Review Article

INFLAMMATION AND MEDICINAL HERBS - AN OVERVIEW

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ABSTRACT

There is an increasing highly demand and easily available for the medicinal plants in developing countries like India and china. Attention need to be given to assess the medicinal value of such plants to explore the potential drugs out of it. Inflammation is the condition associated with many of the disease states and this review elaborate the medicinal plants, List of many more medicinal herbs their parts used and constituents in the effective management of Inflammation and its associated conditions.

Keywords: Inflammation, Cardamom, Holy basil, *Wilthania somniferous.*

INTRODUCTION

Inflammation[1] is a part of the complex biological response of vascular tissues to harmful stimuli, such as pathogens, damaged cells or irritants. Inflammation is derived from Latin word (inflammare to set on fire). Inflammation is a protective attempt by organism to remove the injurious stimuli and irritate the healing process. Without inflammation, wounds and infections would never heal. A bacterial infection irritates inflammation through several interconnecting mechanisms:

(i) The "non self" surface of bacteria allows the complement system to be activated through the alternate pathway.

(ii) Specific surface molecules of the bacteria, called pathogen associated molecular patters (PAPS), bind to Toll – like receptors (TLRS) on or in a variety of leukocytes.

MAST CELLS

Mast cells are found in the tissues

The mast cells appear to be the key players in the initiation of inflammation.

Mast cells are found to contain toll –like receptors, trigger exocytosis, when they interact with pamps like. The lipopolysaccharides (LPS or endotoxin) of gram negative bacteria (TLR -4). The peptidoglycan of gram positive bacteria consists of receptors that trigger exocytosis, when they bind to C_3a and C_5a and bacteria coated with C3b. Activated mast cells release literally dozens of potent mediators. These mediators are active in recruiting all the types of WBC to the site, thus activating many of these recruited cells to produce their own mediators of inflammation.[2-5]

SOME OF THE MEDIATORS THAT CAUSE INFLAMMATION

TNF α – Tumor necrosis factors, Tryptase – Protein released by mast cells, Chemokines – Chemotactic cytokines, Histamine, Interleukin – I, Brodykinin.

WHAT HAPPENS WHEN INFLAMMATION OCCURS

When inflammation occurs normally, chemicals from the body's WBC are released to protect us from foreign substances. This release of chemicals increases the blood flow to that area and may result in redness, warmth. Some chemicals cause leakage of fluid in to tissues, resulting in swelling. The inflammatory process may stimulate nerves and causes pain in some diseases, however the body's defense system inappropriately triggers an inflammatory response, when there are no foreign substances to flight off these diseases are called "Autoimmune diseases".

CAUSES OF INFLAMMATION [6-8]

Burns, Chemical irritants, Frost bite, Toxins, Infection by pathogens, Physical injury, blunt or penetrating , Immune reactions due to hypersensitivity, Ionizing radiation, Foreign bodies including splinters, drug, debris.

DISEASES ASSOCIATED WITH INFLAMMATION

Some types of arthritis are the result of misdirected inflammation. Arthritis is a general term that describes inflammation in Joints. Some types of arthritis, associated with inflammation are Rheumatoid arthritis, shoulder tendonitis or bursitis, gouty arthritis, Polymyalgia rheumatic.

SYMPTOMS OF INFLAMMATION

Redness, swollen joint that is warm to touch, Joint pain, Joint stiffness Loss of Joint functions. Inflammation may also be associated with general "flu like" symptoms including Fever, Chills, Fatigue / loss of energy, Head ache, Loss of appetite, Muscle stiffness.

TYPES OF INFLAMMATION

Inflammation can be divided into Acute and Chronic:

Acute Inflammation

It is of short duration, ranging from a couple minutes to a few days and is the initial response of the body to a

foreign substance or harmful stimuli. The stimulation results in increased movement of plasma and WBC into injured tissues.

Chronic Inflammation

It is the result of inflammation being prolonged for a period of time. It may last for weeks, months or even years. It results in a change of type of cells at the site of inflammation acute inflammation:

Acute inflammation is characterized by five cardinal signs.

