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Herbs Combating with Inflammation- A Review

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ABSTRACT
Inflammation is a component of the intricate biological replication of vascular tissue to deleterious stimuli such as pathogens, damaged cells or irritants. The major anti-inflammatory drugs available are NSAIDS, but due to their rigorous side-effects such as GI bleeding, ulcers, stomach upset their utilization has been constrained. Therefore to surmount the side-effects, revelation of potent NSAIDS with very low or no gastro-intestinal side-effects is the area of prime paramountcy. As a result of innate quandary associated with NSAID's there is perpetual search for alternative agents, especially from natural sources. Several herbal drugs constitute a paramount avenue for inflammation and rheumatoid arthritis that obviates structural damage of arthritic joint caused by tissue or bone breakdown. Additionally it is safe, inexpensive, highly abode and convenient for many patients.
KEYWORDS-Inflammation, Mechanism of inflammation, NSAID's , Anti-inflammatory herbs.

INTRODUCTION

WHAT IS INFLAMMATION?

Inflammation is a biological reaction to disrupt tissue homeostasis at its fundamental level, it is a tissue eradicating process that involves recruitment of blood derived products, such as plasma proteins, fluid and leukocytes into perturbed tissue. This migration is facilitated by alteration in the local vasculature that lead to vasodilation, incremented vascular permeability and incremented blood flow. Infection by microbial invader is often implicated has the major culprit that promotes inflammatory replications. However injury or trauma (in the absence of parasitic infection) and exposure to peregrine particles or irritants or pollutants are additionally potent activators of inflammation, suggesting that this replication likely evolved as a general adaptation for coping with damaged or malfunctioning tissue.

FUNCTION OF INFLAMMATION

The primary functions of inflammation are to rapidly eradicate or isolate the underlying source of perturbance, abstract damaged tissue and then instaurate tissue homeostasis. Inflammation when regulated felicitously is putatively adaptive. This verbal expression is fortified by incremented risk of earnest infection in humans with genetic deficiency in primary components of inflammation such as neutropenia (eccentric low caliber of circulating neutrophils). Conversely there are several immune germane gene whose disruption leads to spontaneous inflammation, suggesting that the inflammatory replication is actively suppressed by

regulatory gene products to maintain health when inflammatory stimuli are not present when not regulated opportunely, extortionate inflammation can have devastating effects, resulting in extortionate collateral damage and pathology.[1]

