INFLAMMATION AND MEDICINAL HERBS - AN OVERVIEW

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Accepted on: 08-03-2011; Finalized on: 01-07-2011.

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, Willithania somniferous.

INTRODUCTION

Inflammation 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 C3a and C5a 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

SOME OF THE MEDIATORS THAT CAUSE INFLAMMATION

TNF α - Tumor necrosis factors, Tryptase – Protein released by mast cells, Chemokines – Chemotactic cytokines, Histamine, Interleukin – 1, 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 into 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

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**

<table>
<thead>
<tr>
<th>ENGLISH</th>
<th>LATIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Redness</td>
<td>RUBOR</td>
</tr>
<tr>
<td>Swelling</td>
<td>TUMOR/TURGOR</td>
</tr>
<tr>
<td>Heat</td>
<td>CALOR</td>
</tr>
<tr>
<td>Pain</td>
<td>DOLAR</td>
</tr>
<tr>
<td>Loss of function</td>
<td>FUNCTIO LAESA</td>
</tr>
</tbody>
</table>

The first four signs were described by celsus

**COMPARISON OF ACUTE AND CHRONIC INFLAMMATION**

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

**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 arylic acid derivatives: diclofenac, ketorolac
g. Fenamates: Mefanamic acid
h. Oxkams: Piroxican
II. Selective Cox -2 inhibitors – Nimesulide, Meloxicam, Celecoxib.

**STERoidal ANTI INFLAMMATORY DRUGS**

**GLUCO CARTICO STEROIDS CLASSIFICATION**

a. Short Acting – Hydrocortisone.
c. Long Acting – Dexamethasone, 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 cardamomum

Macroskopical characters
Colour: Reddish brown
Odour: Aromatic
Taste: Sweetish slighter.

Chemical Constituents: Volatile oil (3-6% containing 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: Trumpet 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

Macroscopy
Leaves: Alternate
Size:
Length: 10 X 20 cm
Width: 5 X 18 cm
Shape: Lobed or too the edges.

Flowers:
Colour: White (ranging from pale yellow to light green) Black (Ranging from light red to purple – black)
Odour: Sweet, pleasant
Taste: Mostly sweet, some are sour in taste.

Appearance: Smoothened skinned, juicy, with or without seeds

Chemical constituents: Reseratrol, procyanidins, oleicacids, linoelacids, 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, ursolic acid, 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

PINE

Synonym: Scots pine

Scientific classification

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

Biological source: Pinus sylvestris

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:** 2 X 5 cm
- **Colour:** Pale – Dark green.
- **Chemical constituents:** Aminoacidl-theanine, caffeine, catechin polyphenols, epigallocatechin gallate (egcg), oxalates, fluoride, tannin.

**Parts used:** Leaves

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**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

