A REVIEW: SOME RHIZOMATOUS PLANTS FOR THE TREATMENT OF INFLAMMATION IN WEST BENGAL

Priyanka Chakraborty*[1], N.N.Bala, S.Das

1Bcd College of Pharmacy and Technology.
2Netaji Subhas Chandra Bose Institute of Pharmacy.

ABSTRACT

Inflammation is a localized protective response elicited by injury or destruction of tissues, which serves to destroy, dilute, or wall off both the injurious agent and the injured tissue. West Bengal has so many species of medicinal plants that possess a large number of secondary constituents. Although plants do not use them for their primary needs, they are basically used against adverse conditions. These secondary metabolites are used to treat a wide variety of human diseases, the added advantage of using plants as medicine is that they are cheap and easily available. The presentation of this paper is to deal with species of medicinal plants’ rhizome from West Bengal which is used for inflammatory responses.

KEYWORDS: Inflammation, Injuries, Rhizomes West Bengal, Secondary constituents, Human diseases.

INTRODUCTION

Herbal medicine is still the mainstay of about 75–80% of the world population, mainly in the developing countries, for primary health care because of better cultural suitability, better compatibility with the human body and lesser side effects. The Eastern India, being one of the hot spots of floristic diversity, offers immense scope on the study of pant for medicinal research.[1]

Inflammation is a localized protective response elicited by injury or destruction of tissues, which serves to destroy, dilute, or wall off both the injurious agent and the injured tissue.
Inflammation is currently treated by NSAIDs. Unfortunately these drugs cause increased risk of blood clot resulting in heart attacks and strokes.

Therefore, the developments of potent anti inflammatory drugs from the natural products are now under considerations. Natural products are rich source for discovery of new drugs because of their chemical diversity. A natural product from medicinal plants plays a major role to cure many diseases associated with inflammation. The conventional drug available in the market to treat inflammation produces various side-effects. Due to these side-effects, there is need for the search of newer drugs with less or no side-effects.\[^{2}\]

**Causes of Inflammation**

1. **Microbial infections:** One of the most common causes of inflammation is microbial infection. Microbes include viruses, bacteria, protozoa, fungi and various parasites. Viruses lead to death of individual cells by intracellular multiplication and either cause the cell to stop functioning and die, or cause explosion of the cell (cytolytic), in which case it also dies.

2. **Hypersensitivity reactions:** A hypersensitivity reaction occurs when an altered state of immunologic responsiveness causes an inappropriate or excessive immune reaction that damages the tissues.

3. **Physical agents, irritant and corrosive chemicals:** Tissue damage leading to inflammation may occur through physical trauma, ultraviolet or other ionizing radiation, burns or excessive cooling ('frostbite'). Corrosive chemicals (acids, alkalis, oxidizing agents) provoke inflammation through direct tissue damage. These chemical irritants cause tissue damage that leads directly to inflammation.

4. **Tissue necrosis** Death of tissues from lack of oxygen or nutrients resulting from inadequate blood flow (infarction) is a potent inflammatory stimulus. The edge of a recent infarct often shows an acute inflammatory response. Effects of Inflammation The effects of inflammation can be both local and systemic. The systemic effects of acute inflammation include fever, malaise and leukocytosis. The local effects are usually clearly beneficial, for example the destruction of invading microorganisms, but at other times they appear to serve no obvious function, or may even is harmful. Beneficial effects of inflammation Harmful effects of inflammation Dilution of toxins Entry of antibodies Fibrin formation Delivery of nutrients and oxygen Stimulation of immune response
Persistent cytokine release Destruction of normal tissues Swelling Inappropriate inflammatory response.[3]

Rhizomes
Rhizomes are commonly confused with roots. Both grow underground. But a rhizome is actually a stem. If you cut a root, a rhizome, and an above-ground stem in cross section, you can see that the tissues in the rhizome look more like a stem than a root. A rhizome is in fact an underground, horizontally growing stem.

Rhizomes with Anti-Inflammatory Activity
1. Kalo Halud (Curma Caesia Roxb.)

