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# REVIEW OF ANTI-INFLAMMATORY HERBAL MEDICINES

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**ABSTRACT**

As a supplement therapy, medicinal plants and their secondary metabolites are increasingly being employed to treat illnesses. A broad spectrum of illnesses, including rheumatoid arthritis, immune-mediated disorders, diabetes, skin disease, heart attacks, edema, neoplastic disease and more including dental disorder are **Oral Lichen Planus (OLP)**, **Oral Submucous Fibrosis (OSF), Recurrent Aphthous Stomatitis (RAS), Denture Stomatitis (DS)** in the pathologic condition known as inflammation. The pathological changes are found to be prostaglandin, phenolic compound, histamine and short peptides like kinin. Here trying to present a few plants whose anti-inflammatory properties have been assessed in both experimental and clinical research. Among the therapeutic herbs introduced in this review are Devil's claw, evening primrose, Zingiber officinale, Rosmarinus officinalis, Borago officinalis, essential oil, flavonoid and Curcuma longa etc. This review attempts to arrive at a multifaceted therapeutic strategy to inflammation with the aid of herbal medicine and lifestyle change because the treatment of inflammation is not a one-dimensional solution.[1]

**KEYWORDS:** Kinin ,Prostaglandin ,Phenolic compound ,Edema ,Histamine,Rheumatoid arthritis, Immune-mediated disorders , Diabetes, Heart attacks, Oral Lichen Planus(OLP), Oral submucous Fibrosis(OSF), Recurrent Aphthous stomatitis (RAS), Denture Stomatitis (DS), Skin disease.

## INTRODUCTION

The word “inflammation”, derived from the latin word “inflammare” (to set on fire), is a complex biological process including several chemical mediators which are induced by vascular tissue of the body, when it comes in contact with several harmful stimuli like pollens, irritants, pathogens, and damaged cells. It provides a protective comeback that helps in healing of tissues. Sometimes, inflammation seems to produce events that are quite serious and become chronic like occurrence of rheumatoid arthritis and hay fever which may be life threatening. Hence, appropriate measures are to be taken against it. In brief, inflammations are generally of two types: acute inflammation and chronic inflammation.[2]

Naturally, we need to learn more about herbal medications as they are advancing medical research. Herbal drug recommendations are primarily derived from complementary, alternative, and traditional medicine; however, contemporary medicine must first validate these recommendations through scientific means before implementing them. Here attempted to evaluate the plants and the strongest clinical evidence of their anti-inflammatory properties in this review.[1]

Some Examples which are available in our country like aspirin (from willow bark), digoxin (from foxglove), quinine (from cinchona bark), and morphine (from the opium poppy). development of drugs from plants continues, with drug companies engaged in large scale pharmacological screening of herbs.[3]

### Medicinal plants with anti-inflammatory activities found from different countries including regions of Africa Egypt

Research in Egypt has identified natural anti-inflammatory medicines from local plants with minimal side effects. Compounds from **Ipomoea** and **Alstonia** genera exhibit anti-inflammatory properties. **Ipomoea pescaprae** leaf extracts successfully treated edema and jellyfish sting dermatitis in experimental animals, with identified substances preventing prostaglandin formation. In a controlled study, **Ipomoea palmate**, **Alstonia scholaris**, and leaves from **Salix** and **Phyllostachys** were tested in albino mice, revealing varying degrees of anti-inflammatory activity. The aqueous methanol extract of **A. scholaris** was notably effective, with up to 91% inhibition after carrageenan injection, while extracts from **I. palmata** and **S. subserrata** also demonstrated significant anti-inflammatory effects.[4]

**Fig. 1: Alstonia.**

**Algeria**

Boubekri et al. studies the anti-inflammatory activity of Genista quadriflora Munby extract using female rats. Collected in May 2008 from El Kala, Algeria, the plant is used in traditional medicine. The anti-inflammatory effects were assessed with a carrageenan-induced paw edema model. The n-butanol extract (100 and 200 mg/kg) significantly reduced edema in a dose-dependent manner, comparable to aspirin (100 mg/kg). The carrageenan paw model is effective for evaluating anti-inflammatory properties, as it involves multiple mediators across a three-phase process. Significant inhibitory effects were noted in the third phase (after 3 hours), suggesting the extract may inhibit intracellular signaling related to inflammatory mediators. The authors also proposed that the antioxidant content, particularly phenolic compounds, may contribute to the extract's anti-inflammatory effects.[4]

