



Review Article

A Comprehensive Review On Anti-Inflammatory Properties Of *Bergenia Ciliata*, *Viscum Articulatum* And *Astilbe Rivularis*

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ABSTRACT

Inflammatory diseases present a significant global health burden, necessitating effective and accessible treatment options. While synthetic medications are commonly used, they pose limitations such as adverse effects and costliness. Herbal medicines, with their diverse phytochemical compositions, offer promising alternatives for inflammation management. This review explores the anti-inflammatory potential of three medicinal plants: *Bergenia ciliata*, *Astilbe rivularis*, and *Viscum articulatum*. These plants, rich in bioactive compounds like flavonoids, alkaloids, and phenolic acids, have demonstrated anti-inflammatory effects through various mechanisms, including modulation of inflammatory enzymes and cytokines. Moreover, they exhibit antioxidant properties, further augmenting their therapeutic efficacy. The collection and extraction methodologies ensure the preservation of bioactive constituents for pharmacological studies. Continual research into these herbal remedies offers potential for novel preventive and therapeutic approaches against inflammatory disorders, providing cost-effective and accessible alternatives to synthetic drugs.

INTRODUCTION

Inflammatory diseases are becoming increasingly prevalent globally [1-3]. Inflammatory illnesses involving several systems are challenging to treat, requiring long-term therapy, incurring high management costs, and negatively impacting health [2-4]. Chemical synthesized medications are commonly used as anti-inflammatory treatments for various disorders [3,5]. Despite their effectiveness and fast action, these medicines

have numerous limits [3]. They cause major side effects, are expensive, and are not widely available in all countries [1,3,6,7]. Medicinal herbs are increasingly used to prevent and treat inflammatory illnesses [8-12]. They were effective, cheap, readily available, and reasonably priced, and they are gaining appeal among the general public [11-14]. Anti-inflammatory herbs are plants that have been found to have anti-inflammatory properties in traditional

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applications, clinical trials, or experimental studies [10-12]. Recent research has focused on synthetic anti-inflammatory drugs, which have been linked to health issues [10-14]. Herbs include phytochemicals that have anti-inflammatory effects and common anti-inflammatory plants are *Bergenia ciliate*, *Astilbe Rivularis* and *Viscum articulatum*. They contain steroids, flavonoids, alkaloids, polyphenols, glycosides, terpenoids, curcumins, GLA, linear aliphatic alcohols and phenolic diterpenes with anti-inflammatory effects. Anti-inflammatory agents are chemical substances that can inhibit inflammation. They can be synthetic or natural, with the former being steroidal and non-steroidal with numerous adverse effects and the latter being plant and/or microbe-derived with few or no side effects [11-13, 15, 16]. The body uses inflammation as a host defence mechanism and as a necessary immunological response to keep tissues stable in toxic environments and to survive infections and injuries. Although inflammation is typically thought of as a harmful process, it can be helpful in the fight against an unpleasant injury or illness. Acute or chronic inflammatory processes can heal, but inflammation can also cause inflammatory illnesses when it reacts poorly or when substances or enzymes exacerbate the inflammatory process. Many cytokines contribute to the activation of enzymes, the release of mediators, the extravasation of fluid and vasodilation of blood vessels, cell migration, and ultimately tissue damage, all of which are collectively referred to as inflammation. These complex and uncontrollable processes result in inflammatory disorders that necessitate progressive anti-inflammatory therapy, with frequently used synthetic drugs having a high risk of severe side effects. [17-19]

HERBAL Medicine:

Herbal medicine plays a crucial role in complementary healthcare, being utilized both for disease prevention and treatment, including

inflammatory conditions. While herbal remedies have been used for centuries, their specific efficacy and value in addressing inflammation remain relatively understudied. Nevertheless, herbs continue to augment both traditional and modern medical practices, likely continuing to do so in the future. [3,18-19] Various plants, renowned for their medicinal properties, are being investigated for their potential anti-inflammatory effects. These studies, whether based on traditional uses or rigorously evaluated in clinical and experimental settings, often involve the use of whole plants or specific plant parts such as roots, stems, leaves, or fruits/flowers. However, in research and clinical trials, extracts, secondary metabolites, natural compounds, chemical constituents, or purified compounds are typically employed. [20-21]. Phytochemical investigations have identified several compounds within these herbal plants that exhibit anti-inflammatory properties, including steroids, flavonoids, alkaloids, polyphenols, glycosides, terpenoids, curcumin, GLA, and others. The therapeutic effect of medicinal plants may arise from the synergistic interactions of multiple metabolites, potentially explaining the sometimes-paradoxical results observed. The mechanisms underlying the anti-inflammatory action of these herbal remedies involve interference with various components of the inflammation pathway, such as enzymes, proteins, factors, or intermediates. Common targets include cyclooxygenase (COX), lipoxygenase (LOX), prostaglandins (PG), leukotrienes (LT), nitric oxide (NO), and others. Ongoing research aims to elucidate specific molecular pathways involved in these effects. Certain herbal preparations with anti-inflammatory properties have even been patented. Continual advancements in understanding anti-inflammatory medicine have led to the development of more effective drugs, promising improved therapeutic outcomes with fewer side



effects. However, synthetic drugs, while effective, often come with significant costs and serious side effects, prompting continued exploration of herbal remedies which are typically more affordable, readily available, and possess diverse bioactive compounds, offering potential for novel preventive and therapeutic approaches. [19-21].

1. *Bergenia Ciliata*:

Bergenia ciliata, a perennial herbaceous plant native to the Himalayan region, has been traditionally used in folk medicine for its purported anti-inflammatory properties. This review aims to provide a comprehensive overview of the scientific evidence supporting the anti-inflammatory effects of *Bergenia ciliata*, including its plant profile, chemical constituents, pharmacological properties, and methodologies employed in collection and extraction.[22]

Plant Profile:

Bergenia ciliata, commonly known as 'Himalayan Bergenia' or 'Pashanbheda,' belongs to the family Saxifragaceae. It is indigenous to the alpine regions of the Himalayas, where it thrives in cool, shady environments with well-drained soil. The plant is characterized by thick, fleshy leaves arranged in a rosette formation and adorned with hairy margins. *Bergenia ciliata* has a long history of traditional use in indigenous systems of medicine, where various parts of the plant, including leaves, rhizomes, and roots, are utilized for their medicinal properties, particularly in the management of inflammatory conditions.[23]



Figure 1: Plant and rhizome of *Bergenia Ciliata*.

Chemical Constituents:

Numerous studies have identified a diverse array of chemical constituents in *Bergenia ciliata* that contribute to its pharmacological effects. Among these constituents, bergenin (also known as bergeninol) stands out as one of the major bioactive compounds present in the plant. Bergenin has been extensively studied for its anti-inflammatory properties, demonstrating inhibition of pro-inflammatory mediators such as cytokines, prostaglandins, and leukotrienes. In addition to bergenin, *Bergenia ciliata* extracts contain other phytochemicals, including flavonoids, tannins, and phenolic compounds, which also exhibit anti-inflammatory activity through various mechanisms [22,25].

Pharmacological Properties:

Bergenia ciliata exhibits a broad spectrum of pharmacological properties, with a particular emphasis on its anti-inflammatory effects. Preclinical studies have demonstrated the plant's ability to suppress inflammatory responses both in vitro and in vivo. *Bergenia ciliata* extracts have been shown to attenuate inflammatory mediators

such as tumor necrosis factor-alpha (TNF- α), interleukins (ILs), and cyclooxygenase-2 (COX-2), thereby modulating the inflammatory cascade. Moreover, the plant exhibits antioxidant activity, which may contribute to its anti-inflammatory effects by scavenging reactive oxygen species and reducing oxidative stress [22,24].