Curcuma caesia Roxb. (family- Zingiberaceae) commonly known as kali haldi is a perennial herb belonging to Genus Curcuma. Methanolic extract of Curcuma caesia Roxb. also showed anti-inflammatory activity in carrageenan (acute) and cotton pellet induced granuloma model (sub acute). This activity can be contributed to the phytochemicals present in the extract like alkaloids, phenolic compounds, flavanoids and tannin.[4]

2. Ada (Zingiber officinale)

Ginger, the rhizome of Zingiber officinale (Zingiberaceae) is a perennial herb with an aromatic pungent taste. A study showed that ethanol extract of Zingiber officinale rhizome inhibited carrageenan – induced suplantar edema in rats. Carrageenan – induced rat paw edema is a valuable test used in predicting the value of antiinflammatory agents acting by inhibiting the mediators of acute inflammation. Many substances have been proposed as inflammatory mediators, released locally at the site of inflammation and having biological properties that cause or enhance the signs and symptoms of inflammation.[5]
3. **Halud (Curcuma longa Linn.)**

![Image of turmeric](image)

Curcuma longa (turmeric) has a long history of use in ayurvedic medicine as a treatment for inflammatory conditions. Turmeric constituents include the three curcuminoids: curcumin (diferuloylmethane; the primary constituent and the one responsible for its vibrant yellow color), demethoxycurcumin, and bisdemethoxycurcumin, as well as volatile oils (tumerone, atlantone, and zingiberone), sugars, proteins, and resins. While numerous pharmacological activities, including antioxidant and antimicrobial properties, have been attributed to curcumin, this article focuses on curcumin’s anti-inflammatory properties and its use for inflammatory conditions. This property of curcumin acting as anti-inflammatory has been taken under consideration to treat the inflammatory response of gums with positive results according to various studies.^[6^]

4. **Padma (Nelumbo nucifera)**

![Image of lotus](image)

Nelumbo Nucifera (of the family Nymphaeaceae) is a large aquatic Asiatic medicine known as 'Sacred Lotus' that has been used for culinary and ornamental purposes as well as medical. The anti-inflammatory activity of the methanol extract of Nelumbo nucifera rhizome as well as of betulinic acid, a steroidal triterpenoid isolated from it, were evaluated on carrageenin and serotonin induced rat paw edema. Methanol extract at doses of 200 and 400 mg/kg and betulinic acid at doses of 50 mg/kg and 100 mg/kg p.o., showed significant anti-inflammatory activity in both the models of inflammation in rats. The effects produced were comparable to that of phenylbutazone and dexamethasone, two prototype anti-inflammatory drugs.^[7^]
5. **Madur-kathi (Cyperus tegetum Roxb.)**

Cyperus tegetum Roxb (Cyperaceae) is also commonly called as Madhur kathi. The anti-inflammatory activity of methanol extract of C. tegetum against carrageenan induced paw edema showed that the extracts exhibit significantly reduced the paw edema swelling. The percentage reduction in the paw edema in animals treated with C. tegetum extract was found to be 49.57% and 86.40% at the dose of 250 and 500 mg/kg b.w. respectively.\(^8\)

6. **Galangal (Alpinia galanga Willd)**

Alpinia galanga Willd (Family - Zingiberaceae) is used in medication, culinary and cosmetics for centuries. The study was carried out using albino rats of either sex (150-200 g). An extract of the root of A. galanga was prepared using absolute alcohol and distillation in a Soxhlet apparatus. The acute anti-inflammatory effects of this extract were evaluated using carrageenan-, bradykinin- and 5-HT-induced rat paw edema. The chronic anti-inflammatory effects were evaluated using formaldehyde-induced rat paw edema. Inhibition of inflammation was seen to be 32.22% in carrageenan-induced, 37.70% in 5-HT-induced, and 35.21% in bradykinin-induced anti-inflammatory models. In chronic inflammatory model, a progressive inhibition of 34.73% (3\(^{rd}\) day), 37.50% (5\(^{th}\) day), 38.83% (7\(^{th}\) day), 44.66% (9\(^{th}\) day), 49.59% (11\(^{th}\) day) and 55.75% (13\(^{th}\) day) was observed with study compound. The efficacy was comparable with the standard drugs. It can be thus concluded that A. galanga has anti-inflammatory properties and probably acts by blocking histaminic and
serotonin pathways. It may be an effective alternative to NASAIDs and corticosteroid in inflammatory disorders. [9]

