



A REVIEW ARTICLE ON ANTI-INFLAMMATORY ACTIVITY ON NATURAL PRODUCT'S

Neha Mukesh Lohat

Gajanan Maharaj College Of Pharmacy, Chh. Sambhajinagar.

nehahat626@gmail.com

Prof- Manisha Virkar (M.Pharm) Department Of Pharmaceutics, Ganajan Maharaj College Of Pharmacy, Chh. Sambhajinagar.

Dr. Kavita Kulkarni (Phd.M.Pharm) Department Of Quality Assurance. Gajanan Maharaj College Of Pharmacy, Chh. Sambhajinagar.

Abstract:-

Recent scientific understanding of the cascade of inflammatory mediators from arachidonic acid, a precursor of prostanoids, has enabled researchers to adopt new test procedures and also apply these new methods for medicinal plant research. Whole crude extracts from plants have been widely investigated in the past few decades and several plants have been found to have antiinflammatory activity. Plant-based substances are potent in treating several inflammatory disorders. Alkaloids, flavonoids, polyphenols, and terpenes are the few chemical classes that have been reported for antiinflammatory activity and a few classical examples include andrograpanin, azadirachtin, curcumin, embelin, resveratrol, and quercetin. This chapter deals with the antiinflammatory activity of various compounds of natural origin.

KEYWORDS:- natural products, anti-inflammatory activity, plant extract, pure compounds, Medicinal plants, Paw edema, In-vivo model, Markar compound, Active biological compound

Introduction:

Throughout human history, plants have been the primary therapeutic substances. Traditional use of plants as medicine in every region and culture and plants are routinely examined to date for their medicinal potential.

[1]. Inflammation is still an important public health problem in the entire world, causing enormous suffering for the patients.

[2]. Inflammation is a better solution for external or internal stimuli that protects body/tissue.

These include:-

physical stimuli (e.g., X-rays, ultraviolet radiation);

chemical stimuli (e.g., Croton oil)

infectious stimulus (e.g., Propionic Bacterium acne)

immunological stimuli.

External stimuli are divided into physical, chemical, and infectious stimuli, whereas inner or endogenous stimuli categorize immunological stimuli. Clinical symptoms of inflammation include.

Pain.

swelling or edema.

erythema or redness (rubor).

heat of fever.

The role of natural products as remedies has been recognized Since ancient times. There has been considerable public and Scientific interest in the use of natural products to combat Human diseases such as cardiovascular disease, cancer, and Inflammatory disease.

MARINE SPONGE OF NATURAL PRODUCTS :-

There are many anti-inflammatory natural products from Marine sponge. Eighty four anti-inflammatory compounds Dominated by isoprenoid derived metabolites, especially Sesterterpenes (means 2.5 terpenes) have been isolated From marine sponges.⁸⁰ The most commonly used assay To assess anti-inflammatory activity of natural products From marine sponge is the inactivation of PLA2. PLA2 Enzymes hydrolyze phospholipids at the sn-2 position of The glycerol backbone, generating AA. AA is then meta- Bolized via several different pathways to form the in- Flammatory compounds prostaglandins, thromboxanes And leukotrienes.⁸⁰ Boswellia serrata gum resin contains a monoterpene Essential oil (3-10%), resin acids (60-70%), and water Soluble gum (about 20%). Boswellia serrata gum resin Has been reported to have anti-inflammatory activity.

There are several clinical trials which shown to improve Symptoms of ulcerative colitis and Crohn's disease. As a Result of its alleged safety, boswellia was considered superior over mesalazine in terms of a benefit-risk evaluation.⁸⁹ Gupta et al., (2001) studied the gum resin of Boswellia serrata for the treatment of chronic colitis.⁹⁰ In

This study, thirty patients with chronic colitis were includes.

CAUSES - (ANTI – INFLAMMATORY ACTIVITY OF NATURAL PRODUCTS)

Natural products have anti-inflammatory properties due to the presence of phytochemicals, fatty acids, and other compounds:

Phytochemicals

Flavonoids, terpenoids, saponins, tannins, alkaloids, anthraquinones, and essential oils are phytochemicals found in plants that can help treat inflammatory diseases.

Fatty acids

The body uses fatty acids to create prostaglandins, which regulate inflammation.

Non-saponifiable lipids

These lipids are found in vegetable oils and are responsible for their anti-inflammatory and antioxidant effects.

