



**INTERNATIONAL JOURNAL OF
PHARMACEUTICAL SCIENCES**
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: <https://www.ijpsjournal.com>



Research Article

Phytochemical Characterization and In Vitro Anti-inflammatory Evaluation of *Lepidium sativum* Seed Extract

Dr. Samrat Khedkar, Dr. Nitin Mali, Amit Chaugule*

Vidya Niketan College of Pharmacy, Lakhewadi, Pune, Maharashtra , India 413103

ARTICLE INFO

Published: 14 July 2026

Keywords:

Lepidium sativum, Anti-inflammatory activity, Sinapic acid, FTIR, UV spectroscopy

DOI:

10.5281/zenodo.21363153

ABSTRACT

The present study aimed to characterize the methanolic extract of *Lepidium sativum* and evaluate its in vitro anti-inflammatory activity. The extract was examined for organoleptic properties, solubility, phytochemical constituents, UV-visible spectroscopy, and FTIR analysis. Phytochemical screening confirmed the presence of flavonoids, alkaloids, and triterpenoids, which are known for their biological activities. UV spectroscopy showed absorption maxima at 207 nm and 321 nm, while FTIR analysis confirmed the presence of hydroxyl and hydrocarbon functional groups. The anti-inflammatory activity was evaluated using the protein denaturation method with diclofenac sodium as the standard drug. The extract showed concentration-dependent inhibition of protein denaturation, indicating significant anti-inflammatory activity. These findings suggest that *Lepidium sativum* extract is a promising natural source of bioactive compounds and may be useful for developing safe herbal anti-inflammatory formulations.

INTRODUCTION

Medicinal plants have been used for centuries as natural remedies because they contain a wide variety of bioactive compounds with therapeutic properties. Herbal medicines are considered safer and more economical than many synthetic drugs, leading to increased interest in their scientific evaluation (1). *Lepidium sativum* L., commonly known as garden cress, belongs to the family Brassicaceae and is widely cultivated in Asia,

Africa, and Europe. The seeds are traditionally used to treat inflammation, respiratory disorders, digestive problems, bone fractures, and skin diseases (2).

The seeds of *Lepidium sativum* are rich in flavonoids, phenolic acids, alkaloids, glucosinolates, triterpenoids, vitamins, and minerals. Among the phenolic compounds, sinapic acid is an important constituent known for its antioxidant and anti-inflammatory activities (3).

***Corresponding Author:** Amit Chaugule

Address: Vidya Niketan College of Pharmacy, Lakhewadi, Pune, Maharashtra , India 413103.

Email ✉: chauguleamit16@gmail.com

Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.



These phytochemicals reduce oxidative stress and suppress inflammatory mediators, thereby helping in the management of inflammatory diseases (4). Standardization of herbal extracts is essential to ensure their quality, purity, and therapeutic consistency. Organoleptic evaluation, phytochemical screening, UV-visible spectroscopy, and Fourier Transform Infrared (FTIR) spectroscopy are commonly used techniques to characterize medicinal plant extracts (5,6).

Inflammation is a protective response against tissue injury, but prolonged inflammation may lead to chronic diseases such as arthritis and cardiovascular disorders. The protein denaturation assay is a simple and reliable method for evaluating anti-inflammatory activity because inhibition of protein denaturation is closely associated with anti-inflammatory potential (7). Therefore, the present study aimed to characterize *Lepidium sativum* seed extract and evaluate its in vitro anti-inflammatory activity.

MATERIALS AND METHODS

Seeds of *Lepidium sativum* were collected, authenticated, dried, powdered, and extracted using methanol by a suitable extraction technique. The extract and the reference compound, sinapic acid, were evaluated for organoleptic properties including colour, odour, taste, and physical appearance (8). Solubility studies were carried out

in methanol, ethanol, chloroform, and other solvents according to standard procedures.

Preliminary phytochemical screening was performed to identify alkaloids, flavonoids, and triterpenoids using standard qualitative chemical tests (9). UV-visible spectroscopic analysis was carried out by preparing the extract in methanol, and the maximum absorption wavelengths (λ_{max}) were determined. FTIR spectroscopy was performed to identify the major functional groups present in the extract (10).

The in vitro anti-inflammatory activity was evaluated by the protein denaturation method using egg albumin. Different concentrations of the extract were compared with diclofenac sodium as the standard drug. The absorbance was measured spectrophotometrically, and the percentage inhibition of protein denaturation and IC_{50} values were calculated. All experiments were performed in triplicate, and the results were expressed as mean $\pm$ standard deviation (11).

RESULT AND DISCUSSION

Evaluation of Standard Compounds and *Lepidium Sativum*

Organoleptic Properties

Properties of *Lepidium Sativum* and standard compounds were examined for following organoleptic properties.

