IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals
ISSN 2349-7203
HUMAN

Human Journals
**Review Article**
July 2021 Vol.:21, Issue:4
© All rights are reserved by Rituparna Borah et al.

# A Review on The Usage of Herbal Plants as Anti-Inflammatory Agent

IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals
ISSN 2349-7203
HUMAN

**Rituparna Borah*, Kaushik Nandan Dutta, Lakshyajeet Nath**

*NETES Institute of Pharmaceutical Science, NEMCARE Group of Institution, Assam, India.*

**Submitted:** 23 June 2021
**Accepted:** 30 June 2021
**Published:** 30 July 2021

HUMAN JOURNALS
www.ijppr.humanjournals.com

**Keywords:** Inflammation, allopathic medicines, herbal medicines

**ABSTRACT**

The plants are used in the treatment of diseases as a complementary medicine. Inflammation is defined as the local response of living mammalian tissues to injury from any agent. It is a body defence reaction in order to eliminate or limit the spread of injuries agent, followed by removal of the necrosed cells and tissues. It is characterized by redness, swollen joints, joint pain, its stiffness and loss of joint function. Inflammation is currently treated by NSAIDs. But these drugs cause various adverse effect such as increased risk of blood clot resulting in heart attacks and strokes and many more. Therefore, the developments of a potent anti-inflammatory drugs from natural sources are now under considerations. In this review article different medicinal plants having anti-inflammatory activity used in the north-eastern region is documented and recorded.

## INTRODUCTION:

Inflammation is defined as the local response of living mammalian tissues to injury from any agent. It is a body defence reaction in order to eliminate or limit the spread of injurious agent, followed by removal of the necrosed cells and tissues. This process involves changes in blood flow, increased vascular permeability, destruction of tissue via the activation and migration of leucocytes with synthesis of reactive oxygen derivatives (oxidative burst) and the synthesis of local inflammatory mediators, such as prostaglandins (PGs), leukotrienes and platelet-activating factors induced by phospholipids A2, cyclooxygenases (COXs) and lipoxygenases. Arachidonic acid is a key biological intermediate that is converted in to a large number of eicosanoids with potent biological activities.[1]

The two major pathways of arachidonic acid metabolism are the COX pathway, which results in the formation of both PGs and thromboxanse and 5-lipoxygenase pathway which is responsible for the formation of leukotrienes and 5S-hydroxy-6E, 8Z, 11Z, 14Z-eciosatetraenoic acid (5-HETE).[1]

## SIGNS OF INFLAMMATION:

The cardinal signs of inflammation are- rubor (redness), tumor (swelling), calor (heat), dolor (pain), loss of function.

## CAUSES OF INFLAMMATION:

Any form of tissue damage stimulates the inflammatory response, even in the absence of infection. The wide range of triggers includes extremes of temperature, the presence of foreign bodies, trauma, corrosive chemicals including extremes of pH, abrasion, immune reactions including autoimmunity, and infection.[2]

## TYPES OF INFLAMMATION:

Depending upon the defence capacity of the host and duration of response, inflammation can be classified into two types i.e. acute and chronic inflammation.

**1. Acute inflammation:** Acute inflammation is of short duration (lasting less than 2 weeks) and represents the early body reaction, resolves quickly and is usually followed by healing.[2] The main features of acute inflammation are:

- Accumulation of fluid and plasma at the affected site.

- Intravascular activation of platelets.
- Polymorphonuclear neutrophils as inflammatory cells.