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**Wormwood**

**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.

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**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.
<table>
<thead>
<tr>
<th>S.N.</th>
<th>Name of the Herb</th>
<th>Synonym</th>
<th>Biological Source</th>
<th>General Active Chemical Constituents</th>
<th>Part used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Aloevera</td>
<td>Aloe</td>
<td>Source: Aloe barbadensis Family: Liliaceae</td>
<td>Aminoacids, Anthroquinones, Enzymes, lignin</td>
<td>Juice of the inner leaf.</td>
</tr>
<tr>
<td>5.</td>
<td>Balasm of peru</td>
<td>Balsam, peru</td>
<td>Source: Myroxylon pereirae. Family: Fabaceae or leguminosae.</td>
<td>Cinnamaldehyde, Benzaldehyde</td>
<td>Resin of</td>
</tr>
<tr>
<td>6.</td>
<td>Boswellia extract</td>
<td>Olibanum</td>
<td>Source: Boswelliaserrata Family: Bursereacae</td>
<td>Terpenoids, oloresins, Boswellic acid</td>
<td>Resin collected from trunk of tree</td>
</tr>
<tr>
<td>7.</td>
<td>Barley</td>
<td>Barley Grass</td>
<td>Source: Hordeumuvulare Family: Poaceae or graminiae</td>
<td>Vitamins, minerals, amino acids like, beta-carotene, betaine, biotin.</td>
<td>Dried or fresh shoot</td>
</tr>
<tr>
<td>8.</td>
<td>Black seed oil</td>
<td>Black cumin, fennel – flower</td>
<td>Source: nigella sativa Family: ranunculaceae</td>
<td>Oleic acid, Palmitic acid, phytoesters, stigma sterol, thynoquinone</td>
<td>Seeds</td>
</tr>
<tr>
<td>9.</td>
<td>Calendula flower</td>
<td>Calendula, potmarigold</td>
<td>Source: Calendula officinalis Family: Astereae or compositae.</td>
<td>Carotenoids, resin, flavonoids, sterol</td>
<td>Flowers and leaves</td>
</tr>
<tr>
<td>10.</td>
<td>Chamomile</td>
<td>Chamomilla, chamomile</td>
<td>Source: Matricaria recuita Family: Astereae or compositae</td>
<td>Chamuzulene, farnesene quercimeritrin, coumarins, cyanogenic glycosides</td>
<td>Flowers</td>
</tr>
<tr>
<td>12.</td>
<td>Cinnamon</td>
<td>Cassia bark</td>
<td>Source: Cinnamomum zeylanicum Family: lauraceous</td>
<td>Eugenol, tamin, trace coumarin, complex sugars</td>
<td>Dried bark</td>
</tr>
<tr>
<td>15.</td>
<td>Lemon grass</td>
<td>Lemon grass</td>
<td>Source: cypogogen citrates Family: Poaceae or graminiae</td>
<td>Citral, citronellar, geranial, limonene</td>
<td>grasses</td>
</tr>
<tr>
<td>16.</td>
<td>Oats</td>
<td>Oat meal, oat straw</td>
<td>Source: Avenasativa Family: Graminaceae</td>
<td>Saponins, trigonelline, avenine, gluten (protein)</td>
<td>Leaves, stems of pae-flowering plant</td>
</tr>
<tr>
<td>17.</td>
<td>Papaya</td>
<td>Papaw, melon tree</td>
<td>Source: Carica papaya Family: cucurbitaceae</td>
<td>Papain, carpaineniacin.</td>
<td>Fruits, seeds</td>
</tr>
<tr>
<td>18.</td>
<td>Pineapple</td>
<td>Source: Ananus sativus Family: Bromeliad</td>
<td></td>
<td>Promelain</td>
<td>Enzyme of fruit</td>
</tr>
<tr>
<td>19.</td>
<td>Rose</td>
<td>Gulab</td>
<td>Source: Rosa centifolia Family: Rosaceae</td>
<td>Nicotinamide, vitamins (b,e,k) pectin.</td>
<td>Flower petals, leaves</td>
</tr>
<tr>
<td>21.</td>
<td>Turmeric</td>
<td>Indian saffron</td>
<td>Source: Curcuma longa Family: Zingiberaceae</td>
<td>Terpene, curcumen, curcumin</td>
<td>Rhirome</td>
</tr>
<tr>
<td>22.</td>
<td>Uvaursi</td>
<td>Bearberry</td>
<td>Source: Arctostaphylousa – ursi Family: Ericaceae</td>
<td>Arbutin, hydroquinone, tannins</td>
<td>leaves</td>
</tr>
<tr>
<td>24.</td>
<td>Wild cherry</td>
<td>Black cherry, chokecherry</td>
<td>Source: Prunus serotina Family: Rosaceae</td>
<td>Acetylcholine, tannins, kaempfeler, prunasin.</td>
<td>Bark, fruit</td>
</tr>
<tr>
<td>25.</td>
<td>Wild yam</td>
<td>Rhevamatism root, colic root</td>
<td>Source: Dioscorea villosa Family: Dioscoraceae</td>
<td>Dioscin, trillin, diosgenin, tannins.</td>
<td>Dried tuber</td>
</tr>
<tr>
<td>26.</td>
<td>Winter green</td>
<td>Teaberry, spiceberry</td>
<td>Source: Gauthheria procumbent Family: Ericacae</td>
<td>Methylsalicylate, ketone, alcohol</td>
<td>leaves</td>
</tr>
<tr>
<td>27.</td>
<td>Worm wood</td>
<td>Source: Artemisia absinthium Family: Astereae or compositae.</td>
<td>Thujone, chamazulene, carotene, tannins</td>
<td>Aerial parts</td>
<td></td>
</tr>
<tr>
<td>28.</td>
<td>Yucca</td>
<td>Source: Yucca scheidigera Family: Liliaceae</td>
<td>Saponins.</td>
<td>Roots</td>
<td></td>
</tr>
<tr>
<td>29.</td>
<td>Lemon balm</td>
<td>Melissa</td>
<td>Source: Melissa officinalis Family: Lamiaceae or labiate</td>
<td>Eugenol, geraniol, Rosmarinic acid, citronellar</td>
<td>Whole herb</td>
</tr>
<tr>
<td>30.</td>
<td>Comfrey salves</td>
<td>Comfrey</td>
<td>Source: Symphytum officinale Family: Boraginaceae</td>
<td>Annin, inulin, pyrrolizidine, alantoin</td>
<td>Root leaves</td>
</tr>
</tbody>
</table>
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.

### REFERENCES