Table 1: Organoleptic properties of *Lepidium Sativum*

Sr. No	Tests	Specifications	Observation
1	Colour	Brown	Brown
2	Odour	Odorless	Odorless
3	Taste	bitter	bitter
4	Physical appearance	Crystalline powder	Crystalline powder

Table 2: Organoleptic properties of Sinapic Acid

Sr. No	Tests	Specifications	Observation
1	Colour	White	White
2	Odour	Odorless	Odorless



3	Taste	bitter	bitter
4	Physical appearance	Crystalline powder	Crystalline powder

Physical Properties

Solubility

The higher solubility of *Lepidium Satvium* was found in methanol.

Table 3: Solubility of *Lepidium Satvium*.

Sr. No.	Solvent	Solubility
1	Methanol	Freely soluble
2	Chloroform	soluble
3	Ethanol	soluble
4	n-Hexane	Insoluble

Table 4: Solubility of Sinapic Acid.

Sr. No	Solvent	Solubility
1	Methanol	Freely soluble
2	Ethanol	soluble
3	Water	Slightly soluble
4	Ether	Insoluble

Chemical Test for *Lepidium Satvium*

The chemical test for *Lepidium Sativum* was performed as per IP.

Table 5 chemical tests for *Lepidium Satvium*

Sr. No.	Chemical Test	Observation	Inference
1	2mg of drug + 2 drops of acetic anhydride + conc. Sulphuric acid (from side wall of test tube)	Formation of deep red colour.	Indicate presence of triterpenoid in drug.
2	2 mg of drug + saturated trichloro acetic acid	Presence of the colored precipitate	Indicate presence of triterpenoid in drug.
3	Extract dissolved in ethanol + few drops of conc. HCL + small amount of magnesium turnings is added	Appearance of pink Colour	Presence of alkaloids
4	Small quantity of extract + lead acetate solution	Formation of yellow colored precipitate	Presence of flavonoids.

UV Spectroscopic Analysis

Determination of λ max:

Dissolved 100 mg of *Lepidium Satvium* in sufficient methanol to produce 100 ml and dilute

10 ml resulting solution to 100 ml with methanol. When examined in the range 200nm to 400nm, the resulting solution shows an absorption maximum only at 207 nm and 321 nm.

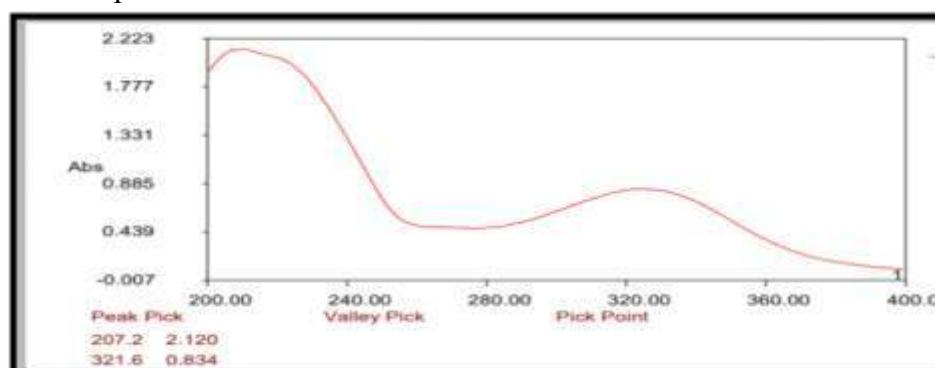


Figure 1:UV spectra *Lepidium Satvium*.

FTIR Spectroscopy Analysis:

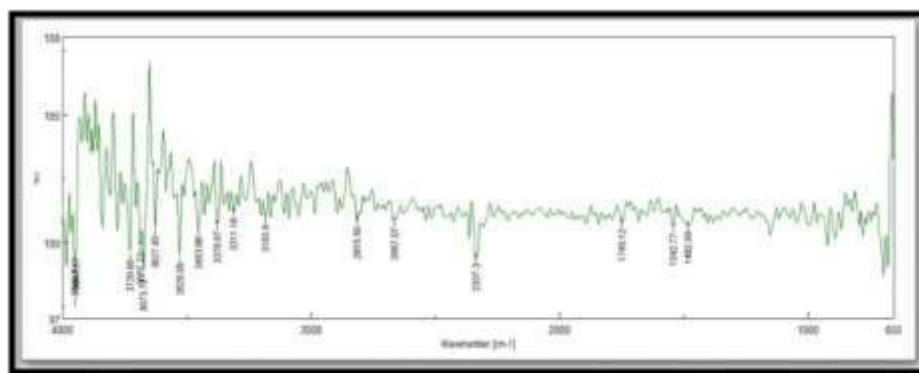


Figure 2: IR spectra of *Lepidium Satvium*.