MECHANISM OF INFLAMMATION

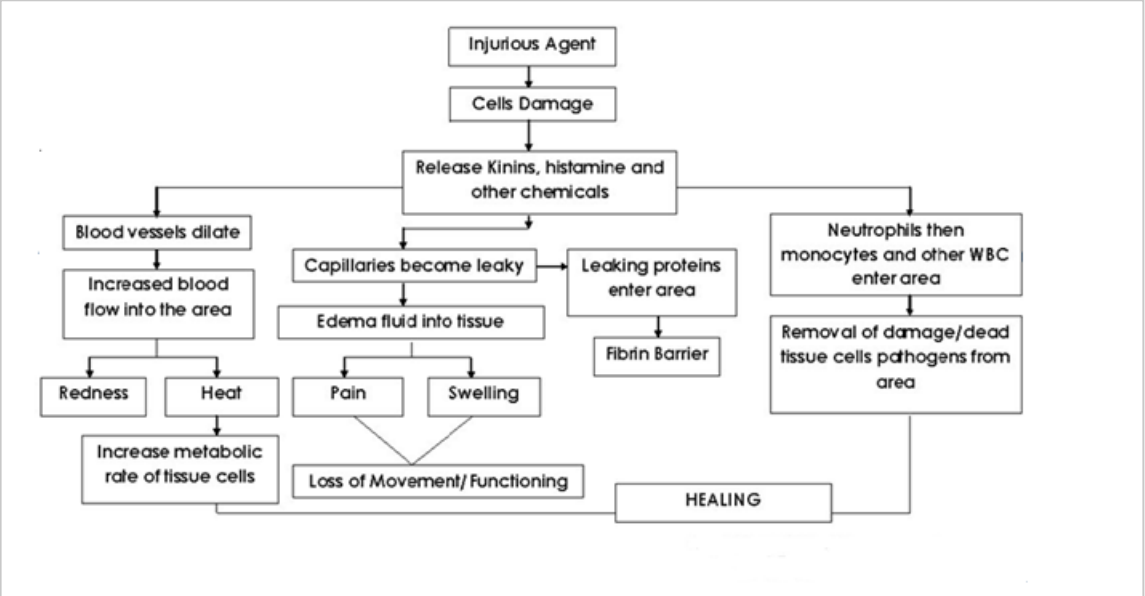


Fig 1. Flow chart of Mechanism of Inflammation

PLANTS AS NATURAL ANTI-INFLAMMATORY AGENTS
INDIAN OLIBANUM TREE- *BOSWELLIA SERRATA* (BURSERACEAE)

Fig2. *Boswellia serrata Herb*

It consists of oleo-gum-resin obtained from plant kenned as *Boswellia serrata* belonging to family Burseraceae.

About 10 species of genus Boswellia occur in tropical part of Asia and Africa. *Boswellia serrata*, the species found in dry hilly area of Bihar, Madhya pradesh, Gujarat.[2] The oleogum resin contains volatile oil, gum and resin. Volatile oil is composed of sesquiterpenes, alcohol, anisaldehyde, d-α-thujone, α-pinene, d-α-phellandrene and phenolic compounds. Gum is mainly composed of arabinose with diminutive amounts of xylose and galactose. Gum additionally contains oxidizing and diastatic enzymes.[3] The main active constituent of boswellia is the boswellic acid, most importantly acetyl-11-keto-beta-boswellic acid(AKBA). Acetly-11-keto-beta-boswellic acid (AKBA) has demonstrated many consequential immunomodulatory and inflammation modulating effects in preclinical research. The best reported action of boswellic acid is probably the inhibition of inflammatory mediator 5-lipoxygenase.[4] However, other factors such as cytokines(interleukins and TNF α) and complement systems are likely molecular targets.[5,6] AKBA withal naturally inhibits NF-KappaB.[7]

TURMERIC- *CURCUMA LONGA* **(ZINGIBERACEAE)**

Fig. 3. *Curcuma longa Herb*

It consists of dried, ground rhizomes of the perennial herb *Curcuma longa* belonging to family Zingiberaceae. This is a perennial plant in Zingiberaceae family. It is cultivated through the tropics and used as medicine.[8] Turmeric as a whole herb as well as some of its constituents has been found to exert anti-inflammatory, antioxidant activity.[9] There are three main curcuminoids in turmeric, of which curcumin (diferuloylmethane) is best measured. Other curcuminoids in turmeric covers demethoxycurcumin and bisdemethoxycurcumin. Curcumin conveys yellow colour to the plant and is used as powerful anti-inflammatory agent. After curcuminoids, the key phytochemicals are turmeric terpenes, including various turmerones, borneol, cineol, eugenol and curcumone. These are found in turmeric essential oil and are antifungal, antibacterial, anti-inflammatory and hepatoprotective properties.[10] Many mechanism of anti-inflammatory activity has been identified for curcumin. For ex, curcumindownregulates COX-2 and iNOS enzymes, likely by suppressing NF-kβ activation.[11] It inhibits arachidonic acid metabolism via lipoxygenase and scavenging of free radicals generated in this pathway. It obstructs the production of inflammatory cytokines, TNFα, IL-1, IL-2, IL-6, IL-8, IL-12, monocyte chemoattractant protein (MCP) and migration ianhibitory protein, it downregulates mitogen-activated, Januskinase and protein kinase.[12,13,14]

