



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



Review Article

A Review on Pharmacological Evalution and Phytochemical Profile of Anaphalis Margaritacea (Western Pearly Everlasting)

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ARTICLE INFO

Published: 21 May. 2026

Keywords:

Anaphalis margaritacea, phytochemicals, antioxidant, anti-inflammatory, antimicrobial activity, antidiarrheal activity.

DOI:

10.5281/zenodo.20322220

ABSTRACT

Anaphalis margaritacea (family: Asteraceae), commonly referred to as pearly everlasting, is a perennial herb widely distributed in the Himalayan and temperate regions. The plant has been traditionally utilized in indigenous systems of medicine for the management of respiratory ailments, inflammatory conditions, wounds, and gastrointestinal disturbances. The increasing interest in plant-based therapeutics has led to scientific investigations aimed at validating these traditional claims and identifying the bioactive constituents responsible for its medicinal effects.[1] Medicinal plants continue to play a vital role in both traditional and modern systems of healthcare, particularly in regions where access to synthetic drugs is limited or where herbal remedies are culturally accepted. Anaphalis margaritacea, a member of the family Asteraceae, is one such plant that has been used for a long time in folk medicine across Himalayan regions. It is commonly found in high-altitude areas and is easily recognized by its woolly leaves and small, white, papery flowers. Local communities have traditionally relied on this herb for treating a variety of conditions, especially respiratory problems such as cough, cold, and asthma, as well as inflammatory disorders, wounds, and digestive issues.[2] Over the past few years, interest in this plant has increased due to the growing demand for natural and plant-based therapeutic agents. Preliminary scientific investigations have shown that Anaphalis margaritacea contains several important bioactive constituents, including flavonoids, phenolic compounds, terpenoids, and essential oils. These compounds are known to contribute to its biological activities and may explain many of its traditional uses. Extracts prepared using different solvents have demonstrated noticeable antioxidant properties, which help in reducing oxidative stress by neutralizing free radicals.

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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.



This is particularly important because oxidative stress is linked with the development of many chronic diseases. A careful combination of traditional knowledge and modern scientific research may help in exploring its full potential and developing it into a useful natural therapeutic agent in the future.[3]

INTRODUCTION

Anaphalis margaritacea, belonging to the family Asteraceae, is a perennial herb commonly found in

temperate and Himalayan regions. It grows in open slopes and grasslands and is easily recognized by its woolly leaves and small white flower heads. The plant has been used by local communities for a long time in the treatment of respiratory problems such as cough and cold, as well as for wounds, inflammation, and digestive disorders. Its traditional use suggests that it contains biologically active compounds that may have therapeutic importance.[4]



In recent years, some scientific studies have been carried out to explore the chemical constituents and pharmacological properties of this plant. These studies have reported the presence of flavonoids, phenolic compounds, terpenoids, and essential oils, which are known to show antioxidant, anti-inflammatory, and antimicrobial activities. Such findings support many of its traditional uses and indicate that the plant may have potential in the development of new drugs.[5] However, despite its widespread use and promising properties, detailed scientific information on *Anaphalis margaritacea* is still limited. There is a need for more systematic studies to understand its mechanism of action, safety profile, and clinical effectiveness.[6] Since ancient times, plants have been used as an important source of medicine for the treatment of various diseases. Even today, a large part of the population, especially in rural and hilly regions, depends on herbal remedies for primary

healthcare. The use of medicinal plants is not only based on traditional knowledge but is now also supported by scientific studies that confirm their therapeutic value.[7] In recent years, there has been growing interest in identifying plant-based compounds that can serve as safer and more affordable alternatives to synthetic drugs. Therefore, the present review aims to compile and discuss the available information on the ethnomedicinal uses, phytochemistry, and pharmacological activities of this plant, with the hope of encouraging further research in this area.[8]

2. Botanical description and traditional use:

Anaphalis margaritacea is a hardy perennial herb from the Asteraceae family that grows naturally in temperate regions, including the Himalayan belt. It usually reaches about 30 to 90 cm in height and has upright, slender stems covered with fine white hairs, which give the plant a soft, greyish look. The

leaves are narrow and elongated, arranged alternately along the stem, and are also covered with a woolly layer that helps the plant conserve moisture. Its flowers are small and white, appearing in clusters at the top, and are surrounded by dry, papery bracts that retain their shape even after drying, which is why the plant is often called “pearly everlasting”.[9] In traditional medicine, this plant has been used for a variety of everyday health problems, especially in rural and Himalayan communities. People commonly prepare a decoction from its aerial parts to manage diarrhea and dysentery. Fresh leaves are crushed into a paste and applied to cuts, wounds, and burns to support healing. It is also used in simple home remedies for cough and cold, as it provides a soothing effect. In some areas, it is valued for reducing swelling and pain, suggesting mild anti-inflammatory properties. Apart from this, it has also been used in treating fever, minor skin issues, and general weakness, showing its importance as a useful and easily available medicinal herb in traditional practices.[10]

