

A Study to Compare the Anti Inflammatory Activity of *Cissus Quadrangularis* with Sterile Normal Saline and Diclofenac Sodium in Male Wistar Albino Rats

Praneetha Banavatu¹, Roopa Bagurubilli², Veeraiah Dakkumalla³, T Jaya Chandra⁴

¹Assistant Professor, Department of Pharmacology, Rangaraya Medical College, Kakinada.

²Assistant Professor, Department of Pharmacology, Rangaraya Medical College, Kakinada.

³Assistant Professor, Department of Pharmacology, Rangaraya Medical College, Kakinada.

⁴Professor, Department of Microbiology, GSL Medical College, Rajahmundry.

Received: 30-11-2023 / Revised: 11-12-2023 / Accepted: 14-12-2023

Corresponding Author: Dr. Praneetha Banavatu

Conflict of interest: Nil

Abstract

Introduction: Several anti-inflammatory (AnI) agents are available in the market but side effects during the clinical usage is the major limitation of these. *Cissus quadrangularis* (CQ) contain many pharmacological properties. Currents study was taken to assess the AnI activity of CQ in male wister albino rats.

Methods: It was a prospective research conducted in the department of Pharmacology, Dr Pinnamaneni Institute of Medical Sciences & Research Foundation between October 2014 and 2016. Male wistar albino rats weighing about 250-300gm were included. Animals were divided in to test, standard and control groups, sterile normal saline, diclofenac sodium and TC were administered, respectively; 6 animals each, respectively. CQ was studied at different concentration, 19.95mg/kg, 25.69mg/kg and 33.25mg/kg in the test group on the paw volume, categorized in to 1A, 1B and 1C, respectively and 6 animals in each category. Sterile normal saline and diclofenac to the control and standard groups, respectively. The animals were maintained in well ventilated animal house with light and dark cycle, 12 hours each. Plethysmograph was used to measure different parameters of the animal. Descriptive statistics such as ANOVA, Dunnett's test, Tukey post hoc test were used for the data analysis; P <0.05 was considered to be statistically significant.

Results: The herbal medicament, CQ showed significant reduction in the paw volume of rat. When the test group was compared with the control and standard, there was a significant reduction in the paw volume.

Conclusions: In the animal models also CQ exhibited AnI activity. Studies on large samples with different animal models is recommended.

Keywords: Animal, Anti-Inflammation, Animal, Research.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Inflammation is a complex and physiological process of a living body which can help to defend against inflammogens. [1] However inflammation also be a damaging tool may worsen major diseases as well as responsible for various physiological complications. Increased expression as well as the activity of cyclooxygenase 2 (COX-2) play an important role in the process of inflammatory. [2] At this point anti-inflammatory (AnI) agents are required due to the tissue injury and other adverse effects.

Several AnI agents are available in the market but side effects during the clinical usage is the major limitation of these. Nonsteroidal AnI drugs are the inhibitors of COX-2 and responsible for serious gastrointestinal disturbances such as ulceration, bleeding, and also cause hypersensitivity reactions. [2] Some inflammatory conditions such as

osteoarthritis and rheumatoid arthritis are progressive and require prolonged treatment; but the AnI agents cause long term complications such as analgesic nephropathy.

This creates an increased demand of natural products with AnI activity with minimal side effects. Here plants and mushrooms are targeted in the search of newer AnI agents. [3] *Cissus quadrangularis* (CQ) contain many pharmacological properties. [4] With this background, current study was taken to assess the AnI activity of CQ in male wister albino rats.

