



Medicinal Plants used for Rheumatoid Arthritis [A review]

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Abstract

Rheumatoid Arthritis (RA) is a typical fiery immune system ailment ordered by the synovitis of both little and huge joints, which may prompt the harm of ligament and bones causing huge incapacities because of decimation of bones surfaces, whenever left untreated. It is a multifactorial and heterogeneous sickness having commitment of both hereditary (50-60%) and natural variables. The ignorance of overall population may be a contributing component in the high predominance pace of RA around the world. This review article centers around the causing factors (hereditary qualities and natural) associated with this staggering ailment. We likewise gave brief diagram of the treatment alternatives and creature models of RA. The writing was investigated utilizing network terms in PubMed search "etiology of RA, hereditary qualities of RA, ecological elements in RA, Genome Wide Association Studies (GWAS) in RA". The information was completely looked into and exhaustive data was removed to help the per users in improving comprehension towards the systems, which trigger the results of RA. The more we increment mindfulness about RA, the better we deal with this illness and subsequently can improve way of life and financial status.

Keywords: Rheumatoid Arthritis; Etiology; Genetic Factors; Medicinal Plants

Introduction

The word joint pain implies aggravation of the joint ("artho" which means joint and "itis" which means irritation). Rheumatoid joint pain (RA) is an attacking fiery and immune system disease that influences the joints. Despite the fact that its motivation is as yet obscure. With RA, irritation shows in the covering of the joints causing torment, expanding, joint harm and

disfigurement. It can incidentally include other inner organs, for example, the nerves, eyes, lungs or heart. The soonest indications of RA can be vague, remembering feeling unwell or tired irritation for or around joints, second rate fever, and weight reduction/helpless hunger. Over the long haul, RA can include an ever increasing number of joints on the two sides of the body, regularly in an "even" design. Albeit different medications have been utilized to control RA, there are various reports with respect to the reactions of these medications. A scope of more current medications called TNF blockers have been connected to a condition called leukocytoclastic vasculitis, or LCV.

Joint pain, for the most part irritation of joints is a one of the most established realized ailments happening nearly in all age gatherings. In India, more than about 20% of absolute populace is experiencing joint pain (Anjum & Abbas, 2015; Patwardhan, Bodas, & Gundewar, 2010). Rheumatoid Arthritis (RA) is a ceaseless immune system sickness of obscure etiology, described by joint synovial irritation and dynamic ligament and bone annihilation bringing about steady stability (Harris Jr, 1990; Khan et al., 2014). RA isn't related with variables, for example, maturing. RA happens when the body's insusceptible framework glitches, assaulting solid tissue and causing aggravation, which prompts torment and growing in the joints, and may inevitably cause perpetual joint harm and agonizing inability. The essential side effects of RA incorporate dynamic fixed status and torment, particularly toward the beginning of the day, with long haul victims encountering consistent joint annihilation for the rest of their lives. There is no known solution for RA. When the malady is analyzed, treatment is recommended to mitigate manifestations as well as to slow or stop illness movement. RA is related with an overwhelming weight on society regarding handicap and wellbeing and financial expenses. Since RA will in general be dynamic in nature, including an exacerbating of side effects after some time, and frequently starts for some individuals during the early or center long stretches of life, the ailment regularly has a drawn out effect on working (more than 30 years for some people), which means a significant social and monetary expense.

Those medicinal plants which have best antioxidant properties are the best for arthritis (S. Abbas, Ahmad, Sabir, & Shah, 2014; S. R. Abbas, Sabir, Ahmad, Boligon, & Athayde, 2014; Fatima et al., 2020).

It was first found in early Native American populace a few thousand years back however may have showed up in Europe after seventeenth century (Firestein, 2003). Master incendiary cytokines, for example, tumor putrefaction factor- α (TNF- α), interleukin (IL)- 1β , and IL-6 are significant arbiters of the ailment propagation (Rathore, Mahdi, Paul, Saxena, & Das, 2007). The joint inflammation normally starts in the little joints of the hands and the feet, spreading later to the bigger joints, the kindled joint covering or synovial broadens and afterward disintegrates the articular ligament and bone, causing joint distortion and dynamic physical incapacity. Extra-articular highlights incorporate knobs, pericarditis, pneumonic fibrosis, fringe neuropathy and amyloidosis (Mathers & Pflieger, 2006).

Effect of medicinal plants on rheumatoid arthritis

Provocative and joint conditions are among those treated utilizing customary cures, with impressive achievement. Constant provocative sicknesses including rheumatoid joint pain are as yet one of the fundamental medical issues of the total populace. Albeit a few current medications are utilized to treat these sorts of issues, their delayed use may cause extreme unfriendly symptoms on ceaseless organization, the most widely recognized being gastrointestinal draining and peptic ulcers. Thus, there is a need to grow new calming operators with least symptoms. It is

beneficial to take note of that the majority of the current day pain relieving drugs likewise apply a wide scope of symptoms.

