



**RESEARCH ARTICLE**

**Evaluation of Anti Inflammatory Activity of Vajravalli Chooranam by Formalin Induced Paw Odema Method in Albino Rats**

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**ABSTRACT**

Vajravalli chooranam is a poly herbal siddha medicinal formulation mentioned in “siddha system of pharmacopoeia” with indication for treatment of all types of vata diseases. The aim of the study is to evaluate the anti-inflammatory activity of the herbal medicine vajravalli churnam by formalin induced paw odema method in albino rats. The animals are divided into three groups with six animals in each group. Group 1 is normal control ,group 2 and group 3 received the drugs Diclofenac sodium (25mg/kg) in distilled water, Vajravalli chooranam (500mg/kg) in 2 % CMC p.o respectively one hour before the onset of inflammation in the animals.The mean increase in the volume of the paw odema is measured using a plethysmometer and the percent of inhibition is calculated .The results show that vajravalli chooranam has significant anti-inflammatory activity (P<0.05) at a dosage of 500 mg/kg within three hours of formalin induced inflammation.

**KEYWORDS**

Vajravalli chooranam, siddha, Anti inflammation, formalin

**INTRODUCTION**

Inflammation (Latin, *inflammatio*, to set on fire) is the complex biological response of vascular tissues to harmful stimuli, such as pathogens, damaged cells, or irritants. It is a protective attempt by the organism to remove the injurious stimuli as well as initiate the healing process for the tissue<sup>1</sup>. Inflammation is a process by which the body's white blood cells and chemicals

protect us from infection and foreign substances such as bacteria and viruses. When inflammation occurs, chemicals from the body's white blood cells are released into the blood or affected tissues in an attempt to rid the body of foreign substances. This release of chemicals increases the blood flow to the area and may result in redness and warmth. Some of the chemicals cause leakage of fluid into the tissues, resulting in swelling. The inflammatory process may stimulate nerves and cause pain. Sometimes, however, the white blood cells and their inflammatory chemicals cause damage to the body's tissues<sup>2</sup> prolonged and uncontrolled inflammation is very harmful in certain diseases like allergies, cardiovascular dysfunctions,

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metabolic syndrome, cancer, and autoimmune diseases like vasculitis, glomerulonephritis posing an immense threat, affecting the quality of life of the individual.<sup>3</sup> Drug related toxicities, iatrogenic reactions, and adverse effects complicating the treatment processes also limit the usage of the available steroidal, non-steroidal anti-inflammatory drugs and immunosuppressants<sup>4,5,6</sup>. Hence the search for a novel herbal anti-inflammatory drug with increased pharmacological response and the lowest degree of unwanted side effects is never ending<sup>7</sup>.

The primary action of the drugs is to inhibit arachidonate cyclo-oxygenase and, thus to inhibit the production of prostaglandins and thromboxanes. NSAIDs reduce the components of inflammation that are caused by COX-2 action, which include vasodilation, edema, and pain<sup>8</sup>. NSAIDs are effective against pain that is caused by prostaglandins acting on nociceptors (ie. pain associated with inflammation or tissue damage).<sup>9</sup> Decreased prostaglandin production leads to less sensitization of nociceptive nerve endings to the inflammatory mediators, bradykinin and 5-hydroxytryptamine. [Rang et al., 1995] The formalin causes a local injury of the paw, is used as a model for tonic pain<sup>10</sup>, and localized inflammatory pain.<sup>11,12</sup> There are two phases of responses, while the stimulus during the early phase is a direct chemical stimulation of nociceptors, and that during the late phase, involves inflammation<sup>13</sup>.

Vajravalli chooranam is a poly herbal formulation with pirandai (cissus quadrangularis) as the main ingredient and others in minimal quantity like citrathai (alpinia chinensis), kirambu (Syzygium aromaticum), chukka (Zingiber officinale), Thippili (Piper longum). As per the text "siddha system of pharmacopoeia" vajravalli chooranam is indicated for all types of vatha diseases. The phytochemical screening of the drug showed the presence of alkaloid, coumarin, flavanoid, glycoside, protein, steroid, tannins, triterpene and volatile oils. In this study the author has made an attempt to evaluate the anti-inflammatory activity of vajravalli churnam a

poly herbal siddha medicinal formulation to scientifically validate the role of the herbal medicine against inflammation.

## MATERIALS AND METHODS

### Collection of Plants Materials

The raw herbal materials used in the preparation of vajjiravalli choornam were obtained from the local market in Chennai and identified and authenticated by the botany department of central research institute of siddha arumbakkam Chennai. The raw drugs were dried and the choornam prepared as per the methodology mentioned in the text "siddha system of pharmacopoeia".

### Stock Solution Preparation

The powdered form of Vajjiravalli chooranam was filtered through cheese cloth and was mixed uniformly in 2% CMC solution to achieve 50mg/ml as main stock solution and used in this study.

### Experimental Animals

Albino rats of either sex weighing between 150-200gm were used in this study. The animals were housed in standard microlon boxes and were given standard laboratory diet and water *ad libitum*. The animals were acclimatized for one week under laboratory conditions. The animals were maintained under the standard environmental condition of temperature (22°C ± 5°C) and humidity (55 ± 5%) and 12 hr light dark cycles throughout the experimental period. The study was carried out at Vel's university, Pallavaram, after obtaining the needed clearance from the institutional animal ethics committee with a reference code of (XIII/IAEC/CPCSEA/290/2000/14a/VELS/8.8.2013).