**2. Chronic inflammation:** Chronic inflammation is of longer duration and occurs after delay, either after the causative agent of acute inflammation persists for a long time or the stimulus is such that it induces chronic inflammation from the beginning.[2]

**Conventional medicine use as an anti-inflammatory:**

**Aspirin:** Aspirin inhibit both COX-1 and COX-2 isoforms, thereby decrease PGs and thromboxane synthesis. The anti-inflammatory effect of Aspirin is mainly due to irreversible inhibition of COX activity.[3]

**Ibuprofen:** Ibuprofen is a non-selective inhibitor of an enzyme called cyclooxygenase (COX), which is required for the synthesis of prostaglandins via the arachidonic acid pathway. COX is needed to convert arachidonic acid to prostaglandins H2 (PGH2) in the body. This PGH2 is then converted to prostaglandins. The inhibition of COX by ibuprofen therefore lowers the level of prostaglandins made by the body.[3]

**Prednisone:** Prednisone is a synthetic, anti-inflammatory glucocorticoid that derives from cortisone. It is biologically inert and converted to prednisolone in the liver. Prednisone decreases inflammation via suppression of the migration of polymorphonuclear leukocytes and reversing increased capillary permeability. It also suppresses the immune system by reducing the activity and the volume of the immune system.[3]

**Naproxen:** Naproxen works by reversibly inhibiting both the COX-1 and COX-2 enzymes as a non-selective coxib. This results in the inhibition of prostaglandin synthesis. Prostaglandins acts as signalling molecules in the body, inducing inflammation.[3]

**HERBS USED AS AN ANTI-INFLAMMATORY:**

Herbal plants have been used as an anti-inflammatory agent in India for a long time and has been popularized world over by leading pharmaceuticals. Plant medicines commonly used in traditional treatment of inflammation are given below.

**1. *Garcinia mangostana Linn*. (Guttiferae)**

The fruit rinds of *Garcinia mangostana* have been used as a traditional medicine for the treatment of trauma and skin infections. The xanthones, α- and γ-mangostins are major bioactive componds found in the fruit hulls of mangosteen. The xanthones exhibits their biological effects by blocking inducible nitric oxide synthase (iNOS) and cyclooxygenase-2 (COX-2). It was reported that two mangostins decrease prostaglandins (PGE2) levels through inhibition of COX-2 activity and NO production. It is reported that α-mangostin shows a more potent inhibition of PGE2 release than either histamine or serotonin.[4]

**2. *Ricinus communis Linn*. (Euphorbiaceae)**

*Ricinus communis* Linn. is found almost everywhere in the tropical and subtropical regions of the world. Anti-inflammatory and free radical scavenging activities of the methanolic extract of *Ricinus communis* root was studied by llavarasan et al. in Wistar albino rats. The methanolic extract exhibited significant anti-inflammatory activity in carrageenan-indiced hind paw edema model. The methanolic extract showed significant free radical scavenging activity by inhibiting lipid peroxidation. The obsereved pharmacological activity may be due to the presence of phytochemicals like flavonoids, alkaloids and tannins in the plant extract.[5]

**3. *Mangifera indica Linn.* (Anacardiaceae)**

*Mangifera indica* grows in the tropical and subtropical region and its parts are commonly used in folk medicine for a wide variety of remedies.[6] The plant Mangifera indica has been reported for various therapeutic uses in traditional medicines such as a fluid extract or the infusion of the bark is used in monorrhagia, leucorrhoea, bleeding piles and in case of haemorrhage from the lungs. Idibs of the leaves calcined are used to remove warts of eyelids. Dried powdered leaves are used in diabetes. Dried flowers in decoction or powder are useful in diarrhea, chronic dysentery and gleet.[7] The ethyl acetate and ethanol extracts of the roots of Mangifera indica has been reported to have considerable anti-inflammatory activity as compared with standard drug Diclofenac sodium.[8] The phytochemical analysis revealed the presence of flavonoids. The flavonoids have potent anti-inflammatory activity by inhibiting prostaglandin synthesis.[9]

**4. *Curcuma longa* (Zingiberaceae)**

The common name of *Curcuma longa* is Turmeric in English and is an Indian indigenous plant.[13] The most important secondary metabolite of *C. longa* is curcumin, which is responsible for anti-inflammatory effect of this plant.[14]

