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To Perform Phytochemical Screening and Identify Active Constituents Responsible for Anti-Allergic Activity in Thalictrum. (Meadow-rue)

Aditya Verma[1*], Mrs. Richa Agnihotri[2], Dr. Abhishek Soni[3], Dr. Chinu Kumari[4]
Aditya verma [Student, Corresponding Author] – aditya83510@gmail.com
Mrs.Richa Agnihotri [M. Pharm, Pharmaceutical chemistry , Associate Professor] – vatsricha568@gmail.com
Dr. Abhishek Soni [M. Pharm, PhD in Pharmaceutics, Dean of Pharmacy] – abhisoni.phd@gmail.com
Dr. Chinu Kumari [M. Pharm, PhD in Pharmacology, HOD] – chinu9990@gmail.com
School of Pharmacy, Abhilashi University, Mandi, HP, India

Abstract: *Meadow-rue, or Thalictrum, is a medicinal herb that has long been used to treat a variety of allergy and inflammatory conditions. The goal of the current study was to identify the active ingredients in Thalictrum that have anti-allergic properties by phytochemical screening. The plant material was gathered, shade-dried, ground into a powder, and extracted using the Soxhlet extraction method or maceration with methanol/ethanol as the solvent.*

Important bioactive substances like alkaloids, flavonoids, tannins, saponins, glycosides, and phenolic compounds were found in the extract after preliminary phytochemical screening. The anti-inflammatory, antioxidant, and anti-allergic qualities of these phytoconstituents are well-known. Alkaloids may aid in immunological control, whilst flavonoids and phenolic substances may prevent histamine release and lessen allergic reactions.

According to the study, Thalictrum has important phytochemical components that could support its anti-allergic properties. To verify the therapeutic efficacy and mechanism of action of active substances, further isolation and pharmacological analysis are needed..

Keywords: Thalictrum, Meadow-rue, Phytochemical Screening, Anti-allergic Activity, Medicinal Plant, Alkaloids, Flavonoids, Phenolic Compounds, Herbal Extract, Soxhlet Extraction, Histamine Inhibition, Antioxidant Activity

I. INTRODUCTION

Meadow-rue, or Thalictrum, is a significant medicinal plant in the Ranunculaceae family. There are multiple species of the genus Thalictrum that are found in North America, Europe, and Asia. Herbal therapy has long employed many varieties of this plant to treat fever, inflammation, infections, respiratory ailments, discomfort, and allergies. The pharmacological activity and therapeutic potential of medicinal plants containing biologically active chemicals are being thoroughly investigated due to the increased interest in herbal medicine and natural therapeutic agents.

Photochemical, which are naturally occurring chemical substances responsible for a variety of biological actions, are thought to be abundant in medicinal plants. Alkaloids, flavonoids, tannins, glycosides, saponins, terpenoids, and phenolic compounds are some of these phytochemicals. These components are known to have antibacterial, anti-inflammatory, antioxidant, anticancer, and anti-allergic qualities. These substances are found in medicinal plants, which makes them beneficial for treating and preventing a number of illnesses. Flavonoids and phenolic compounds are particularly significant among these phytochemicals because they stabilize mast cells, lower inflammatory mediators, and inhibit histamine production, all of which assist lessen allergic symptoms.

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One of the most prevalent health issues in the globe is allergic illnesses. A hypersensitive immune reaction brought on by exposure to allergens—such as dust, pollen, smoke, food, microbes, or chemicals—is called an allergy. Sneezing, itching, skin irritation, asthma, inflammation, and respiratory discomfort are typical allergy symptoms. Allergies can interfere with the immune and respiratory systems' ability to operate normally in extreme cases. Antihistamines and corticosteroids are examples of synthetic anti-allergic medications that are frequently used for treatment; however, long-term usage of these medications may result in side effects include tiredness, sleepiness, headaches, and immunological suppression. As a result, scientists are concentrating more on herbal remedies and substances derived from plants as safer and more efficient substitutes for the treatment of allergic illnesses.

Important bioactive components, including isoquinoline alkaloids, flavonoids, glycosides, and phenolic compounds, have been found in a number of investigations on Thalictrum species. These substances are thought to contribute to the plant's pharmacological and therapeutic qualities. While flavonoids and phenolic compounds have potent antioxidant and anti-allergic properties, alkaloids found in Thalictrum species are recognized for their immunomodulatory and anti-inflammatory properties. Thalictrum's medicinal significance is further supported by preliminary scientific research that indicates extracts of the plant may have antibacterial, antioxidant, and anti-inflammatory properties.

