



## A REVIEW ON PLANTS HAVING ANTI-ARTHRITIC POTENTIAL

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### ABSTRACT

Arthritis is an chronic, inflammatory, systemic autoimmune disease characterized by pain, swelling and stiffness. Allopathic medications have been prescribed to alleviate symptoms of this disease which results into associated side effects like gastrointestinal bleeding and bone loss (osteoporosis). The use of herbal medicine becoming popular due to toxicity and side effects of allopathic medicines. Medicinal plants play an important role in the development of potent therapeutic agents. In this review an attempt has been done to highlight the work on medicinal plants having Anti-arthritic potential. The present paper also involves various plant drugs along with their chemical constituents and pharmacological profile which focus on the dose administered, bioactive extract involved in anti-arthritic mechanism. This work stimulates the researchers for further research on the potential use of medicinal plants having anti-arthritic property.

**Keywords:** Arthritis, inflammatory, extract, medicinal plants.

### INTRODUCTION

Arthritis is an auto immune disorder characterized by pain, swelling and stiffness. Its prevalence depends upon age. It is an inflammation of synovial joint due to immunomediated response<sup>1</sup>. Rheumatoid arthritis has 19th century roots and a 20th century pedigree. Although its name was introduced in the 1850s. Rheumatoid arthritis is characterised by persistent synovitis, systemic inflammation and autoantibodies (particularly to rheumatoid factor and citrullinated peptide)<sup>2</sup>.

Rheumatoid arthritis (RA) is a chronic, inflammatory, systemic autoimmune disease that affects about 1% of the general population in Western countries and is two to three times more common in women than in men<sup>3</sup>. It is characterized by both local and systemic inflammation with elevated plasma concentration of pro-inflammatory cytokines, such as interleukins-6 (IL-6), interleukin 1b (IL-1b), tumor necrosis factor-alfa (TNF-a), and acute phase proteins.

Conventional treatments for RA, including Non-steroidal Anti-inflammatory Drugs (NSAID's), disease modifying anti-rheumatoid drugs (DMARD's) and corticosteroids, aim to reduce the patient's pain and joint inflammation, minimize loss of function and decrease the progression of joint damage. However, such treatments are rarely totally effective and some pharmacological therapies have the potential to cause side effects<sup>4</sup>. All anti inflammatory drugs are not anti-arthritic because it does not suppress T-cell and B-cell mediated response<sup>1</sup>. Rheumatoid arthritis is associated with poor nutritional status in relation to various nutrients due to not only because of increased requirements and reduction in their absorption but also due to NSAID's, DMARD's and corticosteroids prescribed to alleviate symptoms of this disease<sup>4</sup>.

**Table 1:** Showing toxicities of allopathic anti-rheumatic drugs<sup>5</sup>

SR. NO.	DRUG	TOXICITIES
1	Methotrexate (DMARD's)	Stomatitis, rash, alopecia, infrequent myelosuppression, hepatotoxicity, rare but potentially life-threatening pulmonary toxicity
2	Oral Gold Salts	Diarrhoea
3	Injectable Gold Salts	Stomatitis, myelosuppression, Rash, thrombocytopenia
4	Cyclosporine	Renal impairment, hypertension, gingival overgrowth
5	D-penicillamine	Rash, stomatitis, dysgeusia, proteinuria, myelosuppression
6	Nonsteroidal Antiinflammatory Drugs	Gastrointestinal symptoms (Indigestion, ulceration, hemorrhage, stomatitis); renal abnormalities; pulmonary neurological abnormalities; dermatologic abnormalities; hematologic abnormalities; hepatic abnormalities; displacement of protein-bound drugs; possible systemic complications

### NEED FOR NATURAL SOURCES AS AN ANTI-ARTHRITIC AGENT

Natural products from plant, animal and minerals have been the basis of the treatment of human disease. Today estimate that about 80 % of people in developing countries still relays on traditional medicine based largely on species of plants and animals for their primary health care. The use of herbal medicine becoming popular due