### Drugs and Chemicals

The drugs Diclofenac sodium (25mg/kg) in distilled water, Vajjiravalli chooranam (500mg/kg) in 2% CMC were administered orally an hour before the onset of inflammation in the animals. The chemicals used in the study were obtained from Sigma Aldrich chemicals Pvt. Ltd

## METHOD

A total number of 18 rats were used in this experiment and were divided into three groups, each group consisting of 6 rats.

group 1 : Normal control treated with saline (5ml/kg) orally.

group 2 : Standard control treated with Diclofenac sodium (25mg/kg) orally.

group 3 : Treatment control treated with Vajravalli chooranam (500mg/kg) orally.

Oedema was produced by sub-plantar injection of 0.1 ml of 1 % formalin in the right hind paw of each rat one hour after the administration of the corresponding drugs. The paw was marked with ink at the level of lateral malleolus and immersed in mercury upto the mark. The paw volume was measured at 0, 1, 2, 3, 4 and 24 hours after formalin injection using a plethysmometer. Mean increase in the volume of oedema was measured and the percentage inhibition was calculated. The one way ANOVA followed by Dunnet test was applied to assess the significance. The actual edema volume is obtained by measuring the difference between the initial and the subsequent readings.

## RESULTS AND DISCUSSION

Body responds to the injury caused to the tissues by physical, chemical or microbiological agents by inducing inflammation and tries to

destroy the causative organisms, inactivate them, remove the irritants and initiates the processes of tissue healing. Inflammation acts as normal protective mechanism and is initiated when the chemical mediators of inflammation are released from the damaged and migratory cells<sup>14</sup>. Depending upon the type of inflammation, different chemical mediators are released such as histamine, serotonin, leukotrienes and platelet activating factor lipids such as prostaglandins and small peptides such as Kinins.<sup>15,16,17</sup> Formalin-induced pain is caused primarily by peripheral tissue inflammation.<sup>18</sup> Acute inflammation may last for relatively shorter duration, ranging from few minutes to few days. Exudation of fluid and plasma proteins, emigration of leukocytes, and predominantly neutrophils, are characteristic changes.

The main action of anti-inflammatory agents in the inhibition of cyclooxygenase enzyme, which are responsible for conversion of arachidonic acid to prostaglandin (PG).<sup>19</sup> The extracellular activity of these enzymes is said to be related to acute and chronic inflammation.

NSAID'S act either by inhibiting these lysosomal enzymes (Cyclooxygenase)<sup>20</sup>. The result suggests that the test drug Vajjiravalli chooranam (500mg/kg) becomes significant within two hour, during the phagocytic phase of formalin-induced inflammation.

Table 1: Effect of Vajjiravalli chooranam on Formalin induced paw oedema

S. No	Treatment	Dose (mg/kg)	Mean increase in Paw volume (ml)	% inhibition
1	Control	5 ml/kg	0.90 ± 0.22	--
2	Diclofenac sodium	25 mg/kg	0.29 ± 0.04**	67.77
3	<b>Vajravalli chooranam</b>	500 mg/kg	<b>0.71 ± 0.04*</b>	21.11

Values are mean ± SEM

Values were compared with control; \*\*P<0.01;\*P<0.05 was considered as significant

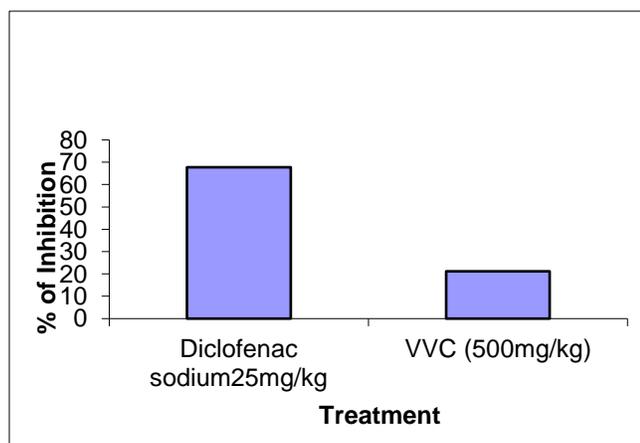


Figure 1: Effect of Vajravalli chooranam on Formalin induced paw oedema

## CONCLUSION

The Vajravalli chooranam as well as diclofenac showed anti-phleogestic activity. This anti-inflammatory activity was found to be statistically significant ( $P < 0.05$ ) at the concentration of 500 mg/kg after 120 minutes of drug treatment. The result shows that the Vajiravalli chooranam produced a significant ( $P < 0.05$ ) reduction of rat paw edema at different assessment times. Diclofenac sodium, a COX-inhibitor at the dose of 25mg/kg, p.o. significantly reduced the paw edema. The Vajiravalli chooranam at dose of 500 mg/kg have shown promising effect in reducing the formalin induced acute paw edema volume in rats when compared with vehicle treated group.

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