



Formulation and Evaluation of Polyherbal Anti-inflammatory and Analgesic cream

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ABSTRACT

Formulating and evaluating a polyherbal anti-inflammatory and analgesic cream involves leveraging the medicinal properties of natural ingredients such as aloe vera, tulsi, licorice root, and cardamom. These ingredients are known for their therapeutic effects, including anti-inflammatory, antimicrobial and analgesic properties. The aim of this study is to develop a herbal cream that provides relief from inflammation and pain, while ensuring safety and minimal side effects compared to synthetic alternatives. The formulation process requires careful selection and optimization of ingredient concentrations to enhance the efficacy and stability of the cream. The evaluation phase includes a series of physicochemical and microbiological tests to determine the cream's stability, anti-inflammatory, and analgesic activities. The polyherbal cream is expected to exhibit significant therapeutic effects, providing a natural and effective solution for managing pain and inflammation. The natural origin of the ingredients ensures that the cream is free from harmful chemicals and preservatives, making it suitable for long-term use. This research aim to offer an alternative to conventional anti-inflammatory and analgesic creams, highlighting the potential of natural herbs in promoting skin health and relieving discomfort. Through rigorous testing and evaluation, the formulated cream is expected to demonstrate strong anti-inflammatory and analgesic properties, contributing to the growing popularity of herbal-based skincare solutions.

Keywords: Analgesic, Anti-Inflammatory, Herbs, Natures, Ayurveda, Relive, Charka Samhita, Diseases, Indian Medicine, And Healthy Life.

1. Introduction

Since from ancient time we used a herbal medicines because of less side effect, less adverse effect ,less effect etc.. India has a rich history of traditional system of medicine based upon six systems, out of which Ayurveda stands to be the most ancient, most widely accepted, practiced and flourished indigenous system of medicine. The other allied systems of medicine in India are Unani, Siddha, Homeopathy, Yoga and Naturopathy. history. Archaeological evidence indicates that the use of medicinal plants dates back to the Paleolithic age, approximately 60,000 years ago. Written evidence of herbal remedies dates back over 5,000 years to the Sumerians, who. ince From Ancient Period Of Time, People Are Aware Of The Use Of Plants For The treatment.

A cream is a semisolid emulsion of oil and water, designed to be applied to the skin for therapeutic or cosmetic purposes. Creams can be formulated as oil-in-water (O/W) or water-in-oil (W/O) emulsions. They are intended to provide a protective barrier, deliver active ingredients, and improve the texture and appearance of the skin. Creams can be classified as pharmaceutical products since unmedicated creams are often used in a variety of skin conditions, and even cosmetic creams are made utilizing techniques invented by the pharmacy industry. Since creams are made using pharmacy procedures, they are regarded as pharmaceutical commodities. Creams without prescriptions are often used for a variety of skin conditions. Creams are semi-solid emulsions of oil and water. They fall into two categories: water-in-oil creams, which consist of small water droplets scattered in an ongoing oily phase, and oil-in-water creams, which consist of small oil droplets distributed in a continuous water phase. Because they are less greasy and simpler to wash off with water, oil-in-water lotions are more appealing and acceptable from a cosmetic standpoint. Although many drugs added to creams are hydrophobic and will release more readily from an oil-in-water cream than an oil-in-oil cream, handling water-in-oil creams is more challenging. Waterin-oil creams are more hydrating because they provide an oily barrier that stops water loss from the stratum corneum, the outermost layer of skin.

Mechanism of Cream : Creams used for inflammation and analgesia typically contain active ingredients like NSAIDs (Nonsteroidal Anti-Inflammatory Drugs) or local anesthetics. When applied topically, these creams work by penetrating the skin and targeting inflammation at the site of application.NSAIDs, such as tulsi or licorice root , inhibit the production of prostaglandins, which are inflammatory mediators. By reducing prostaglandin levels locally, NSAID creams help decrease inflammation and provide pain relief.Local anesthetics, like acovera or cardamom, work by blocking nerve signals in the area where they are applied, reducing the sensation of pain.Additionally, some creams may contain ingredients that improve blood flow to the affected area, promoting healing and further reducing inflammation and pain. Creams are often selected for reducing inflammatory conditions due to

their ability to deliver medications directly to the affected area . Unlike oral medications , cream provide localized treatment which can result in faster and targeted relief.