Many clinical trials have been done for proving the anti-inflammatory effect of curcumin. Their results suggest that curcumin can be effective in improving inflammation of rheumatoid arthritis (RA) and reducing clinical manifestation of RA, such as joint swelling and morning stiffness in comparison with phenylbutazone which is used as a positive control.[15] Curcumin is beneficial in irritable bowel syndrome (IBS) treatment[10] and also works as a reducing agent delayed graft rejection (DGR) after kidney transplant surgery.[11] Curcumin also has a beneficial effect in inhibition of inflammatory bowel disease (IBD).[12]

**5. *Cassia fistula L.* (Caesalpiniaceae):**

The whole plant possesses medicinal properties useful in the treatment of skin diseases, inflammatory diseases, rheumatism, anorexia and jaundice. The bark extracts of *Cassia fistula* possess significant anti-inflammatory effect in the acute and chronic anti-inflammatory model of inflammation in rats. Reactive oxygen species (ROS) generated endogenously or exogenously are associated with the pathogenesis of various diseases such as atherosclerosis, diabetes, cancer, arthritis and aging process. ROS play an important role in pathogenesis of inflammatory diseases. The main constituents responsible for anti-inflammatory activity of *Cassia fistula* are flavonoids and bio-flavonoids.[16]

**6. *Olea europaea* (Oleaceae)**

The positive effect of extra virgin olive oil (EVOO) on modulating postprandial plasma lipopolysaccharide, proinflammatory cytokines, TXB2 and LTB4, and diminished performance in risk of coronary heart disease has been demonstrated in healthy individuals and metabolic syndrome patients.

**7. *Zingiber officinale* (Zingiberaceae)**

Oral administration of *Z. officinale* extract has shown different and inconsistent effects, depending on the quantity of consumption. Although administration of squeezed ginger extract to mice one time or twice has elevated the tumour necrosis factor-α (TNF-α) in

peritoneal cells, long-term consumption of the extract has increased the serum corticosterone level and has reduced proinflammatory markers. [17]

**8. *Rosmarinus officinalis* (Lamiaceae)**

In an open-label trial, the effects of rosemary extract have been assessed in patients with osteoarthritis (OA), rheumatoid arthritis (RA), and fibromyalgia during 4 weeks; hs-CRP (an index for inflammation presence) was decreased noticeably in patients who had demonstrated augmentation in this index.

**9. *Borago officinalis* (Boraginaceae)**

This plant is a rich source of gamma linoleic acid (GLA), which contains 25% of GLA, by elevating prostaglandin-E (PGE) level that leads to cyclic adenosine monophosphate (cAMP) augmentation.

**10. *Oenothera biennis* (Onagraceae)**

GLA, linear aliphatic alcohols (e.g., Tetracosanol), and phenolic compound (ferulic acid) are the active components of evening primrose oil which have had protective roles against proinflammatory markers.

**11. *Harpagophytum procumbens* (Pedaliaceae)**

Root's extract of Devil's claw has been claimed to possess inhibition potential of NO, inflammatory cytokines (IL-6, IL-1β, and TNF-α), and PGE2, as well as prevention of arachidonic acid metabolism and eicosanoid biosynthesis, leading to COX-2 inhibition and reducing inflammation.

**12. *Boswellia serrata***

Efficacy of *Boswellia serrata* extract in patients with osteoarthritis has been substantiated; dramatic alleviation in the frequency of joint swelling and pain and augmentation in joint flexibility and walking distance have been observed at the end of treatment period.

**13. *Urtica dioica* (Urticaceae)**

50 mg Diclofenac per day was administered to patients with acute arthritis together with 50 mg infusion of *Urtica dioica* orally. This remedy has caused remarkable attenuation in

CRP level and some patients' complaints for 200 mg Diclofenac per day; according to these outcomes, U. dioica when combined with NSAIDs have an outstanding synergistic effect. [18]

**14. *Salvia officinalis* (Lamiaceae)**

Carnosol and carnosic acid are phenolic diterpenes which have had anti-inflammatory activity. These two components could have inhibited PGE2 production via microsomal PGE2 synthase-1 inhibition.