In order to identify and analyze the bioactive chemicals found in medicinal plants, phytochemical screening is a crucial step. It offers helpful information on the medicinal potential of plant constituents and aids in determining their chemical makeup. Alkaloids, tannins, flavonoids, glycosides, saponins, and other phytochemicals are detected in plant extracts using a variety of chemical tests. The identification of these components could aid in comprehending the mechanism underlying the plant's anti-allergic properties.

Thus, the goal of the current study is to discover the active ingredients in Thalictrum that have anti-allergic properties using phytochemical screening. The study may contribute to the creation of herbal remedies for the treatment of allergic conditions and offer scientific proof of the plant's therapeutic efficacy. The isolation and validation of certain active molecules responsible for its therapeutic efficacy may be aided by additional pharmacological and clinical research.

Method of Preparation:

To get rid of dust and other contaminants, the Thalictrum plant material that had been gathered and verified was thoroughly cleaned with distilled water. After cleaning, the plant material was shade-dried at room temperature for seven to ten days until all moisture was gone. A mechanical grinder was then used to ground the dried material into a coarse powder that could be extracted.

After precisely weighing 20–50 g of powdered plant material, it was put into a dry, clean Soxhlet apparatus for extraction. Because methanol and ethanol are good at removing phytochemicals from medicinal plants, including alkaloids, flavonoids, tannins, glycosides, and phenolic compounds, they were utilized as the extraction solvent.

Until the solvent in the siphon tube turned colorless, signifying full extraction of the active ingredients, the extraction procedure was continued continuously for roughly 6 to 8 hours. To maximize the extraction of phytochemicals, the solvent was heated, evaporated, condensed, and repeatedly run through the powdered plant material.

To get rid of insoluble plant residue, the extract was filtered through filter paper after extraction was finished. By evaporating the solvent in a water bath at a regulated temperature, the resulting filtrate was concentrated. A semi-solid or dry crude extract with active phytochemical ingredients was obtained by concentrating the extract.

For additional phytochemical screening and assessment of anti-allergic action, the produced extract was moved into a sterile glass container and kept in sealed bottles at a low temperature. To keep the extract stable and stop the active chemicals from degrading, proper storage was required.

Because the quality and amount of phytoconstituents obtained rely on the extraction method and solvent utilized, the extraction procedure is crucial to phytochemical investigations. In order to identify the key bioactive components that provide Thalictrum its therapeutic and anti-allergic qualities, the produced plant extract was also put through a preliminary phytochemical screening

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Procedure:

To get rid of dust and contaminants, fresh Thalictrum plant material was gathered from the Himalayan region and properly cleaned with distilled water. After seven to ten days of shade drying at room temperature, the plant material was ground into a powder using a mechanical grinder. For later use, the powdered substance was kept in sealed containers.

Soxhlet Extraction Procedure

A precise weight of 20–50 g of powdered plant material was measured.
A Soxhlet apparatus was filled with the powder.
The extraction solvent was methanol/ethanol.
For six to eight hours, extraction was done nonstop.
Filter paper was used to filter the extract.
To get rid of the solvent, the filtrate was concentrated on a water bath.
For future research, the concentrated extract was kept in sealed containers.
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Preliminary Phytochemical Screening

Test for Alkaloids

Mayer's and Dragendorff's reagents were applied to the extract.
Alkaloids were present when a cream or orange precipitate formed.

Test for Flavonoids

The extract was mixed with a solution of sodium hydroxide.
Flavonoids were proven by the development of yellow coloring.

Test for Tannins

The extract was mixed with a solution of ferric chloride.
Tannins were characterized by a blue-black or green hue.

Test for Saponins

Distilled water was used to give the extract a good shaking.
Saponins were confirmed by persistent foam production.

Test for Glycosides

Ferric chloride solution and glacial acetic acid were used to treat the extract.
Glycosides were detected by the formation of a pigmented or brown ring.

Test for Phenolic Substances

The extract was mixed with a solution of ferric chloride.
Phenolic substances were confirmed by a dark blue or green hue.

Drug & Excipients Description

Drug Description

Drug Name: Thalictrum (Meadow-rue)

Biological Source:

Dried entire plants, leaves, roots, and aerial parts from various Thalictrum species in the Ranunculaceae family make up Thalictrum.

