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Review

Herbal Remedies for Arthritis: Advancements, Potential, and Future Prospects in Alternative Therapy

Vivek Tripathi*, Suraj Mandal

Department of Pharmacy, IIMT College of Medical Sciences, IIMT University, O-Pocket, Ganganagar, Meerut, 250001, U.P., India

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Abstract:

Arthritis is a leading global cause of disability and chronic health issues, with its pathophysiology characterized by the dysregulation of pro-inflammatory cytokines and enzymes, leading to elevated levels of prostaglandins, leukotrienes, and nitric oxide. Additionally, the expression of adhesion molecule matrix metalloproteinase and the excessive proliferation of synovial fibroblasts exacerbate the condition. The transcription factor nuclear factor κβ plays a crucial role in regulating these factors. Therefore, the development of drugs targeting these pathogenic mechanisms holds promise for arthritis treatment. However, current synthetic molecules often fall short due to their toxicity, side effects, or symptom recurrence upon cessation. In light of the urgent need for alternative treatments, traditional medicine offers a rich repository of herbal therapies. Recent scientific research has demonstrated the efficacy of these remedies in managing arthritis, leading to a surge in industrial interest and clinical trials for herbal medicines in treating various ailments, including arthritis. These meticulously designed clinical trials have significantly advanced our understanding of herbal treatments for arthritis.This review delves into the potential of herbal remedies as a promising alternative for arthritis therapy, highlighting current advancements and future prospects.

Keywords: *Herbs, Cytokines, Matrix metalloproteinase, Nitric oxide, Complementary and alternative medicine, Natural cure, Arthritis*

***Corresponding Author**

Vivek Tripathi,

Scholar, Department of Pharmacy, IIMT College of Medical Sciences, IIMT University, O-Pocket, Ganganagar, Meerut, 250001, U.P., India

Email: vktripathi098@gmail.com

1. Introduction

Arthritis, a musculoskeletal disorder, arises from imbalances in the normal processes of articular cartilage creation and degradation. Although it can affect individuals of all ages, it is most common between 25 and 50 years old, peaking between 40 and 50. There are over 100 different types of arthritis, with juvenile arthritis, osteoarthritis, rheumatoid arthritis, ankylosing spondylitis, and systemic lupus erythematosus being the most prevalent. Certain populations, such as Americans and Indians, exhibit high rates of arthritis, with rheumatoid arthritis affecting 5% and osteoarthritis affecting 22–39% of the Indian population. Arthritis primarily impacts weight-bearing joints like the feet, knees, hips, and spine, leading to inflammation, pain, stiffness, and decreased mobility. It also affects peri-articular bone, synovial joint lining, and surrounding connective tissues.

Effectively managing arthritis necessitates appropriate therapy and consideration of the costs associated with chronic treatment. While synthetic drugs are available for arthritis management, their long-term use is often limited by significant side effects. Herbal remedies have a historical precedent in treating inflammatory conditions

like arthritis, both internally and topically. The utilization of herbal medicine in arthritis care has gained traction due to its positive impact on altering arthritis pathophysiology. While many herbal treatments show potential in reducing long-term joint inflammation, further scientific investigation is required to confirm their therapeutic efficacy. This review focuses on herbs that hold promise for arthritis treatment.