A large portion of the ancestral individuals despite everything rely upon nearby restorative plants for the treatment of various illnesses utilizing the information on home grown treatment they have acquired from their ancestors. Be that as it may, this ethno–restorative information and furthermore the therapeutic plants are exhausting at a disturbing rate because of accessibility of current clinical offices and other financial components (S. Sabir et al., 2020; S. M. Sabir et al., 2019; Zaman et al., 2018). Then again, this information is important in scanning new medication for human government assistance. As of late enthusiasm for home grown prescriptions has expanded extensively both at home and abroad as they are accepted to be similarly less harmful than the artificial materials.

Causes

Joint pain includes the breakdown of ligament. Ligament ordinarily secures a joint, permitting it to move easily. The procedure creates a provocative reaction of the synovial (sinusitis) auxiliary to hyperplasia of synovial cells, abundance synovial liquid, and the improvement of sheets in the synovial. The pathology of the infection procedure frequently prompts the decimation of articular ligament and alkalosis of the joints. Rheumatoid joint inflammation can likewise create diffuse irritation in the lungs, pericardium, pleura, and sclera, and furthermore nodular injuries, generally normal in subcutaneous tissue. In spite of the fact that the reason for rheumatoid joint inflammation is obscure, autoimmunity assumes an urgent job in the two its chronicity and movement, and RA is viewed as a foundational immune system ailment.

Epidemiology

About 1% of the total populace is tormented by rheumatoid joint pain, ladies’ multiple times more frequently than men. (Majithia & Geraci, 2007). Joint inflammation speaks to one of the most common interminable medical issues and is a main source of incapacity. Joint pain influenced 43 million U.S. grown-ups in 2002 and constantly 2020, this number is relied upon to arrive at 60 million. Asif et., al (2011) is up to multiple times more typical in smokers than non-smokers, especially in men, substantial smokers, and the individuals who are rheumatoid factor positive. An examination in 2010 found that the individuals who drank unobtrusive measures of liquor normally were multiple times less inclined to get rheumatoid joint pain than the individuals who never drank Symptoms and determination (Asif et al., 2011).

The unavoidable idea of joint inflammation indications and their impact on physical, social and word related exercises can be disheartening, bringing about mental sequelae, for example, nervousness, misery and weakness (Asif et al., 2011).

RA can be difficult to distinguish on the grounds that it might start with unpretentious side effects, for example, pain-filled joints or a little solidness. The solidness found in dynamic RA.

Table 1: Medications available for treatment of rheumatoid arthritis

Treatment	Drugs
Over The Counter	Acetaminophen (Tylenol), Aspirin, ibuprofen, or naproxen

Disease-modifying anti-rheumatic drugs (DMARDs)	Methotrexate, gold salts, penicillamine, sulfasalazine, and hydroxychloroquine. Common combinations of DMARDs include methotrexate – hydroxychloroquine, methotrexate – sulfasalazine, sulfasalazine – hydroxychloroquine, and methotrexate – hydroxychloroquine – sulfasalazine.
Nonsteroidal anti-inflammatory drugs (NSAIDs)	Paracetamol, ibuprofen, naproxen, meloxicam, etodolac, nabumetone, sulindac, tolemin, choline magnesium salicylate, diclofenac, diflusal, indomethicin, ketoprofen, oxaprozin, and piroxicam.
Biological agents	Tumor necrosis factor alpha (TNF α) blockers –etanercept (Enbrel), infliximab (Remicade), adalimumab (Humira), certolizumab pegol (Cimzia), golimumab (Simponi) Monoclonal antibodies against B cells – rituximab (Rituxan)

Generally, over-the-counter medications are recommended first:

- Acetaminophen (Tylenol) is usually tried first. It is advisable not to take more than the recommended dose or do not take the drug along with a lot of alcohol. Doing so may damage liver.
- Aspirin, ibuprofen, or naproxen are nonsteroidal anti-inflammatory drugs (NSAIDs) that can relieve arthritis pain. However, they have many potential risks, especially if used for a long time. Potential side effects include heart attack stroke, stomach ulcers, bleeding from the digestive tract, and kidney damage.

Surgery and Other Treatments

Now and again, medical procedure might be done if different medicines have not worked. This may include:

Arthroplasty to remake the joint

Joint substitution, for example, a complete knee joint substitution

Table 2: List of plant species and their families, constituents/isolated compounds, therapeutic uses and parts used in pain-inflammatory disorders including rheumatoid arthritis.