This IR spectra is of methanolic extract of *Lepidium Satvium* which consists of different plants.

Table 6: Interpretation of IR spectra of *Lepidium Satvium*

Peak Position(cm^{-1})	Functional Group
3453	O-H
2815	C-H

In Vitro Anti-inflammatory Activity

Table 7: In Vitro Anti-inflammatory Activity of *Lepidium sativum* Extract (Protein Denaturation Method)

Sr. No.	Concentration ($\mu\text{g/mL}$)	% Inhibition (Extract)	% Inhibition (Diclofenac Sodium - Standard)
1	100	62.45 $\pm$ 0.52	94.12 $\pm$ 0.31
2	200	68.87 $\pm$ 0.48	95.36 $\pm$ 0.28
3	300	74.53 $\pm$ 0.44	96.24 $\pm$ 0.26

Sample	IC ₅₀ ($\mu\text{g/mL}$)
Diclofenac Sodium (Standard)	182.64
<i>Lepidium sativum</i> Extract	228.91

The in vitro anti-inflammatory activity of *Lepidium sativum* extract was evaluated using the protein denaturation method. The extract showed a concentration-dependent inhibition of protein denaturation, with 62.45%, 68.87%, and 74.53% inhibition at 100, 200, and 300 $\mu\text{g/mL}$, respectively. Although the activity was lower than

that of the standard drug, diclofenac sodium, the extract demonstrated significant anti-inflammatory potential. The observed activity may be attributed to the presence of flavonoids, phenolic compounds, alkaloids, and other phytochemicals known to inhibit inflammatory mediators. These findings suggest that *Lepidium sativum* possesses promising natural anti-inflammatory properties and may serve as a potential herbal source for the development of anti-inflammatory formulations.

CONCLUSION

The present study successfully characterized the methanolic extract of *Lepidium sativum* through organoleptic evaluation, solubility studies, phytochemical screening, UV-visible spectroscopy, and FTIR analysis. The extract contained important phytochemicals such as flavonoids, alkaloids, and triterpenoids, which are known for their therapeutic properties. UV and FTIR analyses confirmed the characteristic chemical profile of the extract. The protein denaturation assay demonstrated that the extract exhibited concentration-dependent anti-inflammatory activity, indicating its ability to reduce protein denaturation associated with inflammation. Although the activity was lower than that of diclofenac sodium, the extract showed



significant natural anti-inflammatory potential. These findings support the traditional medicinal use of *Lepidium sativum* and suggest that it may serve as a valuable herbal source for the development of anti-inflammatory formulations. Further studies involving isolation of active compounds, in vivo pharmacological evaluation, toxicity assessment, and clinical investigations are recommended.

REFERENCES

1. World Health Organization. WHO Traditional Medicine Strategy 2014–2023. Geneva: WHO; 2013.
2. Nadkarni KM. Indian Materia Medica. Vol. 1. Mumbai: Popular Prakashan; 2007.
3. Sharma S, Agarwal N, Verma P. Phytochemical composition and pharmacological properties of *Lepidium sativum*: A review. Int J Pharm Sci Res. 2015;6(11):4688–4695.
4. Nile SH, Park SW. Edible berries: Bioactive components and their effect on human health. Nutrition. 2014;30(2):134–144.
5. Kokate CK, Purohit AP, Gokhale SB. Pharmacognosy. 56th ed. Pune: Nirali Prakashan; 2021.
6. Stuart B. Infrared Spectroscopy: Fundamentals and Applications. Chichester: John Wiley & Sons; 2004.
7. Mizushima Y, Kobayashi M. Interaction of anti-inflammatory drugs with serum proteins, especially denaturation of proteins. J Pharm Pharmacol. 1968;20(3):169–173.
8. Indian Pharmacopoeia Commission. Indian Pharmacopoeia. Ghaziabad: IPC; 2022.
9. Harborne JB. Phytochemical Methods: A Guide to Modern Techniques of Plant Analysis. 3rd ed. London: Chapman & Hall; 1998.
10. Beckett AH, Stenlake JB. Practical Pharmaceutical Chemistry. 4th ed. New Delhi: CBS Publishers; 2007.
11. Evans WC. Trease and Evans Pharmacognosy. 16th ed. London: Elsevier; 2009.

HOW TO CITE: Dr. Samrat Khedkar, Dr. Nitin Mali, Amit Chaugule, Phytochemical Characterization and In Vitro Anti-inflammatory Evaluation of *Lepidium sativum* Seed Extract, Int. J. of Pharm. Sci., 2026, Vol 4, Issue 7, 2874-2878. <https://doi.org/10.5281/zenodo.21363153>

