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Review Article

Review Paper: Formulation And Evaluation of Pain Reliever Balm with Diclofenac

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ABSTRACT

As our understanding of pain mechanisms advances, so too has the emphasis on creating novel drug delivery systems that can offer patients individualised care without compromising the effectiveness of analgesia. Acute pain serves as a warning, but chronic pain is a syndrome that necessitates careful selection of highly bioavailable analgesic medications for long-term treatment. A typical symptom of many illnesses and accidents is pain, which is frequently treated topically. Due to their natural source and fewer adverse effects than synthetic medications, formulations for pain management have grown in popularity. Owing to their effectiveness, non-steroidal anti-inflammatory drugs (NSAIDs) like diclofenac are frequently used to treat pain. This review focuses on the composition of a pain reliever balm that includes diclofenac and assesses its patient acceptance, safety, stability, and effectiveness. Diclofenac topical is commonly used to relieve inflammation and pain. This thorough analysis evaluates topical diclofenac's effectiveness and safety in treating a variety of inflammatory and painful conditions.

INTRODUCTION

Acute or chronic pain can have a major negative influence on one's quality of life. Topical analgesics reduce systemic side effects by providing localised relief. In pain therapy, the balm formulation has a strong synergistic impact when paired with contemporary medications like diclofenac. A well-known NSAID with anti-inflammatory and analgesic qualities, diclofenac is frequently prescribed to treat sprains, arthritis, and other musculoskeletal ailments. In order to treat both locally inflammatory skin tissues and inflammatory and painful states of the body's supporting structures—the bones, ligaments, joints, tendons, and muscles—a diclofenac

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formulation that penetrates the skin deeply could be beneficial.

A deep penetration diclofenac formulation may be advantageous. The inherent anti-inflammatory and analgesic qualities of several plants are combined with the established effectiveness of diclofenac in our herbal balm to create a synergistic combination that:

1. Improves localised pain alleviation.
2. lessens oedema and inflammation.
3. encourages tissue repair and healing.
4. reduces systemic adverse effects.

Our balm's carefully selected natural components complement diclofenac to:

1. Enhance joint flexibility and mobility.
2. Calm and soothe inflamed tissues.
3. Encourage the body's inherent healing mechanisms.

Using a combination of conventional and traditional medicine, our balm provides a holistic approach to pain management. Our approach offers a potent and non-invasive remedy for people who want to effectively relieve both acute and chronic pain by utilising the synergistic effects of diclofenac and extracts.

Treatment of pain:

Something soothing and reassuring is balm. It is the cause of the suffering. The term "herbal pain" so naturally contains the phrase "relief." In the physical sense, a balm is a semi-solid preparation that is administered externally to relieve irritation and soothe it. It can also refer to any of the different aromatic resinous compounds found in a remedy that has calming and restorative properties. When pressure and movement are applied to the location where pain is released, an overload of sensory input is created, which prevents the pain from being felt. There is no known way to alleviate pain. In order to treat pain, the underlying cause of it needs to be physiologically extracted from your body by means of Most of the time, surgery is neither practical nor practicable, nor is it considered a pain-relieving treatment. Famed nurses experience pain when they are anxious at the site of an accident or illness. In most cases, any effective pain treatment solution will be exclusive to each of us. Finding a product, technique, or pain management treatment that can significantly reduce your pain level is the first step towards achieving pain relief and control.

Pain reliever balm pharmacological effect on body:

Instead of truly reducing pain, pain relief balms suppress it by irritating the area where they are administered. This operates on the counterirritant principle. The formulation of pain reliever balms includes extracts from organically certified herbs, organic essential oils, and organic beeswax, which are combined to create a medicated topical application. These applications provide rapid relief from various types of pain, including headaches, backaches, and arthritic discomfort. The organic vegetable oil used in these formulations is sourced from India, such as coconut oil. The variety of

balms comprises, among others, body, foot, lip, and cold balms.