Methods

It was a prospective research conducted in the department of Pharmacology, Dr Pinnamaneni Institute of Medical Sciences & Research Foundation, chinnoutpally. Institutional Animal

Ethical Committee (IAEC) approval was obtained prior to the study. The study was conducted from October 2014 to October 2016. Male wistar albino rats weighing about 250 – 300gm were included in this research. The animals were divided in to test, standard and control groups. In the control group, sterile normal saline was injected and diclofenac sodium injection in the standard animal; 6 animals each, respectively in the control and standard. Necessary precautions were taken during the experiment to minimize the mortality. In the test group of animals, CQ was studied at different concentration, 19.95mg/kg, 25.69mg/kg and 33.25mg/kg on the paw volume of the animal; these were categorized in to 1A, 1B and 1C, respectively and 6 animals in each category. The medicament extracts were prepared as per the standard guidelines.

Carrageenan induced rat paw oedema model was used to study the AI and sub-acute phase of inflammation in this research. [5] Based on the weight of the animal, the test drug was administered intraperitoneally or orally. Mode of administration was selecting based on the body weight of the animal and just half an hour before the carrageenan challenge. A mark was made at the tibio tarsal joint of the animal. Paw oedema volume up to the ankle joint was measured in the test animals at 0 and 3hours following carrageenan challenge by using

mercury Plethysmograph filled with mercury. [6] The animals were maintained in well ventilated animal house with light and dark cycle, 12 hours each. Plethysmograph was used to measure different parameters of the animal. [7]

Statistical Analysis

The data were analyzed using SPSS software version 20. The analyzed data was presented in mean, standard deviation (SD). Descriptive statistics such as ANOVA, Dunnett's test, Tukey post hoc test were used for the data analysis; P <0.05 was considered to be statistically significant.

Results

In the control and standard animal groups, statistically there was significant difference in the mean \pm SD of the paw volumes respectively at 0 hrs and 3 hrs (Table 1). The herbal medicament showed significant reduction in rat paw volume. When the control group was compared with the test and standard, there was a significant reduction in the paw volume. In the Test1A the mean \pm SD were 0.6 \pm 0.06; whereas these were 0.42 \pm 0.08 and 0.25 \pm 0.08, respectively in the groups; statistically there was significant difference in all the three groups, respectively (Table 1).

Table 1: Mean change in the paw volume among the study animals.

Group	Mean \pm SD			Inhibition (%)	Statistical analysis
	0 hr	3 hr	Change		
Control	4.03 \pm 0.05	4.8 \pm 0.09	0.77 \pm 0.05	0%	t = 36.37; P <0.001
Standard	4.07 \pm 0.05	4.25 \pm 0.05	0.18 \pm 0.04	77%	t = 11; P <0.001
Test1A	4.1 \pm 0.09	4.7 \pm 0.09	0.6 \pm 0.06	22%	t = 23.24; P <0.001
Test1B	4.08 \pm 0.1	4.5 \pm 0.11	0.42 \pm 0.08	45%	t = 13.56; P <0.001
Test1C	4.23 \pm 0.1	4.48 \pm 0.13	0.25 \pm 0.08	68%	t = 7.32; P <0.001

Discussion

CQ is a dessert plant, usually found in tropical and subtropical xeric wood. This is one of the most frequently used medical plant throughout the India subcontinent. Ayurveda prescribed this for several medicinal uses. Just moderate water source is sufficient to cultivate this and around 30 cm stem which can be removed for the mother plant without any harm for propagation and can be used for the medicinal properties. [4, 8] Various chemical substances such as Triterpenes including α - and β -amyryns, β -sitosterol, ketosteroids, phenols, tannins, carotene and vitamin C are present. [9]

Diclofenac is the most extensively used non-steroidal AnI agent. [10] In the current research it was tested on the standard group of animals and there was significant difference in the mean \pm SD of the paw volumes respectively at 0 hrs and 3 hrs. S JP et al. also reported Anlactivity of diclofenac but the

authors conducted the research in the female rats. Whereas the current research was on male wistar rats. [11] There is no analysis of gender related parameters such as hormones in this research. Here the inflammation was analyzed by carrageenan induced rat paw oedema, one of the standard methods to evaluate the Anlactivity; this was also used in our previous reports also. [12]

