along with anti-inflammatory activity of turmeric may have synergistic effects on the inflammation induced by the invading pathogens also.

Carrageenan induced rat paw edema is used widely as a working model of acute inflammation in the search for new anti-inflammatory drug⁷. The development of edema in the paw of the rat after the injection of

Carrageenan is due to release of histamine, serotonin and prostaglandin like substances⁸. In our study fresh turmeric powder (300 mg/kg) suspended in 2% gum acacia, p.o. significantly reduced edema induced by the Carrageenan. The percent inhibition of paw edema by Indomethacin was 62.31 % while that of turmeric powder is 54.78 %. Hence turmeric powder showed 88 % anti inflammatory activity as that of standard Indomethacin under the present experimental condition. The results obtained in this study are in concurrence with the study done by using curcumin suspended in carboxymethyl cellulose orally in the doses of 25 to 400mg/kg. It produces anti-edematous effect consequent to the reduction of prostaglandins⁹. Thus the probable mechanism of anti-inflammatory effect of fresh turmeric powder is due to reduction of prostaglandins through inhibition of cyclooxygenase.

CONCLUSION

In this study, fresh turmeric powder significantly inhibited inflammation in the Carrageenan induced rat paw edema in comparison to Indomethacin. The pharmacological activity combined with least toxicity render turmeric powder, a routinely used spice as an agent for treatment of various disorders associated with inflammation. These studies are valuable for identifying lead compounds that can be used as an adjuvant along with NSAIDs and corticosteroids, in order to reduce their dose and adverse effects. Hence from this study we can infer that patients can use fresh Turmeric powder as a household remedy without any extraction in the treatment of inflammatory conditions.

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