Mechanism of Action:

1. Non-Steroidal Anti-Inflammatory Drugs (NSAIDs): Diclofenac inhibits cyclooxygenase (COX) enzymes, reducing prostaglandin synthesis and subsequent inflammation and pain.
2. Prostaglandin Synthesis Inhibition: Diclofenac blocks COX-1 and COX-2 enzymes, decreasing prostaglandin E2 (PGE2) production, which contributes to pain and inflammation.

Pharmacological Effects:

1. Analgesic Effect: Diclofenac provides pain relief by blocking pain transmission and reducing inflammation.
2.Anti-Inflammatory Effect: Diclofenac reduces inflammation by inhibiting prostaglandin synthesis and suppressing inflammatory mediators.
3. Antipyretic Effect: Diclofenac helps reduce fever by inhibiting prostaglandin synthesis.
4. Anti-Platelet Effect: Diclofenac inhibits platelet aggregation, which may contribute to its anti-inflammatory effects.

Local Effects (Topical Application):

1. Skin Penetration: Diclofenac penetrates the skin, reaching therapeutic concentrations in affected tissues.
2.Local Analgesia: Topical diclofenac provides localized pain relief, reducing inflammation and discomfort.

Systemic Effects (After Topical Absorption):

1. Circulatory Effects: Diclofenac may affect blood pressure, cardiac output, and renal function, particularly at high doses.
2. Gastrointestinal Effects: When compared to oral NSAIDs, topical diclofenac is less likely to cause gastrointestinal adverse effects.

Eucalyptus leaves and the oil derived from them have been widely utilised for the treatment of common respiratory ailments and other infections, including coughs, colds, fevers, sore throats, congestion, joint pain, and wounds. The eucalyptus tree, scientifically known as Eucalyptus globulus, is native to Australia but is now cultivated globally. This tree encompasses over 300 species, all recognised for their significant medicinal properties. The therapeutic benefits of the tree, commonly referred to as "blue gum," are attributed to the oil extracted from its oval-shaped leaves. The leaves are subjected to drying and crushing, followed by extraction through either the stem distillation method or cold pressing to obtain the essential oil. This oil is typically colourless and has a robust woody aroma, which is usually diluted prior to direct application. Historically, the indigenous peoples of Australia extensively utilised this tree. They would either chew the roots or consume tea infused with eucalyptus leaves, leveraging the medicinal properties of the oil found in both the leaves and roots to alleviate symptoms of fever, colds, and body aches, leading to eucalyptus being referred to as "Australian fever tea." In the late 19th century, upon the extraction of concentrated oil, physicians observed that it promoted sweating and alleviated chest congestion and sore throats. Subsequent research led to the prescription of this oil and its formulations for various respiratory conditions, including asthma, bronchitis, influenza, and coughs. The essential oils derived from eucalyptus leaves exhibit analgesic and anti-inflammatory properties. Twenty chemical compounds isolated from the essential oil have been studied for their effects against cyclooxygenase-2, tumour necrosis factor-α, and interleukin-1β convertase, elucidating their analgesic and anti-inflammatory activities. Eucalyptus, a rapidly growing exotic species in Bangladesh, belongs to the Myrtaceae family. Plants within this family are known to contain essential oils with diverse biological activities, including antimicrobial, antifungal, cytotoxic, and anti-inflammatory effects. Traditionally, these oils have been employed in the

treatment of colds, influenza, cystitis, diabetes, gastritis, kidney diseases, and laryngitis. The essential oil extracted from eucalyptus leaves has demonstrated an inhibitory effect on inflammation in rat models, effectively inhibiting cyclooxygenase enzymes and pro-inflammatory cytokines to clarify its analgesic and anti-inflammatory properties. Negundo, commonly known as the five-leaved chaste tree, is a significant Ayurvedic plant recognised for its remarkable therapeutic properties.

Literature review:

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AIM:

Formulation and evaluation of pain reliever balm with diclofenac.

OBJECTIVE:

• To reduce the discomfort in the patients' muscles and joints.

• To Significantly Enhance Headache Sufferers' Experience.

