

Review on Inflammation and Marketed Preparation

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Abstract

This article describes the physical aspects of pain and inflammation. The aim is to study pain, inflammation and their pathophysiology, including the mechanism of inflammation and the various pathways involved in the mechanism of the inflammatory response and intracellular signaling and extracellular used to initiate and initiate. And study of various marketed preparations. It stimulates various receptors and hormones. It is one of the most common problems and one of the most difficult to diagnose, and it can be seen in normal people. Pain is a complex experience that includes cognitive and behavioral components and results from injury, disease and surgery. Various mediators such as IL, PG, PAF, LT and cytokines cause inflammation and pain. There are many types of drugs used to treat inflammation, such as salicylates, propionic acid, pyrazolone derivatives, arylacetic acid, oxycam, and pyrrolepyrrole derivatives.

KEYWORDS: Inflammation, Pain, Acute and Chronic inflammation, NSAID, Diagnose

INTRODUCTION

Inflammation is painful redness and swelling in a part of the body caused by disease, injury, or disease. Inflammation is a natural, protective response to tissue damage caused by physical injury, toxic substances, or microbiological organisms. It is part of a complex biological response of body tissues to harmful stimuli such as infections, damaged cells or allergies, a protective response that involves immune cells, blood vessels and nerves. Molecular mediators of inflammation may be active or persistent⁽¹⁻³⁾

Inflammation is a protective response that triggers various physiological adaptations that reduce tissue damage and eliminate pathogenic insults, and pain is an expected consequence of many diseases, medical treatments, surgeries, and pain. Pain is a complex experience that involves mental, emotional and behavioral aspects that are all the result of a psychological process. It describes mental states.^(4,5)

The nature of pain involves pathophysiological and psychological components, which are difficult to interpret. Suffering is a word used to refer to pain, meaning to bring pain or distress, which is associated with a wide range of negative and negative mental states, whether physical or mental. . The most comprehensive and comprehensive definition of pain is given by the International Association for the Study of Pain.⁽⁶⁾

Inflammation is a defensive response which causes the different physiological adaptations which limits the tissue damage and removes pathogenic insult. This type of mechanism involves a complex series of events which includes dilation of arterioles, venules and capillaries with increased vascular permeability, exudation of fluids which includes plasma proteins and the migration of leukocyte into the inflammatory area. In the inflammation, there is immediate infiltration of a specific site or lesion with PMN followed by monocytes and lymphocytes⁽⁷⁻⁸⁾

The objective of inflammation is to destroy and eliminate the damaging agent. However, if doesn't occur or is protracted process then inflammation will isolate and contain the injury. In each aspect, the objective is to allow the repair and healing of injured tissue with the minimum damage of host's physiology. Inflammation occurs due to the stress responses and is an integral part of it.^(9, 10, 11)

In the case of the fight or flight response, acute psychosocial stress can cause the activation of the nuclear transcription factor κ B and the secretion of proinflammatory cytokines, presumably by adrenergic stimulation. The inflammation causes the destruction, the reduction of the walls of the harmful agents and at the same time precipitates a series of events in a series that causes the healing and reconstruction of the damaged tissue, both by the regeneration of the parenchymal cells native or by filling the defect with fibroblastic tissue (healing) or by both processes. A critical function of inflammation is the delivery of leukocytes to the site of injury, which is achieved by increasing blood flow, structural changes in the microvasculature to allow the migration of leukocytes and their accumulation at the site of the wound.

Pathophysiology and pathogenesis of inflammation

The aim of this chapter is to grasp the pathophysiology and pathogenesis of pain and inflammation. Identifying inflammation is difficult, even though it is a common problem. Simply put, pain and inflammation are complex due to their psychological and behavioral aspects, as well as the effects of physical injury, illness, or medical procedures. Experiencing inflammation and its symptoms can cause discomfort and potentially harm tissues or cause similar damage. Inflammation happens when tissue damage and factors that cause inflammation, like histamine and cytokines, result in widening of venules, heightened vascular permeability, and the infiltration of inflammatory substances. The reactions to stress stimulate inflammation, which is a crucial part of it. Once the troublesome element is eliminated, the mission can be concluded and inflammation will be stopped. In this section, we talk about the sequence of events and the mediators involved in short-term inflammation, and also explore the potential patterns of morphology. This discussion covers the key aspects of chronic inflammation. Various mediators such as IL, PG, PAF, LT, and causing inflammation, resulting in cytokines are responsible for pain⁽¹²⁾.