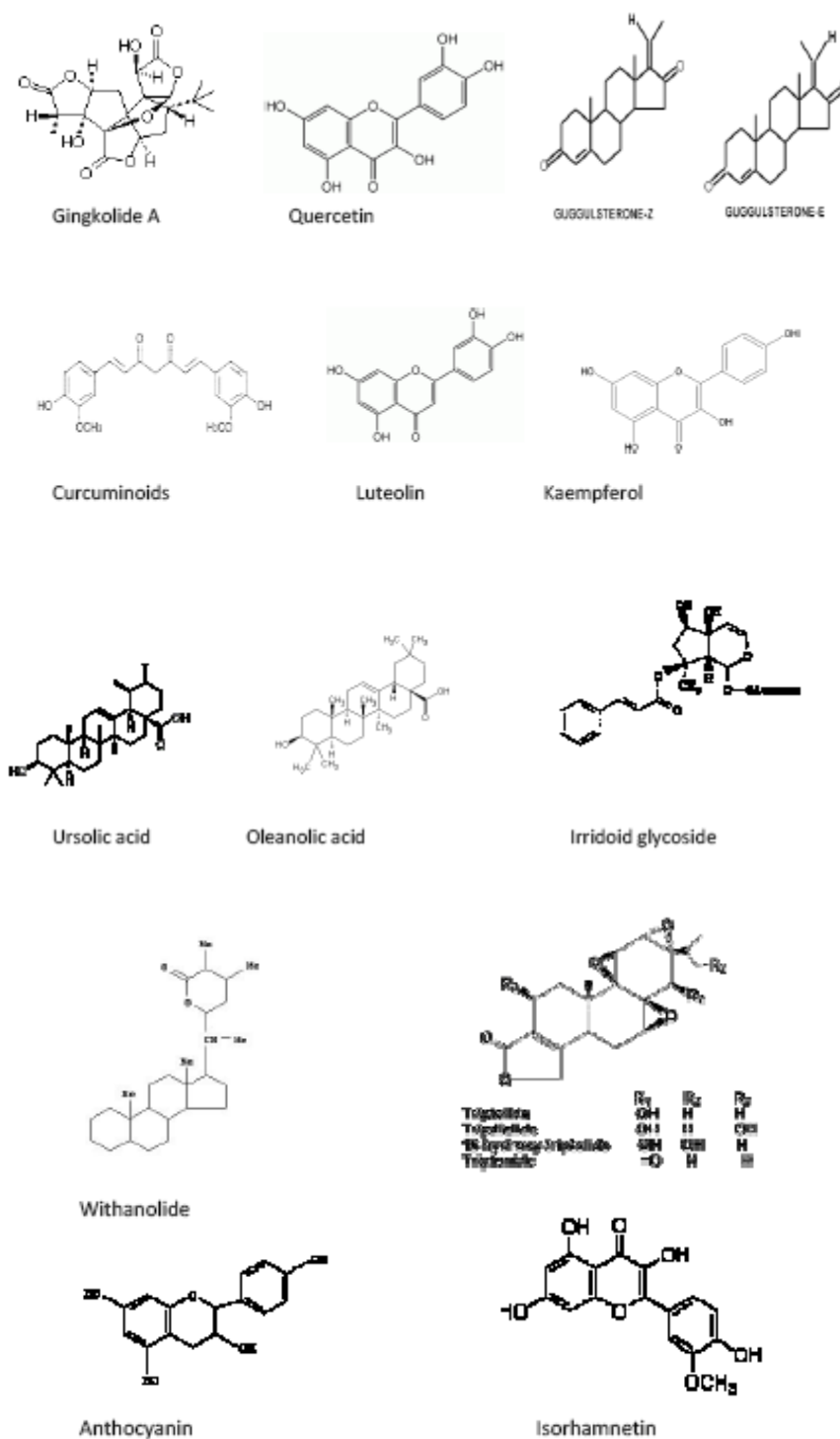


to toxicity and side effects of allopathic medicines. Medicinal plants play an important role in the development of potent therapeutic agents. There are over 1.5 million practitioners of traditional medicinal system using medicinal plants in preventive, promotional and curative applications<sup>6</sup>.

Agents derived from plants (table 2 & 3) that can modulate the expression of pro-inflammatory signals

clearly have potential against arthritis. These include flavonoids, terpenes, quinones, catechins, alkaloids, anthocyanins and anthoxanthins, all of which are known to have anti-inflammatory effects. Some of these polyphenols which have been tested for the treatment of arthritis are discussed below<sup>38</sup>. The chemical structures of these agents are shown in figure 1.