2. *Astilbe rivularis*:

Plant Profile:

Astilbe rivularis, commonly known as 'False Goatsbeard,' belongs to the Saxifragaceae family and is indigenous to forested areas and mountain slopes in East Asia, including China, Japan, and Korea. It is characterized by feathery plumes of small, densely packed flowers that bloom in various hues, including white, pink, and red, depending on the cultivar. The plant typically thrives in moist, well-drained soil and partial shade. In traditional medicine systems, various parts of *Astilbe rivularis*, such as roots and rhizomes, have been utilized for their purported medicinal properties, including anti-inflammatory effects [26].

Common name:

River Astilbe

Vernacular name

Gosy, Pothee (Hindi), Budho Okhati, Thulo Aushadhee, Budho Aushadhee, Bedaanggo, Gaane Gurjo (Nepali).



Figure 2: Plant and rhizome of *Astilbe rivularis*

Chemical Constituents:

Several studies have identified a range of chemical constituents in *Astilbe rivularis* that contribute to its pharmacological activities. Among the major compounds isolated from the plant are triterpenoids, flavonoids, and phenolic acids. Triterpenoids, such as astilbin and astilbic acid, have been shown to possess significant anti-inflammatory properties by modulating various inflammatory pathways. Flavonoids, including quercetin and kaempferol derivatives, exhibit antioxidant and anti-inflammatory effects. Phenolic acids, such as caffeic acid and ferulic acid, also contribute to the plant's anti-inflammatory activity by inhibiting inflammatory enzymes and cytokines [27-28].

Pharmacological Properties:

Astilbe rivularis demonstrates a range of pharmacological properties, with particular emphasis on its anti-inflammatory effects. Preclinical studies have shown that extracts and isolated compounds from *Astilbe rivularis* can inhibit the production of pro-inflammatory mediators, such as nitric oxide, prostaglandins, and cytokines. These anti-inflammatory effects are mediated through the suppression of nuclear factor-kappa B (NF- κ B) signaling pathway and the modulation of inflammatory enzyme activity. Additionally, *Astilbe rivularis* extracts have been reported to alleviate inflammatory pain in animal models, further supporting its therapeutic potential in inflammatory conditions [29].

3. *Viscum articulatum*:



Viscum articulatum, commonly known as the Korean mistletoe, is a perennial plant belonging to the Santalaceae family. It is a hemi parasitic plant, meaning it partially relies on other plants for nutrients while also carrying out photosynthesis. Viscum articulatum is native to East Asia, particularly found in Korea, China, and Japan. It grows predominantly on deciduous trees, forming greenish-yellow clusters of small, jointed stems with opposite leaves. In traditional Korean and Chinese medicine, various parts of Viscum articulatum have been used for their medicinal properties[30].

Taxonomical Classification: [31]

Botanical Name:

Viscum articulatum

Common Names:

Sanskrit: Arka

Hindi: Aankra, Aamak, Amrul

Nepali: Aankra, Herchur,

Kannada: Amarulu

English: Korean mistletoe

Family: Santalaceae

Habitat:

Deciduous trees in East Asia

Morphology:

Small jointed stems, opposite leaves, greenish-yellow clusters

Medicinal Part

Leaves, stems, berries



Figure 3: whole plants of Viscum Articulatum

Chemical Constituents:

1. Viscotoxins:

These are proteinaceous toxins found in mistletoe plants, known for their cytotoxic effects.

2. Lectins:

Bioactive proteins that bind to carbohydrates, potentially influencing immune responses.

3. Flavonoids:

Various flavonoids have been identified in Viscum articulatum, contributing to its antioxidant properties.

4. Other Compounds:

Triterpenoids, polysaccharides, and other secondary metabolites have been reported, contributing to its medicinal properties[30,32].

