

Development of Anti Arthritis Herbal Ointment from Mint Extract

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Abstract

In India, more than 210 million individuals suffer from arthritis, accounting for approximately 15% of the country's total population. Rheumatoid arthritis arises when our immune system malfunctions, leading to our body attacking itself with the assistance of antigens such as Interleukin-2 (IL-2) and Tumor Necrosis Factor (TNF- α). Specifically, TNF- α cause's inflammation in the joints by stimulating the proliferation of synovial lining cells. While arthritis cannot be entirely cured without surgical intervention, we can minimize the disease progression and alleviate the discomfort associated with it. It is also possible to avoid surgeries for arthritis if effective topical treatments are applied in the initial stages. The herbal TNF- α inhibitors will assist in managing arthritis by suppressing the inflammatory agent TNF- α , while also minimizing side effects. This study focuses on the formulation and assessment of a polyherbal anti-arthritic ointment that includes mint extract cinnamon oil and camphor. All the above ingredients shows the Anti-Arthritic and Anti-Inflammatory effects. A total of 3 formulations of batches were created using white soft paraffin, cetostearyl alcohol, hard paraffin, and wool fat as components for the ointment base.

Keywords: Anti-Arthritic, herbal, mint extract, Cinnamon oil, camphor

Introduction

Arthritis, commonly referred to as joint disease, results from the inflammation of joints such as the knees, wrists, or ankles. It starts with inflammation and can progress to joint stiffness, swelling, and pain. Over 100 distinct types of arthritis exist globally, with Rheumatoid Arthritis and Osteoarthritis being the two most prevalent forms. Approximately 0.5-1% of the global population is affected by Rheumatoid Arthritis.

Rheumatoid Arthritis:

Rheumatoid arthritis is a persistent condition, known as chronic, that leads to pain, swelling, and inflammation in the joints. However, it can also affect other areas of the body, such as the skin, eyes, lungs, heart, and blood vessels. Rheumatoid arthritis occurs when the immune system mistakenly attacks the tissues of its own body, which is referred to as an autoimmune disorder. Rheumatoid arthritis is distinct from the more prevalent osteoarthritis, and some individuals may experience both conditions. Osteoarthritis results in joint deterioration due to excessive use. In contrast, rheumatoid arthritis impacts the joint lining and destroys the underlying bone. This leads to painful inflammation that can result in joints becoming misaligned over time, known as deformity. The swelling associated with rheumatoid arthritis can also harm other areas of the body. Recent advancements in medications have significantly enhanced treatment options. Nevertheless, rheumatoid arthritis can still lead to lasting damage and elevate the risk of heart disease. ^[5]

Osteoarthritis:

Osteoarthritis (OA) is the most prevalent degenerative disease and a primary contributor to disability, marked by persistent pain and various joint disorders including damage to articular cartilage, inflammation of the synovium, alterations in subchondral bone, and the development of osteophytes. The incidence of osteoarthritis (OA) is rising progressively, attributed to both the aging demographic and the global obesity crisis, which creates significant societal burdens and presents a considerable challenge to public health. Approximately 303 million adults globally were impacted, while in China, around 61.2 million individuals were diagnosed with OA in 2017. ^[3]



Fig.1. Osteoarthritis

Objectives:

- To treat the patients of arthritis suffering from severe pain and inflammation
- To provide relief from the pain for joints
- To surpass the toxic effects of the chemicals used in the synthetic formulations

Materials [6] and Methods:

Mint: It's still unclear how effective monoterpenes are at reducing inflammation. LPS-stimulated monocytes from healthy participants were used in preclinical in vitro studies to assess the potential role of L-menthol and mint oil as an anti-inflammatory medication. LTB₄ and PGE₂ were measured as markers for the lipoxygenase and cyclooxygenase pathways, respectively, in order to evaluate arachidonic acid metabolism. The two terpenes' anti-inflammatory effects on IL-1β production were also examined. L-menthol dramatically reduced monocytes' in vitro production of all three inflammatory mediators. [8]

Cinnamon: The extract of *Cinnamomum* spp. is rich in antioxidant, anti-inflammatory and anticancer biomolecules. These include widely reported cinnamic acid and some phenolic Compounds, such as proanthocyanidins A and B, and kaempferol. These molecules are sensitive to physical-chemical properties [4]