Redness, Swelling, Increased heat, Pain, Loss of function

SIGNS AND SYMPTOM OF ACUTE INFLAMMATION

ENGLISH	LATIN
Rednes	RUBOR
Swelling	TUMOR/TURGOR
Heat	CALOR
Pain	DOLAR
Loss of function	FUNCTIOLAESA

The first four signs were described by celsus

COMPARISON OF ACUTE AND CHRONIC INFLAMMATION

CHARACTERISTICS	ACUTE	CTTRONIC
Causative agent	Pathogens, Injured tissues	Due to non-degradable pathogens, persistent foreign bodies, or auto immune reactions.
Major cells involved	Neutrophils, mononuclear cells (nonocytes, macrophages)	Mononuclear cells (monocytes, mace phages, lymphocytes, plasma cells), fibroblasts
Primary mediators	Vaso active amines eicosanoids	IFN-γ, other cytokines, growth factors, hydrolytic enzynes
Onset	Immediate	Delayed
Duration	Few days	Up to many months or years
Outcomes	Resolution, abscess format; chronic inflammation	Tissue destruction fibrosis.

LIST OF OTHER TYPES OF INFLAMMATION

1. Heart diseases inflammation
2. Inflammation in the longs
3. Catarrhal
4. Purulent / supportive
5. Fibrinous / Pseudomembranous
6. Hemorrhagic
7. Necrotizing
8. Ulcerative

AFFECT TO INTERNAL ORGANS BY INFLAMMATION

1. Inflammation of the heart may cause shortness of breath or leg swelling.
2. Inflammation of the small tubes that transport air to the lungs may cause an asthma attack.
3. Inflammation of the kidneys may cause high B.P or kidney failure.
4. Inflammation of large intestine (colitis) may cause cramps and diarrhea.

TREATMENT OF INFLAMMATION

Inflammation can be treated by anti-inflammatory agents

ANTI-INFLAMMATORY AGENTS

These are the agents or drugs that reduces inflammation, swelling and hopefully prevent or minimize the progression of the inflammatory disease. The medications include.

1. Steroids (corticosteroids) – Specifically Glucocorticoids
2. NSAIDS - Indomethacin
3. Antimalarial medications - Hydroxyl, chloroquine
4. Other medications including methotrexate, sulfasalazine, leflunomide

NSAIDS

CLASSIFICATIONS

I. NON SELECTIVE COX-1 INHIBITORS

a. *Salicylates :* Acetyl salicylic acid

b. *Para aminophenol Derivatives:* Paracetamol

c. *Pyrazolone Derivatives:* Phenylbutazone, oxyphenbutazone

d. *Indoles:* Indomethacin

e. *Heterocyclic aryl acetic acid derivatives*: diclofenac, ketorolac

f. *Propionic Acid derivatives:* ibufrofen, Naproxen, ketoprofen.

g. *Fenamates:* Mefanamic acid

h. *Oxkams:* Piroxican

II. Selective Cox -2 inhibitors – Nimesulide, Meloxicam, Celecoxib.

STEROIDAL ANTI INFLAMMATORY DRUGS [9, 10, 11, 12]

GLUCO CARTICO STEROIDS

CLASSIFICATION

a. Short Acting – Hydrocortisone.

b. Intermediate Acting – Prednisolone, Methyl Prednisolone, Triamainolene.

c. Long Acting – Dexa methasone, Beta methasone.

OTHER TREATMENTS

Ice treatment

Applying ice or even cool water to a tissue injury has an anti inflammatory effect and suggested as injury treatment and pain management technique for athletes.

Cool temperature inhibits local blood circulation, which reduces swelling in the injured tissues.

DESCRIPTION OF SOME ANTI-INFLAMMATORY HERBS

CARDAMOM

Synonym: Cardamom fruits

Kingdom: Plantae
Order: Zingiberales
Family: Zingiberaceae

Biological source: Elettaria cardamonum

Macroscopical characters

Colour: Reddish brown

Odour: Aromatic

Taste: Sweetish slighter.

Chemical Constituents: Volatile oil (3-6% containg terpene), terpineol, cineol, starch, gun.

Parts used: seed pods, essential oil.

DATURA

Synonym: Jimson weed, Metelnut, thornapple

Scientific Classification

Kingdom: Plantae
Order: Solanales
Family: Solanaceae
Subfamily: Solanoideae
Biological source: Datura stramonium

Family: Solanaceae

Macroscopy

Leaves: Alternate

Size:

Length: 10 X 20 cm

Width: 5 X 18 cm

Shape: Lobed or too the edges.