**Fig. 2: Quadriflora Munby.**

**Zimbabwe**

Zimbabwe is home to a rich diversity of medicinal plants used in traditional medicine, with over 5,000 species identified, of which more than 10% have medicinal potential. Traditional medicine serves as an affordable and accessible treatment option in the country's primary health care system. Maroyi investigated the traditional uses of medicinal plants in south-central Zimbabwe and found 93 species used therapeutically. Of these, 79 are indigenous, while 14 are exotic, either naturalized or cultivated. Notable examples of these plants include Lannea discolor, Seasia tenuinervis, Corisa bispinosa, Flacourtia indica, and Ficus ingens.[4]

**Fig. 3: Ficus Ingens.**

**Swaziland**

Medicinal plants are vital to Swaziland's biological resources, with many Swazis relying on traditional medicine for their health needs, deeply intertwined with cultural and religious beliefs. To preserve cultural heritage, Amusan and colleagues conducted ethnobotanical surveys on medicinal plants in Swaziland. In the Manzini region, notable plants include Spirostachys africana, Trichilia emetic, Ximenia americana, and Peltophorum africanum. The study reported on traditional medical practitioners in the area who described 41 remedies for 25 different disease conditions, including inflammatory diseases.[4]

**Fig. 4: Peltophorum Africanum.**

**Tanzania**

Tanzania has a rich tradition of herbal medicine, influenced by diverse interethnic cultural interactions. Moshi et al. examined the ethnomedicine of the Kagera region, highlighting medicinal plants used for various diseases, many of which have multiple therapeutic uses. For instance, Draceana steudneri treats both fibroids and asthma. Commonly treated conditions include respiratory infections, cardiovascular diseases, infectious diseases, and skin ailments, all related to inflammatory responses. Leaves are the most utilized part of the plants (20 species), followed by roots (13 species), with monotherapy being more common than mixed preparations. Sixteen of the 34 plants identified have documented therapeutic claims in literature without reported harmful effects. Key plants supported by this literature include Ageratum conyzoides, Bidens pilosa, Boerhavia diffusa, Capparis tomentosa, Cassia alata, Clerodendrum myricoides, Lantana camara, Flueggea virosa, and Vernonia amygdalina. These plants not only have medicinal potential but also provide food and nutrition for local communities.[4]

**Fig. 5: Flueggea Virosa.**

United Kingdom:

Spending on herbal products in the United Kingdom is over £40m a year, mainly from self prescription of over the counter products. This type of herbal drug use is typically based on a simple matching of a particular herb to particular diseases or symptoms—such as valerian (*Valeriana officinalis*) for sleep disturbance.[3]

**Fig. 6: Valeriana Officinalis.**

**ANTI-INFLAMMATORY Herbal Medicine in the Treatment of Cancer**

This review examines the growing therapeutic use of herbal medicine in cancer treatment, highlighting its anti-oxidative and superoxide scavenging properties that contribute to enhanced survivability in patients. It discusses the antipyretic, analgesic, anti-inflammatory, and anti-cancer effects of various individual herbal ingredients, along with their roles as nutrient supplements. While numerous in vitro and in vivo studies have reported positive outcomes, the mechanisms of action remain largely unclear. The review aims to summarize recent developments, potential mechanisms, and pharmacological applications of herbal medicine as anti-cancer agents.[5]

1. For Breast Cancer, 2.For Prostate Cancer, 3. For Lung Cancer, 4. For Liver Fibrosis and Cancer, 5. For Pancreatic Cancer,

**Table 1:**
**Clinical use of herbal medicines exhibiting anticancer activities.**
**For breast cancer**

| Herbal medicine | Source | Suppressive effects on carcinogenesis and cancer metastasis | References |
|---|---|---|---|
| Isoflavone | Soybeans (Glycine max) Red cover(Trifolium) | To reduce risk of breast cancer | [6] |
| Isoflavones genistein and daidzein | Legumes, Alfalfa, Pueraria mirifica L | To confer weak estrogenic effects | [7] |
| Alkaloids | Opium poppy, Tobacco, fung horsetail, Algae | Inhibition of cancer cell growth | [8,9] |
| Coumarins | Tonka beans, sweet clover, cinnamon | Inhibition of cancer cell growth | [10,11] |
| Terpenoids | Phytoplanktons, mushrooms etc. | MCF-7 cell apoptosis | [12] |
| Quinone | Cinchona officinalis. | To induce G2-M arrest and autophagy by inhibiting the AKT/mammalian target of rapamycin pathway in breast cancer cells | [13] |
| Artemisunate | Artemisia | Decrease the proliferation of human breast cancer cells from expressing a high Er$\alpha$ : Er$\beta$ ratio | [14] |