INDIAN ALOE- *ALOE BARBADENSIS* **(LILIACEAE)**

Fig. 4 *Barbados Aloe Herb*

It consists of dried latex leaves of sundry species of *Aloe barbadensis, Aloe Barbados,Socotrine aloe, Zangiber aloe* belonging to family Liliaceae. Albeit the plant is native to northern components of Africa, it has rapidly spread across the world because its cultivation facile. A variety of Aloe species are still utilized in folk medicines in Africa and Asia.[15] The most prevalent folk utilization of Aloe has been for treatment of burn wounds and specially to avail in the rejuvenating process, reduce inflammation and tissue scarring.[16] There are more than 300 species of Aloe plant.[17] Different species of Aloe have different chemical composition.[18] The leaves of Aloeveraplant contains 99.5% dihydrogen monoxide and 0.013% proteins.[19] Aloe was result of aloin, an acrid juice that dried to yellow powder and functioned as cathartic medicine. It is synonymous with barbaloin 10-(1l,5l–anhydroglucosyl)-aloe-emodin-9-anthrone, which is a glycoside.[20] Anthroquinone imitative include anthracenes such as aloe-emodin, which is 1,8-

dihydroxy-3-(hydroxymethly)-9,10-anthracenedione.[18] The anti-inflammatory activity of plant sterols like lupeol, compesterol and β-sitosterol[21] through bradikinase activation,prostaglandin F2 and E2 as well a thromboxane A2 inhibition and inhibition of IL-10 secretion.[22,23,24,25,26]

INDIAN BDELLIUM TREE- *COMMIPHORA WEIGHTII* **(BURSERACEAE)**

Fig. 5 *Commiphora weightii Herb*

It consists of oleogum resin that exudes spontaneously as result of injury from the bark of *Commiphora weightii* belonging to family Burseraceae Guggul more popularly kenned as Bdellium is derived from gummy resinous exudate of a plant proximately cognate to 'Myrrh' that is found in arid and semiarid areas of northern India, Bangladesh and Pakistan.[27] Gum resin portion of guggul contains an involute coalescence of steroids, diterpenoids, aliphatic esters, carbohydrates, amino acids and range of inorganic compounds. It withal contains Z-guggulosterone, E-guggulosterone, 16β-hydroxyprogesterone and three incipient sterols viz. guggulosterol I, II, III.[28] Later workers have isolated two more incipient sterols guggulosterol-IV and guggulosterol-V.[29,30] Guggul is a resin, the major ingredient in joint care and immune care that has been regarded as a remedy in Ayurvedic medicine, kenned to increment the WBC counts and to possess vigorous immune-modulating properties.[31] Pharmacological studies have shown that the oleoresin is a highly potent anti-inflammatory agent.[32] The acidic fraction of oleoresin was active one where the non-acidic faction of the oleoresin was dormant.[33] Guggul withal utilized as anti-rheumatic, hypolipidemic, hypocholesteremic drug.[34]

ASHWAGANDHA- *WITHANIA SOMNIFERA* **(SOLANACEAE)**

Fig. 6 *Withania Somnifera Herb*

It consists of dried roots and stems of *Withania somnifera* belonging to family Solanaceae.[35] This plant grows widely in all dried components and subtropical India, South Africa, Pakistan, Sri lanka. Withania root is an Ayurvedic herbs that has been utilized for centuries in India as an adaptogenic herbal remedy to ameliorate overall health. Traditionally the plant Withania somnifera utilized for different purposes such as asthma, bronchitis, Rheumatoid arthritis, inflammation.[36,37,38,39] The main components of ashwagandha are alkaloids and

steroidal lactones. Among the sundry alkaloids, withanine is the main component. The other alkaloids are somniferine, somnine, withanine, pseudo-withanine, tropine, pseudo-tropine, 3-α-gloyloxytropine, choline, cuscohygrine, isopelletierine, anaferine and anahydrine. The leaves comprise steroidal lactones which are commonly called as "withanolides". The withanolides have C28 steroidal nucleus with C9 side chain, have six membered lactone ring. Lavie et.al have isolated such compounds.[40] Another series of steroidal lactones viz. withanolides E, F, G, H, I, J, K, L, M have been obtained from chemotype III.[41] Compound like withanolides are to be believed to account for the multiple medicinal application of ashwagandha. Ashwagandha and its withanolides have been extensively researched in a variety of animal studies examining effects on immune function, inflammation and even cancer. Withania root stimulates the activation of immune system cells such as lymphocyte.[42] It has been shown to inhibit inflammation.[43] Ashwagandha additionally have hypotensive, stimulant actions along with bradycardia.[44]