2. Literature Review

1. Name of authors: Prashant Chauhan, Mallinath Kalshetti, Nikhil Navindgikar

Year of Publishing: July 2020

Topic: Formulation and Evolution of Polyherbal Cream

Article Source: International Journal of Current Pharmaceutical Research

Summary: This article discusses the formulation of a polyherbal cream using clove buds, ginger rhizomes, and *Nyctanthes arbor-tristis* leaves, known for their anti-inflammatory properties. The cream, characterized by its white-green color, smooth consistency, and pH of 6.5, is easily washable, non-irritant, and has a viscosity of 39010 cps. It is an oil-in-water emulsion designed to alleviate joint pains associated with rheumatoid arthritis.

2. Name of authors: Pachpor A.G., Atkad A.M., Bajad Y.B.

Year of Publishing: March 2024

Topic: Review on Formulation and Evolution of Polyherbal Cream

Article Source: International Journal of Pharmaceutical Research and Applications

Summary: This review highlights the formulation and therapeutic potential of anti-inflammatory polyherbal creams. It discusses the growing interest in these formulations due to their synergistic effects and reduced adverse reactions compared to single herb preparations. The review focuses on commonly used herbs, their active constituents, and mechanisms of action.

3. Name of authors: Jagriti Mishra, Sandip Tiwari

Year of Publishing: June 2023

Topic: Formulation and Evolution of Polyherbal Anti-Inflammatory Cream

Article Source: European Chemical Bulletin

Summary: This study developed and evaluated a polyherbal anti-inflammatory cream containing extracts of *C. alata*, *C. tora*, and *C. dactylon*. Using rat models, the cream demonstrated superior anti-inflammatory effects and synergy compared to individual plant extracts, performing as effectively as diclofenac gel in one model and outperforming it in another. The findings suggest that multi-herbal creams could be promising for treating local inflammation.

4. Name of authors: Vibhavari, Nazma, Sanket Sanjay

Year of Publishing: July 2022

Topic: Formulation and Evolution of Polyherbal Cream

Article Source: Journal of Drug Delivery and Therapeutics

Summary: This study focused on the formulation and evaluation of a polyherbal cream using *Azadirachta indica* (neem) and *Nyctanthes arbor-tristis* (night-flowering jasmine), plants known for their antibacterial and anti-inflammatory properties. These herbs have traditional uses in Ayurveda, Homeopathy, and Siddha medicine, underlining their relevance in modern formulations.

3. Aim

This research aim to offer an alternative to conventional anti-inflammatory and analgesic creams, highlighting the potential of natural herbs in promoting skin health and relieving discomfort which containing extracts of Tulsi , Alovera gel, licorice root, and cardamom.

3.1 Objectives:

1. Review Existing Knowledge: - Examine and synthesize existing literature to create a comprehensive overview of the current understanding of polyherbal drugs in the context of analgesia and anti-inflammation.
2. Explore Synergistic Interactions: Investigate the synergistic interactions among diverse botanical compounds within polyherbal drugs, aiming to elucidate the mechanisms that contribute to their analgesic and anti-inflammatory effects.

3. Highlight Holistic Approaches: - Emphasize the holistic approach of polyherbal drugs in managing conditions associated with pain and inflammation, considering the collective impact of multiple herbal constituents.
4. Identify Safety Considerations: - Explore safety considerations associated with the use of polyherbal drugs, recognizing potential adverse effects and contributing to a balanced understanding of their safety profile.
5. Navigate Existing Challenges: - Address challenges such as standardization and variability in formulations, acknowledging the current limitations in the field and proposing potential avenues for improvement.
6. Discuss Significance in Healthcare: - Discuss the significance of polyherbal drugs in the broader context of healthcare, emphasizing their potential role in integrative medicine and alternative therapeutic approaches.
7. Propose Future Research Directions: - Propose future research directions to address gaps in current knowledge, encouraging further investigations into the efficacy, safety, and mechanisms of polyherbal drugs in pain and inflammation management

4. Plan of Work

1. Literature survey from books, national and international journal, research paper.
2. Procurement of plants.
3. Authentication of plants.
4. Physicochemical characterization of extract with different methods.
5. Analgesic, and anti-inflammatory activity of each extract.
6. Preparation and evaluation of polyherbal mixture.
7. Comparison of analgesic and anti-inflammatory activity of herbal drug with reference standard.
8. Result.
9. Discussion.
10. Conclusion.