3. Phytochemical profile:

Anaphalis margaritacea has been reported to contain a diverse range of bioactive compounds that contribute to its medicinal value. Phytochemical investigations of the plant, particularly its aerial parts, reveal the presence of flavonoids, alkaloids, terpenoids, tannins, and phenolic compounds, which are commonly associated with antioxidant and therapeutic activities. Flavonoids such as quercetin and kaempferol derivatives are believed to play a significant role in free radical scavenging and anti-inflammatory effects.[11] In addition to these, the plant contains glycosides and saponins, which may contribute to its antimicrobial and antidiarrheal properties. The presence of essential oils and volatile constituents further supports its traditional

use in treating respiratory conditions like cough and cold. Tannins, known for their astringent nature, are particularly important in explaining the plant’s use in diarrhea, as they help reduce intestinal secretions and improve stool consistency.[12] The plant also contains alkaloids, which are nitrogen-containing compounds often associated with pharmacological activities such as antimicrobial and antispasmodic effects. This may partly justify the plant’s traditional use in managing gastrointestinal disorders like diarrhea. Tannins are another important group present in significant amounts; their astringent property helps in reducing intestinal secretion and improving mucosal resistance, thereby contributing to antidiarrheal action.[13]

4. Pharmacological Activities:

Anaphalis margaritacea has been investigated for several biological activities, many of which are in agreement with its traditional applications. Extracts prepared from different parts of the plant have shown noticeable antidiarrheal activity, which is often related to the presence of tannins and flavonoids. These constituents are known to reduce intestinal secretion and improve the consistency of stool by exerting an astringent effect on the intestinal mucosa.[14] The plant also exhibits considerable antioxidant potential, mainly due to its phenolic and flavonoid content. These compounds are capable of neutralizing free radicals and may help in minimizing oxidative damage at the cellular level. Such activity is important in conditions where oxidative stress plays a key role. Studies have further indicated anti-inflammatory effects of the plant extracts. This activity may be associated with triterpenoids, sterols, and flavonoids, which are known to interfere with inflammatory pathways and reduce swelling and tissue irritation. This supports its traditional use in relieving pain and



inflammation.[15] In addition, antimicrobial activity has been observed against certain pathogenic microorganisms. The presence of alkaloids, saponins, and tannins may contribute to the inhibition of microbial growth, thereby supporting its use in treating minor infections and wounds.[16] The plant has also shown wound-healing properties, where topical application of extracts promotes faster repair of damaged tissues. This effect is likely due to a combination of antimicrobial action and enhanced tissue regeneration.[17] Some reports also suggest mild analgesic and antipyretic effects, although these findings are still limited and require further validation through detailed experimental studies. Overall, the pharmacological profile of *Anaphalis margaritacea* indicates that its biological activities are closely linked to its phytochemical constituents, but more systematic research is needed to establish its efficacy and safety.[18]

5. Mechanism of action:

Anaphalis margaritacea exerts its pharmacological effects through a combination of mechanisms that are largely linked to its diverse phytochemical constituents. The antidiarrheal activity of the plant is mainly attributed to tannins and flavonoids, which act by reducing intestinal secretion and increasing the tone of the intestinal mucosa. Tannins form protein–tannin complexes on the intestinal lining, creating a protective layer that decreases fluid loss, while flavonoids may inhibit intestinal motility by modulating smooth muscle contraction.[19] The antioxidant mechanism is primarily based on the ability of phenolic compounds and flavonoids to donate hydrogen atoms or electrons, thereby neutralizing free radicals and preventing oxidative damage to cells and tissues. This action helps in stabilizing reactive oxygen species and reducing lipid peroxidation.[20] The antimicrobial activity is

thought to involve disruption of microbial cell membranes, inhibition of enzyme activity, and interference with protein synthesis in microorganisms. Alkaloids, saponins, and tannins contribute to this effect by altering membrane permeability and causing leakage of essential cellular components. *Anaphalis margaritacea* shows its effects through multiple pathways that are closely related to the chemical constituents present in the plant. Its antidiarrheal action is mainly due to tannins and flavonoids, which reduce intestinal secretion and form a protective layer over the mucosal lining, thereby limiting fluid loss and improving stool consistency. [21]