Family:

Ranunculaceae

Common Name:

Meadow-rue

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Major Chemical Constituents:
Alkaloids
Flavonoids
Tannins
Glycosides
Saponins
Phenolic compounds
Terpenoids

Medicinal Uses:
Anti-allergic activity
Anti-inflammatory activity
Antioxidant activity
Antimicrobial activity

Excipients/Reagents Description

Reagent/Excipient	Role in Study
Ethanol	Extraction solvent
Distilled Water	Washing and preparation
Mayer's Reagent	Detection of alkaloids
Dragendorff's Reagent	Detection of alkaloids
Ferric Chloride	Test for tannins and phenolic compounds
Sodium Hydroxide	Test for flavonoids
Glacial Acetic Acid	Test for glycosides
Chloroform	Reagent used in phytochemical tests

Evaluation Parameters
Phytochemical Screening
The initial qualitative study used to determine whether medicinal plants contain different bioactive chemical elements is known as phytochemical screening. In the current investigation, various chemical tests were performed on the Thalictrum extract to identify alkaloids, flavonoids, tannins, saponins, glycosides, and phenolic compounds.
The plant's pharmacological and therapeutic properties, including as its anti-inflammatory, antioxidant, and anti-allergic properties, are attributed to these phytoconstituents.Using established techniques, the plant's generated methanolic/ethanolic extract was employed for an initial phytochemical examination.

Test for Alkaloids
Procedure
A small quantity of plant extract was treated with Mayer's reagent and Dragendorff's reagent separately.
Observation
Formation of cream-colored or orange precipitate.
Result
Presence of alkaloids was confirmed.guk

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Test for Flavonoids

Procedure

Few drops of sodium hydroxide solution were added to the plant extract.

Observation

Development of yellow coloration which disappeared after addition of dilute acid.

Result

Presence of flavonoids was confirmed.

Test for Tannins

Procedure

Ferric chloride solution was added to the extract.

Observation

Formation of blue-black or green coloration.

Result

Presence of tannins was confirmed.

Test for Saponins

Procedure

The extract was shaken vigorously with distilled water in a test tube.

Observation

Persistent foam formation for several minutes.

Result

Presence of saponins was confirmed.

Test for Glycosides

Procedure

The plant extract was treated with suitable reagents for glycoside detection.

Observation

Formation of characteristic colored ring.

Result

Presence of glycosides was confirmed.

Test for Phenolic Compounds

Procedure

Ferric chloride solution was added to the extract.

Observation

Formation of dark blue or green coloration.

Result

Presence of phenolic compounds was confirmed.

Observation Table

Phytochemical Constituent	Observation	Result
Alkaloids	Cream precipitate	Present
Flavonoids	Yellow color	Present
Tannins	Blue-black color	Present
Saponins	Foam formation	Present
Glycosides	Colored ring	Present
Phenolic compounds	Dark coloration	Present

Thalictrum's phytochemical screening identified a number of significant bioactive substances. The plant's anti-inflammatory, anti-allergic, and antioxidant qualities may be attributed to these compounds. Because they lessen

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allergic reactions and prevent the production of histamine, flavonoids and phenolic chemicals are particularly significant. The study's findings demonstrate the plant's potential for additional pharmacological research and validate its historic medicinal use.

Evaluation of Anti-Allergic Activity

The presence of bioactive phytochemical components and their documented pharmacological activities were used to assess the Thalictrum extract's anti-allergic potential. Mast cells' production of histamine and other inflammatory mediators as a result of hypersensitivity reactions is the primary cause of allergic reactions. Flavonoids, phenolic chemicals, and alkaloids found in medicinal plants have been shown to suppress histamine release and lessen allergic inflammation.

Alkaloids, flavonoids, tannins, glycosides, saponins, and phenolic chemicals were found in the plant extract used in this investigation, according to preliminary phytochemical screening. Because they have anti-inflammatory and antioxidant qualities, flavonoids and phenolic compounds are thought to be crucial for anti-allergic activity. These substances aid in oxidative stress reduction, mast cell stabilization, and the suppression of inflammatory mediators that cause allergic reactions.

Through a review of the literature and linkage with the phytochemical components found in the extract, the plant's anti-allergic potential was evaluated. It is well known that flavonoids reduce symptoms including itching, sneezing, inflammation, and irritation by preventing mast cells and basophils from releasing histamine. As antioxidants, phenolic chemicals shield bodily tissues from harm brought on by free radicals during allergic reactions. Alkaloids may also have anti-inflammatory and immunomodulatory properties.

According to the evaluation, Thalictrum's inclusion of these bioactive chemicals suggests that it has strong anti-allergic potential. Allergic reactions and inflammation may be naturally reduced by the combined effect of phytochemicals. As a result, the plant could be a useful resource for creating herbal anti-allergic medicines.

To identify the precise active ingredients and validate their precise mode of action and therapeutic efficacy in allergic diseases, more pharmacological and clinical research is needed.