**Figure 1:** Chemical structures of various phytoconstituents



**Table 2:** A brief description of common anti-arthritic plants<sup>10-39</sup>

S. NO.	BOTANICAL/FAMILY NAME	COMMON NAME	PART USED	CHEMICAL CONSTITUENTS	OTHER BIOLOGICAL ACTIVITIES
1	<i>Cissampelos pareira</i> , Menispermaceae	Velvet-Leaf Pareira	Root	Alkaloid (beberine)	Neuromuscular- blocking agents
2	<i>Allium</i> genus, Liliaceae	Allium	Bulbs	Sulphurous constituents	Antibiotic, anti-inflammatory antibacterial, antisclerotic, anticoagulant, antiasthmatic, expectorant, carminative
3	<i>Aloe vera</i> , Liliaceae	Aloe	Gel from plant	Anthraquinone glycosides	Purgative
4	<i>Anisomeles malabarica</i> , Labiatae	Malabar catmint	Leaves	Steroid, flavonoid and terpenoid	Antipyretic, diaphoretic, antiperiodic, emmenagogue
5	<i>Aralia elata</i> , Araliaceae	Japanese Angelica-tree	Leaves, flowers	Triterpenoids, congmyanosides	Cytotoxic
6	<i>Camellia sinensis</i> , Theaceae	Tea	Leaves	Kaempferol, Caffeine, quercetin, flavonoids,	Stimulant, diuretic
7	<i>Buchanania lanzan</i> , Anacardiaceae	Almondette tree	Kernel, Leaves, flowers	Triterpenoids, saponins, tannins flavonoids	Laxative, febrifuge
8	<i>Artocarpus</i> genus	Artocarpus	Fruits, leaves	Flavonoids, lectin stilbenoids, arylbenzofurans	Antibacterial, antitubercular, antiviral
9	<i>Withania somnifera</i> , Solanaceae	Winter Cherry	Root	Alkaloids including withanine, withananine, withananine, pseudo-withanine, somnine, somniferine, somniferine	Sedative and hypnotic in anxiety neurosis
10	<i>Boswellia carterii</i> , Burseraceae	Frankincense	Gum-resin	Triterpenes of oleanane, ursane and euphane series	Antiseptic, antiinflammatory, antiatherosclerotic, analgesic emmenagogue
11	<i>Calotropis procera</i> , Asclepiadaceae	Swallow-Wart	Seed, root, leaves	Benzoyllineolone, benzolisolineolone	Used against bronchial asthma
12	<i>Comarum palustre</i> , Rosaceae	Purple Marshlocks	Rhizome	Proanthocyanidins	Useful in tumors
13	<i>Curcuma longa</i> , Zingiberaceae	Turmeric	Rhizome	Curcuminoids, flavonoids	Antioxidant, antiinflammatory, gastroprotective and hepatoprotective
14	<i>Zingiber officinale</i> , Zingiberaceae	Ginger	Rhizome	Monoterpenes, mainly geranial and neral; and sesquiterpenes	Antiemetic, antifatulent, hypocholesterolaemic, anti-inflammatory, antispasmodic
15	<i>Eugenia caryophyllata</i> , Myrtaceae	Clove	Flower buds	Eugenin, triterpene acids, crategolic acid and steroid glucosides	Carminative, antibacterial, antiinflammatory
16	<i>Ginkgo biloba</i> , Ginkgoaceae	Living Fossils	Leaves	Ginkgo flavone glycosides, terpenoids (ginkgolides and bilobalide)	Memory deficits, disturbance in concentration, depressive emotional conditions
17	<i>Harpagophytum procumbens</i> , Pedaliaceae	Devils claw	Root	Iridoid glycosides	Antioxidant
18	<i>Leucas aspera</i> , Labiatae	White Dead Nettle	Leaves, flowers	Oleanolic acid, ursolic acid and beta-sitosterol, triterpenoid, leucolactone	Carminative, antihistaminic, antipyretic, febrifuge, antiseptic
19	<i>Kalopanax pictus</i> , Araliaceae	Prickly Castor-oil tree	Leaves, flowers	Saponins and phenol compounds	Anti-diabetic effect
20	<i>Merremia tridentate</i> , Convolvulaceae	Merremia	Root	Flavonoids, diosmetin, luteolin	Urinary infections and general debility apart from being a good laxative and astringent
21	<i>Ocimum sanctum</i> , Labiatae	Holy Basil	Leaves, flowers	Essential oil, ursolic acid, apigenin, luteolin	Carminative, stomachic, antispasmodic, antiasthmatic
22	<i>Citrus aurantium</i> , Rutaceae	Orange	Fruits, leaves	Alkaloid synephrine and N-methyltyramine	Laxative, feeble stomachic, emmenagogue
23	<i>Psammosilene tunicoides</i> , Caryophyllaceae	Psammosile	Roots	Saponins	Antiinflammatory
24	<i>Semecarpus anacardium</i> , Anacardiaceae	Marking-Nut	Fruits	Biflavonoids including tetrahydrobustaflavone, tetrahydroamentoflavone and anacardoflavanone; nallaflavone; anacardic acid; aromatic amines and bhillawanol	Caustic, astringent, antitumour
25	<i>Smilax corbularia</i> , Liliaceae	Smilax	Rhizome, roots	Saponins	Alterative, antiinflammatory
26	<i>Tripterygium wilfordii</i> , Celastraceae	Thunder God vine	Leaves, flowers	Diterpenoids, including triptolide and triptolidide	Against solid tumors
27	<i>Uncaria tomentosa</i> , Rubiaceae	Cats claw	Leaves	Flavonoid, alkaloids	Against asthma, stomach ulcers
28	<i>Vitex negundo</i> , Verbenaceae	Five-leaved Chaste tree	Leaves	Iridoid glycosides, isomeric flavanones	Anti-inflammatory, analgesic
29	<i>Commiphora mukul</i> , Burseraceae	Gum Guggul	Oleo-gum-resin	Steroids guggulsterones Z and E, guggulsterols I-V, diterpenoids; volatile oil, terpene hydrocarbon	Hyperlipidemia
30	<i>Vitis vinifera</i> , Vitaceae	Wine Grape	Fruits	Flavonoids, tannins, tartrates, inositol, carotenes, choline and sugars	Used in prescriptions for cough, respiratory tract catarrh