SWEET WOOD LIQUORICE- *GLYCYRRHIZA GLABRA* **(LEGUMINOSAE)**

Fig. 7 *Glycyrrhiza glabra Herb*

It consists of dried, unpeeled roots and stolons of *Glycyrrhiza glabra* belonging to family Leguminosae.

It is commercially cultivated on an immensely colossal scale in Spain, Sicily and England. Glycyrrhiza glabra var. glandulifera (Russian liquorice) grows in Russia and G.glabra var. violacea emanates from Iran.[45] Glycyrrhizaglabra withal kenned as liquorice and saccharine wood. A number of traditional rejuvenators have claimed the efficacy of Glycyrrhiza species for a variety of pathological conditions as a diuretic and as insecticides. Additionally in traditional medicine for coughs, colds and painful swelling.[46] The root of Glycyrrhizaglabra, include a dihydrogen monoxide soluble biologically active intricate that accounts for 40-50% of total dry material weight. This intricate is composed of triterpene saponin, flavonoid, polysaccharidepectin's, simple sugar[47,48]. Glycerrhizin, a triterpeniodcompound, a cumulation of potassioum-calcium-magnesium salt of glycyrrhizic acid. It is a molecule composed of a hydrophilic part, two molecules of glucuronic acid and a hydrophobic fragment, glycyrrhetic acid.[49] The yellow colourof liquorice is due to the flavonoid content of the plant, which include liquiritin, isoliquiritin (a chalcone) and other compounds.[50] Glycyrrhizaglabra constituents withal exhibit steroid like anti-inflammatory activity, homogeneous to the action of hydrocortisone. This is due, in part to inhibition of phospholipase A2 activity, an enzyme critical to numerous inflammatory processes.[51] Liquorice withal utilize as anti-spasmodic.Glycyrrhizin is an established anti-inflammatory drug.[52] Withal employed for treatment of Rheumatoid arthritis, Addison's disease

INDIAN LONG PEPPER- *PIPER LONGUM* **(PIPERACEAE)**

Fig. 8 *Piper longum Herb*

It consists of dried unripe fruit of *Piper longum* L. belonging to family Piperaceae. It is widely distributed in the tropical and subtropical regions of the world through the Indian subcontinent, Sri lanka, America.[53] Pepper contains an alkaloid piperine (5-9%), volatile oil (1-2.5%), punjent resin (60%), piperidine and starch (about 30%). The volatile oil which is yellowish in color contains mainly L-phellandrene and caryophyllene.[54] Ebony pepper is utilized for treating chronic inflammatory diseases such as rheumatoid arthritis. They are typically prescribed long term to felicitously control the disordered immune system. It is found that piperine significantly inhibited the engenderment of two paramount pro-inflammatory mediators, IL-6 and PGE2, in IL-1-β-stimulated human FLS.[55] The inhibition of PGE2 is paramount due to its central role in triggering pain. In additament,MMP1 and MMP13 collagenases play ascendant role in rheumatoid arthritis, osteoarthritis because they are the rate inhibiting components of collagen degradation process.The consequential inhibition of MMP13 expression is particularly paramount because it degrades a wide range of collagenous and noncollagenous extracellular matrix macromolecule and remarkably active against collagen type II, the predominant transmutation in cartilage. Piperine inhibits the expression MMP13 in IL-1-β-stimulated FLSs. Piperine acted significantly on early acute transmutations in inflammatory process.[56]