Flowers:

Colour: White, some are in Red, blue or yellow.

Fruit: Spiny capsule that contain many seeds.

Shape: Trumphet shaped.

Chemical constituents: Alkaloids like atropine, scopolamine, hyoscyamine, ascorbic acid.

Parts used: Leaves, flowers, seeds.

GRAPES

Synonym: Grape seed

Scientific Classification

Kingdom: Plantae
Division: Magnoliophyta
Class: Magnoliopsida
Order: Vitales
Family: Vitaceae
Genus: *Vitis*
Species: *V. vinifera*

Macroscopical characters

Colour: White (ranging from pale yellow- green to light green) Black (Ranging from light red to purple – black)

Odour: Sweet, pleasant

Taste: Mostly sweet, some are sour in taste.

Appearance: Smoothed skinned, juicy, with or without seeds

Chemical constituents: Reseratrol, procyonidins, oleicacids, linolecacids, palmitricacids.

Part used: Fruits

HOLY BASIL

Synonym: Tulsi, Tulasi, Indian basil

Scientific classification

Kingdom: Plantae
Order: Lamiales
Family: Lamiaceae
Genus: *Ocimum*

Biological Source: Ocimum sanctum ocimum tenuiflorum

Macroscopical Characters

Colour:

Leaves: Green

Stems: Purplish

Flowers: Purple

Odour: Refreshing, Pleasant

Taste: Pungent

Chemical Constituents: Ascorbic a, convacrol, methyl – charvicol, Palnitic acid, ursolic acid

Part used: Leaves

Mechanism of action: This contains phytonutrient, ursolicacid, which inhibits Cox -2, responsible anti-inflammatory action.

MUSTARD

Synonym: Black mustard, mustard seed

Scientific Classification

Kingdom: Plantae
Order: Brassicales
Family: Brassicaceae

Biological source: Brassica nigra

Macroscopical characters

Leaves: Variously lobed, divided, finely toothed, terminal lobe larger than 2-4 side ones.

Seeds:

Colour: Pale brown seeds

Odour: Pungent

Taste: Characteristic

Size: Very small

Chemical constituents: Sinigrin (glycoside), Myrosin (enzyme), allyl isothiocyanate, fixed oils, proteins

Parts used: Leaves, seeds

PINE

Synonym: Scots pine

Scientific classification

Kingdom: Plantae
Division: Pinophyta
Class: Pinopsida
Order: Pinales
Family: Pinaceae
Genus: *Pinus* L.

Biological source: Pinussyl vestries

Macroscopical characters

Colour – green,

Odour – Camphor like

Chemical constituents: Bornyl acetate, codinene, dipentern, phellandrene, pinene, sylvestrene.

Parts used: Needles

TEA

Synonym : Green tea, Black tea.

Scientific Classification

Kingdom: Plantae
Order: Ericales
Family: Theaceae
Genus: *Camellia*
Species: *C. sinensis*

Biological source: Canellia sinesis.

Macroscopical Characters

Leaves:

Length

Size – 4 X 15 cm

Breadth: 2X 5 cm

Colour : Pale – Dark green.

Chemical constituents: Aminoacidl- theanine, caffeine, catechin polyphenols, epigalloca techin gallate (egcg), oxalates, fluoride, tannin.

Parts used: Leaves

THUJA

Synonym: Arbovitae, white cedar, yellow cedar

Scientific Classification

Kingdom: Plantae
Division: Pinophyta
Class: Pinopsida
Order: Pinales
Family: Cupressaceae
Genus: *Thuja*
Species: ***T. occidentalis***

Biological source: Thuja Occidentalis

Family: Cupressaceae

Macroscopical Characters

Leaves: Scale leaves are arranged in alternating decussate pairs in four rows along the twigs.

Chemical constituents

Volatile oil, 65% thujone, fenchone, borneol, limonene, pinene, falconoid glycoside, mucilage, tannin.

Parts used: Leaves and young twigs

WORM WOOD

Scientific Classification

Kingdom: Plantae

Order: Asterales
Family: Asteraceae
Genus: *Artemisia*
Species: *A. absinthium*

Biological source: Artemisia absinthium

Family: Asteraceae or compositae

Macroscopical Characters

Leaves: Alternate, 2-3 pinnately parted finely pubescent with close silky hairs, leaflets are sparingly toothed.