7. Aam-ada (Curcuma amada Roxb.)

The plants belonging to Zingiberaceae family are found to be a rich source of substances of phytochemical interest. The crude ethanol extract showed presence of multiple chemical constituents with presence of hydroxyl, ester, carbonyl and olefinic groups. The ethanol extract of C.amada is devoid of toxicity upto 1 g/kg in albino rats. The extract showed dose dependent antiinflammatory activity, which was found to be statistically significant at higher concentration in acute carrageenan induced rat paw oedema model. However, this activity was less potent as compared to indomethacin. This activity appears to be significant in early phases of inflammation in which various biochemicals, viz. histamine, 5-HT, various kinins are involved. In the chronic model of cotton pellet implantation the activity was dose dependant and significant reduction in granular tissue formation was recorded. The results were significant when analysed statistically. Thus, extract shows antiinflammatory activity at various acute phases of inflammation and on formation of granular tissue. [10]

8. Paashanbhed (Bergenia ciliata Sternb.)

The species of genus Bergenia (Saxifragaceae), popularly known in the folk medicine as Paashaanbhed, grow at Himalayas, usually on rocky, moist and shady places. The methanol extract of the rhizome of Bergenia ciliata Sternb. (Saxifragaceae) has been evaluated for anti-inflammatory potential using two acute rat models (carrageenan- and serotonin (5-HT)-
induced rat paw oedema) and a chronic rat model (cotton pouch-induced granuloma). Phenylbutazone (100 mg kg$^{-1}$), a non-steroidal anti-inflammatory agent, was used as a standard. The methanol extract (100, 200 or 300 mg kg$^{-1}$) exhibited significant (P < 0.05) anti-inflammatory activity in all the animal models. At 300 mg kg$^{-1}$ the methanol extract exhibited maximum inhibition of 32.4+/-2.89% in carrageenan-induced rat paw oedema while the standard showed an inhibition of 44.1+/-2.7% after 3 h of drug treatment. In the serotonin-induced rat paw oedema model, 300 mg kg$^{-1}$ methanol extract suppressed oedema by 45.33+/-2.09%, whereas the standard produced an inhibition of 53.5+/-4.3%. In the cotton pouch granuloma model the methanol extract inhibited significantly (P < 0.001) the granuloma weight in a dose-dependent manner. In this model, 300 mg kg$^{-1}$ extract produced a maximum inhibition of 31.4+/-1.09% in granuloma weight compared with 41.1+/-1.32% reduction in granuloma weight for the standard. The methanol extract of B. ciliata exhibited significant anti-inflammatory potential at the dose levels examined.$^{[11]}$

9. **Jangli Ada (Alpinia nigra B.L. Burtt)**

A. nigra, (family Zingiberaceae) is a perennial aromatic medicinal plant found in China, Bhutan, India and Bangladesh. A study showed that extracts of A. nigra possess significant anti-inflammatory activity. This supports the traditional uses of this plant in various painful inflammatory diseases.$^{[12]}$

**CONCLUSION**

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. Despite the divergent bioactivities of the plant medicines against various diseases, active components of most plant extracts have not been elucidated thoroughly, due their complex mixtures. However, the core chemical classes of anti-inflammatory agents from natural sources have been reported to engage a vast range of compounds such as polyphenols, flavnoids, terpenoids, alkaloids, anthraquinones, lignans,
polysaccharides, saponins and peptides. From the study done so far, it has been believed that flavonoids are major anti-inflammatory agents. Some of them act as phospholipase inhibitors and some have been reported as TNF-α inhibitors in different inflammatory conditions. Biochemical investigations have been also shown that flavonoids are able to inhibit both cyclo oxygenase and lipoxygenase pathways of arachidonic metabolism depending upon their chemical structures. Alkaloids containing pyridine ring system have been reported to have striking anti-inflammatory activity. Significantly terpenoids inhibit the development of chronic joint swelling. However, still many herbal plants have not undergone through scientific investigations for inflammation and rheumatism. Hence it is need of time that all such herbal medicines should be considered for determination of their pharmacological activities by isolation of single entity responsible for antiinflammatory activity and development of suitable formulation which would be beneficial against inflammatory disorders.

REFERENCES