**Table 3:** Pharmacology of some anti-arthritic plants<sup>40-49</sup>

SR. NO.	PLANT/FAMILY NAME	EXTRACT	DOSE (mg/Kg)	ANTI-ARTHRITIC SCREENING MODEL	RESULT OF STUDY
1	<i>Ammania baccifera</i> , Lythraceae	Alcoholic, aqueous	250-500	Cotton pallet granuloma test, Adjuvant arthritis	In both the inflammatory models alcoholic extracts show more potency than the aqueous extracts in terms of percentage of inhibition of inflammation
2	<i>Daucus carota</i> , Umbelliferae	Ethanollic	100-400	Formaldehyde induced arthritis in rats	Extract shows antiinflammatory effect
3	<i>Cleome gynandra</i> , Capparidaceae	Ethanollic	150	Adjuvant induced arthritis in rats	Extract suppresses the development of chronic arthritis induced by Freund's adjuvant
4	<i>Cyperus rotundus</i> , <i>C. esculentus</i> Cyperaceae	Essential oil	250-500	Formaldehyde induced arthritis in rats	Oil possess significant antiinflammatory properties
5	<i>Hybanthus enneaspermus</i> , Violaceae	Alcoholic, aqueous	500	Adjuvant induced arthritis in rats	Extract possesses potentially useful anti-arthritic activity since it give a positive result in controlling inflammation in adjuvant induced arthritic model in rats
6	<i>Piper nigrum</i> , Piperaceae	Alcoholic	100	Carrageenan induced arthritis in rats	Piperine has antiinflammatory, antinociceptive and anti-arthritic effects in an arthritis animal model
7	<i>Premna serratifolia</i> , Verbenaceae	Ethanollic	300	Adjuvant induced arthritis in rats	Ethanol extract of wood possess a significant anti-arthritic activity against adjuvant induced arthritis
8	<i>Syzygium cumini</i> , Myrtaceae	Methanollic	500	Adjuvant induced arthritis in rats	Extract shows significant anti-arthritic properties
9	<i>Sida rhombifolia</i> , Malvaceae	Petroleum ether, chloroform, ethyl acetate, aqueous	30, 100	Adjuvant induced arthritis in rats	Polar constituents (ethanol and aqueous extracts) of the plant <i>S. rhombifolia</i> were useful in the treatment of arthritis
10	<i>Strychnos potatorum</i> , Loganiaceae	Aqueous	200	Adjuvant induced arthritis in rats	Extract significantly normalize the haematological and biochemical abnormalities in adjuvant induced arthritic rats in both developing and developed phases of FCA (Freund's complete adjuvant) induced arthritis

### CHEMISTRY OF ANTI-ARTHRITIC PLANTS<sup>10-39</sup>

Wide ranges of phytoconstituents were responsible for anti-arthritic activity includes alkaloids, glycosides, tannins, phenolics, anthocyanins, sterols, triterpenoids etc. These phytoconstituents present in plant exert desired pharmacological effect on body and thus act as natural anti-arthritic agents.

### PHARMACOLOGICAL ACTIVITIES<sup>40-49</sup>

Natural anti-arthritic agent's acts by suppressing the various types of inflammatory mediators involved in inflammation process. *Ammania baccifera*, *Daucus carota*, *Cleome gynandra*, *Cyperus rotundus*, *Hybanthus enneaspermus*, *Piper nigrum*, *Premna serratifolia*, *Syzygium cumini*, *Sida rhombifolia*, *Strychnos potatorum* etc are capable of inhibiting inflammatory process in various pharmacological screening models like Freund's adjuvant arthritis model in rats, Formaldehyde induced arthritis in rats, Carrageenan induced arthritis in rats, Cotton pallet granuloma test.

### CONCLUSION

Plants have been a prime source of highly effective conventional drugs for the treatment of many forms of arthritis. From the above review it should be evident that

there are many medicinal plants which exert anti-arthritic activity at a particular dose. This review makes an attempt to give scientific account of use of valuable medicinal plants extracts in arthritis.

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