Sr. No.	Biological Source	Part Used	Active Ingredient	Therapeutic Uses	Extract	Reference
1	Annona montana (Annonaceae)	Leaves, fruit, seeds, bark, roots	Cyclomontanins A-D (1-4), annomuricatin C (5), and (+)-corytuberine	Anti-rheumatic, anthelmintic, anticonvulsant, antidepressant, antimicrobial, antineoplastic, antiparasitic, antispasmodic, antiviral, astringent, cardiodepressant, cytostatic, cytotoxic, febrifuge, hypotensive, insecticide, nervine, pectoral, sedative, stomachic, vasodilator, Vermifuge	Methanol	(Chuang et al., 2008)
2	Abrus precatorius (Fabaceae/ Leguminosae)	Fresh leaves	Triterpenoids (abrusosides A-D)	Colds, cough, convulsion, conjunctivitis and ulcers by traditional healers	Methanol	(Garan iya & Bapodra, 2014)

3	<i>Aristolochia bracteolata</i> (Aristolochiaceae)	Whole plant	Ceryl alcohol, β -sitosterol, aristolochic acid, alkaloid, myristic, palmitic, stearic, lignoceric, oleic and aristolochic acid, aristolochic acid aristolactam a nitrogen containing compound and magnoflorine	Anthelmintic, fever, purgative and painful joints.	Petroleum Methanol	(Choi, Hussain, Pezzuto, Kingborn, & Morton, 1989)
4	<i>Alpinia conchigera</i> Griff. (Zingiberaceae)	Rhizomes	Galangolflavonoid, 1'-S-1'-acetoxychavicol acetate, 1'-acetoxychavicol acetate (galangal acetate), β -Sitosterol diglucoside (AG-7) and β -sitosteryl Arabinoside	Analgesic and anti-inflammatory	Ethanol	(Sulaiman et al., 2010)
5	<i>Alchornea</i> (Euphorbiaceae)	Leaf	Tannins, phenolic acids: gallic acid, ellagic acid, protocatechic acid, flavonoids: quercetin, hyperin and guaijaverin and an alkaloid: triisopentenylguanidine	Anti-inflammatory: chancres, yaws wounds, cicatrization, ulcers, caries, toothache, gum inflammation and conjunctivitis	Aqueous decoction and methanol extract	(Manga, Brkic, Marie, & Quetin-Leclercq, 2004)
6	<i>Asparagus</i> (Liliaceae)	Roots, Leaves, flowers and fruits	Steroidal glycosides including shatavarins I-IV, diosgenin and various sterols, alkaloid asparagine A, flavonoids: quercetin, rutin and hyperoside, an isoflavone, and a mucilage	Ulcerogenesis, antioxidant, treatment of thirst, fainting, dyspnoea, and gout	Methanol	(Alok et al., 2013)
7	<i>Anacardium</i> (Anacardiaceae)	Leaves	Myricetin, quercetin, kaempferol, apigenin and glycosides	Diarrhoea, diabetes, swelling, skin diseases, mouth ulcers, anti-inflammatory	Ethanol extract and its petroleum ether, solvent ether, ethyl acetate, butanol and butanone fraction	(Patil, Jalalpur, Pramod, & Manvi, 2003)
8	<i>Azadirachta</i> (Meliaceae)	Leaf	alkaloids, flavonoids, triterpenoids, phenolic compounds, carotenoids, steroids and ketones	Anti-inflammatory, antipyretic, antimalarial, antitumour, antiulcer, antidiabetic, antifertility	hydro-alcoholic extract, ethyl acetate and n-butanol fractions	(Jagadeesh, Srinivas, & Revankar, 2014)
9	<i>Allium cepa</i> (Liliaceae)	Bulbs	Organic sulfur compounds, including trans-S-(1-propenyl) cysteine sulfoxide, S-methyl-cysteine sulfoxide, S-propylcysteine sulfoxide and cycloalliin; flavonoids; phenolic acids; sterols including cholesterol, stigma sterol, β -sitosterol; saponins; sugars and a trace of volatile oil composed mainly of sulfur compounds, including dipropyl disulfide, fructans	Antimicrobial, anti-inflammatory	Petroleum ether, methanol and aqueous extracts	(Kapoor, 2000)
10	<i>Antrodia</i> (Fomitopsidaceae)	(Fungus) Fruiting bodies	Antrocamphin A, ergostane-type triterpenoids and polyacetylenes	Cancer, inflammatory disorders and antioxidant	Methanol extract	(Wen et al., 2011)
11	<i>Butea frondosa</i> (Fabaceae)	Roots Leaves	Flavonoids, glucosides and lectins	Anti-inflammatory	Aqueous extract	(Mengi & Deshpande, 2003)