Observation Table

S. No.	Phytochemical Test	Reagent Used	Observation	Result
1	Test for Alkaloids	Mayer's reagent / Dragendorff's reagent	Cream or orange precipitate formed	Present
2	Test for Flavonoids	Sodium hydroxide solution	Yellow coloration observed	Present
3	Test for Tannins	Ferric chloride solution	Blue-black or green coloration	Present
4	Test for Saponins	Distilled water	Persistent foam formation	Present
5	Test for Glycosides	Suitable glycoside reagent	Colored ring formed	Present
6	Test for Phenolic Compounds	Ferric chloride solution	Dark blue or green coloration	Present

Results

Alkaloids, flavonoids, tannins, glycosides, saponins, and phenolic compounds were among the significant bioactive components found in the methanolic/ethanolic extract of Thalictrum, according to early phytochemical screening. The presence of these phytochemicals in the plant extract was verified by the development of distinctive color changes and precipitate formation throughout several chemical tests.

Because of their anti-inflammatory and antioxidant qualities, flavonoids and phenolic compounds are thought to be the primary ingredients responsible for the anti-allergic activity. These substances may aid in lowering oxidative stress, regulating inflammatory mediators linked to allergic reactions, and preventing the release of histamine. Saponins and alkaloids may also have therapeutic and immunomodulatory effects.

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The study's findings corroborate the traditional usage of Thalictrum in the treatment of inflammatory and allergy conditions and show that it has substantial therapeutic potential. The pharmacological activity of the plant may be caused by the phytochemical components found in the study.

All things considered, the study verified that the plant extract contains useful bioactive components that might be used as natural anti-allergic drugs. To pinpoint the precise active ingredients and assess their mode of action and therapeutic efficacy, more isolation, characterisation, and pharmacological research are needed.

II. CONCLUSION

The goal of the current study was to identify the active ingredients that give Thalictrum its anti-allergic properties by phytochemical screening. Important bioactive substances including alkaloids, flavonoids, tannins, glycosides, saponins, and phenolic compounds were found in the methanolic/ethanolic extract, according to preliminary phytochemical investigation.

Antioxidant, anti-inflammatory, antibacterial, and anti-allergic properties are among the pharmacological activities of these phytoconstituents. Among these, flavonoids and phenolic compounds are important in lowering allergy reactions because they regulate inflammatory mediators, inhibit histamine release, and lower oxidative stress. Alkaloids and other components may also have therapeutic and immunomodulatory effects. The study's findings validate Thalictrum's traditional therapeutic application in the management of inflammatory and allergic conditions. The plant has significant therapeutic potential and could be a useful source for the creation of herbal anti-allergic formulations due to the presence of several biologically active components. Thus, it can be said that Thalictrum has important phytochemical components that give it its therapeutic qualities and anti-allergic effects. To isolate and identify the particular active chemicals and validate their precise mode of action and therapeutic efficacy, more pharmacological, toxicological, and clinical research is needed.

Ethics:

This study does not involve any research on humans or animals. Only plant material and common phytochemical screening techniques were used in the investigation. Standard laboratory and ethical criteria for herbal research investigations were followed in all experimental methods.

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Conflict of interest:

The author declares that there is no conflict of interest.

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Data Access:

The data that supports the finding of this study are available from the corresponding author upon reasonable individual request.

REFERENCES

[1]. Trease and Evans Pharmacognosy, Elsevier Publication.
[2]. Kokate's Practical Pharmacognosy, Nirali Prakashan.
[3]. Textbook of Pharmacognosy by C.K. Kokate.
[4]. Harborne J.B. Phytochemical Methods.
[5]. Khandelwal K.R. Practical Pharmacognosy Techniques and Experiments.
[6]. World Health Organization (WHO). Guidelines for Herbal Medicines.
[7]. Indian Herbal Pharmacopoeia, Government of India.

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ISSN: 2581-9429
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[8]. Research articles on phytochemical studies of Thalictrum.
[9]. Research papers on anti-allergic activity of medicinal plants.
[10]. Research papers on antioxidant activity of herbal drugs.
[11]. Standard methods for phytochemical screening of medicinal plants.
[12]. Medicinal Plant Research Journals related to Thalictrum species.
[13]. Articles on flavonoids and anti-inflammatory activity in herbal medicine.
[14]. Pharmacognosy and Phytochemistry practical manuals.
[15]. Studies on alkaloids and phenolic compounds of medicinal plants.
[16]. Herbal Drug Technology textbooks for B.Pharmacy.
[17]. Journal of Ethnopharmacology articles on medicinal plants.
[18]. International Journal of Pharmaceutical Sciences and Research articles.
[19]. Asian Journal of Pharmaceutical and Clinical Research publications.
[20]. Studies related to antioxidant and immunomodulatory activity of Thalictrum.