Evaluation of Analgesic and Anti- Inflammatory Activity of the Solvent Fractions of *Chenopodium Ficifolium*

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Abstract

Background: *In the presence of different drugs for treatment many people still experience different diseases. The available drugs have many side effects, which required a search for new drugs from several sources in which medicinal plants are the major one this study evaluated the analgesic and anti- inflammatory activity of the solvent fractions of Chenopodium ficifolium in rodent models of pain and inflammation.*
Methods: *Successive maceration method were used for extractions using solvents; chloroform, n-hexane, ethyl acetate and water. Albino mice, acetic acid induced writhing and carrageenan induced paw edema were used to assess the analgesic and anti-inflammatory activity. The test groups received different doses (100 mg/kg, and 200 mg/kg) of the four fractions (chloroform, n-hexane, ethyl acetate and aqueous).*
Results: *In all models, the n- hexane fraction had protections to reduce paw edema only at a dose of 200 mg/kg. However, the ethyl acetate fraction shown significant analgesic activities with a comparable result to the standards.*
Conclusion: *The C.ficifolium having the resistance against inflammation and analgesia by different agent. It is farther suggested to evaluate the anti-spasmodic and anti-pyretic activities.*

Keywords: *inflammation, analgesia, C.ficifolium*

INTRODUCTION

C.ficifolium is an annual herb belong to chenopodiaceae, commonly known as Fig-leaved Goosefoot, also known by its synonyms *Chenopodium serotinum* grows up to 20-70 (-150) cm tall (Singh and Singh, 2020). Stem is usually erect, green-striped, sometimes yellow or marked with red. Rarely with red spots in leaf axils, branched especially in lower parts, branches spreading, fairly short Leaves. Inflorescence a terminal, much branched, leafless only in uppermost parts. Seeds horizontal, black, 0.8-1.0 mm, roundish in outline (Zhou and Shine, 2022).It was once an archaeophyte weed in Europe, but today it may be found in most temperate crop-growing countries (Nobis *et al.*, 2018). The majority of people in the globe rely on traditional medicine, including herbs, to treat a variety of illnesses.Herbal traditions served as the foundation for modern medicine (Ezeonwumelu *et al.*, 2012). Pharmacology is the broad field of natural science related with the learning of medicine action, whereas medicine as any internally derived molecule, natural or any man made which utilize a biochemical or physiological impression on the cell, tissue, organ or on the whole organism (Gupta *et al.*, 2012). Pharmacology have both the cooperative and harmful effects of natural and artificial substances on living systems (Vallance and Smart, 2006). Medicinal plants have the existence properties of biologically active compounds or phytochemical constituents that arise obviously in plants and are widely used for several pharmacological purposes (Parekh and Chanda, 2008, Singh *et al.*, 2018).

Analgesic or painkiller is the group of medicine used for the relief of pain. Pain are unpleasant physiological sensory sensation promoted by injury or tissue damaging.The chemical such as prostaglandins and leukotrienes which can released the pains. Formalin and acetic acid is responsible to transmit the pain in both the peripheral nervous system and central nervous systems (Hossain, 2015).The drugs that provide relief from pain is analgesics.These drugs have a lot of side effect such as constipation, dry mouth, vomiting and respiratory depression but they have a good analgesic properties (Leiherer *et al.*, 2013).The nonsteroidal anti-inflammatory drugs (NSAIDs) are paracetamol such as the

salicylates, and opioid such as morphine and oxycodone are include in analgesic (Dworkin *et al.,* 2009). According to the International Association for the Study of Pain (IASP) pain is an unpleasant, sensory and responsive practice associated with definite or potential tissue injury, or described in terms of such damage (Merskey and Bogduk, 1994). It can alternatively be described as the result of nerve impulses arriving in consciousness that are caused by noxious sensations in the brain (Mishra *et al.,* 2011). Mild, moderate, or severe pain can range in intensity, quality, and duration from brief, sporadic, or continuous to intense, scorching, or dull. Additionally, it might be confined or disseminated, superficial or deep (Woolf, 2004).

