

Assessment of Anti-inflammatory Activity of Leave Extract of *Cardiospermum Halicacabum* (L.), in Rats

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1-5 Conception & Study design, Data Collection & Processing, Data Analysis and Interpretation, Drafting of Manuscript, Critical Review.

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ABSTRACT

Objective: The research has been carried out to explore and investigate the anti-inflammatory effect of orally administered *Cardiospermum halicacabum* (L.) leaf methanolic extract in caused inflammation in rats.

Methods: The study was carried out at the University of Karachi's Department of Pharmacology. For the investigation, a total of 30 healthy rats weighing 150-200g were selected from the department of pharmacology's animal house at Karachi University. Each group of 10 rats included three groups made up of all the animals. Rats in group I (the control group) received distilled water, whereas rats in group II received a methanolic extract of *Cardiospermum halicacabum* (L) leaves. (Test group) and rats of group III were given Ibuprofen 40 mg/kg (Standard group). The activity in inflammation was observed after oral dosing of extract, Ibuprofen and distilled water to respective groups for a week and on test day inflammation was induced by injecting 1% carrageenan solution intradermally (I/D) in the right rat's hand paw and subsequently the degree of paw edema was measured by means of plethysmometer after 1, 2, 3, 4, 5 and 24hrs and the percentage of inhibition is calculated.

Results: The rats of groups II and III, which were given methanolic extract of *Cardiospermum Halicacabum* (L) and standard Ibuprofen (40mg/kg) respectively showed significant decreased paw edema in comparison with control group after 2, 3, 4 and 5hrs.

Conclusion: It has been determined that the anti-inflammatory activity of the leaf extract from *Cardiospermum halicacabum* (L) differs significantly from that of the control group. Hence, it may be considered for use in this regard. Furthermore, it has a comparable anti-inflammatory activity with standard (Ibuprofen) as an anti-inflammatory agent and non-significant difference in inhibition of paw's edema, paralleled with the standard group (Ibuprofen), but significant difference is indicated on comparison with the control group (Distilled Water).

Keywords: Anti-inflammatory activity, carrageenan, edema, inflammation, Ibuprofen, methanolic extract of leaves of *Cardiospermum halicacabum* (L.)

INTRODUCTION

Herbs are a possible source of medications and are crucial to the global curative healthcare system. Due to their spiritual beliefs and economic considerations, the common people of developing nations are already attracted to alternative and complementary medicine, and this trend is growing. Around 25 to 50 percent of people worldwide use herbs or herbal-based medication to maintain their health and treat ailments¹. Exact research is being done on the herbal medications' natural attributes. Animals and plants are the primary sources of the active ingredients in allopathic medications². The drugs are made from important prospective sources and then synthetically modified to lessen their toxicity and increase their effectiveness³. The discovery of novel medications is greatly aided by the technical progress in isolating active compounds^{4,5}. The draw of conventional medicine is due to the expense and oversight of allopathic pharmaceuticals. Today, between 55 and 75 percent of the population of emerging and underdeveloped nations rely on traditional medicines⁶. Herbal remedies can be made from the entire plant or only a portion of it, such as the fruit's shell, the entire fruit, the stem and leaves, or just the leaf or stem^{7,8}.

Cardiospermum halicacabum (L) belongs to Sapindaceae (Soapberry) family. This serves as a perennial and annual herb with rapid growth. Its leaves are 2-4/1-2 cm in length and breadth with toothed margin^{9,10}. Phytochemical screening revealed the surface parts contain effective or active ingredient such as phytosterols, saponins, triterpinoids, alkaloids and amounts of long chain fatty acids. *Cardiospermum halicacabum* (L) contains phytosterols that have anti-inflammatory properties⁸. By changing inflammation modulators and lowering pro-inflammatory enzymes and their inducers, they reduce itching and pain¹¹.

The study was conducted out to assess and explore the anti-inflammatory effect of oral dose of methanolic extract of leaves of *Cardiospermum halicacabum* (L.) in caused inflammation in rats due to the lack of data on this issue.

MATERIALS AND METHOD

The Karachi University Department of Pharmacology was where this investigation was carried out. Total 30 healthy rats weighing 150 – 200g were chosen from

the animals house of Department of Pharmacology, Karachi University, for the study. All animals are kept at room temperature $26 \pm 2^\circ\text{C}$ and 12/12 hrs day/night cycle means light from 8:00 am to 8:00 pm. All animals has easy accessed to food stuff and water add with libitum. Before starting the dose, they have been kept for a week in standard condition for acclimatization. From Karachi University, leaves of *Cardiospermum halicacabum* (L) were gathered. Hamdard University's Dean of Pharmacy, Prof. Dr. Ghazala Rizwani, discovered and verified the leaves. After being cleaned, fresh leaves were immersed in methanol for fifteen days. The solvent was filtered via filter paper on the sixteenth day and evaporated using a rotary evaporator at a lower pressure. The concentrated extract was achieved. The dose used for *Cardiospermum halicacabum* (L) was 200mg/kg¹². Carrageenan, 1% w/v fresh solution, was produced and 0.1ml I/D was injected in the plantar side of the right hand paw of all 30 rats to examine its anti-inflammatory effect. Edoema in the paws was measured using a plethysmometer. To dip it till the spot where volume displacement is measured, the right hand paw is marked with marker. The formula shown below¹³ can be used to determine the percentage of inhibition:

Percentage (%) of inhibition = $(Do - Dt) / Do \times 100$

Do = Average inflammation of Control

Dt = Average inflammation of Treated

Thirty healthy rats weighing between 150 and 200g were chosen from the University of Karachi's Department of Pharmacology animal facility. The animals were all kept at room temperature, 26°C , with a 12/12-hour light cycle, which implies light from 8 am to 8 pm. All animals have unlimited access to food, water, and other amenities. Before beginning the dose, they were kept for a week under usual circumstances. Three groups of 10 rats each were formed from the 30 total rats. Control group (group I) was given Distilled water, Test group (group II) was given methanolic extract of leaves of *Cardiospermum halicacabum* (L.) 200mg/kg and Standard group (group III) were given Ibuprofen 40 mg/kg for a week before test day. The anti-inflammatory activity was investigated after injecting 1% carrageenan solution intradermally (I/D) in the rat's right hand paw and measure paw edema via a Plethysmometer. Right hand paw was marked with a marker and after the dipping into the plethysmometer container, where

volume displaced is noted and the percentage of inhibition is calculated. After 1, 2, 3, 4, 5 and 24 hours of injecting carrageenan.

SPSS version 19 was used to analyse the study's collected data. All findings were presented as the mean standard deviation.

RESULTS

In table the data is expressed as mean $\pm$ SD of tests. The edema observed in response to injection Carrageenan I/D in paws was noted by the amount of displaced water of plethysmometer after 1,2,3,4,5 and 24hrs. In all three groups. In standard group, the percentage of inhibition shows increasing response from 1 to 4 h and then it started to decrease from 5hr. to 24 hrs. In extract group, there were also increasing response from 1-4 h and then it decreases after 5h to 24h. The results of standard group and extract group on comparison with control, show significant ($p\leq 0.05$) response after 2 and 24 h and highly significant ($p\leq 0.01$) response after 3, 4 and 5h of injection carrageenan. (Table- I, II)

DISCUSSION

Cardiospermum halicacabum (L), known as joyotishmati in Ayurvedic medicine, is used to treat rheumatism, piles, and bronchitis^{14,15}. *Cardiospermum halicacabum* (L) is used orally and topically in

veterinary homoeopathy as a decoction or lotion¹⁶. The leaves are crushed and immersed in water to treat dandruff. After that, the water is utilised to wash hair¹⁷. Oral usage of dried plant powder is said to be harmless¹⁸. Salted leaves are used as a poultice to sores, whereas castor oil-boiling leaves are applied to sores to cure rheumatism and lumbago^{19,20}. Numerous studies have demonstrated the antioxidant and disease-curing capacity of the phytochemicals and phenolic content of herbs²¹⁻²³. The suppression of inflammatory mediators is thought to be the cause of its inhibitory effects on a number of enzymes, including those involved in the metabolism of arachidonic acid^{24,25}. It also has an anti-inflammatory impact.

Cardiospermum halicacabum (L) methanolic leaf extract's anti-inflammatory effects in the current investigation are equivalent to those of the industry standard, ibuprofen. *Cardiospermum halicacabum* possesses anti-inflammatory properties that last for a long time while also being useful in the acute phase. Thus, it is suggested that it be used as an anti-inflammatory.

The study's drawback is the small sample size. It is advised that more research be done to examine the effects of *Cardiospermum halicacabum* (L) methanolic leaf extract before it may be utilised as a medicinal agent.

Table I. Rat's Paw Edema After I/D Carrageenan and Oral Dosage.

Groups	01hr	02hrs	03hrs	04hrs	05hrs	24hrs
Group I (D/W)	0.41 $\pm$ 0.17	0.59 $\pm$ 0.18	0.79 $\pm$ 0.13	0.82 $\pm$ 0.13	0.75 $\pm$ 0.16	0.58 $\pm$ 0.19
Test group II Methanolic Extract of Leaves (<i>Cardiospermum halicacabum</i> L.)	0.30 $\pm$ 0.15	0.34 $\pm$ 0.13*	0.36 $\pm$ 0.16*	0.35 $\pm$ 0.11*	0.37 $\pm$ 0.11**	0.44 $\pm$ 0.25*
Standard (Ibuprofen)	0.26 $\pm$ 0.19	0.28 $\pm$ 0.19*	0.28 $\pm$ 0.15*	0.30 $\pm$ 0.16*	0.33 $\pm$ 0.12*	0.48 $\pm$ 0.16*

Table II. Percentage of Inhibition with Comparison to Control.

Groups	01hr	02hrs	03hrs	04hrs	05hrs	24hrs
Percentage of inhibition for Extract group	11%	25%	43%	47%	38%	14%
Percentage of inhibition for Standard Group	15%	31%	51%	52%	42%	10%

CONCLUSION

According to the study's findings, the *Cardiospermum halicacabum* (L) leaf methanolic extract significantly distinguished itself from the control group in terms of its anti-inflammatory efficacy. Hence, it may be considered for use in this regard. Furthermore, it has a comparable anti-inflammatory activity with standard (Ibuprofen) as an anti-inflammatory agent. We have seen non-significant difference in inhibition of paw's edema, paralleled with the standard group (Ibuprofen), but significant difference is indicated on comparison with the control group (Distilled Water).

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