LEOPARD'S BANE- *ARNICA MONTANA* **(COMPOSITAE)**

Fig. 9 *Arnica Montana Herb*

It consists of dried flower heads of *Arnica montana* linn, belonging to family Compositae. This species occurs growing as a perennial herb, mainly in calcareous soil of mountainous regions in Central Europe, England, Scotland and U.S.A. Canada as a garden cultivated plant.[57] Arnica acts as anti-inflammatory, analgesics and antimicrobial avail. Its anti-inflammatory activity may put forward why arnica reduces swelling time in injuries and withal expeditiously reduces bruising. Arnica anti-inflammatory activity is probably due to compound kenned as helanin.[58,59,60,61] Arnica flowers contains sesquiterpenes lactones collectively called helenanolides which include helanin 11,13-dehydrohelanin, epoxyhelanalin. Arnifolin is withal present as a sesquiterpene lactone in flowers. Flowers and rhizomes additionally contain arnidiol and faradiol which are counter irritants. The flavonoid principles present in flowers are apigenin, quercetin, tricin and kaempferol.[62] Helenalin and certain other sesquiterpene lactone in arnica exert potent anti-inflammatory activity

in vitro by inhibiting the activation of transcription factor nuclear factor (NF)-kappa B.[63] Arnica additionally utilized in treatment of chronic rheumatism, spinal paralysis and amocrosis (visual impairment).[64]

GINGER- *ZINGIBER OFFICINALE* **(ZINGIBERACEAE)**

Fig. 10 *Zingiber officinale Herb*

It consists of the fresh or dried root of *Zingier officinale* belonging to family Zingiberaceae.[65] Ginger cultivated in India, China, South East Asia, West Indies, Mexico and other components of the world. It is consumed worldwide as spice and flavoring agent and is attributed to have many medicinal properties. The British Compendium reported its action as carminative, anti-emetic, spasmolytic, Peripheral circulatory stimulant and anti-inflammation.[66] The oil of ginger is a cumulation of constituents consisting of monoterpenes (phellandrene, camphene, cineole, citral and bomeol) and sesquiterpenes (Zingiberene, Zingiberol, Zingiberenol, β-bisabolene, sesquiphellandrene and others). Aldehydes and alcohols are withal present.[67,68] Fresh ginger have two wide range of categories ie. volatile and non-volatiles. Volatile oil include sesquiterpene and monoterpenoid hydrocarbons providing distinct aroma and taste of ginger. On contrary, nonvolatile punjent compounds include gingerols, shogoals, paradols and zingerone.[69] Gingerol, shogoal and other structurally cognate substances in ginger inhibit prostaglandin and leukotriene biosynthesis through suppression of 5-lipoxygenase or prostaglandin synthetase. Adscititiously, they can supplementally inhibit synthesis of pro-inflammatory cytokines such as IL-1, TNF-α, IL-8.[70,71] In another investigation, Pan et.al. showed inhibition of pro-inflammatory cytokines.[72] Shogoal can down-regulate inflammatory iNOS and COX-2 gene expression.[73]

HOLY BASIL- *OCIMUM TENUIFLORUM* **(LAMIACEAE)**

Fig. 11 *Ocimum tenuiflorum Herb*

It consists of fresh and dried leaves of *Ocimum tenuiflorum* Linn, family Lamiaceae. It is a herbaceous, much branched annual plant found throughout India. It is considered as sacred by Hindus. The plant is commonly cultured in garden and additionally grown near temples. Tulsileaves contains effulgent, yellow

colored and congenial volatile oil (0.1-0.9%). It contains approximately 70% eugenol, carvacrol (3%) and eugenol-methly-ether (20%). It additionally contains caryophyllin. The plant is additionally reported to contains alkaloids, glycosides, saponin, tannins an appreciable amount of Vitamin C and traces of maleic, citric and tartaric acid.[74] It is utilized for treating mundane cold, headache, stomach complaints, inflammation, heart disease poisoning and malaria. Withal utilized as insect repellant.[75,76] The leaves of tulsi are utilized as stimulant, aromatic, spasmolytic and diaphoretic. Compounds isolated from O.sanctum L. extract, Civisilineol, Civsimavatine, Isothymonin, Apigenin, Rosavinic acid and eugenol were observed. For their anti-inflammatory activityor cycloxygenase inhibitory activity [77]. Singh in his study reported that linoleic acid present in different amount in the fine-tuned oil of different spices of O.sanctum L. has the capacity to block both the cycloxygenase and lipoxygenase pathway of arachidonate metabolism and could be responsible for anti-inflammatory activity.[78]