**For prostate cancer**

| Herbal medicine | Source | Suppressive effects on carcinogenesis and cancer metastasis | References |
|---|---|---|---|
| Vitamins A-D and retinoid | carrots, sweet potatoes | Maintain homeostasis and prevent various metabolic disorders | [15] |
| Vitamin E | Seeds,Vegetables | Reduce the risk of lethal or advanced prostate cancer relative to nonusers | [16] |
| *Scutellaria baicalensis* | baicalin | Inhibit enzymatic synthesis of eicosanoids | [17] |
| Lycopenes | Tomato, Watermelon, Pink grapefruit | Decreases prostate cancer risk | [18] |
| Epigallocatechin-3-gallate (EGCG) | Green tea (comellie sinensis). | Arrest LNCaP and DU145 prostate cancer cells at the G0-G1 phase of the cell cycle | [19] |

**For lung cancer**

| Herbal medicine | Source | Suppressive effects on carcinogenesis and cancer metastasis | References |
|---|---|---|---|
| *Morus alba* (Moraceae) | Mulberry, White Mulberry | Anticancer effect in lung cancer patients | **[20,21]** |
| *Prunus armeniaca* (Rosaceae) | **apricot** | Anticancer effect in lung cancer patients | |
| *Rhus verniciflua* (Anacardiaceae) | **Lacquer tree, varnish tree** | Anticancer effect in lung cancer patients | |
| *Perilla frutescens* (Labiatae) | **Shiso, beefsteak plant** | Anticancer effect in lung cancer patients | |
| **Traditional Chinese Medicine (TCM)** | *Stemona japonica* | Anticancer effect in lung cancer patients | |

**For liver fibrosis and cancer**

| Herbal medicine | Source | Suppressive effects on carcinogenesis and cancer metastasis | References |
|---|---|---|---|
| *Inchin-ko-to* (TJ-135) | **Artemisia Capillaris Spica,Tardenia fructuse** | Preventive effectt on liver fibrosis | **[22]** |
| *Danggui Buxue Tang* (DBT) | **Angelicae sinensis radix(danggui),astragali radix (huangqi)** | | **[23]** |
| ***Yi Guan Jian* (YGJ)** | **Rehmannia glutinosa, Malian toosendan, angelicasinensis** | | **[24]** |
| Curcumin | **Turmeric ,curcuma longa** | Suppressive effect on hepatic fibrogenesis and carcinogenesis | **[25]** |
| Oxymatrine | **sophora flavescens(Chinese herb)** | | |
| Compound 861 | **Salvia miltiorrhiza, Astragalus membranaceus, Spatholobus Subrectus.** | Suppressive effect on hepatic fibrogenesis | **[26,27]** |
| *Sho saiko-to* (TJ-9) | **Bupleurum root (chai hu),pinellia tuber (ban xia)** | Reduces/limits the progression of hepatocellular carcinoma | **[28]** |

**For pancreatic cancer**

| Herbal medicine | Source | Suppressive effects on carcinogenesis and cancer metastasis | References |
|---|---|---|---|
| **Cyclopamine** | **American wild corn lily, varatrum californicum.** | **Inhibit SHH signaling by directly binding to the 7-helix** | **[29]** |

| | | | |
|---|---|---|---|
| | | **bundle of the SMO protein; arrest the growth of pancreatic tumors** | |
| | | **Weakens the recruitment of BMPCs into cancer cells and reduces the formation of tumor vasculature** | **[30]** |
| | | **The cancerous vascular system becomes unstable after treatment with cyclopamine due to the expression of angiopoietin-1** | **[31]** |

**Herbal remedies in dental care:**

The growing interest in herbal products over traditional medicine can lead to consumer risks due to potential misuse. Herbal remedies, often seen as effective with fewer side effects, are increasingly used in developing countries facing economic challenges and antibiotic resistance. These natural products contain active compounds, such as flavonoids and essential oils, which can effectively treat oral health conditions like gingivitis and mucosal infections.[32]

