



ANTI-INFLAMMATORY ACTIVITY OF *Cosmos sulphureus* BY USING ALBINO RAT'S

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ABSTRACT

This study investigates the anti-inflammatory effects of cosmos sulphureus plant leaves using rat models. Utilizing a controlled experimental design, we administered various doses of cosmos sulphureus leaves extract to male Wistar rats induced with inflammation via formalin or carrageenan injections. Parameters measured included paw edema, biochemical markers of inflammation, and histopathological changes. Results indicated a significant reduction in swelling and inflammatory markers in treatment groups compared to control. This finding support cosmos sulphureus potential as a natural anti-inflammatory agent highlight therapeutic value in managing inflammatory conditions. Further studies are warranted to elucidate its mechanisms of action.

Key words:

Anti-inflammation, *cosmos sulphureus* plant leaves, preliminary

INTRODUCTION

Analgesics are the drugs which relieve or suppress the pain sensation by their action on the CNS without causing loss consciousness. An analgesics drug, also called simply an analgesic, antalgic, pain reliver, or painkiller is any member of the group of drugs used for pain management. Analgesics are conceptually distinct from anesthetics, which temporarily reduce, and in some instance eliminate, sensation although analgesia and anesthetic effects.

These medications are widely used in medical treatments, ranging from mild headaches to server post-surgical pain management. While analgesics provide relief, their misuse can lead to side effect such as gastrointestinal tissues (in NASIDs) or addition (in opioids). Proper dosage and medical supervision are essential for safe use.

The analgesics decreases pain or make the individual unaware of existing pain. it is very difficult to define pain.

It is recognized as warning signal of danger in a person or individual that may be due to some diseases or infection. The intractable pain can cause damage to organs heart and kidneys.

Pain Inflammation:

Inflammation is an important physiological reaction which occurs in response to a wide variety of injurious agents (example: bacterial infection, physical trauma, chemicals or any other phenomenon) ultimately aiming to perform the dual function of limiting damage and promoting tissue repair. Inflammatory processes are required for immune surveillance, optimal repair, and regeneration after injury. The inflammatory process protects our body from diseases by releasing.

Cells and mediators that combat foreign substances and prevent infection. However, sustained, excessive or inappropriate inflammation is the cause of numerous

diseases including rheumatoid arthritis, psoriasis and inflammatory bowel disease. Inflammation is a major component of the damage caused by autoimmune diseases, and is a fundamental contributor of various infectious and non-infectious diseases such as cancer. Diabetes cardiovascular disease, rheumatoid arthritis, Alzheimer's and arteriosclerosis. Depending on the intensity of this process, mediators generated in the inflammatory site can reach the circulation and cause fever.

Common Treatment and Management Strategies:

- Medical Treatment: Non-steroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen and
- Aspirin are used to block enzymes that cause inflammation.



Pathophysiology:

The Pathophysiology of analgesic drugs involves diverse mechanism depending on the specific drug class. Generally, analgesics aim to disrupt the pain pathway, which involves both peripheral and central nervous system components. Non-steroidal Anti-inflammatory drugs (NSAIDs) like Ibuprofen primarily inhibit cyclooxygenase (COX) enzymes, reducing the production of prostaglandins, which are inflammatory mediators that sensitize pain receptors. In contrast, opioids analgesics such as morphine bind to opioid receptors in the CNS, modulating pain signal transmission and perception. The action triggers a cascade of events that ultimately decreases the release of neurotransmitters involved in pain signaling. Acetaminophen, while its exact mechanism is not fully understood, is believed to act centrally by inhibiting COX enzymes, pathophysiological pathways is crucial for selecting appropriate analgesic drugs and managing pain effectively.

Complications:

- Acute renal failure
- Chronic renal failure
- Interstitial nephritis
- Renal papillary necrosis

- Immediate Care (Acute): For injuries, use the RICE method (Rest, Ice, Compression, Elevation) to reduce swelling.
- Lifestyle Changes: A healthy diet (low in sugar, high in nutrients), regular exercise, and 7-9 hours of sleep are crucial for managing chronic inflammation.
- Natural Remedies: Foods high in antioxidants, such as leafy greens, berries, nuts, and olive oil, can help reduce inflammation.

Pain disease

Chronic pain disease is a persistent of ten disabling over 3-6 months, distinct from acute injury related pain. It's can manifest as condition like fibromyalgia complex regional pain syndrome or chronic migraines. Management combines lifestyle change, physical therapy, and medication to improve functionality as cruse are often unavailable.