TYPES OF INFLAMMATION

1) Acute Inflammation

2) Chronic Inflammation

1) Acute inflammation: Acute inflammation is of short duration and its duration is from minutes to few days. The main characteristics:

a) Exudation of fluids

b) Plasma protein (edema)

c) Emigration of leukocytes specially neutrophils



Fig No 1: Acute inflammation

2) Chronic inflammation: Chronic inflammation lasts longer than acute inflammation. In the history, it is related to the presence of lymphocytes, macrophages, growth of blood vessels, fibrosis and tissue necrosis. These processes of active inflammation and tissue damage. After acute inflammation, it begins with a mild symptom, and the response ends without symptoms. It can also be caused by persistent infection with certain organisms such as bacillus tuberculosis or Treponemapallidum, prolonged exposure to highly toxic, exogenous agents such as silica, or ultimately such as plasma lipids. leading to atherosclerosis, autoimmune, such as rheumatoid arthritis^(13,14)

Leukocytosis, thrombocytosis, negative nitrogen balance, increased BMR, increased lipogenesis and lipolysis. The level of plasma protein is decreased and the level of C-reactive protein is increased⁽¹⁵⁾

Chronic inflammation occurs when:

Sensitization: Inflammation occurs when the body senses something that shouldn't be there. Exposure to external stimuli can cause allergies.

Exposure: Sometimes for a long time, a small amount of exposure, such as industrial chemicals, can lead to chronic inflammation. **Autoimmune diseases:** The immune system mistakenly attacks healthy tissue, such as psoriasis.

Auto-inflammatory diseases: The most common genetic cause affects the functioning of the immune system, such as Behçet's disease.

Acute chronic inflammation: Sometimes, people may not fully recover from acute inflammation. Sometimes this leads to chronic inflammation..⁽¹⁶⁾