6. Recent Scientific Developments:

Anaphalis margaritacea has gained increasing attention in recent years, particularly with the application of modern analytical and computational techniques to validate its traditional uses. Recent studies have focused on phytochemical profiling using advanced methods such as GC–MS analysis, which has led to the identification of more than 30 bioactive compounds in its essential oil fraction. These studies indicate that a large proportion of the plant extract is composed of pharmacologically active constituents, supporting its medicinal relevance.[22] In addition to chemical profiling, in silico approaches such as molecular docking and ADMET prediction have been applied to evaluate the biological potential of identified compounds. These computational studies suggest that certain constituents of the plant may interact effectively with biological targets involved in inflammation and oxidative stress, indicating possible therapeutic applications. Recent experimental work has also validated the antioxidant and anti-inflammatory potential of different extracts of the plant, with polar extracts (such as methanolic extract) showing higher



activity compared to non-polar ones. This highlights the importance of extraction methods in determining biological activity. [23] Furthermore, current research trends emphasize the concept of multi-target activity of plant-based compounds, where multiple phytoconstituents act together rather than a single isolated compound. This approach aligns with modern pharmacological understanding that natural products often exhibit synergistic effects across different biological pathways. [24]

7. Therapeutic Potential:

Anaphalis margaritacea shows promising therapeutic potential due to the presence of multiple bioactive constituents that act together to produce a range of biological effects. The plant has considerable scope in the management of gastrointestinal disorders, especially diarrhea, where its astringent and gut-stabilizing properties may help in reducing fluid loss and improving intestinal function. Its strong antioxidant activity suggests a possible role in conditions associated with oxidative stress, including metabolic disorders and chronic inflammatory states.[25] The plant also holds potential in the treatment of inflammatory conditions, as its constituents may help in reducing pain, swelling, and tissue damage. In addition, its antimicrobial properties indicate usefulness in managing minor infections and preventing microbial growth, particularly in wound care. The wound-healing ability of the plant further supports its application in topical formulations aimed at faster tissue repair and protection against infection.[26] There is also some scope for its use in respiratory conditions, such as cough and mild throat irritation, where it may provide a soothing effect. Although still under investigation, the plant may have a supportive role in fever management and general weakness, based on traditional usage. Overall, the therapeutic

potential of the plant lies in its multi-component nature, where different classes of compounds contribute collectively to its activity. However, detailed pharmacological studies and clinical evaluation are still required before it can be fully developed into standardized therapeutic agents.[27]

CONCLUSION:

Anaphalis margaritacea can be considered a valuable medicinal herb with a strong background in traditional use and growing scientific support. The plant contains a variety of bioactive compounds such as flavonoids, tannins, and terpenoids, which are responsible for its multiple biological activities. Studies carried out so far indicate that it possesses antidiarrheal, antioxidant, anti-inflammatory, and antimicrobial properties, which justify its use in treating common health conditions, especially in rural and Himalayan regions. From a pharmaceutical point of view, the plant shows good potential for further development as a natural therapeutic agent. Its ability to act through multiple mechanisms and target different conditions makes it an interesting candidate for future research. However, most of the available data are based on preliminary and experimental studies. Therefore, more detailed investigations, including isolation of active compounds, mechanism-based studies, and clinical trials, are necessary to confirm its safety and effectiveness. Flavonoids present in the plant are believed to reduce intestinal motility by relaxing smooth muscles of the gut and may also inhibit the release of prostaglandins, which are known to increase intestinal secretion and motility during diarrhea. By controlling both movement and secretion, these compounds help in restoring normal bowel function. Alkaloids may contribute through antispasmodic activity, reducing abdominal cramps and excessive peristalsis. In

addition, the antimicrobial properties of the plant can help in managing diarrhea caused by pathogenic microorganisms, as it may inhibit the growth of bacteria responsible for intestinal infections. Some experimental studies (in vitro and in vivo models) suggest that plant extracts can reduce the frequency of defecation and delay the onset of diarrhea, especially in models induced by agents like castor oil. This indicates that the plant may act by interfering with mechanisms such as increased intestinal secretion and hypermotility.

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HOW TO CITE: Bhanu Singh*, Abhishek Soni, Chinu Kumari, Richa Agnihotri, Bhopes Kumar, Anmol Chandel, A Review on Pharmacological Evaluation and Phytochemical Profile of *Anaphalis Margaritacea* (Western Pearly Everlasting), *Int. J. of Pharm. Sci.*, 2026, Vol 4, Issue 5, 5347-5353. <https://doi.org/10.5281/zenodo.20322220>