Flowers: Tiny, Yellow- green flowers – heads numerous small, heterogamous.

Chemical constituents: Volatile oil, chamazulene, absinthum, carotene, tannins, vit.c.

Parts used: Aerial parts.

YUCCA

Scientific Classification

Kingdom: Plantae
Order: Asparagales
Family: Agavaceae
Genus: *Yucca*
Species: *Y. schidigera*

Macroscopical Characters

Leaves: Sharp and sword like leaves

Flowers: Cream coloured

Chemical Constituents: Saponins

Parts used: Root.

HERBS USED TO TREATMENT OF INFLAMMATION: [13-16]

S.No	Name of the Herb	Synonym	Biological Source	General Active Chemical Constituents	Part used
1.	Aloevera	Aloe	Source: Aloe barbadensis Family: Liliaceae	Aminoacids, Anthroquinones, Enzymes, ligin	Juice of the inner leaf.
2.	Apple	Apple cider vinegar	Source: Malus domestica Family: Rosaceae	Aceticocid, Apha-linolenicacid, isoquercitrin, rutin.	Fruit, howers.
3.	Ashwagandha	Ashwaganda	Source: Withania somniferous Family: Solanaceae.	Withanolides, glycosides, alkaloids	Root
4.	Gilead Balm	Poplar buds	Source: Populus species. Family: Salicaceae	Volatileoil, cineole, bisabolene, bisabolol, salicin	Leaf buds.
5.	Balasm of peru	Balsam, peru	Source: Myroxylon pereirae. Family: Fabaceae or leguminosae.	Cinnamaldehyde, Benzaldehyde	Resin of
6.	Boswellia extract	Olibanum	Source: Boswelliaserrata Family: Burseraceae.	Terpenoids, oleoresins, Boswellic acid	Resin collected from trunk of tree
7.	Barley	Barley Grass	Source: Hordeumvulgare Family: Poaceae or graminae	Vitamins, minerals, amino acids like, beta-carotene, betaine, biotin.	Dried or fresh shoot
8	Black seed oil	Black cumin, fennel – flower	Source: Nigella sativa Family: Ranunculaceae	Oleic acid, Palmitic acid, phytosterols, stigma sterol, thynoquinone	Seeds
9	Calendula flower	Calendula, potmarigold	Source: Calendula officinalis Family: Asteraceae or compositae.	Carotenoids, resin, flavonoids, sterol	Flowers and leaves
10.	Chamomile	Chamomilla, chamomile	Source: Matricaria recutita Family: Asteraceae or compositae	Chamuzulene, farnesene quercimertrin, coumarins, cyanogenic glycosides	Flowers
11.	Chrysanthemum	Mums, Juhua	Source: chrysanthemum morifolium. Chrysanthemum sinense.	Ascorbic acid, Beta-cartone, Folacine, Iron	Flowers
12.	Cinnamon	Cassia bark	Source: Cinnamomum zeylanicum Family: lauraceae	Eugenol, tamins, trace coumarin, complex sugars	Dried bark
13.	Corn	Corn silk Indian corn	Source: Zea mays Family: Graminaceae	Fats glycosides, saponins, alkaloids, allantoin.	Silk.
14.	Cumin	Cumin seed, cummin	Source: cuminumcyminum Family: Apiaceae or Umbelliferae.	Cuminaldehyde, pyrazines	Seeds
15.	Lemon grass	Lemon grass	Source: cymopogon citrates Family: Poaceae or graminae	Citral, citronellal, geranial, limonene	grasses
16.	Oats	Oat meal, oat straw	Source: Avenasativa Family: Graminaceae	Saponins, trigonelline, avenine, gluten (protein)	Leaves, stems of pre-flowering plant
17.	Papaya	Papaw, melon tree	Source: Carica papaya Family: cucurbitaceae	Papain, carpaineniacin.	Fruits, seeds
18.	Pineapple		Source: Ananus sativus Family: Bromeliad	Promelain	Enzyme of fruit
19.	Rose	Gulab	Source: Rosa centifolia Family: Rosaceae	Nicotinamide, vitamins (b,e,k) pectin.	Flower petals, leaves
20.	Spearmint	Peppermint	Source: menthe spicata Family: lamiaceae or labiatae	Consists of 50% carvone.	Leaves.
21.	Turmeric	Indian saffron	Source: Curcuma longa Family: Zingiberaceae	Terpene, curcomen, curcumin	Rhizome
22	Uvaursi	Bearberry	Source: Arctostaphylosuva – ursi Family: Ericaceae	Arbutin, hydroquinone, tannins	leaves
23	Walnut	Green walnuts	Source: Juglansnigra Family: juglandaceae	Juglone, vit-C, zinc	Nuthills.
24.	Wild cherry	Black cherry, chokecherry	Source: Prunus serotina Family: Rosaceae	Acetylcholine, tannins, kaempferol, prunasin.	Bark, fruit
25.	Wild yam	Rhevmatism root, colic root	Source: Dioscorea villosa Family: dioscoreaceae	Dioscin, trillin, diosgenin, tannins.	Dried tuber
26.	Winter green	Teaberry, spiceberry	Source: Gaultheria procumbent Family: Ericaceae	Methylsalicylate, ketone, alcohol	leaves
27	Worm wood		Source: Artemisia absinthium Family: Asteraceae or compositae	Thujone, chamazulene, carotene, tannins	Aerial parts
28	Yucca		Source: Yucca schidigera Family: liliaceae	Saponins.	Roots
29.	Lemon balm	Melissa	Source: Melissa officinalis Family: Lamiaceae or labiate	Eugenol, geraniol, Rosmarinic acid, citronellal	Whole herb
30.	Comfrey salves	Comfrey	Source: Symphytum officinale Family: Boraginaceae	Annin, inulin, pyrrolizidine, allantoin	Root leaves