- Urinary tract infections
- Hypertension,

Treatment:

Non opioid and opioids analgesics are the main drugs used to treat pain. Anti-depressants, Anticonvulsant and other CNS active drugs may also be used for chronic or neuropathic pain and are first line therapy for some condition. Neuraxial infusion, Nerve stimulation, injection therapies, and neural blockades can help selected patients. Cognitive behavioral interventions may reduce pain and pain related disability and help patients scope.

Classification:

Types of analgesics drugs:

1. Non –opioids Analgesics
2. Opioid Analgesics
3. Adjuvant Analgesics.

Non-Opioid analgesics:

Non-opioids Anti-inflammatory drugs (NSAIDs)

These drugs reduce pain and inflammatory by inhibiting production of prostaglandins, which are chemicals that

contribute to pain inflammation. These can also reduce fever.

E.g; Ibuprofen, Naproxen, Diclofenac, Celecoxib.

Acetaminophen

These drugs relieve pain and reduce fever but its minimal anti-inflammatory effect. It works through different mechanism in the CNS.

Opioids analgesics:

These are powerful that work by binding to opioid receptors in the brain, spinal cord and other parts of the body reducing the perception of pain. Opioids can be highly effective for serve pain, but they also carry a risk of dependence and addiction.

Adjuvant analgesics:

These drugs are not primarily designed to relieve pain but they can be helpful in certain in certain pain conditions.

- Anti-depressant: some types of anti-depressants like, tricyclic anti-depressant and SNRIs can help with neuropathic pain.
- Anti-convulsant: this medication such as gabapentin, are used to treat nerve pain.
- Corticosteroids: -These can reduce inflammation and are used for pain related o inflammation.
- Local anesthetics: -such as lidocaine, these medications numb a specific area

Cosmos Sulphureus



MATERIALS AND METHODS

MATERIALS:

1. **Raw Material:** Dried flowers of *Cosmos sulphureus* sourced from a reliable supplier to guarantee quality.
2. **Solvents:** Suitable solvents for extraction, commonly ethanol (ethyl alcohol), olive oil (for oil infusion), and glycerine (for glycerite preparation).
3. **Equipment:** Glass jar for extraction, filter paper, measuring cylinder, glass rods, dark glass bottles for storage, beaker, and pH meter.
4. **Dosing and Monitoring:** Syringe and feeding tube; equipment for recording the behavior of rats.
5. **Safety Equipment:** Rat holder, handling equipment, lab coat, and gloves.
6. **Maceration Extraction Method:**
 - Plant material (*Cosmos sulphureus*)
 - Solvent
 - Container
 - Measuring tools/cylinder
 - Glass rod
 - Filter paper

- Storage and labeling materials
- Extracted drug: *Cosmos sulphureus* extract

2. Administration Requirements

- Extracted drug (*Cosmos sulphureus* extract)
- Rat models – healthy rats of appropriate age and body weight
- Dosing method-oral, subcutaneous injection, or topical application
- Dosing equipment-syringe and feeding tube
- Control group
- Ethical approval-treatment/use of animal subjects in accordance with approved ethical guidelines
- Monitoring equipment-weighing scale for measuring body weight and equipment for recording the behavior of rats
- Data recording materials-digital devices and notebooks for observations

Material Requirements-Animals

Animals: Rats-a sufficient number of healthy rats.

Housing: Appropriate cages with suitable bedding, adequate food, and drinking water for the rats.

RESULT

Phytoconstituents	Phyto constituents extract of COSMOS SULPHUREUS
Flavonoids	+
Tannis	+
Saponins	+
Glycosides	-
Terpenoids	+
Steroids	+
Phenols	+
Alkaloids	+

Phytochemical test

Group	Treatment	Paw edema volume	%inhibition of edema
Group1	Vehicle (Distilled water)	0.50±0.02	0% (reference)
Group2	Indomethacin(10mg/kg)	0.65±0.03	48%
Group3	Carrageenan(1ml/kg)	1.25±0.03	0%(inflammation)
Group4	Carrageenan + extract (100mg/kg)	0.90±0.04	28%
Group5	Carrageenan + extract (200mg/kg)	0.70±0.03	44%

