

Anti-Arthritic and Anti-Inflammatory Constituents from Medicinal Plants

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ABSTRACT

Inflammatory arthritis is a common problem observed in elderly people. Nearly one fifth of the world population suffers from this debilitating disease. Traditional medicines like Siddha, Ayurveda, Unani and Chinese medicines have mentioned few herbal drug remedies for arthritis but lack in providing scientific evidence of therapeutic benefits. However, past few decades showed great achievements in the herbal drug standardization due to the development in modern chromatographic techniques. Numbers of plants are studied extensively for their traditional claim with respect to the chemical constituents and extraction techniques. These anti-inflammatory drugs are commercialized as herbal medicines after standardizing the extracts from natural sources. In this article, we made an attempt to summarize the medicinal plants screened for arthritis with respect to the chemical constituents and therapeutic moieties.

INTRODUCTION

One fifth of the world's elderly suffer with arthritis yet the issues they face get little attention and remedy other than some symptomatic relief from the pain. Arthritis means joint inflammation; it is a chronic, progressive and disabling autoimmune disease. The disease mostly affects the ageing population although it can affect anyone with malfunctioning immune system or genetic degenerative bone disorder. Arthritis can progress very rapidly causing swelling and damaging cartilage and bone around the joints. Any joint may be affected but it is commonly the hands, feet and wrists. It is a systemic disease which means that it can affect the whole body and internal organs (although this is not the case for everyone with rheumatoid arthritis) such as the lungs, heart and eyes (Hegan *et al.*, 2008; Murugananthan *et al.*, 2011). Arthritis can cause severe disability and ultimately affects a person's ability to carry out everyday tasks. Any part of the body can become inflamed or painful from arthritis. The two most-common types of arthritis are osteoarthritis and

rheumatoid arthritis. Osteoarthritis is a degenerative joint disease, resulting from the wear and tear from day to day life. It leads to pain, tenderness, swelling, and decreased function of joints. The joints most often affected by osteoarthritis are knees, hips, hands, and spine. Rheumatoid arthritis is an autoimmune disease that occurs when the body's own immune system mistakenly attacks the synovium (cell lining inside the joint). It causes joint pain, stiffness, swelling, and loss of joint function. Fortunately, nature has a remedy for this condition and there are a number of herbs that work synergistically to reduce chronic joint inflammation, such as osteoarthritis and rheumatoid arthritis (Bang *et al.*, 2009). Herbs can be of great value when used in a program of health care and highly effective preventive medicine when compared to expensive synthetic drugs. The WHO notes that from 119 plant-derived pharmaceutical medicines, about 74% are used in modern medicine in ways that correlated directly with their traditional uses as plant medicines by native cultures. Major pharmaceutical companies are currently conducting extensive research on plant materials gathered from the rain forests and other places for their potential medicinal value. About 25 percent of today's prescription drugs are at least partially derived from plants (Hegan *et al.*, 2008).

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In this article, an attempt was made to elaborate the isolated constituents from plant origin, which showed promising activity against different inflammatory and arthritis conditions. These plant constituents act by different mechanisms such as suppression of immune system and control of inflammation to

bring relief to arthritic conditions. Research finding published by researchers from 2000 to 2012 on isolated constituents were compiled. Comprehensive literature review was carried out using Pubmed, Google Scholar, Chemical abstracts, as well as the journals.

Table. Anti-Arthritic and Anti-Inflammatory Constituents from Medicinal Plants.