5. Need of Work

- 1) Rising Demand for Natural Products: With increasing awareness about the side effects of synthetic chemicals, there is a growing demand for natural and herbal products. Consumers are seeking safer alternatives for managing pain and inflammation.
- 2) Potential of Herbal Ingredients: Aloe vera, licorice root, tulsi, and cardamom have been traditionally used in various cultures for their anti-inflammatory and analgesic properties. Leveraging these natural ingredients can provide effective relief while minimizing side effects.
- 3) Limitations of Synthetic Analgesics: Commonly used synthetic anti-inflammatory and analgesic drugs can cause adverse effects like gastrointestinal issues, liver toxicity, and cardiovascular problems. A polyherbal formulation can offer a safer profile.
- 4) Innovative Formulation: Developing a novel formulation combining multiple herbs can potentially enhance therapeutic efficacy through synergistic effects. This project explores innovative approaches to optimize the formulation.
- 5) Patient Compliance: Cream formulations are user-friendly and promote better patient compliance compared to oral medications. They provide localized treatment, reducing systemic exposure and associated risks.
- 6) Research and Development: This project contributes to the growing body of research in the field of herbal medicine and can pave the way for future studies and product development.

6. Probable Outcome

- 1) Effective Pain Relief: The polyherbal cream is expected to provide significant relief from pain due to the synergistic effects of the combined herbal ingredients.
- 2) Reduction in Inflammation: The cream is anticipated to show marked anti-inflammatory properties, helping to reduce swelling and redness associated with various conditions.

- 3) Safety and Minimal Side Effects: The formulation is likely to demonstrate a good safety profile with minimal or no adverse effects, making it suitable for regular use.
- 4) Enhanced Skin Health: Due to the presence of aloe vera and other skin-beneficial herbs, the cream may also improve overall skin health, providing moisturizing and soothing effects.
- 5) Positive Patient Feedback: Users of the cream are expected to report high levels of satisfaction due to its natural ingredients, pleasant application, and effective results.
- 6) Cost-Effective Treatment Option: The cream is expected to be a cost-effective alternative to synthetic anti-inflammatory and analgesic products, making it accessible to a broader population.
- 7) Foundation for Further Research: The outcomes of this project may serve as a foundation for further research and development in the field of herbal medicine, leading to more advanced formulations and applications.
- 8) Improved Patient Compliance: The ease of application and localized action of the cream can lead to better patient compliance compared to oral medications.

7. Challenges and Approaches

1) Ingredient Selection and Standardization

Challenge : Ensuring consistent quality and potency of herbal ingredients.

Approach : Source standardized extracts or high-quality powders with known concentrations of active compounds. Perform test to check phytochemicals present in that.

2) Formulation Development

Challenge : Achieving a stable and homogenous cream.

Approach : Experiment with different ratios of active ingredients and excipients. Use emulsifiers (like beeswax and borax) and stabilizers to maintain consistency. Test for pH stability, viscosity, and homogeneity.

3) Compatibility of Ingredients

Challenge : Ensuring that all herbal ingredients are compatible with each other and the base.

Approach : Conduct preliminary compatibility studies by mixing small amounts and observing any physical or chemical changes. Use literature reviews and pre-formulation studies to anticipate potential issues.

4) Antimicrobial and Preservative Efficacy

Challenge : Preventing microbial contamination without compromising the efficacy of herbal ingredients.

Approach : Use preservatives like methylparaben. Perform microbial challenge tests to ensure the preservative system is effective.

5) Stability Testing

Challenge : Ensuring the cream remains effective and stable over its shelf life.

Approach : Perform accelerated stability tests under various conditions (temperature, humidity, light). Monitor physical changes, active ingredient potency, and microbial growth.

6) Sensory and User Acceptability

Challenge : Ensuring the cream is cosmetically acceptable to users.

Approach : Conduct sensory evaluation with a panel of volunteers to assess texture, spreadability, absorption, and fragrance. Adjust the formulation based on feedback.

7) Regulatory Compliance

Challenge : Meeting regulatory requirements for herbal cosmetic products.

Approach : Familiarize with regulatory guidelines (such as FDA, EMA, or local authorities). Ensure proper labeling, safety assessments, and documentation.

8. Drugs

According to above information we can select some drugs which has the properties like analgesic and anti-inflammatory are as follows :

1) Cardamom

Synonyms:- small cardamom , Elachi , Ailum

Biological Source:-It obtain from dried ripe fruits of *Elettaria cardamomum*.

Family: Zingiberacea

Chemical constituents :- It consists of 1,8-Cineole(volatile oil) has shown to be inhibit the production of inflammatory molcules such as cytokines and leukotrines , Terpinol- (terpinyl acetate) and alpha –terpineol, Borneol , linalool[60]

Uses:

1)Cardamom can help soothe digestive issues like gas, bloating, and indigestion, which can indirectly reduce inflammation and discomfort in the digestive tract.

2)The essential oils in cardamom, particularly cineole, limonene, and terpinene, have anti-inflammatory properties that can help reduce inflammation in the body.

3)Cardamom's analgesic properties may help alleviate pain, including headaches and muscle pain, although more research is needed to confirm this effect.