Pharmacological Actions: [31,33]

a Immunomodulatory Effects:

Viscum articulatum extracts have been reported to modulate immune responses, potentially enhancing immune function.

b Antitumor Activity:

Studies suggest that compounds present in Viscum articulatum may exhibit cytotoxic effects on cancer cells and inhibit tumor growth.

c Antioxidant Properties:

Certain constituents, such as flavonoids, contribute to the plant's antioxidant activity, which may help protect cells from oxidative stress.

d Cardiovascular Effects:

Some research indicates potential cardiovascular benefits, including vasorelaxant effects.

Collection and Extraction Methodology:

The collection and extraction of *Astilbe Rivularis*, *viscum articulatum*, *Bergenia ciliata* involve systematic procedures to ensure the preservation of its bioactive constituents. The plant material, including roots and rhizomes, is typically harvested during specific seasons to maximize phytochemical content. Various extraction techniques, such as maceration, Soxhlet extraction, and supercritical fluid extraction, are

employed to isolate bioactive compounds from the plant matrix. Solvents of varying polarities, including ethanol, methanol, and water, are used for extraction based on the chemical nature of the target compounds. Following extraction, purification steps may be employed to obtain concentrated extracts suitable for pharmacological studies. [19,20,22,24]

TABLE 1: Herbs with used as anti-inflammatory [24,28,32].

Sr No.	Scientific name	Family	Chemical Constituent	Reference
1.	<i>Astilbe Rivularis</i>	Saxifragaceae	1. Triterpenoids: Oleanolic Acid, Ursolic Acid 2. Alkaloids: Astilbin, Astilbene 3. Saponins: Hederagenin, Oleanolic Acid Glycosides 4. Flavonoids: Quercetin, Rutin 5. Phenolic Acids: Salicylic Acid, Vanillic Acid	
2.	<i>Bergenia Ciliata</i>	Saxifragaceae	1. Flavonoids: Quercetin, Kaempferol 2. Phenolic Acids: Gallic acid, Ellagic acid 3. Tannins: Ellagitannins, Catechins 4. Terpenoids: β -Sitosterol, Ursolic acid 5. Alkaloids: Bergenin	
3.	<i>Viscum Articulatum</i>	Santalaceae	1. Lectins: Viscumin, Viscotoxins 2. Polysaccharides: Arabinogalactans, Xylogalactans 3. Lignans: Isolariciresinol, Lariciresinol 4. Flavonoids: Quercetin, Kaempferol 5. Alkaloids: Viscumamine, Viscosine	

SUMMARY:

Inflammatory diseases pose significant challenges globally, necessitating effective and accessible treatment options. Synthetic medications, while commonly used, have limitations such as adverse effects and costliness. Herbal medicines offer promising alternatives due to their diverse phytochemical compositions. This review explores the anti-inflammatory potential of *Bergenia ciliata*, *Astilbe rivularis*, and *Viscum articulatum*. These plants, rich in bioactive compounds, have demonstrated anti-inflammatory effects through various mechanisms, including

modulation of inflammatory enzymes and cytokines. Moreover, they exhibit antioxidant properties, further augmenting their therapeutic efficacy. The collection and extraction methodologies ensure the preservation of bioactive constituents for pharmacological studies. Continual research into these herbal remedies offers potential for novel preventive and therapeutic approaches against inflammatory disorders, providing cost-effective and accessible alternatives to synthetic drugs.

CONCLUSION:



Inflammatory diseases represent a significant healthcare challenge globally, necessitating effective and accessible treatment options. Herbal medicines, with their diverse phytochemical compositions, offer promising alternatives for inflammation management. *Bergenia ciliata*, *Astilbe rivularis*, and *Viscum articulatum* have demonstrated anti-inflammatory effects through various mechanisms, including modulation of inflammatory enzymes and cytokines. Additionally, their antioxidant properties further enhance their therapeutic efficacy. Continual research into these herbal remedies offers potential for novel preventive and therapeutic approaches against inflammatory disorders, providing cost-effective and accessible alternatives to synthetic drugs.

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