CINNAMON- *CINNAMOMUM ZEYLANICUM* **(LAURACEAE)**

Fig. 12 *Cinnamomum zeylanicum Herb*

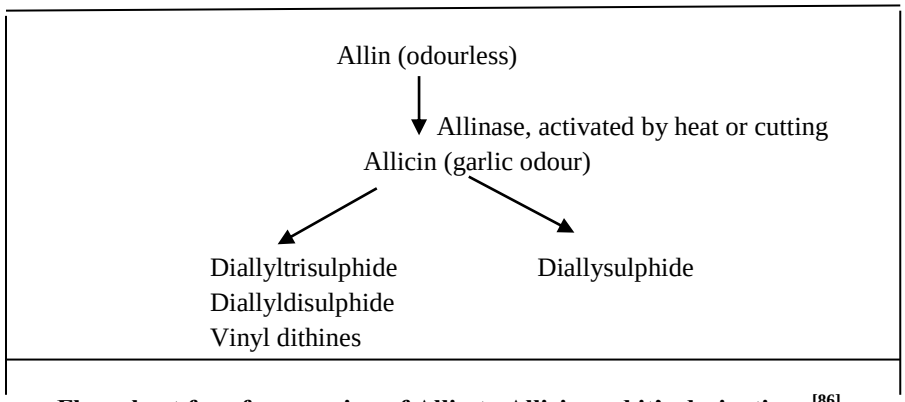
It consists of dried inner bark of the shoot of coppiced trees of *Cinnamomum zeylanica* Nees belonging to family Lauraceae [79] It is native to Sri lanka and South India. In medicine it acts like other volatile oils and once had a reputation as a cure for colds. It has also been used to treat diarrhea and other problems of digestive system. Cinnamon is high in anti-oxidant activity. The essential oil of cinnamon also has antimicrobial properties which aid in the preservation of certain foods.[80] Cinnamon bark contains about 0.5-1% of volatile oil, 1.2% of tannins, mucilage, calcium oxalate, starch and sweet substances known as mannitol. Cinnamon oil contains 60-70% cinnamaldehyde, 5-10% eugenol, benzaldehyde, cuminaldehyde and other terpenes like phellandrene, pinene, cymene, caryophyllene.[81] Some other constituents are terpinolene, α-terpineol, α-cubebene, and α-thujene.[80] Cinnamaldehyde inhibits nitric oxide production implicated in the inflammatory disease process and also demonstrated inhibition of cycloxygenase-2, catalyzed prostaglandin E_2 biosynthesis.[82]

GARLIC- *ALLIUM SATIVUM* **(LILIACEAE)**

Fig. 13*Allium sativum Herb*

It consists of bulbs of the plant known as *Allium sativum* belonging to family Liliaceae. Garlic is cultivated in Central Asia, Southern Europe, U.S.A. In India is found in almost all the states.[83] Potentially active chemical

constituents- Sulphur compounds: Allin, Allicin, ajoene, diallyltrisulphide, sallylcystiene, vinyl dithines, allylpropyldisulphides-Enzymes: allinases, peroxidases, myrosinase and others.[84,85]



Flow chart for of conversion of Allin to Allicin and it's derivatives.[86]