PROPERTIES. (NATURAL PRODUCTS)

Some examples of natural products that have anti-inflammatory properties include:

Turmeric

Research has shown that turmeric can reduce inflammation related to arthritis, diabetes, and other diseases.

Boswellic acids

A topical application of boswellic acids has been shown to improve psoriasis.

Flavonoids

A natural anti-inflammatory agent found in medicinal plants. Flavonoids also have antioxidant activity.

Essential oils

Some essential oils can help calm inflammation and support the immune system.

MEDICATION

Omega-3 fatty acids

These fatty acids are found in fatty fish like salmon and tuna. They are considered one of the most potent anti-inflammatory supplements. However, they can increase the risk of bleeding, so people with bleeding disorders or those taking blood thinners should not take them.

Curcumin

This spice, also known as turmeric, has been used in Ayurvedic and Chinese medicines for its anti-inflammatory properties. It may also help with digestive disorders, wound healing, arthritis, and cancer.

Flavonoids are a major anti-inflammatory natural product that is widely used in the treatment of various chronic inflammatory diseases.

MACHANISUM OF ACTION.

Natural products have several mechanisms of action that contribute to their anti-inflammatory.

Inhibiting enzyme.

Natural products can inhibit enzymes that generate eicosanoids, such as cyclooxygenases, lipoxygenases, and phospholipase A2. This reduces the levels of leukotrienes and prostanoids.

Modulating gene expression

Some flavonoids can modulate the expression of proinflammatory genes, such

as inducible nitric oxide synthase, cyclooxygenase-2, and several cytokines.

Affecting receptors

Some natural products, like coumarins, can affect receptors like Toll like receptors (TLR).

-Classification.

Anti-inflammatory drugs can be classified as.

1.Steroidal.

2.nonsteroidal.

Nonsteroidal anti-inflammatory drugs (NSAIDs) are the most common type of anti-inflammatory drug and include aspirin, acetaminophen, diclofenac sodium, and ibuprofen.

NSAIDs can be further divided into non-selective and selective types.

1.Selective

2.Non- Selective.

(NATURAL COMPOUND OF 5-LOX INHIBITOR.)

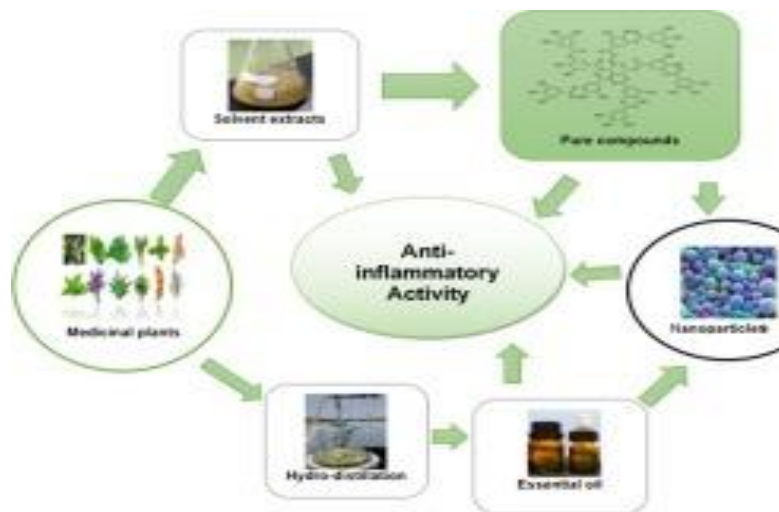
Human 5-LOX has been recognized as an important therapeutic agent for inflammatory diseases like acne vulgaris, allergic rhinitis, asthma, atherosclerosis, atopic dermatitis, chronic obstructive pulmonary disease, idiopathic pulmonary fibrosis, and ischemia–reperfusion injury [11]. The plant families belonging to Asteraceae, Clusiaceae, and Myrsinaceae have been reported as potential sources of lipoxygenase inhibitors [7], [8]. For instance, ardisiaquinone-G from *Ardisia teysmanniana*.

(NATURAL COMPOUND OF 2-COX INHIBITOR.)

COX is an important key enzyme in the biosynthesis of prostaglandins (PGs) from arachidonic acid (AA). In mammalian cells, COX exists in two isoforms. They are (i) COX-1 (constitutive enzyme); (ii) COX-2 (inducible enzyme). Moreover, cytokines and growth factors enhance the expression of COX-2 (inducible enzyme), particularly at inflammatory sites. The plant families belonging to Apocynaceae, Asteraceae, Clusiaceae, Convolvulaceae, Lamiaceae, and Polygonaceae have been reported.

