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A Review of Bellis Perennis: Chemical Composition, Pharmacological Activities, and Applications in Herbal Medicine

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ABSTRACT:

Bellis perennis, commonly known as the common daisy, has long been recognized for its therapeutic potential in herbal medicine. The plant's chemical composition, pharmacological activities, and application in herbal formulations, particularly focusing on its use as a bronchodilator. These compounds contribute to its anti-inflammatory, spasmolytic, antioxidant, and expectorant properties, making Bellis perennis a promising candidate for respiratory health applications. The study emphasizes the bronchodilatory effects of Bellis perennis, which relaxes the airway muscles, reduces bronchial inflammation, and improves mucus clearance. Marketed formulations typically combine the plant's extracts with other respiratory herbs, like Glycyrrhiza glabra and Adhatoda vasica, enhancing therapeutic efficacy in alleviating symptoms of asthma and bronchitis. Additionally, its inclusion in herbal syrups, capsules, and inhalable preparations has positioned Bellis perennis as a safe, natural alternative to synthetic bronchodilators. With growing consumer demand for plant-based respiratory treatments, Bellis perennis continues to gain recognition in the herbal medicine market.

Keywords: Bellis perennis, bronchodilator, anti-inflammatory, herbal medicine, respiratory health.

INTRODUCTION:

Herbal:

Herbal medicine, a practice rooted in the use of plants for healing, has been a cornerstone of traditional healthcare across cultures for thousands of years. This holistic approach emphasizes the use of natural substances—such as leaves, roots, flowers, and seeds—to promote health and treat various ailments. Unlike conventional medicine, which often relies on synthetic compounds, herbal medicine draws on the rich diversity of the plant kingdom, leveraging the complex chemical constituents found in herbs to support the body's natural healing processes. Herbal remedies are employed for a wide range of conditions, from common ailments like colds and digestive issues to chronic diseases such as arthritis and heart conditions. Many herbs possess anti-inflammatory, antioxidant, antibacterial, and adaptogenic properties, making them valuable in both preventative and therapeutic contexts. [1]

Biological Source:

Bellis perennis, commonly known as the common daisy, is a perennial herb from the Asteraceae family, native to Europe but now widespread in temperate regions worldwide. This plant typically grows in meadows, lawns, and disturbed areas, thriving in well-drained, moderately fertile soils. Bellis perennis has a rosette of basal, lanceolate leaves with smooth or toothed edges. Its flowers are distinctive, with a yellow disc surrounded by white petal-like rays, blooming from early spring to summer. The plant's active constituents include flavonoids, tannins, saponins, and essential oils, which contribute to its medicinal properties, such as anti-inflammatory and antimicrobial effects. The entire plant—especially the flowers and leaves—has been traditionally used for various therapeutic purposes, including wound healing and as a mild diuretic.[2,3]

Geographical Sources:

Its natural range extends from Scandinavia to the Mediterranean, including countries like the United Kingdom, France, Germany, and Italy. In the British Isles, it is especially abundant, growing in lawns, meadows, and pastures. The species is adaptable to various environmental conditions, often favoring moist, well-drained soils in open, sunny habitats. In addition to its native range, Bellis perennis has successfully naturalized in other parts of the world. It has been widely introduced to North America, particularly in the northeastern United States and parts of Canada, where it thrives in similar temperate climates. The species is also found in Australia and New Zealand, where it was introduced during European colonization. In these regions, it can be invasive, forming dense populations in lawns, parks, and gardens, often outcompeting native vegetation. In many regions of Asia, particularly in Turkey and parts of the Caucasus, Bellis perennis is also present, growing in open fields and grasslands. While it thrives in various environmental conditions, its growth tends to be restricted in tropical or very dry climates, limiting its spread to areas with moderate temperatures and sufficient moisture. [4,5]

Source / Availability:

It is often found in meadows, lawns, and pastures, thriving in well-drained soils under full sunlight. The plant is naturalized in parts of North America, Australia, and New Zealand, where it grows in similar environments. Bellis perennis is available in various forms, including fresh or dried flowers, essential oils, and extracts, which are commonly sold in herbal shops and online platforms. It is a well-known species in traditional herbal medicine, used for its anti-inflammatory, wound-healing, and astringent properties. Commercial sources often cultivate the plant specifically for medicinal use, ensuring its availability year- round. For detailed sourcing, many companies selling medicinal herbs provide Bellis perennis extracts or powders, with suppliers from Europe being primary contributors to the market. [6-8]

Market Formulation:

The market formulation of Bellis perennis, leverages its long-standing use in traditional medicine as well as its growing appeal in modern herbal and cosmetic industries. Rich in saponins, flavonoids, tannins, and essential oils, Bellis perennis has demonstrated potential in skincare formulations, particularly for its anti-inflammatory, wound-healing, and antioxidant properties. The plant's extract is often utilized in creams, ointments, and serums aimed at soothing irritated skin, treating minor wounds, and enhancing skin vitality. Additionally, its integration into natural beauty products aligns with the increasing consumer demand for plant-based and organic skincare solutions. Market trends suggest a growing interest in Bellis perennis-based products, especially in regions focused on sustainable and eco-friendly cosmetics. The versatility of its extract allows manufacturers to incorporate it into a wide range of topical applications, which is further supported by ongoing research into its bioactive compounds. Research has validated its traditional use, showing significant efficacy in reducing inflammation and promoting skin regeneration. Furthermore, the rise of consumer awareness about natural products, coupled with regulatory support for herbal formulations, has paved the way for Bellis perennis to find a niche in both the pharmaceutical and cosmetic markets. [9,10]

IMG: Bellis perennis

Synonyms:

Aster bellis, Bellis alpina, B. armena, B. croatica, B. hortensis, B. hybrida, B. integrifolia, B. margaritifolia, B. minor, B. perennis var. caulescens, B. p. discoidea, B. p. var. fagetorum, B. p. var. hybrida (Ten.), B. p. subsp. hybrida (Ten.), B. p. var. margaritifolia (Huter) Fiori, B. p. var. microcephala Boiss, B. p. f. plena, B. p. f. pumila, B. p. var. pusilla, B. p. f. rhodoglossa Sacc, B.

p. var. strobliana, B. p. var. subcaulescens, B. p. var. tubulosa, B. p. f. tubulosa, B. pumila Arv.- Touv. & Dupuy, B. pusilla (N.Terracc.), B. scapose, B. validula Gand, Erigeron perennis (L.). [11]

SCIENTIFIC CLASSIFICATION:

Kingdom:	Plantae
Clade:	Tracheophytes
Clade:	Angiosperms
Clade:	Eudicots
Clade:	Asterids
Order:	Asterales
Family:	Asteraceae

Genus:	Bellis
Species:	B. perennis

PHYSICAL CHARACTERSTICS:

1. **Height:** This perennial plant typically grows between 10 to 30 centimeters (approximately4 to 12 inches) tall, making it a small but notable flower in meadows and gardens.
2. **Leaves:** The leaves are basal, forming a rosette close to the ground. They are lanceolate (lance-shaped) to spatula-shaped, with a serrated or slightly toothed edge. The leaves are dark green and can reach lengths of up to 15 centimeters (about 6 inches), providing a lushbackdrop for the flower heads.
3. **Flowers:** The most striking feature of the daisy is its flower head, which consists of numerous white ray florets surrounding a central disc of yellow tubular florets. Each flowerhead measures approximately 3 to 5 centimeters (1 to 2 inches) in diameter. The flowers are borne on slender, erect stems that rise above the leaves.
4. **Stem:** The flower stems are generally upright, slender, and hairless. The length of the stemscan vary depending on the overall height of the plant and environmental conditions.
5. **Fruit:** The fruit of the daisy is a small achene, which is a dry, one-seeded fruit that does not open to release its seeds. The seeds are lightweight and can be dispersed by wind, allowing the plant to spread easily.
6. **Blooming Season:** Bellis perennis typically blooms from early spring to late autumn, offering a cheerful display of flowers throughout the growing season. This extended blooming period enhances its presence in both wild and cultivated settings.[12]