• As an alternative to other product kinds, to cure common colds.

• To promote relaxation and lessen stress.

• Provides short-term relief from mild joint and muscular aches and pains related to arthritis & strained muscles.

Table 1. Causes of pain:

Types of Pain	Causes
Headache	damaged, irritated, or inflammatory nerves.
Foot pain	Foot discomfort Gout, tendonitis, arthritis, a broken or shattered bone, and plantar fasciitis.
Acute arthritis	Bacterial infection, viral & fungal infection, injuries, rheumatoid arthritis, gout.
Chronic arthritis	persistent source of discomfort, such as cancer or arthritis,If there is enough injury, the bone may grind against the bone.

Muscle pain	Stress, strain, excessive use, and small wounds.
Neck pain	I'll post.
Back pain	Strains and sprains, herniated disc, osteoporosis, abnormal shape of spine, inflammatory back pain.

Drug Profile:

1. 1. Menthol:

Scientific Name: Hexahydrothymol.

Synonym: mint extract, peppermint oil.

Biological Source: Mentha piperita.

Family: Labiatae.

Chemical Constituents: 40.7% of menthol, 23.4% of menthone, menthyl acetate, 1,8cineole, limonine, betapinene, and beta-caryophyllene.

Uses:

1. delivering a calming impact and modest analgesic impact by activating cold receptors, acting as a counterirritant.
2. Reduce spasm and pain caused by endoscopy.
3. In migraine headache.
4. Cure cough and sore throat.
5. Decongestant for chest and sinus patch.

2. Camphor:

Synonym: kapur, karpura.

Biological Source: Cinnamomum Camphora.

Family: Lauraceae.

Chemical Constituents: Alpha-terpineol, 1,8-cineole (4.3%), and D-camphor (51.3%).

Uses:

1. Like menthol, camphor has mild local anaesthetic qualities and a calming effect.
2. relieve bronchitis, asthma, chest congestion, and cold cough.
3. Enhances blood circulation and relieves aches in the muscles and joints.
4. Strong analgesic oil that causes a warming sensation to promote circulation and a cold sensation to numb pain.
5. Sturdy antifungal and anti-inflammatory substances that lessen discomfort and irritation

3. Eucalyptus Oil:

Synonym: river red gum, lemon-scented gum, and blue gum.

Biological Source: Eucalyptus globulus.

Family: Myrtaceae.

Chemical Constituents: 1,8 cineole, alpha-pinene, p-cymene, alpha-terpineol, limonene.

Uses:

1. Well-known for its analgesic and anti-inflammatory properties.
2. It improves the absorption of other active substances into the skin.
3. clears the stuffy nose.
4. Reduces aching joints and muscles.
5. Resolves issues with the respiratory system.
6. Lowers tension.
7. Cleans cuts and wounds.

4. Peppermint Oil:

Scientific Name: Menthae piperitae aetheroleum.

Synonym: Mentha piperita oil, brandy mint, extract of peppermint.

Biological Source: Mentha piperita.

Family: Labiatae.

Chemical Constituents: Menthol, menthone, methyl acetate, 1,8 cineole.

Uses:

1. increases the cooling effect and improves the way that cold-sensitive receptors are stimulated to reduce pain.
2. Eases headache, reduces nausea.
3. Lowers stress, eases muscle & joint pain.
4. Improve focus & memory.
5. Cleanses dirt from scalp & promotes healthy hair.

5. Turmeric:

Synonym: Haldi, haridra.

Biological Source: Curcuma longa.

Family: Zingiberaceae.

Chemical Constituents: Curcumin, curcuminoids, B-caryophyllene, alpha-phellandrene, and ar-turmerone.

Uses:

1. An antioxidant with strong anti-inflammatory effects.
2. Boost immune function.
3. Enhance joint mobility.
4. Delays aging, fights depression.
5. It might cure neurodegenerative disease.
6. It improves long term cognitive function.