**Natural products in miscellaneous dental disorders:**

- **Oral Lichen Planus (OLP)**: A chronic autoimmune condition affecting mainly middle-aged women, treated traditionally with corticosteroids, which can have side effects. Studies indicate curcumin, aloe vera (AV), and chamomile gel as alternative treatments. Curcumin shows promise but has bioavailability issues, improved by nano-formulations. AV demonstrated pain relief and higher recovery rates compared to placebo. Chamomile gel significantly improved pain and oral health, suggesting it is a low-cost, effective alternative .
- **Oral Submucous Fibrosis (OSF)**: A chronic condition primarily linked to areca nut chewing, causing oral mucosa inflammation and fibrosis. Curcumin, when combined with intralesional dexamethasone, improved symptoms and mouth opening in a clinical trial, indicating its potential as an adjunct therapy .
- **Recurrent Aphthous Stomatitis (RAS)**: Characterized by painful oral ulcers, RAS treatments focus on pain relief. A study found that myrtle extract significantly sped up healing and reduced pain compared to placebo, suggesting it is a safe treatment option .
- **Denture Stomatitis (DS)**: A common condition causing erythema beneath dentures, often linked to oral hygiene. A study compared nystatin mouthwash and garlic extract, finding both effective, but garlic extract is highlighted as a viable alternative due to its antimicrobial properties.[32]

**Fig. 7: Herbs in Dental Health.**

**Herbal remedies in Berberine(BBR) and Diabetes**

Type 2 diabetes mellitus (T2DM) is a major global health problem linked to oxidative stress and inflammation. Oxidative stress from excess glucose and free fatty acids leads to reactive oxygen species (ROS) production, damaging pancreatic β-cells and causing insulin resistance. Inflammation, driven by cytokines like TNF-α and IL-6, further worsens insulin resistance and diabetes complications.

Berberine (BBR), a plant-derived compound, shows promise in treating T2DM, demonstrating effects similar

to metformin and aiding in managing complications. BBR enhances insulin sensitivity by modulating mitochondrial function, activating AMPK, and reducing oxidative stress and inflammation. This review highlights BBR's antioxidant and anti-inflammatory properties in T2DM management.

**Herbal medicines with anti-inflammatory properties have emerged as potential adjuncts in the treatment of diabetes mellitus. Compounds such as curcumin, berberine, and ginger extract have been shown to reduce inflammation, improve insulin sensitivity, and modulate glucose metabolism. These natural remedies may help address the chronic inflammation associated with diabetes, offering a complementary approach to traditional therapies. Ongoing research continues to explore their efficacy and mechanisms of action, highlighting the therapeutic potential of these herbal treatments in managing diabetes.[33]**