CHEMICAL CONSTITUENTS:

1. **Flavonoids:**
   - **Quercetin:** A prominent flavonoid found in Bellis perennis, known for its antioxidant properties.
   - **Kaempferol:** Another significant flavonoid present in the plant, exhibiting anti- inflammatory and antioxidant activities.
2. **Phenolic Compounds:**
   - **Caffeic Acid:** A phenolic compound with potential anti-inflammatory and antioxidant effects.
   - **Chlorogenic Acid:** This compound may contribute to the antioxidant properties of the plant.
3. **Terpenoids:**
   - ***α*-Pinene:** A monoterpene that has been identified in essential oil extracts from the plant, known for its aromatic properties and potential therapeutic effects.
   - **Limonene:** Another monoterpene that may contribute to the plant's fragrance and has been studied for its potential anticancer properties.
4. **Alkaloids:** Certain alkaloids have been identified, though their specific types and concentrations can vary.
5. **Saponins:**
   - **Bellisaponins:** Specific saponins unique to Bellis perennis, which may exhibit various biological activities, including antimicrobial effects.
6. **Essential Oils:** The essential oil of Bellis perennis contains various volatile compounds, contributing to its fragrance and potential therapeutic effects. The exact composition can vary based on extraction methods and environmental conditions.
7. **Polysaccharides:** Polysaccharides extracted from the plant have been studied for their potential immunomodulatory and antioxidant activities. [13,14]

TRADITIONAL USES:

1. Traditionally, the leaves of Bellis perennis have been used to treat minor wounds and cuts due to their antiseptic properties.
2. The plant is used in folk medicine to alleviate inflammation, especially in cases of arthritis.

3. Infusions of the plant have been applied topically to treat skin conditions such as eczema and dermatitis.
4. raditional herbal medicine has employed Bellis perennis to relieve symptoms of coughs and colds.
5. The leaves are consumed in salads or as a herbal tea to promote digestion and relieve gastrointestinal discomfort.
6. The plant has been recognized for its antioxidant properties, helping to neutralize free radicals.
7. In some traditional practices, it is used to regulate menstrual cycles and relieve menstrual pain.
8. Infusions of the flowers are traditionally used for their mild sedative effects to reduce anxiety and promote relaxation.
9. The sap from the plant has been used in traditional remedies to soothe eye irritation and redness.
10. Traditionally, extracts of Bellis perennis have been used to fight bacterial infections.
11. The leaves and flowers are rich in vitamins and minerals and have been used as a nutritional supplement in traditional diets.
12. The plant is used in traditional medicine to help reduce fever due to its cooling properties.
13. In some cultures, it is used to alleviate symptoms of hay fever and other allergies.
14. Infusions made from the plant are applied to hair to promote growth and treat dandruff.
15. The leaves and flowers are often used as garnishes or in salads, reflecting their traditional use in culinary practices. [15-19]

THERAPEUTIC ACTION:

- **Anti-inflammatory Activity:** One of the most significant pharmacological properties of Bellis perennis is its anti- inflammatory activity. The plant contains a variety of phytochemicals, including flavonoidssuch as quercetin and kaempferol, which are known for their ability to modulate inflammatory pathways. These compounds can inhibit the production of pro-inflammatory cytokines and enzymes, such as cyclooxygenase (COX) and lipoxygenase (LOX), therebyreducing inflammation. Studies have demonstrated that extracts from Bellis perennis can effectively alleviate symptoms associated with inflammatory conditions, such as arthritis and dermatitis.
- **Antioxidant Effects:** The antioxidant properties of Bellis perennis are primarily attributed to its rich content of phenolic compounds and flavonoids. Antioxidants play a crucial role in neutralizing free radicals, thereby preventing oxidative stress, which is linked to various chronic diseases, including cancer and cardiovascular disorders. Research has shown that extracts of Bellisperennis exhibit significant scavenging activity against free radicals, indicating their potential to protect cells from oxidative damage. This property not only contributes to general health but may also have implications for aging and the prevention of age-related diseases.
- **Wound Healing:** Bellis perennis has been used for its wound-healing properties. The anti-inflammatory andastringent effects of the plant support its application in treating minor cuts, bruises, and skin irritations. The presence of tannins and flavonoids in the plant aids in constricting tissues and reducing bleeding, promoting faster healing. Animal studies have shown that topical application of Bellis perennis extracts can accelerate the healing process of wounds,making it a valuable natural remedy for minor injuries.
- **Antimicrobial Activity:** Emerging research suggests that Bellis perennis possesses antimicrobial properties, makingit potentially useful in combating infections. Various studies have indicated that extracts ofthe plant exhibit activity against a range of pathogens, including bacteria and fungi. For example, laboratory tests have demonstrated that Bellis perennis extracts can inhibit the growth of certain strains of bacteria, such as Staphylococcus aureus and Escherichia coli, as well as fungal pathogens like Candida species. This antimicrobial activity may be attributed to the plant's bioactive compounds, including flavonoids and phenolic acids, which disrupt microbial cell membranes and inhibit their growth.

- **Digestive Support:** In traditional herbal practices, Bellis perennis has been utilized to support digestive health.Herbal infusions made from the leaves and flowers are believed to alleviate gastrointestinal discomfort, such as bloating and indigestion. While scientific evidence supporting these uses is limited, the presence of flavonoids and tannins suggests potential benefits for digestive health, possibly through their astringent and soothing properties. Further researchis needed to fully elucidate the mechanisms by which Bellis perennis may aid digestion and its efficacy in treating digestive disorders.
- **Anticancer Potential:** Preliminary studies have suggested that certain extracts of Bellis perennis may exhibit anticancer properties. The flavonoids and phenolic compounds present in the plant have been investigated for their ability to induce apoptosis (programmed cell death) in cancer cells and inhibit tumor growth. Research has indicated that extracts can reduce the viabilityof various cancer cell lines, suggesting that Bellis perennis may have potential as a complementary therapy in cancer treatment. However, more rigorous clinical studies are needed to validate these findings and establish specific therapeutic applications.[20]

Marketed Formulation of Bellis Perennis As A Herbal Bronchodilator:

Bellis perennis, commonly known as the common daisy, has gained attention in herbal medicine for its various therapeutic properties, including anti-inflammatory, expectorant, and bronchodilatory effects. These properties make it a potential candidate for use in formulations aimed at alleviating respiratory disorders such as asthma and bronchitis. The use of Bellis perennis in a marketed formulation for herbal bronchodilators typically involves combining its extracts with other natural ingredients known to support respiratory health. In a bronchodilator formulation, the primary function of Bellis perennis is to help relax the muscles in the airways, making breathing easier for patients suffering from obstructive pulmonary conditions. The mechanism of action is believed to be linked to its active compounds, including saponins, flavonoids, and triterpenes, which exhibit anti-inflammatory, spasmolytic, and antioxidant activities. These components work synergistically to reduce airway constriction, minimize inflammation in the bronchi, and promote mucus clearance, thereby improving airflow. A typical marketed formulation of Bellis perennis as a bronchodilator could be found in liquid extract form, syrups, capsules, or inhalable preparations. For instance, syrups formulated with Bellis perennis extract, combined with other herbal ingredients like Glycyrrhiza glabra (licorice) or Adhatoda vasica (vasaka), are widely used in traditional and modern herbal medicine for their expectorant and anti-inflammatory effects. Such combinations enhance the therapeutic efficacy of the formulation, providing relief from cough, shortness of breath, and chest tightness, which are common symptoms of bronchoconstriction. In capsule or tablet form, the standardized extracts of Bellis perennis may be incorporated alongside natural bronchodilators like Ephedra sinica or Lobelia inflata, enhancing its effectiveness in relieving respiratory distress. These products are marketed as safe, natural alternatives to synthetic bronchodilators, appealing to consumers who seek herbal remedies for managing chronic respiratory conditions without the adverse side effects associated with conventional pharmaceuticals. Manufacturers of these formulations often highlight the benefits of Bellis perennis for its natural origin, safety profile, and efficacy in improving respiratory function. Furthermore, the rising trend of integrating herbal ingredients in over-the-counter respiratory health supplements has expanded the market presence of Bellis perennis as a bronchodilator. The inclusion of Bellis perennis in formulations is supported by its historical use in traditional European medicine for respiratory disorders, and ongoing scientific studies provide a growing body of evidence for its efficacy in bronchodilation. Overall, the marketed formulation of Bellis perennis as a herbal bronchodilator represents a significant development in the field of respiratory therapeutics, offering a natural, well-tolerated option for patients. It continues to gain traction in the herbal product market due to the increasing demand for plant-based remedies for respiratory health. [21-23]

APPLICATION:

1. **Anti-Inflammatory Properties:** Bellis perennis has demonstrated anti-inflammatory effects, making it useful in treating conditions characterized by inflammation.
2. **Wound Healing:** The extract of Bellis perennis has shown potential in promoting wound healing, attributed to its antioxidant and anti-inflammatory properties.
3. **Skin Care:** Due to its soothing properties, Bellis perennis is often included in skincare formulations, providing relief from irritation and promoting skin health.
4. **Antimicrobial Activity:** Bellis perennis exhibits antimicrobial properties, which can be beneficial in preventing infections.
5. **Diuretic Effects:** The plant is known for its diuretic properties, aiding in the treatment of urinary tract disorders and promoting kidney health. [24-27]
6. **Anti-Allergic Effects:** Bellis perennis has been traditionally used to alleviate allergic symptoms, particularly in respiratory conditions.
7. **Antioxidant Activity:** The antioxidant properties of Bellis perennis contribute to its potential in preventing oxidative stress-related diseases.
8. **Potential in Phytotherapy:** Bellis perennis is explored in phytotherapy for its various medicinal applications, including its use in herbal formulations.
9. **Culinary Uses:** Young leaves and flowers of Bellis perennis can be consumed in salads and other dishes, adding nutritional value and flavor.
10. **Potential in Cosmetics:** Bellis perennis extracts are increasingly utilized in cosmetics for their skin-soothing and anti-aging properties. [28-31]

CONCLUSION:

Bellis perennis, is a remarkable plant that bridges traditional herbal medicine and contemporary therapeutic practices. Its historical significance in various cultures underscores its longstanding role as a remedy for numerous ailments. Traditionally, Bellis perennis has been employed for its anti-inflammatory, antimicrobial, and wound-healing properties, with applications ranging from poultices for skin irritations to herbalinfusions for digestive and respiratory health. Phytochemically, the plant is rich in bioactive compounds, including flavonoids, phenolic acids, terpenoids, and essential oils. These constituents are pivotal in determining its health benefits, contributing to its antioxidant and therapeutic activities. The presence of flavonoids like quercetin and kaempferol, along with phenolic acids such as caffeic acid, plays a crucial role in its effectiveness as a natural remedy. Pharmacological studies have further validated the traditional uses of Bellis perennis, demonstrating its potential in reducing inflammation,fighting infections, and promoting wound

healing. The diverse range of bioactive compounds enhances its therapeuticprofile, making it a valuable candidate for both herbalformulations and dietary applications.

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