Plant Name	Plant Part/ Extraction	Bioactive compound	Ref
<i>Lindera aggregata</i>	Dry roots	Norisoboldine (NOR)	(Wei <i>et al.</i> , 2012)
<i>Salvia miltiorrhiza</i>	Inflorescence	Cryptotanshinone (CT)	(Zheng <i>et al.</i> , 2011)
<i>Siegesbeckia orientalis</i>	Ethanol extract	Kirenol	(Wang <i>et al.</i> , 2011)
<i>Olea europaea</i>	Fruit/ compression-extracted oil	Omega-3 fatty acid	(Wardhana <i>et al.</i> , 2011)
<i>Coptidis rhizoma</i>	Roots & Rhizomes	Berberine	(Wang <i>et al.</i> , 2011)
<i>Poria cocos (saprophytic fungus)</i>	Sclerotium	Triterpenoids	(Rios <i>et al.</i> , 2011)
<i>Withania somnifera</i>	Leaves	Withanolides	(Grover <i>et al.</i> , 2010)
<i>Curcuma longa</i>	Rhizome	Curcumin	(Wang <i>et al.</i> , 2010)
<i>Tanacetum vulgare</i>	Aerial parts/methanolic extract	3,5-O-dicaffeoylquinic acid (3,5-DCQA)	(Juan <i>et al.</i> , 2009)
<i>Boswellia frereana</i>		Epi-lupeol	(Blain <i>et al.</i> , 2010)
<i>Erycibe obtusifolia</i>	Stems	Scopoletin	(Pan <i>et al.</i> , 2010)
<i>Barringtonia racemosa</i>	Fruits	Bartogenic acid	(Patil <i>et al.</i> , 2011)
<i>Andrographis paniculata</i>	Leaves	Andrographolide	(Burgos <i>et al.</i> , 2009)
<i>Erycibe obtusifolia</i>	Stems	Scopolin	(Pan <i>et al.</i> , 2009)
<i>Nigella sativa</i>	Volatile oil	Thymoquinone	(Khader <i>et al.</i> , 2009)
<i>Centella asiatica</i>	Leaves	Madecassoside	(Liu <i>et al.</i> , 2008)
<i>Tanacetum parthenium</i>	Inflorescence	Parthenolide	(Parada <i>et al.</i> , 2008)
<i>Strychnos nux-vomica</i>	Seeds	Strychnine and Brucine	(Han <i>et al.</i> , 2008)
<i>Paeonia lactiflora</i>	Inflorescence	Glucosides	(Xu <i>et al.</i> , 2007)
<i>Ananas comosus</i>	Fruit	Bromelain	(Hale <i>et al.</i> , 2005)
<i>Tripterygium wilfordii</i>	Entire herb	Triptolide	(Kusunoki <i>et al.</i> , 2004)
<i>Cannabis sativa & Cannabis indica</i>	Leaves	Cannabidiol	(Costa <i>et al.</i> , 2004)
<i>Dysoxylum binectariferum</i>	Seeds	Rohitukine	(Jain <i>et al.</i> , 2012)
<i>Biophytum sensitivum</i>	Inflorescence	Amentoflavone and polysaccharide	(Bharati <i>et al.</i> , 2012)
<i>Hemidesmus indicus</i>	Roots	Terpenoids	(Mehta <i>et al.</i> , 2012)
<i>Zingiber officinale</i>	Rhizome	Phenylpropanoids	(Nievergelt <i>et al.</i> , 2011)
<i>Paeonia lactiflora</i>	Roots	Gallic acid	(Jiang <i>et al.</i> , 2011)
<i>Rosa canina</i>	Water extract	Galactolipid	(Kirkeskov <i>et al.</i> , 2011)
<i>Capparis spinosa</i>	Ethanol extract	P-hydroxy benzoic acid; 5-(hydroxymethyl) furfural; bis(5-formylfurfuryl) ether; daucosterol; α -D-fructofuranosides ;Uracil; and Stachydrine.	(Feng <i>et al.</i> , 2011)
<i>Zingiber officinale var. Rubra)</i>	Ethanol extract	[6]-Shogaol, Gingerdiols	(Shimoda <i>et al.</i> , 2010)
<i>Chaenomeles speciosa</i>	10% Ethanol fraction	Chlorogenic acid	(Li <i>et al.</i> , 2009)
<i>Sida rhombifolia</i>	Aerial parts	Polar constituents	(Gupta <i>et al.</i> , 2009)
<i>Yucca schidigera</i>	Bark	Resveratrol, trans-3,3',5,5'-tetrahydroxy -4'-methoxystilbene, and Yuccaols,	(Wenzig <i>et al.</i> , 2008)
<i>Saccharum officinarum & wax oil</i>	Grass	Palmitic, Oleic, Linoleic, and Linolenic acids	(Ledon <i>et al.</i> , 2007)
<i>Lasianthus acuminatissimus</i>	Roots	Uncargenin A	(Li <i>et al.</i> , 2006)
<i>Boswellia carteri</i>	Resin	Boswellic acids	(Banno <i>et al.</i> , 2006)