Anti-Inflammatory activity by plethysmometer

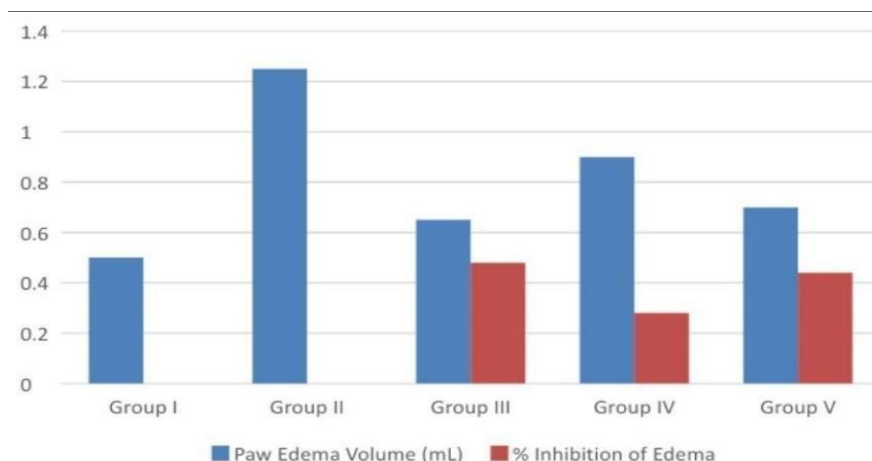


Figure 1: Anti-Inflammatory Activity of *Cosmos sulphureus* Using Albino Rats

DISCUSSION

The present study was conducted to evaluate the anti-inflammatory activity of *Cosmos sulphureus* extract using albino rat models. An acetic acid-induced paw edema model in rats was employed to assess the anti-inflammatory activity. This method is a well-established model for evaluating peripheral inflammation and involves the administration of 0.1 mL of 1% acetic acid into the rat paw to induce localized swelling (edema). The inflammatory response in this model is primarily associated with the release of inflammatory mediators such as prostaglandins, histamine, and cytokines, which cause increased fluid accumulation in the paw tissue. This results in observable and measurable swelling.

In the present study, rats treated with *Cosmos sulphureus* extract exhibited a significant reduction in paw edema compared with the control group. This finding suggests that the extract possesses considerable anti-inflammatory activity. The phytochemical constituents of *Cosmos sulphureus*, particularly flavonoids, sesquiterpene lactones, and phenolic compounds, may be responsible for this anti-inflammatory activity. These compounds may exert their effects by inhibiting cyclooxygenase (COX) enzymes and modulating the release of inflammatory mediators.

The standard group treated with diclofenac showed a marked reduction in paw swelling, as expected. However, the groups treated with *Cosmos sulphureus* extract also demonstrated significant inhibition of paw edema, indicating its potential as a natural source of anti-inflammatory agents. Although the activity of *Cosmos sulphureus* was slightly lower than that of the standard drug, its natural origin and potential for a lower risk of gastrointestinal adverse effects make it a valuable candidate for further investigation in the management of inflammatory conditions.

Inflammation is a biological response of vascular tissues to harmful stimuli, such as pathogens, damaged cells, or irritants. It is characterized by redness, swelling, pain, stiffness, and, in some cases, loss of joint function. In the present study, anti-inflammatory activity was assessed by observing paw edema following induction of inflammation and subsequent administration of the test and standard treatments.

The percentage inhibition of paw edema was observed to be approximately 24% and 44% at doses of 100 mg/kg and 200 mg/kg body weight, respectively, in the groups administered the plant extract. The standard group showed approximately 48% inhibition of paw edema. The 200 mg/kg body-weight dose showed a significant reduction in paw edema compared with the control group and demonstrated an anti-inflammatory effect approaching that of the standard treatment.

CONCLUSION

The results obtained from the present study demonstrated the anti-inflammatory activity of *Cosmos sulphureus* extract in albino rats. The phytochemical constituents present in the plant, particularly flavonoids, may contribute significantly to its anti-inflammatory activity. Flavonoids may reduce inflammation through several mechanisms, including inhibition of lysosomal enzymes, stabilization of cellular membranes, and modulation of endogenous inflammatory mediators involved in the migration of inflammatory cells to the site of inflammation.

In the present study, the selected plant extract significantly reduced paw edema compared with the control group. The 200 mg/kg body-weight dose produced a significant reduction in paw edema and demonstrated better anti-inflammatory activity than the lower dose. The findings suggest that *Cosmos sulphureus* possesses promising anti-

inflammatory properties, with the activity appearing to increase with the concentration/dose of the extract.

Overall, *Cosmos sulphureus* may serve as a potential natural source of anti-inflammatory agents. However, further studies involving biochemical markers, mechanistic investigations, toxicity evaluation, and detailed phytochemical characterization are required to establish its therapeutic potential.

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