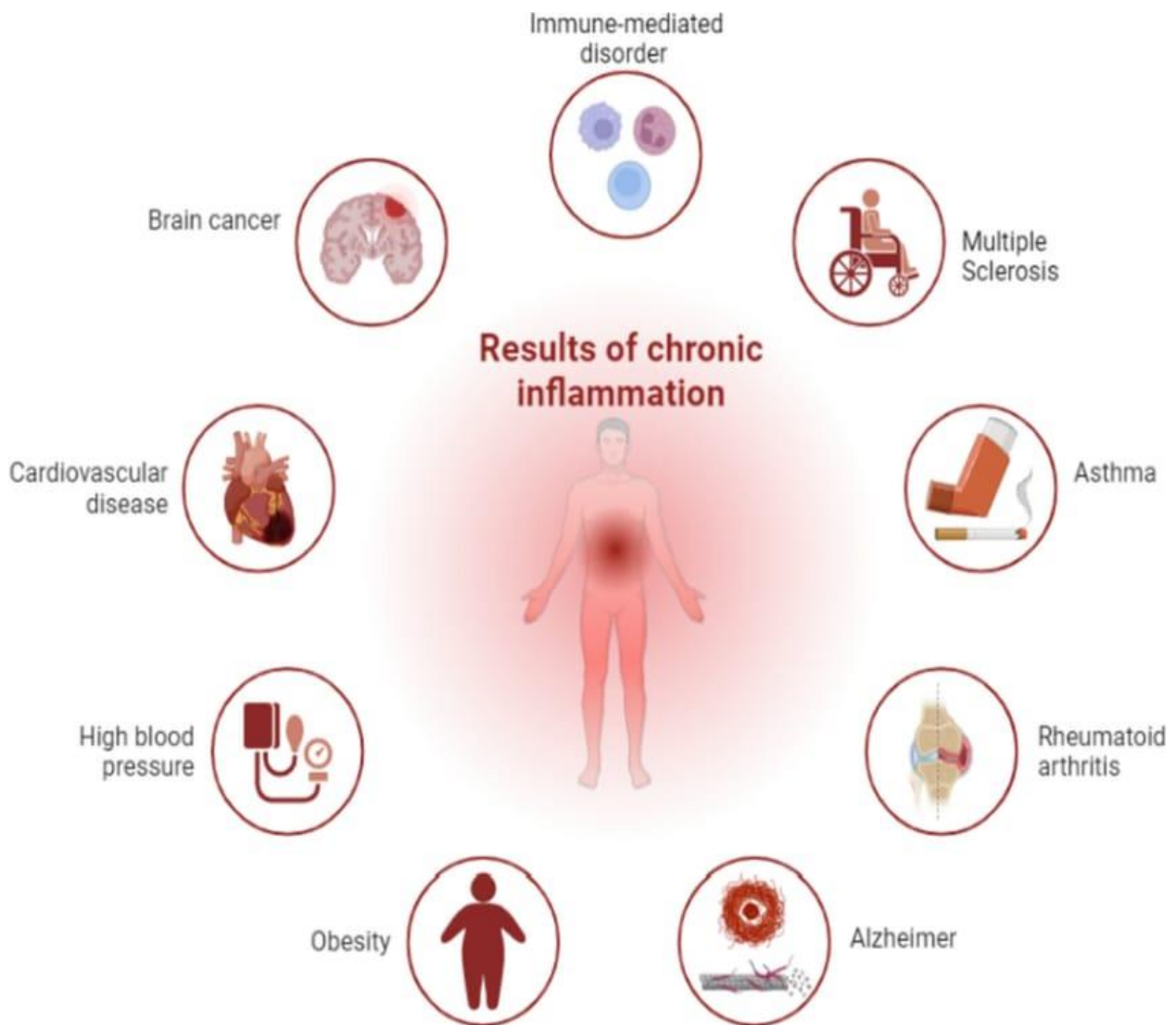


Fig No 2: Chronic inflammation

THE INFLAMMATORY RESPONSE MECHANISM:

The inflammatory response is the specific activation of signaling pathways that regulate the levels of inflammatory mediators in resident tissue cells and blood-derived inflammatory cells.⁽¹⁷⁾ Inflammation is a common pathogenesis of many chronic diseases, including cardiovascular and bowel diseases, diabetes, arthritis, and cancer. ⁽¹⁸⁾Although the inflammatory response processes depend on the exact nature of the initial stimulus and its location in the body, they all share a common mechanism that can be summarized as follows: a) The receptors recognize the surface pattern to negative stimuli. b) Inflammatory pathways are activated. c) inflammatory signals are released and d) inflammatory cells are absorbed.

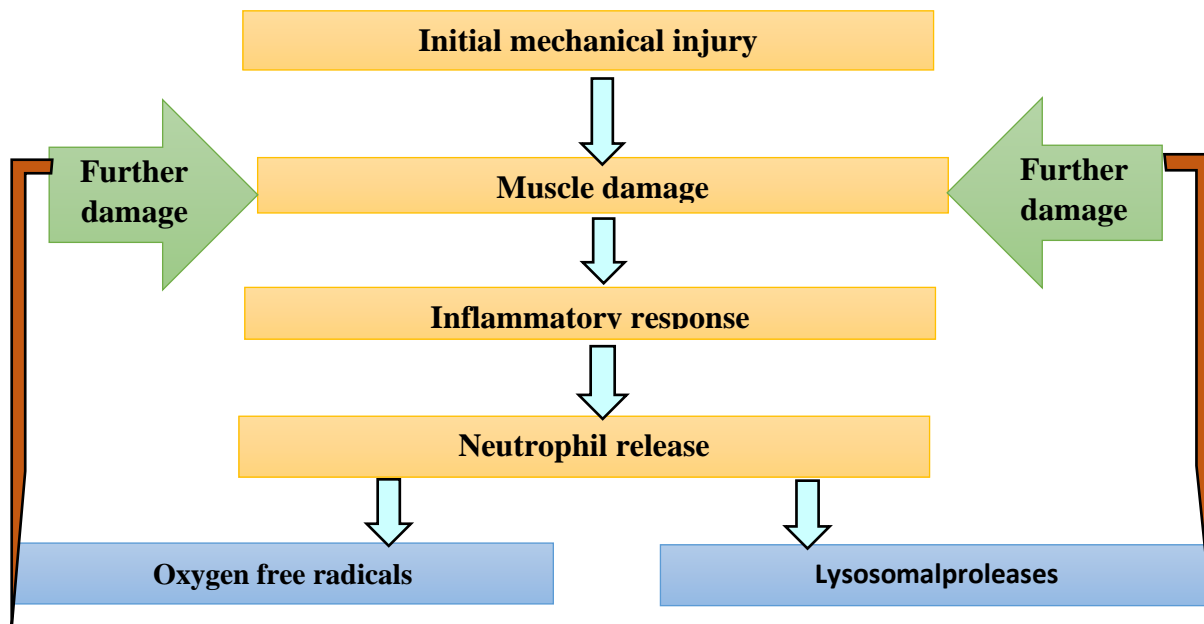


Figure No 3: Inflammatory Response and Mechanism.