(NATURAL COMPOUND OF 2-PLA INHIBITOR.)

Phospholipase A2 (PLA2) is a major key enzyme that catalyzes the hydrolysis the acyl group present in the intracellular membrane phosphoglyceride. Arachidonic acid (AA) is released from membrane phosphoglycerides as a result of this hydrolysis product. Arachidonic acid (AA) is produced from the membrane phosphoglycerides by this hydrolyzed product. Therefore, antiinflammatory action may be accomplished by inhibiting PLA2. The plant families of Aristolochiaceans have been revealed to be inhibitor.



ADVANTAGE OF ANTI-INFLAMMATORY ON NATURAL PRODUCTS.

Chronic disease risk:

Reducing pain: Inflammation is a common cause of pain, so reducing inflammation can help relieve pain.

Improving mental health:

An anti-inflammatory diet can help boost mental health and cognitive function.

Lowering blood pressure:

An anti-inflammatory diet can help lower blood pressure.

Maintaining a healthy weight:

Improving skin issues:

An anti-inflammatory diet can help improve skin issues like psoriasis.

Slowing aging:

An anti-inflammatory diet can help slow down the aging process.

DISADVANTAGE OF ANTI-INFLAMMATORY ON NATURAL PRODUCTS.

Gastrointestinal side effects: NSAIDs can cause stomach upset, indigestion, nausea, diarrhea, and stomach ulcers. These side effects are more likely to occur if you take high doses for a long time, or if you have a history of peptic ulcers.

Cardiovascular side effects: NSAIDs can increase the risk of heart attacks, strokes, and atrial fibrillation.

Renal side effects: NSAIDs can affect the renal system.

Hepatic side effects:

NSAIDs can raise liver enzymes, but liver-related hospitalization is rare.

Hematologic side effects: Nonselective NSAIDs can cause hematologic side effects.

Other side effects: NSAIDs can cause headaches, drowsiness, dizziness, allergic reactions, fluid retention, and high blood pressure.

Infection risk: Corticosteroids increase the risk of infections, especially bacterial, viral, and fungal pathogens. The risk increases with the dose and duration of therapy, and with the use of immune suppressive agents.

Blood pressure: Corticosteroids can cause you to retain excess fluid, which can lead to high blood pressure.

Conclusion.

Medicinal plants have been a source of many antiinflammatory agents since time immemorial. Moreover, if proven, the

efficacy and safety of these natural products would be of great benefit to human beings. Furthermore, several drugs of natural origin, especially from plants, are still in clinical use even today. Drug discovery from plants involves the combination of botanical, ethnobotanical, phytochemical, and biological methods. A few bioactive molecules are reported to have nonspecific enzyme.

References

- Artis D., Spits H. *The biology of innate lymphoid cells. Nature.* 2015;517:293–301. *Based therapy of cancer: a new twist to age old practice.*
- Vane J, Botting R. *Inflammation and the mechanism of Action of anti-inflammatory drugs.* FASEB J 1987; 1: 89-96.
- British Nutrition Foundation. Golberg G ed. *Plants: Diet And Health. The Report of a British Nutrition Foundation Task Force.* Blackwell Publishing, 2003.
- Srivastava R, Srimal RC. *Modification of certain Inflammation induced biochemical changes by curcumin.* Indian J Med Res 1985; 81: 215-223. Satoskar RR, Shah SJ, Shenoy SG. *Evaluation of anti-Inflammatory property of curcumin (diferuloyl methane) in Patients with postoperative inflammation.* Int J Clin Pharmacol Ther Toxicol 1986; 24: 65 47. *sthematics. Biochem Pharmacol* 1997; 54: 819-824.
- Kang BY, Chung SW, Chung W, Im S, Hwang SY, Kim TS. *Inhibition of interleukin-12 production in Lipopolysaccharide-activated macrophages by curcumin.* Eur J Pharmacol 1999; 384: 191-195.
- Bremner P, Heinrich M. *Natural products and their role as Inhibitors of the pro-inflammatory transcription factor NF- κ B.* Phytochem Rev 2005; 4: 27-37.