The anti-inflammatory activity is exhibited by garlic oil is mainly through inhibiting the assembly, disassembly processes of the cytoskeleton.[87] One study indicated that thiacremonone, a sulphur compound isolated from garlic inhibits neuroinflammation and amyloidogenesis through inhibition of NF-kβ activity and thus could be applied for intervention in inflammation realted neurodegenerative disease including Alzeihmer disease.[88]

MARGOSA TREE- *AZADIRACHTA INDICA***(MELIACEAE)**

Fig. 14 *Azadirachta indica Herb*

It consists of all the aerial parts of the plant known as *Azadirachta indica* belonging to family Meliaceae It is native of india and naturalized in most of tropical and subtropical countries are of great medicinal value and distriuted widespread in the world.[89] The importance of neem tree have been recognized by US National Academy of sciences which published a report in 1992 entitled 'Neem- a tree for solving global problem'.[90] Biologically active principles isolated from different parts of the plant include Azadirachtin, meliacin, gedunin, nimbidin, nimin, salanin, yalassin, meliacin forms the bitter principle of neem oil, the seed also contain tignic acid responsible for distinctive odour of the oil.[91] Neem kernels contains 30-50% of oil mainly used by the soap, pesticide and pharmaceutical industries and contain many active ingredients which are together called triterpenes or limnoids.[92] The chloroform extract of stem bark is effective against carragenin-induced paw oedema in rat and mouse ear inflammation.[93] Inflammation stomatitis in children is cured by the bark extract.[94] Antipyretic activity has reported in neem oil.[95,96] A methanol extract of the leaves exerts antipyretic effect in male rabbits.[97] The plant also possesses analgesic activity mediated through opiod receptors in lab animal.[98] Anti-inflammatory and antipyretic activities in various extract have been reviewed.[99]

MAIDENHAIR TREE - *GINGKO BILOBA* (GINGKOACEAE)

Fig. 15 *Gingko biloba Herb*

It consists of dried leaves of *Gingko biloba* linn, the only living member of family Gingkoaceae. Gingko is one of the oldest known tree, tracing its history uptoMezoic era, about 150 million years back. It was one of the most widely distributed tree Chinese system of medicine also shows reference to Gingko in its first pharmacopoeia, called shenNong Pen T' Sao,2000 year ago.[100] The principle diterpeneterpenoids are gingkolides. Gingkolides and bilobalide are the principle constituent of Gingko biloba that exhibit either biological or pharmacological activitites. The flavonoids frequently occurs as glycoside derivatives. Quercetin, Kaempferol and isorhamnetin are the principal flavonoids in Gingko biloba.[101] It has been purpoted that the administration of Gingko biloba leaves extract resulted in decrease in platelet aggregation, allergic reaction, general inflammatory response, oxygen radical discharge and other pro-inflammatory function of macrophages.[102,103] The effects appeas to be attributed to the combined actions of ginkgolides and flavonoids. Flavonoids in gingko biloba leaves extract reportedly inhibits cycloxygenase and lipoxygenase that are involved with arachidonic acid metabolism, COX activity produce thromboxane A_2, a potent platelet aggregator and lipoxygenase is concerned with formation of leukotrienes, the substance associated with inflammation. Houghton, proposed that increase in blood flow and the anti-inflammatory effect of Gingko biloba leave may be related to inhibition of COX and lipoxygenase activity.[104]

Table 1- Plants with anti-inflammatory properties.[105]