NONSTEROIDAL ANTI INFLAMMATORY DRUG (NSAID)

Nonsteroidal anti-inflammatory drugs (NSAIDs) are a sedate lesson FDA-approved for utilize as antipyretic, anti-inflammatory, and pain relieving specialists. These impacts make NSAIDs valuable for treating muscle torment, dysmenorrhea, joint conditions, pyrexia, gout, headaches, and utilized as opioid-sparing operators in certain intense injury cases.^(19,20,21)

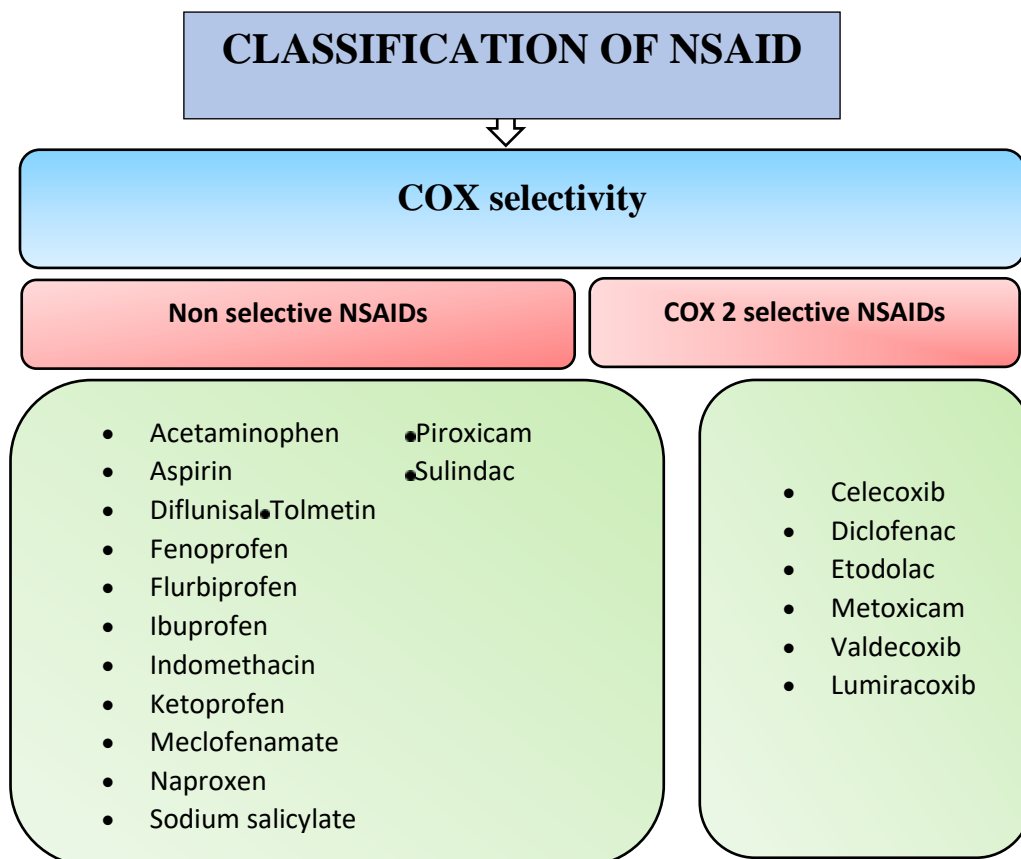


Figure No 4: Classification of NSAID

MECHANISM OF NSAID

The main mechanism of action of NSAIDs is the inhibition of the enzyme cyclooxygenase (COX). Cyclooxygenase is required to convert arachidonic acid into thromboxanes, prostaglandins, and prostacyclins.⁽²²⁾ The therapeutic effects of NSAIDs are attributed to the lack of these eicosanoids. Specifically, thromboxanes play a role in platelet adhesion, prostaglandins cause vasodilation, increase the temperature set-point in the hypothalamus, and play a role in anti-nociception. There are two cyclooxygenase isoenzymes, COX-1 and COX-2. COX-1 gets constitutively communicated within the body, and it plays a part in keeping up gastrointestinal mucosa lining, kidney work, and platelet accumulation. Most of the NSAIDs are nonselective and repress both COX-1 and COX-2. Be that as it may, COX-2 specific NSAIDs (ex. celecoxib) as it were target COX-2 and thus have a distinctive side impact profile. Vitally, since COX-1 is the prime go between for guaranteeing gastric mucosal astuteness and COX-2 is basically included in irritation,⁽²³⁾

Marketed Formulation Used To Treat Inflammation

A. OMNIGEL SPRAY

Omnigel Spray is a pain relief spray that helps relieve musculoskeletal and joint pain.