6. Diclofenac:

Chemical Name: 2-[(2,6-dichlorophenyl)amino]benzene acid.

Molecular Formula: C14H11Cl2NO2.

Molecular Weight: 296.15g/mol.

Class: non-selective COX inhibitor, non-steroidal anti-inflammatory drug (NSAID).

Uses:

Relief of pain & inflammation in conditions such as:

Osteoarthritis.

1. Rheumatoid arthritis.
2. Ankylosing spondylitis.
3. Menstrual cramps.
4. Acute injuries.
5. In post-traumatic & post-operative anti-inflammatory conditions.

7. Beeswax:

Scientific Name: Cera Alba.

Synonym: yellow wax.

Biological Source: Apis mellifica.

Family: Apidae.

Chemical Constituents: Myricin 80%, cerotic acid, melissic acid, cerolein.

Uses:

1. It is used as an antifungal and antibacterial agent.
2. It has anti-allergic and anti-inflammatory effects.
3. In the preparation of ointment, cosmetics, etc.

8. Coconut oil:

Synonym: Nariyal tail, courage oil.

Biological Source: Cocos nucifera.

Family: Palmae.

Chemical Constituents: Fatty acids include caprylic acid, lauric acid, myristic acid, triglycerides, phospholipids, squalene.

Uses:

1. It can lessen discomfort.
2. Because virgin coconut oil possesses a high lauric acid content, numerous studies have demonstrated that it has anti-inflammatory qualities.
3. Coconut oil is therefore a fantastic option for easing sore muscles and joints, particularly after exercise.
4. Also used in eczema & growth in premature infants.

Formulation:

Ingredients	Quantity (%)
Menthol	10%
Camphor	5%
Eucalyptus	3%
Peppermint Oil	2%
Turmeric	1% (Curcumin Extract)
Beeswax	30%
Diclofenac	3% (or as prescribed)

Apparatus:

- Weighing balance.
- Double boiler or heat-resistant glass bowl.
- Thermometer.
- Stirring rod.
- Mortar & pestle.
- Beaker.
- Burner or heating metal apparatus.
- Glass measuring cups and spoons.

Method of preparation:

Step 1: Get the infusion of turmeric ready.

1. Measure 1gm of powdered turmeric (extracted curcumin).
2. Mix with 10 millilitres of a carrier oil.(coconut oil).
3. To infuse, gently heat (at 40°C) for 10 to 15 minutes.

Step 2: Melt beeswax.

1. Weigh 30 gm of beeswax.
2. Transfer to a heat-resistant glass dish or double boiler.
3. Melt between 60 and 70°C, stirring now and then.

Step 3: Include the oils and herbal infusion.

1. Mix the melted beeswax with the turmeric infusion.
2. Give a good stir.
3. Include:

- 2 ml of peppermint oil.
- 3 ml of eucalyptus oil.
- 5 gm of camphor.

-2 ml of menthol (10% solution diluted in carrier oil).

4. Stir everything together thoroughly.

Step 4: Add Diclofenac.

1. Weigh 3g of diclofenac.

2. Mix with a small amount of melted beeswax to create a uniform paste.
3. Add to the main mixture.

Step 5: Cool and Solidify.

1. Remove from heat.
2. Stir occasionally as the mixture cools.
3. Pour into container to shape the balm.
4. Allow to solidify at room temperature.

Step 6: Final Product.

1. Once solidified.
2. Label and package.

Evaluation test:

It will be evaluated for

1. Physical parameters.
2. pH determination.
3. Phase separation.
4. Consistency.
5. Melting point.
6. Thermal stability.
7. Spreadability.
8. Skin Irritation Studies.

CONCLUSION:

Making a diclofenac-infused pain-relieving balm presents a viable substitute for conventional pain management techniques. Diclofenac's analgesic and anti-inflammatory qualities, combined with the inherent advantages of herbal components, can create a balm that is both efficient and patient-friendly. In order to meet safety, effectiveness, and stability requirements while maximising patient comfort and compliance, more research is required to optimise the formulation.

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