Table 1: Traditionally used plants for arthritis

Plant	Family	Part used in arthritis	Reference
Abutilon indicum L.	Malvaceae	Leaves	7
*Acacia leucophloea*Willd.	Mimosaceae	Bark	8
Acalypha indica L.	Euphorbiaceae	Whole plant	9
Adansonia digitata L.	Malvaceae	Leaves	8
Allium cepa L.	Liliaceae	Roots	8
Alangium salviifolium (Linn.f.) Wang.	Alangiaceae	Roots	10
Anisomeles malabarica R. Br.	Lamiaceae	Leaves	8
Bacopa monnieri (L.) Penn.	Scrophulariaceae	Leaves	11,12
Brassica alba (L.) Rabenh.	Brassicaceae	Seed	13
Cadaba indica Lam.	Capparidaceae	Leaves	8
Calophyllum inophyllum L.	Clusiaceae	Seed	8
Cassia fistula L.	Caesalpiniaceae	Fruit	8
Peucedanum graveolens Benth.	Apiaceae	Seed, roots	8
Pongamia glabra Vent.	Fabaceae	Roots	16
Salvadora indica Royle	Salvadoraceae	Fruit, flower	8
Tamarindus indica L.	Caesalpiniaceae	Leaves	8
Vitex negundo L.	Verbenaceae	Leaves	8
Argyreia speciosa Sweet	Convolvulaceae	Roots	10
Asarum europaeum L.	Aristolochiaceae	Roots	8
Azima tetracantha Lam.	Salvadoraceae	Leaves, roots	8
Boerhaavia diffusa L.	Nyctaginaceae	Roots	14
Cardiospermum helicacabum L.	Sapindaceae	Leaves	10,11
Celastrus paniculatus Willd.	Celastraceae	Seed	8
Cephalendra indica Naud.	Curcurbitaceae	Roots	8
Citrullus colocynthis Schard.	Cucurbitaceae	Roots	8
Cleodendrum phlomidis L.	Verbenaceae	Leaves	9
Cleome viscosa L.	Capparidaceae	Leaves	8
Cocculus villosus DC.	Menispermaceae	Roots	8
Corallocarpus epigaeus Benth. ex-Hook. f.	Cucurbitaceae	Roots	8
Cuminum cyminum L.	Apiaceae	Seed	9
Curcuma zedoaria Rosc.	Zingiberaceae	Roots	8
Daemia extensa R. Br.	Asclepiadaceae	Leaves, roots	15,16
Enicostemma littorale Blume	Gentianaceae	Roots	8,10
Glycyrrhiza glabra L.	Fabaceae	Roots	8
Gmelina asiatica L.	Verbenaceae	Roots	10
Indigofera aspalathoides Vahl. ex-DC.	Papilionaceae	Roots	8
Myristica fragrans Houtt.	Myristicaceae	Fruit	8

Ocimum gratissimum L.	Lamiaceae	Leaves, roots	8
Pavonia zeylanica Cav.	Malvaceae	Whole plant	8
Plumbago zeylanica L.	Plumbaginaceae	Roots	14
Randia dumetorum Lam.	Rubiaceae	Bark, roots	8
Ricinus communis L.	Euphorbiaceae	Seed	9
Semecarpus anacardium Linn.f.	Anacardiaceae	Seed	9,17
Sida acuta Burm.f.	Malvaceae	Roots	10
Smilax china L.	Liliaceae	Roots	8
Terminalia chebula Retz.	Combretaceae	Seed	9
Tribulus terrestris L.	Zygophyllaceae	Whole plant	8
Withania somnifera Dunal	Solanaceae	Roots	8,10,12
Zingiber officinalis Roxb.	Scitaminaceae	Roots	12,16

2. Medicinal plants for arthritis treatment

The Widespread Use of Herbal Remedies in Arthritis Treatment Complementary and alternative medicine, including herbal remedies, are extensively used in healthcare around the world, including the USA. Approximately 25% of current pharmaceuticals are derived from herbal sources, and another 25% come from naturally occurring molecules that have undergone chemical modification. The complex blend of phytochemicals found in herbs, such as alkaloids, glycosides, flavonoids, tannins, and resins, contributes to their efficacy and diverse pharmacological actions. Various plants, including Bidens pilosa L., Boerhaavia diffusa L., Boswellia serrata Roxb., Cayaponia tayuya (Vell.) Cogn., Maytenus krukovii A.C. Sm., Mikania guaco Humb. & Bonpl., Persea americana Mill., Pongamia pinnata (L.) Pierre, Smilax officinalis Kunth, Terminalia chebula Retz., and Uncaria tomentosa (Willd. ex Schult.) DC, have been recognized for their potential in treating arthritis. Pongamia pinnata (L.) Pierre, also known as Karanja, is a nitrogen-fixing perennial tree found in littoral regions of Australia and Southeast Asia. Its leaves and stems contain flavone and chalcone derivatives, while its seeds contain sterols and their derivatives. Karanja has been found to possess anti-ulcer, anti-diarrheal, antioxidant, anti-plasmodium, anti-hypoglycemic, anti-viral, anti-bacterial, and anti-inflammatory properties, making it beneficial for arthritis treatment. Boerhaavia diffusa L., or Punarnava, is a creeping weed found across several continents. Its roots, leaves, and seeds contain a rich array of phytochemicals, including flavonoids, glycosides, alkaloids, and steroids. Punarnava has been traditionally used for various ailments, and its seeds act as a blood cleanser and tonic. Pharmacological studies confirm its anti-inflammatory, anti-bacterial, hypoglycemic, and immunomodulatory actions, making it a promising option for arthritis treatment. Terminalia chebula Retz., or Haritaki, is a deciduous tree native to Asia. Its fruits are valued in traditional medicine and have been found to exhibit antibacterial, anti-convulsant, and anti-inflammatory properties. Components of Haritaki are effective against enzymes involved in arthritis pathogenesis, making it a potential candidate for arthritis treatment. Persea americana Mill., or Avocado, is a medium-sized evergreen tree rich in compounds like alkanols, terpinoid glycosides, flavonoids, and coumarins. Avocado demonstrates antioxidant, anti-inflammatory, analgesic, and anti-arthritic properties, making it a promising option for arthritis management. Uncaria tomentosa Willd., or Cat's Claw, is found in South American rainforests and is used for various ailments. Its chemical components include quinovic acid, glycosides, plant sterols, and alkaloids, with demonstrated anti-inflammatory properties useful in arthritis treatment. Cayaponia tayuya (Vell.) Cogn., or Tayuya, is native to Brazil and the Amazon rainforest. It contains flavones, glycosides, and terpenes and exhibits antioxidant, anti-inflammatory, and analgesic properties, making it a potential option for arthritis management. These medicinal plants, along with others listed in additional studies, offer promising avenues for arthritis treatment. Clinical trials are essential to validate their efficacy and safety, providing valuable insights into their long-term usage and regulatory requirements.