Content:

Omnigel Spray contains diclofenac, linseed oil, methyl salicylate, and menthol. Diclofenac and methyl salicylate work by lowering hormones in the body that cause inflammation and pain. Linseed oil inhibits inflammatory mediators like leukotriene, thereby reducing inflammation. Menthol is a soothing and cooling agent which provides a cooling sensation by dilating the blood vessels.

Drug information:

Diclofenac: Diclofenac is a phenyl acetic acid derivative and non-steroidal anti-inflammatory drug (NSAID). NSAIDs inhibit cyclooxygenase (COX)-1 and-2 which are the enzyme responsible for producing prostaglandins (PGs). PGs contribute to inflammation and pain signaling. Diclofenac, like other NSAIDs, is often used as first line therapy for acute and chronic pain and inflammation from a variety of causes. Diclofenac was the product of rational drug design based on the structures of phenylbutazone, mefenamic acid, and indomethacin.



Fig no.5: Omigel

Mechanism:

1. Penetration: Diclofenac penetrates the skin, reaching the affected area.



2. COX Inhibition: Diclofenac inhibits cyclooxygenase (COX) enzymes, specifically COX-1 and COX-2.



3. Prostaglandin Synthesis Reduction: COX inhibition reduces prostaglandin production, Which contributes to inflammation.



4. Anti-Inflammatory Effects: Reduced prostaglandins lead to decreased:

- Pain
- Swelling
- Redness
- Inflammation

Side effect:

- a) Itching
- b) Irritation
- c) Redness
- d) Burning sensation

Uses:

Omnigel Spray is used to relieve acute musculoskeletal pain, inflammation and osteoarthritis. It effectively reduces pain, swelling, and joint stiffness, thereby improving your ability to move and flex the joint.

B. Moovspray

Moov Pain Relief Spray is one of India's most popular ointments for fast pain relief amongst homemakers. It is an analgesic (or pain-relieving) ointment made using 100% ayurvedic ingredients.

Content:

- Wintergreen oil - It has analgesic and anti-inflammatory properties. The soothing and warm effect of wintergreen oil reduces irritation and swelling.
- Mint extract - It has a cooling effect and can treat sore muscles and relieve joint aches.
- Eucalyptus oil - It contains many anti-inflammatory compounds and has a soothing effect.
- Turpentine oil - It eases pain and muscle tension by relaxing the tissues.
- Cinnamon oil - It has anti-inflammatory properties and soothes aching joints and numbs the pain.



Fig no 6: Moov

Mechanism:

- 1. Penetration:** The active ingredients penetrate the skin, targeting the affected area.
- 2. Inhibition of prostaglandins:** Methyl salicylate inhibits prostaglandin synthesis, reducing inflammation.
- 3. Numbing effect:** Benzyl alcohol and menthol provide a numbing and cooling effect, reducing pain perception.
- 4. Reduced inflammation:** The combination of ingredients reduces inflammation, swelling, and pain.

Side effect:

- a) Skin irritation (redness, itching, burning)
- b) Allergic reactions (rash, hives)
- c) Dryness or oiliness of skin
- d) Stinging or tingling sensation
- e) Mild dermatitis

Uses:

- It is an instant pain reliever for muscle pain.
- It cures back pain, shoulder muscle injury or any other kinds of muscle-related sprains.
- It eliminates muscle stiffness.

C. Advil Tablet:

Advil is a nonsteroidal anti-inflammatory drug (NSAID). Ibuprofen works by reducing hormones that cause inflammation and pain in the body.

Content:

Advil is a nonsteroidal anti-inflammatory drug (NSAID). Ibuprofen works by reducing hormones that cause inflammation and pain in the body.

Drug information:

Ibuprofen: Is a medication used to reduce pain, fever, and inflammation, such as during menstrual cramps, migraines, or rheumatoid arthritis. It can also be used to treat a patent ductus arteriosus in premature infants. It can be taken orally or intravenously and usually starts working within an hour. Ibuprofen was derived from propionic acid.