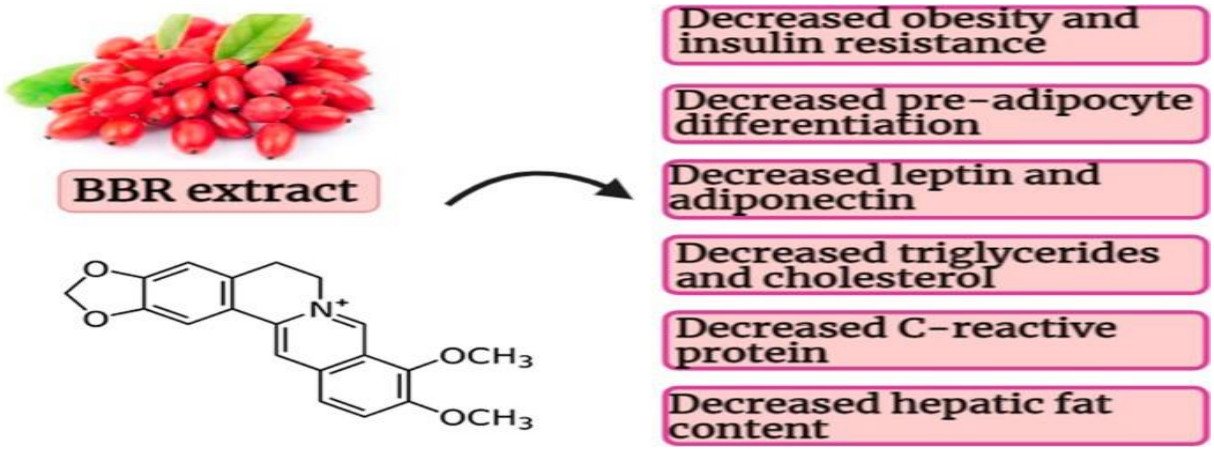


**Fig. 8: Berberine In Metabolic Disease and Diabetes Mellitus.**

**Herbal remedies in Rheumatoid Arthritis**

Rheumatoid arthritis (RA) is a chronic autoimmune disorder causing joint pain and stiffness.Conventional treatments often lack effectiveness and have side effects. Botanical medicines like Black cohosh, Angelica sinensis, and Licorice show promise for their anti-inflammatory properties, potentially offering new treatment options for RA.Herbal medicine has emerged as a promising alternative in the management of rheumatoid arthritis (RA), a chronic autoimmune disorder characterized by inflammation, pain, and stiffness in the joints. Various herbs, including Black cohosh, Angelica sinensis, Licorice, Tripterygium wilfordii, Centella asiatica, and Urtica dioica, have demonstrated notable anti-inflammatory and anti-arthritic effects in recent studies. These botanicals contain a diverse array of phytochemicals such as flavonoids and triterpenes, which may help modulate immune responses and reduce inflammation. As patients increasingly seek safer and more effective treatment options, herbal remedies may provide beneficial adjunctive therapies for managing the symptoms and progression of RA, warranting further research to validate their efficacy and elucidate their mechanisms of action.[34]

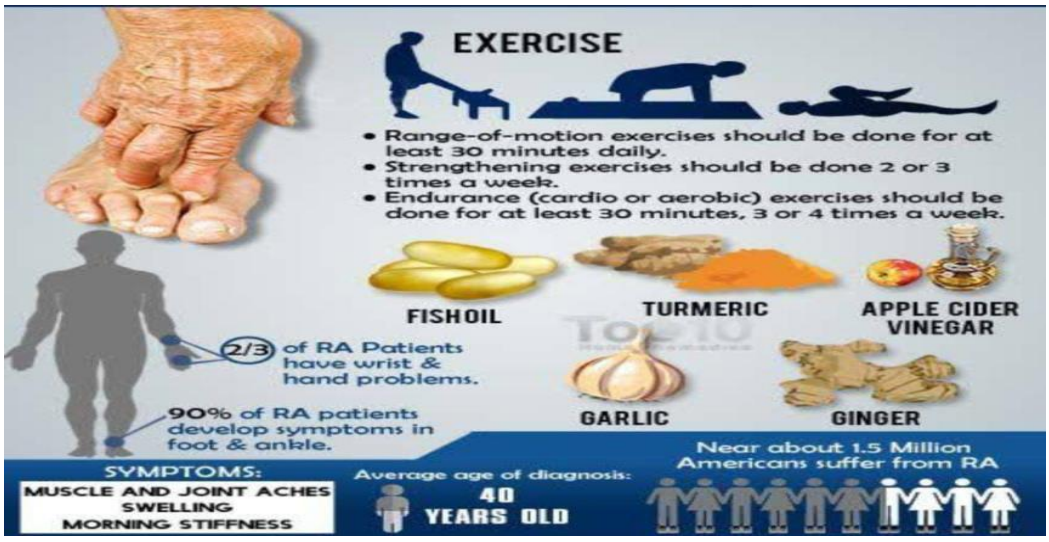


**Fig. 9: Herbal remedies in Rheumatoid Arthritis.**

At a gland herbal remedies in Rheumatoid Arthritis.

**Herbal remedies in Skin disease problem**

Atopic dermatitis (AD) is a common skin condition affecting individuals of all ages, characterized by red, itchy skin, primarily on the face, head, legs, neck, and hands. It is linked to type II IgE-mediated hypersensitivity. Herbal preparations have emerged as effective treatments for various skin conditions, including AD, due to their anti-inflammatory, antioxidant, antibacterial, and antiseptic properties, offering fewer side effects than synthetic alternatives. This review discusses the role of cosmeceuticals and specific phytoconstituents like gallic acid, ferulic acid, boswellic acid, quercetin, naringenin, glycyrrhizic acid, and epigallocatechin gallate in managing atopic dermatitis.[35]