Fig.2 Cinnamomum spp

Camphor: The wood of *Cinnamomum camphora* is the source of camphor, a white, crystalline substance. The pungent taste and strong smell of camphor are among its most significant characteristics. The process of steam distillation, purification, and sublimation of *Cinnamomum camphora* bark and wood yields camphor. There are numerous chemical types of camphor, each with a unique essential oil composition. Camphor is the primary constituent in *Cinnamomum camphora* leaves. Linalool, eugenol, safrole, cineol, -myrcene, nerolidol, camphene, and borneol are among its other constituents. Camphor has been used for generations to cure a wide range of illnesses all across the world. [7]



Fig.3 Camphor

Extraction of Cinnamon:

To extract the essential oil, steam distillation and Soxhlet extraction methods were used. Steam distillation is the simplest method to extract the essential oil from cinnamon. Steam distillation is mostly used to extract various types of essential oils. The process is cheaper than other extraction methods. It does not require any solvent and is safer than other methods. The advantage of steam distillation is that it is relatively cheap to operate at basic level, and the properties of the oils produced by this method are not altered. As steam reduces the boiling point of a particular component of the oil, it never decomposes in this method. Apart from being economical, it is also relatively faster compared to other methods.^[12]

Extraction of mint:

The Soxhlet extraction method is a highly effective technique for extracting essential oils and lipophilic compounds from solid plant materials like mint leaves. It uses a continuous reflux and siphon cycle to repeatedly wash the plant material with a fresh solvent, maximizing extraction efficiency ^[10]

Preparation of Ointment:

For the preparation of ointment base, in china dish required amount of hard paraffin was taken and melted in hot plate at low temperature than take the required amount of cetostearyl alcohol, white soft paraffin, and wool fat was added to China dish one after another. After preparing the base add the extracted API of mint cinnamon and camphor with the help of the slab and spatula.



Fig. Herbal ointment

Formulation of herbal ointment:

The Herbal Anti-Arthritis ointment was made using 3 different types of formulations as follows

Name of Ingredient	Formulation		
	F1	F2	F3
White soft paraffin (g)	15 g	15g	15g
Cetostearyl alcohol (g)	1g	1.2g	1.3g
Hard paraffin (g)	1g	1.2g	1.3g
Wool fat (g)	1g	1.2g	1.3g
Mint extract	1g	1.5g	1.7g
Cinnamon extract	1g	1.2g	1.3g
Camphor	1g	1.2	1.3g

Evaluation parameters: The following parameters are used in ointment evaluation

Tests	Formulation		
	F1	F2	F3
pH	5	5.3	6.3
Viscosity	21960cp	7056 cp	12300 cp
Appearance	Light green	Light green	Slight dark green
Odour	Pungent	Pungent	Pungent
Texture	Smooth	Smooth	Smooth
Consistency	Semi solid	Semi solid	Semi solid

Determination of pH:

The mechanical evaluation parameter of pH 5 ± 1 across all formulations suggests a greater chemical compatibility of the ointment with the skin. The pH of the ointment was assessed using a digital pH meter by fully immersing the glass rod into the ointment. A total of three readings were taken for each individual batch, and the average of these three readings was used as the pH value for the formulation.^[9]

Viscosity:

Viscosity refers to the ointment's ability to resist deformation at a specific rate. The viscosity of the ointment was measured using a Brookfield viscometer (S-63, model DVE), with the spindle spinning at a speed of 60 rpm at a temperature of 25°C^[11]

Spreadability:

To determine spreadability, a device consisting of two glass slides with pans on either side and a wooden board featuring a measurement scale is utilized. A surplus of the ointment sample was deposited in the centre of the two glass slides. A 100g weight was placed on the glass slides for five minutes to ensure uniform compression of the sample. Subsequently, an additional weight of 250g was added to the pan. The duration taken to separate the two glass slides, measured in seconds, was recorded as the spreadability value of the sample.^[2]

Result and discussion:

The mint extract herbal ointment showed good appearance, homogeneity, and pleasant odor. The pH was suitable for skin application and the formulation had good spreadability and viscosity. No skin irritation was observed, indicating safety. The pH of the ointment ranges from 5 to 6.5 that shows the formulation is not harmful to the skin.

Conclusion: The ointment showed effective anti-arthritic activity due to menthol and other anti-inflammatory constituents present in mint. Overall, the formulation was found to be safe, and effective for arthritis management.

In the present study, herbal anti arthritic ointment was developed and evaluated using organoleptic characteristics of mint cinnamon and camphor as well as physiological parameters like pH spreadability viscosity and irritability test. The creation of ointment from herbal drugs shows how beneficial natural drugs are for the treatment of diseases. Mint provide cooling effect cinnamon give the hot effect to cure the pain and the camphor act as an binding agent that gives long term relief to the patient by sticking with the skin.

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