Fig no 7: Advil

Mechanism:

- 1. COX inhibition:** Ibuprofen blocks cyclooxygenase (COX-1 and COX-2) enzymes
- 2. Prostaglandin synthesis reduction:** Decreased production of prostaglandins (PGE₂, PGF₂α)
- 3. Anti-inflammatory effects:** Reduced inflammation, pain, and fever

Side effect:

- Nausea
- Vomiting
- Bleeding
- Dizziness
- Headache
- Gas

Uses:

Advil is used to reduce fever and treat pain or inflammation caused by many conditions such as headache, toothache, back pain, arthritis, menstrual cramps, or minor injury.

D. Combiflam tablet:

Combiflam Tablet combines two medicines that work as painkillers. They're working together to reduce pain, fever, and inflammation. It is used to treat many conditions such as

- **Headache**
- **Muscle pain**
- **Period pain**
- **Toothache**
- **Joint pain**

Combiflam Tablet is best taken with food to minimize side effects

Content:

Combiflam contains ibuprofen and paracetamol, which are used to treat pain and fever. Diclogem, on the other hand, contains Diclofenac, a nonsteroidal anti-inflammatory drug (NSAID) that is primarily used to relieve pain and inflammation.

Drug information: Is a non-opioid analgesic and antipyretic agent used to treat fever and mild to moderate pain. It is a widely used over-the-counter medication. Common brand names include Tylenol and Panadol.



Fig no 8 :Combiflam

Mechanism:

This chemical is responsible for causing pain, inflammation, swelling and redness. The proven synergistic effect of the two ingredients in Combiflam® works by inhibiting the effects of the cyclooxygenases (COX) enzymes, thus bringing relief from pain and inflammation.

Side effect:

- Heartburn
- Indigestion
- Nausea
- Stomach pain
- Vomiting
- Headache
- Sleepiness
- Constipation
- Abdominal pain

Uses:

Fever: Combiflam tablets provide temporary relief from pain and fever.

Menstrual cramps: Combiflam medicine is found to be effective in women's menstrual cramps and associated abdominal conditions.

Osteoarthritis: Combiflam Tablet is used to treat symptoms of osteoarthritis, including tender and swollen joints.

Rheumatoid Arthritis: Combiflam is used to treat symptoms of rheumatoid arthritis, including pain, stiffness, and swelling of the joints.

Gout: Combiflam Tablet helps to relieve gout-related swelling and pain.

E. Dicloplast patch

Dicloplast Patch contains diclofenac and is designed to alleviate pain from conditions such as osteoarthritis, sprains, strains, tennis elbow, joint pain, and post-operative dental procedures.

Content:

Diclofenac Diethyl amine IP: An NSAID that lessens mild to moderate pain and inflammation.

Linseed oil: Relieves achy muscles

Menthol: Eases and diminishes discomfort



Fig no 9: Dicloplast

Mechanism:

Dicloplast Patch works by blocking the effect of a chemical messenger known as cyclooxygenase (COX) enzymes that make other chemical prostaglandins.

Side effect:

- Itching
- Irritation

- Redness
- Eczema

Uses:

Treatment of Pain and inflammation associated with musculoskeletal and joint disorders.⁽²⁴⁾

TREATMENTS:

Non-steroidal anti-inflammatory drugs (NSAIDs) are used to treat inflammation.

Commonly used drugs are: -

- Salicylates: Aspirin.
- Propionic acid products: Ibuprofen, ibuprofen + paracetamol combined.
flurbiprofen, ketoprofen, naproxen, fenamate and mefenamic acid.
- Pyrazolones: phenylbutazone and okifenbutazone.
- Indole version: Ibuprofen.
- Products of arylacetic acid: diclofenac sodium, diclofenac potassium, diclofenac +
combination of paracetamol, combined preparation of diclofenac and peptidase.
- Oxicam products: piroxicam, tenoxicam and meloxicam.
- Pyrrole derivatives: Ketorolac.
- Para-aminophenol derivative: Paracetamol.
- Other: celecoxib, rofecoxib, valdecoxib and nimesulide, prepare a combination of nimesulide, nabumeton.

CONCLUSION:

From this article on inflammation, mechanisms of inflammation, types of inflammation, NSAID introduction (mechanism and classification) and also learn about various marketed preparations for anti-inflammation such as omnigel spray, moov spray, advil tablet, combiflam tablet and dicloplast patch. In addition to preparation, the article also describes mechanisms related to inflammation of that preparations. It also helps to understand the neural pathway and mechanism of inflammation, and the treatment of inflammation.

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