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Review Article

Anti-Inflammatory Activity of Solanum Surattense Fruits

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ABSTRACT

Its immunological response to a stimulation that may have a negative impact is inflammation. The cycle of events that would produce free radicals is stopped by antioxidants. Searching for anti-inflammatory chemicals with a sustainable future is necessary since long-term use of steroids as anti-inflammatory drugs is dangerous. This study investigated the anti-inflammatory and antioxidant properties of Solanum surratanse seeds and leaves in vitro. Maceration was used to create the ethanolic extract of S. Surratanse seeds and leaves. The percentage inhibition of albumin denaturation, membrane stabilisation, and protease inhibition were used to assess the anti-inflammatory properties of the ethanolic extract of seeds (SE) and leaves (LE).The antioxidant activity was assessed using the DPPH free radical scavenging assay, which utilized 1,1-diphenyl-2-picrylhydrazine. The seeds were subjected to successive solvent extraction through maceration with ethanol, ethyl acetate, acetone, and water. The ethanolic extracts from the seeds and leaves of S. xanthocarpum demonstrate both anti-inflammatory and antioxidant properties. The acetone extract displayed stronger anti-inflammatory activity compared to the ethyl acetate and aqueous extracts. The findings presented indicate that S. surratanse possesses both anti-inflammatory and antioxidant capabilities.

INTRODUCTION

The Latin word "inflamers," which means "to burn," is where the word "inflammation" comes from. In the past, inflammation was thought to be a single condition brought on by fluid imbalances in the body. According to current knowledge, inflammation is the body's normal and advantageous response to disturbances or diseases. Barbosa-Filho and associates (2006) The body's natural response to an attack or injury is inflammation, which aids in the isolation and repair of injured tissues. It manifests as redness, warmth, discomfort, and swelling and is an essential component of the body's defense mechanism. Researchers frequently test

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substances for their anti-inflammatory properties using various models in scientific studies on inflammation. These models include biochemical tests and animal trials. It's crucial to remember that no one experimental model can account for every facet of inflammation. (Ialenti and others, 1993). Two primary categories of experimental models in the study of inflammation: acute and chronic. Drugs that impact a number of factors, including blood flow, vascular permeability, white blood cell movement, chemotaxis, phagocytosis (especially by PMNLs and other phagocytic cells), local pain measurement, antipyretic activity, local analgesic action, and rat paw oedema, are tested in acute models. Conversely, chronic models include adjuvant-induced arthritis, rabbit monoarthritis with an immunological origin, granuloma pouches that develop granulation tissue, and sponge and pellet implants. These long-term models aid in the discovery of medications that may impact the ongoing course of the disease. (Mantovani and colleagues, 2008)

Causes of inflammation

When an immune response is triggered by a physical stimulus, inflammation results. Although inflammation can result from an illness, inflammation alone does not always indicate the presence of an infection. An injury, an infection, or exposure to dust, bee stings, or other substances can all cause acute inflammation. The immune system also sets off a series of reactions when the body detects a virus. Plasma proteins begin to build up in the tissues, causing fluid to accumulate and cause edema. White blood cells called neutrophils are released by the system and go in the direction of the afflicted area. These white blood cells have anti-pathogen molecules.

Signs of inflammation

Redness (Rubor): Because the tiny blood vessels in the wounded area enlarge (hyperemia), tissues that are intensely inflamed turn red.

Swelling (Tumor): Edema, or fluid accumulation, in the area outside the blood vessels causes tissues to enlarge. More fluid spilling from blood arteries and increased cell mobility are the causes of this.

Heat: As a result of blood vessel dilatation and the delivery of warm blood, the afflicted area feels warmer due to increased blood flow and warmth. Pain is brought on by chemicals generated during acute inflammation, such as bradykinin and certain prostaglandins. The discomfort is also exacerbated by the stretching and deformation of tissues brought on by inflammatory swelling.

Loss of function: Swelling may physically immobilize the affected area, resulting in a loss of function, and inflammation may restrict movement in the area owing to pain.

Plant Profile

Biological source: It is Fruit obatined from the plant, Solanum surattense Burm. f.

Family: Apiaceae

Taxonomy

- Kingdom: Plantae
- Phylum: Tracheophyta
- Class: Equisetopsida C. Agardh
- Order: Apiales
- Family: Apiaceae
- Genus: Solanum
- Species: surattense

Figure :Solanum surattense Burm. f. Fruit

Common Name: Assamese: Bilkulitita; English: Bitter brinjal; Other : Gulakai, Sundaka, Mullu Sundai

Morphology and Occurrence

This herb is perennial. Both the stem and the leaves are hairy and have straight, sharp spikes. pinnatified leaves. A few-flowered raceme with unique, deep-blue flowers. Lobes of the calyx recurved. The globose fruit is green when young and yellow when ripe, measuring about 1 inch in diameter.

Distribution :

Plains from the coast to 100m. India, Himalaya, south east Asia, Malaysia, Australia, Polynesia.