- Li-Weber M, Giaisi M, Treiber MK, Krammer PH. The Anti-inflammatory sesquiterpene lactone parthenolide Suppresses IL-4 gene expression in peripheral blood T Cells. *Eur J Immunol* 2002; 32: 3587-3597.
- Heinrich M, Ankli A, Frei B, Weimann C, Sticher O. Medicinal plants in Mexico: healers' consensus and Cultural importance. *Soc Sci Med* 1998; 47: 1859-1871.
- Jain NK, Kulkarni SK. Antinociceptive and anti-Inflammatory effects of *Tanacetum parthenium* L. extract In mice and rats. *J Ethnopharmacol* 1999; 68: 251-259.
- Smolinski AT, Pestka JJ. Modulation of lipopoly-Saccharide-induced proinflammatory cytokine production In vitro and in vivo by the herbal constituents apigenin (chamomile), ginsenoside Rb1 (ginseng) and parthenolide (feverfew). *Food Chem Tox* 2003; 41: 1381-1390.
- Tassorelli C, Greco R, Morazzoni P, Riva A, Sandrini G, Nappi G. Parthenolide is the component of *tanacetum Parthenium* inhibits nitroglycerin-induced Fos activation: Studies model of migraine. *Cephalalgia* 2005; 25: 612-621.
- Johnson ES. *Feverfew: a traditional herbal remedy for Migraine and arthritis*. London: Sheldon Press, 1984.
- Palevitch D, Earon G, Carasso R. Feverfew (*Tanacetum Parthenium*) as a prophylactic treatment for migraine: a Double-blind placebo-controlled Study. *Phyto Res* 1997; 11: 508-511.
- Fukuda K, Hibiya Y, Mutoh M, Ohno Y, Yamashita K, Akao S, Fujiwara H. Inhibition by parthenolide of phorbol Ester-induced transcriptional activation of inducible nitric Oxide synthase gene in a human monocyte cell line THP-1. *Biochem. Pharmacol* 2000; 15: 595-600.
- Piela-Smith TH, Liu X. Feverfew extracts and the sesqui-Terpene lactone parthenolide inhibit intercellular adhesion Molecule-1 expression in human synovial fibroblasts. *Cell Immunol* 2001; 209: 89-96.
- Hwang D, Fischer NH, Jang BC, Tak H, Kim JK, Lee W. Inhibition of the expression of inducible cyclooxygenase And proinflammatory cytokines by sesquiterpene lactones In macrophages correlates with the inhibition of MAP
- Kinases. *Biochem Biophys Res Commun* 1996; 226: 810-818. 25. Mazor RL, Menendez IY, Ryan MA, Fiedler MA, Wong HR. Sesquiterpene lactones are potent inhibitors of Interleukin 8 gene expression in cultured human respiratory Epithelium. *Cytokine* 2000; 12: 239-245.
- Kang BY, Chung SW, Kim TS. Inhibition of interleukin-12 Production in lipopolysaccharide-activated mouse macro-Phages by parthenolide, a predominant sesquiterpene Lactone in *Tanacetum parthenium*: involvement of nuclear Factor- κ B. *Immunol Lett* 2001; 77: 159-163.
- Hehner SP, Hofmann TG, Droge W, Schmitz ML. The Antiinflammatory sesquiterpene lactone parthenolide inhi-Bits NF kappa B by targeting the Ikappa B kinase complex.
- *J Immunol* 1999; 163: 5617-5623.
- Rungeler P, Castro V, Mora G, Goren N, Vichnewski W, Pahl HL, Merfort I, Schmidt TJ. Inhibition of transcription Factor NF-kappaB by sesquiterpene lactones: a proposed Molecular mechanism of action. *Bioorg Med Chem* 1999; 7: 2343-2352.
- Jayaprakasam B, Seeram NP, Nair MG. Anticancer and Antiinflammatory activities of cucurbitacins from *Cucurbita Andreana*. *Cancer Lett* 2003; 189: 11-16.
- Jian CC, Ming HC, Rui LN, Cordell GA, Qiu SX. Cucurbitacins and cucurbitane



glycosides: structures and Biological activities. Nat Prod Rep 2005; 22: 386-399.

- *Yesilada E, Tanaka S, Sezik E, Tabata M. Isolation of an Anti-inflammatory principle from the fruit juice of Ecballium elaterium. J Nat Prod 1988; 51: 504-508.*
- *Peters RR, Saleh TF, Lora M, Patry C, de Brum-Femandes AJ, Far MR, Ribeiro-do-Valle RM. Anti-inflammatory Effects of the products from Wilbrandia ebracteata on*
- *Carrageenan-induced pleurisy in mice. Life Sci 1999; 64: 2429-2437.*