Table 2: Herbal drugs reported pre-clinically for the treatment of arthritis

Herbal drug	Animal model used	Reference
Commiphora mukul (Hook.f. ex-Stocks) Engl.	Rat paw oedema, adjuvant induced arthritis	64

Semecarpus anacardium L.f.	Freund's adjuvant induced arthritis	64
Withania somnifera Dunal	Carrageenan induced paw oedema	64
Ricinus communis L.	Freund's adjuvant induced arthritis	64
Vitex negundo L.	Freund's adjuvant induced arthritis	66
Clematis vitalba L.	Carrageenan induced paw oedema	67,68
Harpagophytum procumbens (Burch.)	Freund's adjuvant induced arthritis	69
Acanthopanax chiisanensis Nakai	Freund's adjuvant induced arthritis	69
Tetrapleura tetraptera Taub.	Egg albumin induced paw oedema	71
Dorstenia barteri Bureau	Carrageenan induced paw oedema	72
Kalopanax pictus Thunb.	Freund's adjuvant induced arthritis	73
Bridelia ferruginea Benth.	Adjuvant induced arthritis	74
Hippocratea excelsa Kunth.	Adjuvant induced arthritis	75
Boswellia carteri Birdw.	Adjuvant induced arthritis	76
Sclerocarya birrea (A. Rich.) Hochst.	Carrageenan induced paw oedema	77
Ulmus davidiana Planch.	Collagen induced arthritis	78

Table 3: Clinically proved plants for arthritis

HERB	Clinical Trail Design	Result	Reference
Combination of Boswellia serrata, Withania somnifera, and Curcuma longa	Double-blinded, Cross-over, Placebo controlled	Significant improvement in pain and disability score	80
Combination of Persea americana and Glycine max Merr.	Double-blinded, placebo controlled, phase-iii, multi-centric	Significantly reduced NSAID consumption, pain, and improved disability score	81
Capsicum annuum L	Double-blinded, placebo controlled, multi-centric	Significantly reduced pain	82
Harpagophytum procumbens	Double-blinded, placebo controlled	Significantly reduced pain	83
Combination of Cyperus rotundus L., Tinospora cordifolia Thumb., Saussurea lappa DC., Picrorrhiza kurroa Royle, and Zingiber officinalis	Double blinded, comparative, parallel design	Significantly reduced pain	84
Combination of Populus tremuloides Michx., Achillea millefolium L.	Double blinded, double dummy, crossover	Insignificant reduction of pain	85
Combination of Populus tremuloides, Fraxinus excelsior L., and Solidago virgaurea L.	Three armed, double blinded against placebo	Significantly reduced pain	86
Urtica dioica L.	Double-blinded, placebo controlled, cross over	Lowers pain and disability score significantly	87
Combination of Salix alba L., Guaiacum officinale L., Cimicifuga racemosa L., Hemidesmus Indicus L., and Lirio dendron L.		Significant mild analgesic effect	88

3. Conclusion

Herbal remedies have gained significant attention as a natural treatment option for arthritis, offering an alternative to traditional synthetic pharmaceuticals that may have adverse effects. The therapeutic benefits of many herbal remedies in arthritis treatment have been validated through clinical research and pharmacological studies. Further

investigation and development of herbal therapies could potentially lead to the discovery of new treatment agents for arthritis, highlighting the importance of exploring these natural remedies as a promising avenue for managing this debilitating condition.

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