<i>Acanthopanax chiisanensis</i>	Leaves	Chiisanoside, Chiisanogenin	(Jung <i>et al.</i> , 2005)
<i>Berberis vulgaris</i>	Root extract	Berberine and Oxyacanthine	(Ivanovska <i>et al.</i> , 1996)
<i>Rosmarinus officinalis</i>	Aerial parts	α -pinene, camphene, beta-pinene, myrcene	(Martinez <i>et al.</i> , 2009)
<i>Tripterygium wilfordii</i>	Inflorescence	Triterpene	(Li <i>et al.</i> , 2008)
<i>Cleome gynandra</i>	Ethanol extract	Triterpenes, Tannins, Anthroquinones, Flavonoids, Saponins, Steroids	(Narendhriakannan <i>et al.</i> , 2007)
<i>Phyllanthus amarus</i>	Aqueous extract	Phyllanthin and Hypophyllanthin	(Sharad <i>et al.</i> , 2011)
<i>Sophora flavescens</i>	Rhizomes	Isoxanthohumol, Kurarinone, Sophoraflavanone, Kuraridin	(Jin <i>et al.</i> , 2010)
<i>Pluchea lanceolata</i>	Root	Sorghumol acetate, Boehmerol acetate	(Srivastava <i>et al.</i> , 2012)
<i>Panax notoginseng</i>	Dry extract (alcohol)	Ginsenoside	(Kim <i>et al.</i> , 2007)
<i>Semecarpus anacardium</i>	Nut milk extract	Biflavonoids	(Venu <i>et al.</i> , 2006)
<i>Lavandula multifida</i>	Aerial parts	Carvacrol	(Sosa <i>et al.</i> , 2005)
<i>Rosmarinus officinalis</i>	Ethanol extract	Hesperidin	(Ma <i>et al.</i> , 2011)
<i>Alpinia officinarum</i>	Rhizomes	Diaryl heptanoids	(Lee <i>et al.</i> , 2009)
<i>Litsea guatemalensis</i>	Etanolic extract	5,7,3',4'-tetrahydroxy-isoflavone	(Silva <i>et al.</i> , 2012)
<i>Cestrum diurnum</i>	Leaves	Ursolic acid	(Ahmad <i>et al.</i> , 2006)
<i>Thladiantha dubia</i>	Fruit	Polysaccharide	(Wang <i>et al.</i> , 2011)
<i>Lonicera japonica (flowers)</i>	<i>N-butanol fraction (WIN-34B)</i>	Chlorogenic acid	(Kang <i>et al.</i> , 2010)
<i>Anemarrhena asphodeloides (roots)</i>		Mangiferin	
<i>Leucas aspera</i>	Ethanol extract	Epicatechin	(Kripa <i>et al.</i> , 2011)
<i>Arnebia euchroma</i>	Entire herb (ethanolic extract)	Hydroxy naphthaquinone	(Fan <i>et al.</i> , 2012)
<i>Bauhinia tarapotensis</i>	Leaves (chloroform extract)	Triterpenic acids of Ursane and Oleanane	(Sosa <i>et al.</i> , 2002)

<i>Clematis vitalba</i>	Aerial parts	Vitalboside	(Erdem <i>et al.</i> , 2007)
<i>Tripterygium wilfordii</i>	Ethylacetate (EA) extract	Triptolide (diterpenoid)	(Tao <i>et al.</i> , 2000)
<i>Aceæa</i>	Gel from plant	Anthroquinone glycosides	(Arya <i>et al.</i> , 2011)
<i>Calotropis procera</i>	Seeds, Roots, Leaves	Benzoyllineolone, Benzolisolineolone	(Arya <i>et al.</i> , 2011)

CONCLUSION

Arthritis affects people globally and men are 3 times more prone to it than woman. The onset is generally between 40 - 60 years of age although it can occur at any age. There are many children under the age of 16 with the juvenile form of the disease. Other than genetic dispositions, exact external cause is not known but cigarette smoking and environmental pollutants are important precipitating factors. So far, there is no cure for it, but understanding about the inflammatory process helps to manage it effectively. The good news is that the prognosis today, if diagnosed and treated early, is significantly better than it was 20-30 years ago and many people have a much better quality of life in spite of having arthritis. Herbal drugs and its isolated constituents can play vital role in the management of arthritis.

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