In this study when the test group was compared with the control and standard, there was a significant reduction in the paw volume. In the Test1A the mean \pm SD were 0.6 \pm 0.06; whereas these were 0.42 \pm 0.08 and 0.25 \pm 0.08, respectively in the groups; statistically there was significant difference in all the three groups, respectively (Table 1). In a research by Olga Youyi MF et al. also reported the Anlactivity of CQ. [13] But the authors worked on female rats weighing 40 – 50 grams whereas the current research was conducted on Male wistar albino rats weighing about 250 – 300gm. Though there is

difference in animal as well as its weight, Anlaction is identified. More activity of CQ was also reported but there is difference in the route of administration; here it was administered intra peritoneal route.

Conclusions

In the animal models also CQ exhibited AnI activity. Studies on large samples with different animal models is recommended.

References

1. Fayez, N., Khalil, W., Abdel-Sattar, E. et al. In vitro and in vivo assessment of the anti-inflammatory activity of olive leaf extract in rats. *Inflammopharmacol.* 2023; 31: 1529 – 38.
2. Jayasuriya WJABN, Handunnetti SM, Wangatunge CA, Fernando GH, Abeytunga DTU, Suresh TS. Anti-Inflammatory Activity of *Pleurotus ostreatus*, a Culinary Medicinal Mushroom, in Wistar Rats. *Evid Based Complement Alternat Med.* 2020; 2020: 6845383.
3. Jin J, Chowdhury MHU, Hafizur Rahman M, Choi KY, Adnan M. Bioactive Compounds and Signaling Pathways of *Wolfiporia extensa* in Suppressing Inflammatory Response by Network Pharmacology. *Life (Basel).* 2023;13 (4): 893.
4. Sundaran J, Begum R, Vasanthi M, Kamalapaty M, Bupesh G, Sahoo U. A short review on pharmacological activity of *Cissus quadrangularis*. *Bioinformation.* 2020; 16(8): 579 – 85.
5. Gosh MN, *Experimental pharmacology.* Hilton Publications. 2011; 5th ed.
6. Esmon CT: The interactions between inflammation and coagulation. *Br J Haematol* 2005; 131: 417.
7. Singh SK, and Maurya SP. Mercury plethysmograph in rat paw edema. *Ind J Med Res.*1972; 60:488.
8. Chopra SS, Patel MR, Gupta LP, Datta IC. Studies on *Cissus quadrangularis* in experimental fracture repair: effect on chemical parameters in blood. *Indian J Med Res.* 1975; 63(6): 824 – 8.
9. Gupta R, Gupta S, Gupta P, Nüssler AK, Kumar A. Establishing the Callus-Based Isolation of Extracellular Vesicles from *Cissus quadrangularis* and Elucidating Their Role in Osteogenic Differentiation. *J Funct Biomater.* 2023; 14(11): 540.
10. Bindu S, Mazumder S, Bandyopadhyay U. Non-steroidal anti-inflammatory drugs (NSAIDs) and organ damage: A current perspective. *Biochem Pharmacol.* 2020; 180: 1141 47.
11. S JP, Evan Prince S. Diclofenac-induced renal toxicity in female Wistar albino rats is protected by the pre-treatment of aqueous leaves extract of *Madhuca longifolia* through suppression of inflammation, oxidative stress and cytokine formation. *Biomed Pharmacother.* 2018; 98:45 – 51.
12. Praneetha Banavatu, Shilpa Tejavath, Veeraiiah Dakkumalla, Roopa Bagurubilli, T Jaya Chandra. A study to compare the anti-inflammatory activity of *Tinospora cordifolia* with sterile normal saline and diclofenac sodium in Male wistar albino rats. Submitted for publication.
13. Olga Youyi MF, Marius Mbiantcha, William Nana Yousseu et al. Immunomodulatory, anti-inflammatory and antioxidant activities of aqueous and ethanolic extracts of *Cissus quadrangularis* Linn. (Vitaceae) in chronic pain. *Research Square.* 2022; 1.