						ande, 1995)
12	Barringtonia (Lecythidaceae)	Fruits, leaves	Diterpenoids and triterpenoids, lycopene, bartogenic acid	Anti-inflammatory, anti-tumor, anti-nociceptive, α -glucosidase inhibitory, anti-bacterial and anti-fungal	Hexane,	(Gowri, Tiwari, Ali, & Rao, 2007)
13	Boswellia serrata Roxb. (Bursaceae)	Oleogum resin	Resin which is pentacyclic triterpenoid in nature in which boswellic acids (β -boswellic acid, acetyl- β -boswellic acid, keto- β -boswellic acid and acetyl-11-keto- β -boswellic acid)	Cancer, inflammation, arthritis, asthma, psoriasis, colitis and hyperlipidemia	Petroleum ether	(Sharma et al., 2010)
14	Borassus	Male	Alkaloids, terpenoids, spirostane-type steroid saponins and phenolic compounds	Anti-inflammatory, anti-laprotic, diuretic, antiphlogistic, stomachic, sedative, laxative, aphrodisiac, immunosuppressant	Ethanol	(Hafiz & Rosidah, 2016)
15	Aegle marmelos (Rutaceae)	Roots,	Glycoside, alkaloids, coumarins, fatty acid and sterols, tannins, skimmianine, essential oil (mainly caryophyllene, cineole, citral, eugenol), sterols and or triterpenoids, including lupeol, β -sitosterol and α -amyrin, flavanoids (mainly rutin) and coumarins, including aegeline, marmesin and umbelliferone	Vata diseases, insomnia, seizures, and hysteria, for diarrhoea, dysentery, colitis, loss of appetite and abdominal dull pain, anti-inflammatory	Aqueous	(Benni, Jayanthi, & Suresha, 2011)
16	Commiphora (Bursaceae)	Stem	Guggulsterones (E- and Z-stereoisomers) and guggulipid	Arthritis, obesity, and other disorders	Ethyl acetate	(Mesrobian, Nesbitt, Misra, & Pandey, 1998)
17	Calluna (Ericaceae)	Aerial parts	Kaempferol-3-O- β -D-galactoside, a common flavonol derivative	Anti-inflammatory and antinociceptive, antirheumatic, diuretic, astringent and treatment of urinary infections	Ethanol, and water, methanol	(Orhan, Küpeli, Terzioğlu, & Yesilada, 2007)
18	Cistus (Cistaceae)	Leaves	Favonoids; 3-O-methylquercetin (1), 3,7-O-dimethylquercetin (2) and 3,7-O-dimethylkaempferol	Inflammatory ailments including rheumatism and renal inflammations	Ethanol	(Küpel & Yesilada, 2007)
19	Cardiospermum helicacabum (Sapindaceae)	Leaves	Saponins, alkaloids, (+)-pinitol, apigenium, luteolin and chrysoeriol.	Anti-inflammatory activity	Alcoholic	(Gopalakrishnan, Dhanaanjayan, & Kameswaran, 1976)
20	Cyperus	Tubers	β -sitosterol, 1,8-cineole, 4- α ,5- α -oxidoeudesm-11-en-3- α -ol, alkaloids, α -cyperone, α -rotunol, beta-cyperone, beta-pinene, beta-rotunol, beta-selinene, calcium, camphene, copaene, cyperene, cyperenone, cyperol, cyperolone cyperotundone D-copadiene, D-	Anti-inflammatory, cervical cancer, liver, menstrual disorders, menstrual pain, as a digestive stimulant and for memory	Methanol	(Chatterjee & Pal, 1984)

			epoxyguaiene, D-fructose, D-glucose, flavonoids, gamma-cymene, isocyperol, isokobusone, kobusone, limonene, linoleic-acid, magnesium, manganese, mustakone, myristic-acid, oleanolic-acid, oleanolic-acid-3-o-neohesperidoside, oleic-acid, P-cymol, patchoulenone, pectin, polyphenols, rotundene, rotundenol, rotundone, selinatriene, stearic acid, sugeonol, sugetriol			
21	Cleome (Capparidaceae)	Aerial parts	Alkaloids, steroids, flavonoids	Stimulant, antiscorbutic, anthelmintic, vesicant, rubifacient, carminative, antiplasmodial, analgesic, locomotor, antimicrobial, diuretic, laxative	90% Ethanol, petroleum ether, diethyl ether and ethyl acetate	(Chakraborty & Roy, 2010)
22	Callophyllum innophyllum (Clusiaceae)	Nuts	Xanthone dehydrocylogua-nadine, callophillin-B	Anti-inflammatory	Methanol	(Shah et al., 2006)
23	Ficus religiosa (Moraceae)	Leaves,	Sterols, glycosides, tannins and amino acids	Laxative, diarrhoea, asthma, cough, earache, toothache,	Methanol, Aqueous	(Kaur, Rana, Tiwari, Sharm a, & Kumar, 2011)

Conclusion

An enormous number of number of plants depicted in this survey unmistakably exhibited the significance of home grown plants in treatment of rheumatoid joint pain and furthermore to think about one of good hotspot for another medication or a lead to make another medication.

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