Anti-inflammatory, is the qualities of a substances that reduces inflammation . Inflammation is the body's actual defensive reaction to wound, which may be caused by contaminations, elements or physical causes (Ottani *et al.,* 2010). Abundant synthetic anti-inflammatory treatments are now available but most of them can cause side effects such as gastrointestinal infections (Schmid-Schönbein, 2006). It is distinguished by redness, swelling, heat, pain, and occasionally a loss of function. According to Dalal and Zhukovsky (2006), a fever is the elevation of the core body temperature above normal. Average mouth temperature in healthy persons is 37 1C (98.6 1F). Infection, inflammation, tissue damage, and many disease states can all cause fever. It develops as a result of an infection, a cancerous condition, or another sick state (Tirumalasetty et al., 2014).

3. RESEARCH METHODOLOGY

3.1 Collection of the Plant

The plant *Chenopodium ficifolium* was collected from the local area of Mardan Pakistan and identified with the help of Flora of Pakistan and farther confirm by the specimen present in herbarium department of botany AWKUM.

3.2 Drying and Powdering

The aerial parts of the plant was dried in shad for 25-30 days at room temperature. The dried plant material was split into small pieces and then using electrical grinder this small pieces was ground into powder **(**Vijay *et al.*, 2022**).**

3.3 Experimental Animals

25-30g of albino mice were brought from NIH Peshawar and used for our experiment. They was randomly distributed in a cage and maintained under standard conditions at room temperature.

3.4 Plant Material In April 2018, leaf material from *Chenopodium ficifolium* was gathered in Mardan Local Area. The plant was recognized and verified in the Abdul Wali Khan University Herbarium of the Biological Science Department.

3.5 Preparation of Extract and fractionation

The extraction and fractionation method are followed described by **(**Owoyele *et al.,* 2021**)**.The powdered (1000kg) was exposed for extraction process by maceration using methanol (1.5L) at room temperature and kept in electrical shaker for 7 days then filtered through filter papers. The filtrate was then evaporated to obtain the methanolic extract. After that 100g methanolic extract was dissolved in 400 ml of distal water and 400 ml of n-hexane solvent in separating funnel and mixture was shake for 20 minutes after which through separating funnel the n- hexane portion was separated and dryness . Using the same process aqueous portion, Chloroform fraction and ethyl acetate fractions were obtain and kept in water both for dryness. The fractions gotten were used for biological investigations.

3.5 Analgesic activity

Acetic acid activated writhing test

The method described by (Javed *et al.,* 2020) was used to conduct this test. The animals were distributed into ten groups of observation boxes and each mouse were injected 10% of solution of acetic acid (10 mL/Kg) for inducing writhing. After 15 mints the number of writhing was counted for 5 min. The mice of first group serves saline water serve as a control and the second received aspirin while the four group received 100mg/kg, and other remaining four received 200mg/kg of the filtered fraction of n-hexane, ethyl acetate, chloroform and aqueous fraction respectively. After 15 mints of extract injection the writhing was counted for 5 mints and compared.

$$\textbf{\textit{Percent inhibition}} = \frac{no.writhing\ in\ test\ drug}{no.writhing\ in\ control} \times 100$$

3.8 Anti-inflammatory Activity

Carrageenan promoted paw oedema

The model described by (Sadeghi *et al.*, 2011) was used to evaluate the anti-inflammatory property of the fractions. Mice were randomly divided into 10^{th} groups. Before treatment, the paw volume of each mouse was measured. The mice were then injected with carrageenin (15%) in right hind paw and the edema was measure on hour after carrageenin injection. After that Group first received 15% distilled water, Group second received 10mg/kg Diclofenac sodium, while the four group received 100mg/kg, and other remaining four received 200mg/kg of the filtered fraction of n-hexane, ethyl acetate, chloroform and aqueous fraction respectively then edema was recorded after every hour. The % reduction was calculated with as follows:

$$\% \ Reduction = \frac{Vt-Vn}{Vt-Vo} \times 100$$

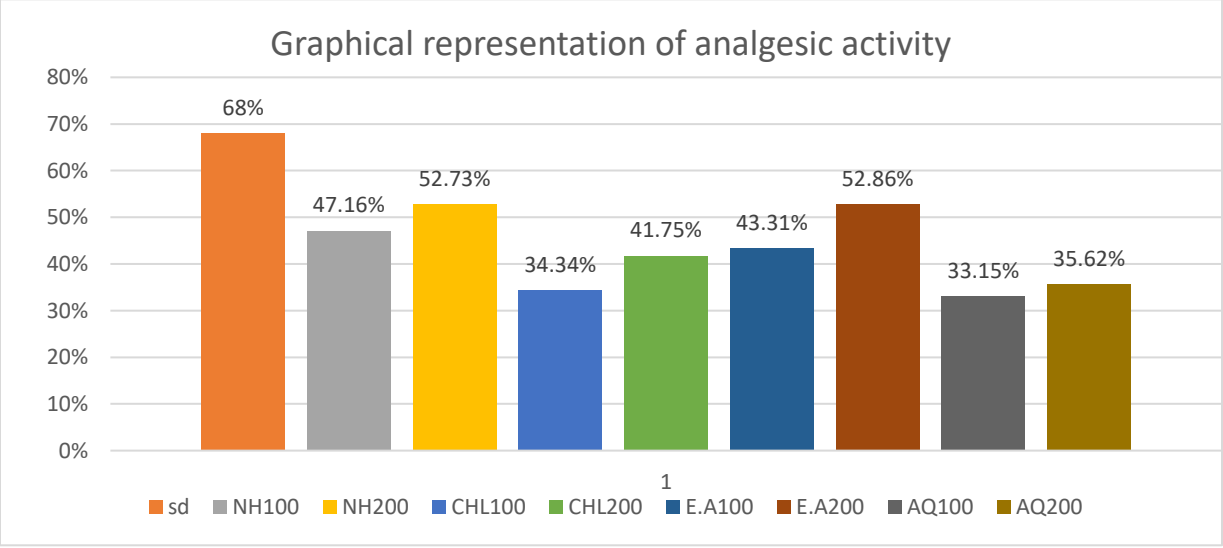
RESULTS

In the present work, biological activities and phytochemical analysis both quantitative and qualitative study of *Chenopodium ficifolium* were conducted.

4.1. Pharmacological activity

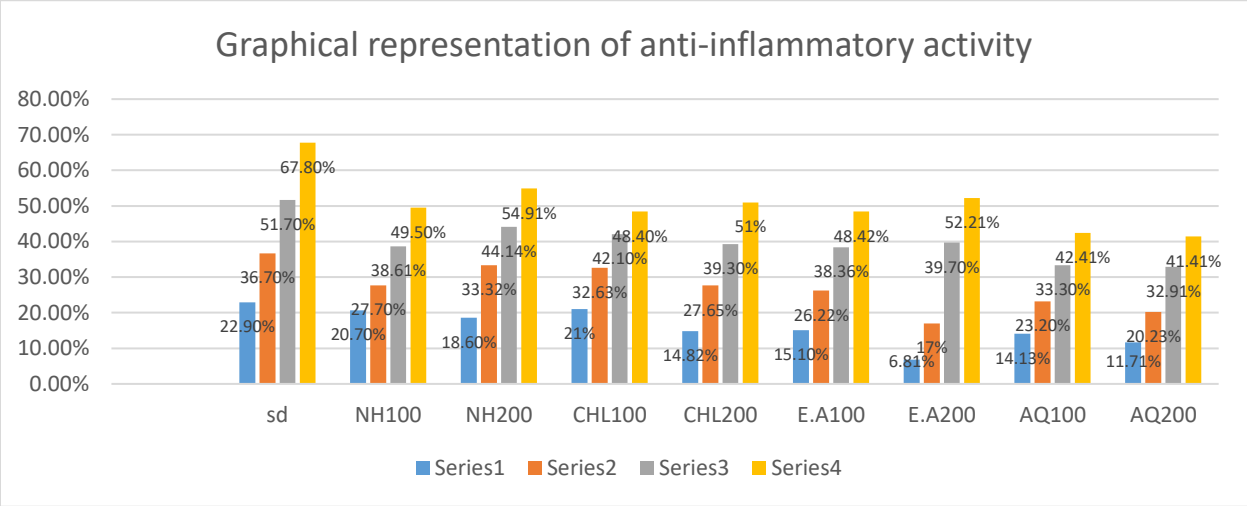
4.1.1. Analgesic Activity

Analgesic activity performed by acetic acid induce writhing method. N-hexane and ethyl acetate, fraction showed significant ($p<0.01$) decreased in number of writhing at a dose of 200mg/kg ($14.33^{b}\pm0.33$, $15.66^{bc}\pm0.66$) respectively. NHF,CHF, EAF and AQF showed 52.73%, 41.75%, 52.86% and 35.62% inhibition at a dose of 200mg/kg respectively. These % inhibition was compared to the standard drug aspirin with 68 % inhibition which is not equal but comparable.