**CONCLUSION:**

The current review is intended to provide an overview of the current knowledge surrounding the use of herbal medicines as anti-inflammatory. Traditional plants exert great role in discovery of new drugs. Herbal medicines are in great demand in the developed as well as in the developing countries for primary health care because of their wide biological and medicinal activities, higher safety margins and lesser costs. The consumption of herbal medicines is increasing throughout the world as an alternative treatment for curing number of health problems including inflammation, diabetes etc. From the above study, we can conclude that herbal medicines are safer as compared to allopathic medicine because herbal medicines have less side effect.

**REFERENCES:**

1. Shah B. N et al A review on Medicinal plants as a source of Anti-inflammatory agents. Research Journal of Medicinal plants, 5(2): 101-115, 2011
2. Mohan Harsh Textbook of Pathology, Seventh Edition, The Health Sciences Publishers, Page no: 70-71
3. Tripathi K. D. Essential of Medical Pharmacology, Eight Edition, Jaypee Brothers Medical Publishers, Page no: 212-216, 217, 313
4. Chen L et al Anti-inflammatory activity of mangostins from Garcinia mangostana. Food Chem Toxicol. 2008;46:688-693
5. Ilavarasan R et al Anti-inflammatory and free radical scavenging activity of Ricinus communis root extract. J Ethnopharmacol. 2006;103:478-480.
6. Coe FG et al Screening of medicinal plants used by the Garifuna of eastern Nicaragua for bioactive compounds. J Ethnopharmacol. 1996;53:29-50.
7. J Zheng et al J Asian Nat Prod Res. 2003;5:69-73.
8. Latha MS et al Anti-inflammatory activity of Mangifera indica L. Var Rasapuri root extracts. J Chem Pharm. Res.2012;4:333-336.
9. Mascob N et al Phytotherapy research. 1987; 1:28-31.
10. Bundy R. et al "Turmeric extract may improve irritable bowel syndrome symptomology in otherwise healthy adults: a pilot study," The Journal of Alternative and Complementary Medicine, vol. 10, no. 6, pp. 1015-1018, 2004
11. Shoskes D. et al "Beneficial effects of the bioflavonoids curcumin and quercetin on early function in cadaveric renal transplantation: a randomized placebo controlled trial," Transplantation, vol. 80, no. 11, pp. 1556-1559, 2005

12. Holt P. R. et al "Curcumin therapy in inflammatory bowel disease: a pilot study," Digestive disease and Sciences, vol. 80, no. 11, pp. 2191-2193, 2005
13. Nishiyama T. et al., "Curcuminoids and sesquiterpenoids in turmeric (Curcuma longa L.) suppress an increase in blood glucose level in type 2 diabetic KK-Ay mice", Journal of Agricultural and Food Chemistry, vol. 53, no. 4, pp. 959-963, 2005
14. Jurenka J. S "Anti-inflammatory properties of curcumin, a major constituent of Curcuma longa: a review of preclinical and clinical research," Alternative Medicine Review, vol. 14, no. 2, pp. 141-153, 2009
15. Deodhar S. D. at el, "Preliminary study on antirheumatic activity of curcumin (diferuol methane)," The Indian Journal of Medical Research, vol. 71, no. 4, pp. 632-634, 1980
16. Ilavarasan R et al Anti-inflammatory and Antioxidant activities of Cassia fistula Linn bark extracts. Afr J Trad CAM. 2005;1:70-85
17. H. Ueda, K. Ippoushi, and A. Takeuchi, "Repeated oral administration of a squeezed ginger (Zingiber officinale) extract augmented the serum corticosterone level and had anti-inflammatory properties," Bioscience, Biotechnology and Biochemistry, vol. 74, no. 11, pp. 2248–2252, 2010.
18. S. Chrubasik, W. Enderlein, R. Bauer, and W. Grabner, "Evidence for antirheumatic effectiveness of Herba Urticae dioicae in acute arthritis: a pilot study," Phytomedicine, vol. 4, no. 2, pp. 105–108, 1997.