Chemical Constituants

Numerous bioactive compounds can be found in Solanum surattense fruit. Among these are phenolic acids (such as caffeic acid), coumarins (such as esculin), flavonoids, and steroidal alkaloids (such as solanocarpidine, solanocarpine, solamargine, and solasonine). Other notable phytochemicals include saponins, glycoalkaloids, triterpenoids (such diosgenin and lupeol), and steroids (including carpesterol, cycloartanol, campesterol, stigmasterol, β-sitosterol, and daucosterol). Seed oil is rich in linoleic, oleic, and arachidonic acids.

Need of study

The body uses inflammation as a natural defense mechanism. It facilitates wound healing, fights infections, and repairs damaged tissues. Serious health issues arise from excessive or persistent inflammation. Diabetes, cancer, cardiovascular diseases, and arthritis are all linked to chronic inflammation. Inflammatory illnesses affect millions of people worldwide. The available treatments, such as corticosteroids and nonsteroidal anti-inflammatory drugs (NSAIDs), are effective but have significant side effects. Immunosuppression, liver toxicity, renal impairment, and stomach ulcers can all arise from long-term use of these drugs. Finding safer and more effective alternatives is therefore absolutely necessary.

In pharmacological research, the cotton pellet-induced granuloma model and the carrageenan-induced acute inflammatory paradigm are widely used. These models are appropriate for examining the anti-inflammatory qualities of medicinal herbs because they make it easier to evaluate both acute and chronic inflammation. Edema, erythema, and nociception are characteristics of acute inflammation, while tissue damage, fibrosis, and persistent immune activation are characteristics of chronic inflammation. Using these animals, this study will assess how well the hydroalcoholic extract of Solanum surattense fruit reduces inflammation in both situations.

Network pharmacology is an advanced computational technique that clarifies the molecular mechanisms behind plant-based medications in addition to in vivo studies. Numerous bioactive compounds found in medicinal plants have different effects on different routes. Phytochemicals affect multiple biological pathways, providing a more comprehensive therapeutic effect than synthetic drugs that just target one. However, it is difficult to manually identify these targets. Predicting compound-target interactions, key chemical pathways, and potential

mechanisms of action is made easier by network pharmacology techniques. Through the integration of network pharmacology and experimental validation, this study will offer a comprehensive understanding of the anti-inflammatory properties of Solanum surattense fruit.

MATERIALS AND METHODS

Collection and authentication of plant Material

In July 2024, fruit from Solanum surattense Burm.f. was gathered in the Lonavala area of Pune district, Maharashtra, India. A botanist at Sandip University in Nashik verified the plant material, and a herbarium specimen was created and deposited there with voucher number SUN2024/07/10.

Preparation and Storage

To avoid microbial contamination and degradation during storage and drying, the gathered plant material was first carefully cleaned with water and then rinsed with 95% ethanol. After that, the fruit was chopped into little pieces and allowed to dry completely in the shade. To create a consistent powder fit for additional processing, the dried material was next ground into a powder and sent through filter number 80.

Extraction methodology

For three days, 1000 g of powdered, dried fruit material was macerated in a hydroalcoholic solution at 25 ± 2°C with periodic stirring. A sterile cotton-lined Buchner funnel was used to filter the resultant extract. A rotary evaporator was then used to entirely evaporate the solvent under reduced pressure, producing 47.65 g of hydroalcoholic extract. The following formula was used to calculate the extracted plant product's yield percentage:

Percentage yield = Weight of Extract / Weight of powdered drug ×100

Animal models to study anti-inflammatory:

1. Carrageenan Induced Paw Edema
2. Histamine/5-HT Induced Paw Edema
3. Bradykinin Induced Paw Edema
4. Dextran Induced Paw Edema
5. Lipopolysaccharide (LPS) Induced Paw Edema
6. Arachidonic Acid-Induced Ear Edema
7. Croton Oil / TPA Induced Ear Edema
8. Oxazolone Induced Ear Edema
9. Vascular Permeability
10. Pleurisy Model

Prepration OF Extract

1. Collect the fruit of solanum surattense were washed with water.
2. Then remove the seed with brusting fruit
3. And store in well closed airtight container.
4. Then dried seed 250 gm are soaked in 1000ml of methanol As a solvent for 96 hr
5. Every 12 hr of intervals the mixture was stirred through glass rod
6. The solvent was filtered through whattman filter paper
7. Then evaporated using rotary evaporator to get dried Extract (50-60°C lower pressure rpm 120) extract was kept in a refrigerator until use

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CONCLUSION

A dual experimental approach that included both acute (carrageenan-induced paw edema) and chronic (cotton pellet-induced granuloma) models,

in addition to network pharmacology and molecular docking, was used to carefully assess the anti-inflammatory potential of Solanum surattense fruit extract. Strong insights into the extract's multi-mechanistic effectiveness and potential as a phytotherapeutic agent were offered by this integrative pharmacological approach.

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