4.2 Anti-inflammatory Activity

The results of anti-inflammatory potential of the different fraction of (n-hexane, ethyl acetate, chloroform and aqueous fraction) *C.ficifolium* were investigated by using carrageenin induced paw edema method. Treatment of mice with different fraction of *C. ficifolium* showed highly anti-inflammatory potential against carrageenin-induced paw edema. After 4 hours at a dose of 200 mg/ kg a strong inhibition ($p<0.01$) of the paw edema was observed with the doses of NHF after carrageenan injection. As shown the maximum protection from increase in paw volume was observed at the second hour from all doses of NHF, EAF, CHF and AQF and the standard drug aspirin. NHF,CHF, EAF and AQF showed 54.91%, 51%, 52.21%, and 41.41% inhibition at the 4th hour, respectively. Compared to the control group, the administration of all doses of the aqueous fraction and that of standard drug showed statistically significant ($p<0.001$) inhibitory effect on mean increase in paw volume.



5. Discussion

In the present work attempts were made to study pharmacological action, particularly Analgesic and anti-inflammatory activity of fraction n-hexane, ethyl acetate, chloroform and aqueous of *C. ficifolium*. The data of this experiment suggests that the *Chenopodium ficifolium* possesses analgesic and anti-inflammatory activities. Acetic acid is one of the common substance which release substance like histamine, prostaglandins, bradykinins and serotine which stimulate nerve endings and causes pain (Gupta et al., 2008). The writhing promoted by acetic acid was significantly decrease when the methanolic fraction like of n-hexane fraction, ethyl acetate fraction, chloroform fraction and aqueous fraction at the dose of 100mg/kg and 200mg/kg of *Chenopodium ficifolium* was injected to mice and also inhibit the synthesis and release of PGs and other endogenous substances. The highest percentage inhibition of writhing was found in a higher dose of 200mg/kg when compare with the standard drug aspirin. The overall central analgesic effect of the test drug of higher dose is not equal to the standard drug aspirin but comparable. (Pan *et al.*, 2010 and Gupta *et al.*, 2012). The organic fraction of *Chenopodium ficifolium* presented significant dose dependent inhibition when compare with control. Therefore, through these mechanisms it is possible that the fraction of *Chenopodium ficifolium* may be perform analgesic effect through although the exact

mechanism of action is yet to be discovered. Inflammation is a common tissue phenomenon when exposed to trauma or injury (Ijeoma *et al.*, 2011 and Amazu *et al.*, 2010). Paw edema promote by carrageenin has been used as anti-inflammatory model in order to study the anti-inflammatory effect of drug (Shenawy *et al.*, 2002). In carrageenan promote paw oedema the methanolic fraction of *Chenopodium ficifolium* showed maximum inhibition at all organic fraction of (200 mg/kg) dose after 4hrs of drug treatment. The present work were compare with (Muhammad *et al.*, 2012) the inti-inflammatory activity of n-hexane fraction showed significant inhibition it 100, 200 and 300mg/kg dose. The inhibition % of anti-inflammatory was 60.8% against carrageenin promoted edema which is comparable to the standard. The result of the current work indicated that organic fraction of *Chenopodium ficifolium* afforded protection against the carrageenan promoted acute inflammation in dose follower manner. The methanolic fraction of C. ficifolium at dose of 200mg/kg presented significant $p<0.001$ anti-inflammatory action with (54.91%), (54.91%), (54.91%) and (54.91%) inhibition of paw oedema and was compared to the standard drug (diclofenac sodium) showed (94.14%) inhibition. Thus the present study suggested that the biologically active substance are present in *C. ficifolium* all fraction with anti-inflammatory properties.

Conclusion

This study confirms the analgesic and anti-inflammatory potential of various organic fraction of *Chenopodium ficifolium* in albino mice. It was able to inhibit pain sensation in the acetic acid induced writhing and carrageenin induce edema. A dose of 100 mg/kg and 200 mg/ kg of the organic fraction of *Chenopodium ficifolium* is more effective in the management of pain and edema agent respectively. The present study, therefore, scientifically confirms and supports the use of this plants in ethno medicine. In various organic fraction of *Chenopodium ficifolium* having different secondary metabolite.

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