Sr.No	Plant name	Family	Chemical constituents
1	*Alchorneacordi folia*	Euphorbiaceae	Di-isopentenyl guanidine and tri-isopentenyl guanidine, β-sitosterol.
2	*Achilleamille folium*	Asteraceae	Rutin, apigenin-7-O-glucoside , luteolin-7-O-glucoside, dicaffeoylquinic acid.
3	*Atractylodes macrocepala*	Asteraceae	Sesquiterpenes and acetylenic compounds, Atractylenolide I
4	*Aspilia Africana*	Asteraceae	Germacrene D, α-pinene and limonene.
5	*Bryonopsis laciniosa*	Cucurbitaceae	Goniothalmin, punicic acid and lipids.
6	*Bacopamonnieri*	Scrophulariaceae	Triterpene, betulinic acid.
7	*Cistus Laurifolius*	Cistaceae	3-O-methlyquercetin, quercetin-3-O-α-rhamnoside.
8	*Calluna vulgaris*	Ericaceae	Quercetin-3-O-β-D-glucoside,callulin, quercetin-3-O-β-D-galactoside, chlorogenic acid,kaempferol-3-O-β-D-galactoside.
9	*Clavulariaviridis*	Clavilaridae	Stoloniferones R,S and T and (25S)-24-methylenecholestane-3β,5α,6β-triol-26-acetate.
10	*Daphne pontica*	Thymelaeaceae	Daphnodorins
	Eupatorium arnottianum	Asteraceae	Cadinenederivatives,a p-coumaroyl acid esters several 6,7-dimethoxyflavones and 2-hydroxy-4-(2-hydroxypropoxy)-acetophenone ,Nepetin and hispidulin
11	*Garcinia mangostana*	Guttiferae	a and c-mangostin

12	*Gardenia jasminoides*	Rubiaceae	Geniposide
13	*Geranium pretense*	Geraniaceae	Quercetin 3-O-α-arabinopyranoside, kaempferol 3-O-β-galactopranoside, quercetin 3-O-β-glucopyranoside
14	*Harpagophytum*	Martyniaceae	Harpagoside and other iridoid glycosides
15	*Helichrysumangusti folium*	Asteraceae	Arzanol
16	*Hibiscus vitifolius*	Malvaceae	Gossypin
17	*Lycopodium clavatum*	Lycopodiaceae	Lycopodine
18	*Myristicafragrans*	Myristicaceae	Eugenol
19	*Phyllanthuspolyphyllus*	Euphorbiaceae	4-O-methylgallic acid,2-(hydroxymethyl)-6,7,8-trimethoxy-4-(3,4-methylnedioxy-phenyl)-3-napthoic acid-ϒ-lactone.
20	*Piper ovatum*	Piperaceae	Piperovatine and piperlonguminine.
21	*Polygala japonica*	Polygalaceae	Saponins
22	*Poncirustrifoliate*	Rutaceae	21 α-methylmelianodiol (21α-MMD) , 21 β-methylmelianodiol (21β-MMD).
23	*Psacaliumde compositum*	Asteraceae	Furanoeremoplilanes such as cacalol ,cacalone, maturin, maturinone and maturone.
24	*Saussureacostus*	Asteraceae	Cynaropicrin, Saussureamines A and B, costunolide.
25	*Sedum sarmentosum*	Crassulaceae	Sedumosides E1,E2,E3, F1,F2,G.
26	*Sideritisozturkii* Aytac	Lamiaceae	Ozturkosides A,B and C, campesterol,stigmasterol and β-sitosterol hypolactin-8-glucodise.
27	*Sphenocentrum jollyanum*	Menispermaceae	Furanoditerpenes-columbin, isocolumbin and fibleucin.
28	*Thespesiapopulnea*	Malvaceae	The spone, mansonone-D,mansonone-H, thespesone.
29	*Trichodesmaamplexicaule*	Boraginoideae	Monocrataline,supinine as pyrrolizidine alkaloids, hexacosane, α-amyrin, lupeol,

CONCLUSION

Plants have played a significant role in human health care since the ancient times. Traditional plant exerts great role in discovery of new drugs. Majority of human population worldwide is getting affected by inflammation related disorders. It is believed that the synthetic drugs like opiates, NSAIDS are not useful in all cases because of their side-effects like GIT irritation, liver dysfunction and much more. Large number of herbal species has been used traditionally or as folk medicines against inflammatory disorders. Many of them have been studied scientifically and proved to be beneficial anti-inflammatory agents Traditional uses of natural compound, especially of plant origin received much attention as they are well tested for their efficacy and generally believed to be safe for human use. Researchers are exploring therapeutic potential of all plants as it has more therapeutic properties which are not known.

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