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S.No.	Name of the Herb	Synonym	Biological Source	General Active Chemical Constituents	Part used
31.	Buchuherb	Buchu	Source: Agathosma betulina Family: Rutaceae	Diosphenol, Diosmin, Pugelone	Leaves,Flowers
32.	Tamanuoil	Calophyllum tamanu, tamanuoil	Source: Calophyllum inophyllum Family: clusiaceae or guttiferae	calophyllolide (C25 H22 O5) , Calophyllic acid (C25 H24 O6)	Seed
33.	Sassafrass tea	Saloop, ague tree	Source: sassafras albidum Family: lauraceae	Anethole, Apiole, Asarone, Thujone	Root bark, essential oil.
34.	Ginger	Ginger	Source: Zingiber officinalis Family: Zingiberaceae	Shogaol, Gingerdiols, and Proanthocyanidins Rhizome	
35.	Garlic	Allium	Source: Allivum sativum Family: lilliaceae	1,2-vinyldithiin (1,2-DT) ,Thiacremonone	Pulb
36.	Andiroba	Andiroba oil	Carapaguianensis Family: Meliaceae	Andirobin Arachidic acid linolenic acid	Oil extractor from nut, bark, leaves
37.	Commelina	Tropical spider worth (or) Benghalday flower	Source: Commelina benghalensis Family: Commelinaceaae	Anthocyanins, Dammarane Triterpene, Sterols, Campesterol.	Whole Plant
38.	Unvaria	Cat's claw	Source: Uncaria tomentosa Family: Rubiaceae	Alicaloids like Rhynchophylline, Isorhynchophylline, Tannins.	Bark, Root.
39.	Euphorbia	Christmas candle, Devil's backbone	Source: Euphorbia tithynaloides Family: Euphorbia ceace	B-sitosterol, Cycloartenone, Octacosanol	Leaves, stems.
40.	Noni	Indian mulberry mengkudu	Source: Morinda citrifolia Family: Rubiaceae	Lignans, scopoletin, damnacanthal	Pulp Juice
41	Neem	Margosa	Source: Azadirachta indica Family: Meliaceae	Nimbin,Quercetin	Leaves, twigs, seed not oil.
42.	Tribulus	Burra gookeroo, Puncture vine	Source: Tribulus terrestris Family: Zygophyllaceae	Saponins, sterols, terrestrinins 'a' & 'b', protodiuscin	seeds
43.	Tribulus	Burra gookeroo, Puncture vine	Source: Tribulus terrestris	Saponins, sterols, terrestrinins 'a' & 'b', protodiuscin	seeds

CONCULSION

This review article detailed the study of inflammation and medicinal herbs in overview. Inflammation details, types of inflammation, causes, comparison of acute and chronic inflammation and Allopathic drugs used inflammation and selected medicinal herbs are discussed here and it will be highly useful to the researchers who are working in this field.

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