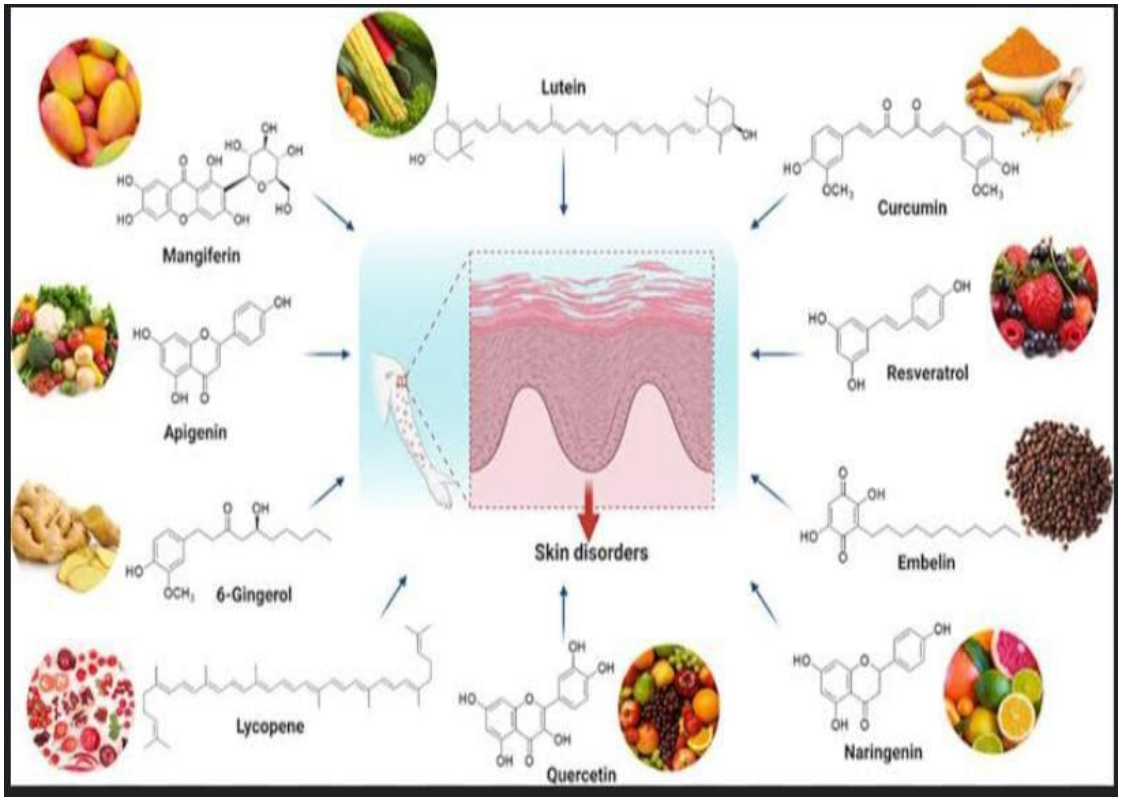


**Fig. 10: Herbal Medicine in Treatment of Skin Disease.**

## CONCLUSION

In conclusion, the review of anti-inflammatory herbal medicines and herbs highlights their significant potential as complementary and alternative therapeutic options in managing inflammatory conditions and the palliative treatment. Numerous studies have documented here the efficacy of various herbs, such as turmeric (curcumin), ginger, boswellia, and others, which possess bioactive compounds that exhibit anti-inflammatory properties. The mechanisms of action often involve the modulation of pro-inflammatory cytokines and pathways, suggesting a multifaceted approach to addressing inflammation.

However, while the available evidence is promising, it is crucial to recognize the variability in quality, different dosage form of herbal product, and preparation methods of herbal products, which can impart their effectiveness and safety. Additionally, further rigorous clinical trials are needed to establish standardized dosages, long-term effects, and optimal combinations of herbal therapies, as well as to better understand potential interactions with conventional medications.

Overall, anti-inflammatory herbal medicine represents a valuable area of research and clinical application. As interest in natural remedies continues to grow, integrating these herbal therapies with conventional treatments may enhance therapeutic outcomes for patients with chronic inflammatory diseases. Future studies should aim to elucidate the full potential and limitations of these herbal agents, paving the way for their safe and effective use in holistic healthcare system.

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