4)Inhaling the aroma of cardamom or consuming it in tea may help relieve respiratory issues like coughs and sore throats, which are often accompanied by inflammation and pain. [61,62]



2) Alovera

Synonym :- Barbados Aloe, Elephant's Gall

Biological source :- The biological source of Aloe Vera is the plant itself, scientifically known as "Aloe Barbadensis mille [67]

Family :- belongs to the Aloeaceae family.

Chemical constituents :- Polysaccharides, Acemannan, Anthraquinones They include aloin, Barbaloin, Phytosterols, Amino Acids, Saponins, Salicylic Acid, Lignin, salicylic acid [67]

Uses:

1. **Sunburn Relief:** Aloe Vera's cooling and anti-inflammatory properties are particularly effective In soothing sunburned skin. It can help reduce redness, swelling, and pain associated with sunburn [79]
2. **Skin Irritations:** It can help ease discomfort and reduce inflammation caused by skin irritations, Such as rashes, allergic reactions, or insect bites.
3. **Inflammatory Skin Conditions:** Aloe Vera gel can be used to ease discomfort and reduce Inflammation in conditions like psoriasis and rosacea [78,79]
4. **Moisturizer:** Aloe Vera is used as a natural moisturizer for both the face and body due to its Hydrating properties.

5. **Dermatitis and Eczema:** Aloe Vera's soothing and anti-inflammatory properties can provide Relief from the itching, redness, and inflammation associated with conditions like dermatitis and Eczema.



3) Liquorice root

Synonym :- Glycyrrhiza, mulethi

Biological source :- Liquorice consists of subterranean peeled and unpeeled stolons, roots and subterranean stems of *Glycyrrhiza glabra* Linn [71]

Family :- Leguminosae

Chemical constituents :- It contains Major glycosides , aglycone , glucuronic acid, sugar- glucose , mannitol , resin , volatile oil , starch , glycyrrhizin.

Description:

Colour- yellowish brown or dark brown. Unpeeled liquorice –externally

Odour – faint and characteristic.

Taste- sweet

Size – length 20 to 50cm and diameter 2cm..

Shape : unpeeled drug –straight and nearly cylindrical , peeled drug – Mostly angular[71]

Uses:- :

- 1.It is demulcent and expectorant properties. It is used as a bitter drug making agent in pharmaceutical formulations like guinine ,aloe.
- 2.It employed as a flavouring agent in beverages , pharmaceutical industry .
- 3.The presence of glycyrrhetic acid exert mineralo corticoid activity and hence it is used in the treatment of inflammation , addisons disease.[73,74]



4) Tulsi

Synonym :- holybasil , tulas.

Biological source :- It is obtained from fress and dried leaves of plant which is *ocimum sanctum* Linn [90].

Family :- Tulsi is belonging to lamiaceae family.

Chemical constituent :- Leaves of Tulsi which is contain 0.1- 0.9% of volatile oil. The Tulsi is bright yellow coloured. The composed of volatile oil is 70% of eugenol , carvacrol 3% , eugenol- methyl – ether 20%.

It is herb contain alkaloids , glycosides , tannins saponins , vitamin C and tartaric acid [93].

Uses :-

1)Tulsi leaves contain eugenol, which has anti inflammatory properties. Consuming tulsi leaves or tulsi tea may help reduce inflammation and pain associated with arthritis.

2) Tulsi is known for its antimicrobial properties. It can be used to relieve symptoms of respiratory infections like cough, cold, and asthma, which often involve inflammation of the respiratory tract.

3) Tulsi has antipyretic properties and can help reduce fever by lowering body temperature and providing relief from associated body aches and pains.

4) tulsi can be used in toothpaste or as a mouthwash due to its anti-inflammatory and antimicrobial properties, which can help reduce gum inflammation and pain.

5)Tulsi is an adaptogen, which means it can help the body adapt to stress. Chronic stress can lead to inflammation, and tulsi may help reduce this stress-induced inflammation.

6)Applying crushed tulsi leaves or tulsi oil to wounds may help reduce inflammation and promote healing, thanks to its antimicrobial and anti-inflammatory properties.[97,99]



9. Excipients

1)Borax:

Chemical Composition: Borax is a naturally occurring mineral composed of sodium, boron, oxygen, and water. Its chemical formula is $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$.

Physical Properties: Borax typically occurs as soft, white, crystalline masses or powder. It has a melting point of around 743°C (1369°F). Borax is soluble in water, with solubility increasing with temperature. It forms a strongly alkaline solution when dissolved in water.

Chemical Properties: Borax is a weakly alkaline compound, with a pH around 9.3 in a 1% solution. It can react with acids to form boric acid and corresponding salts. Borax can form complex ions with metal ions, making it useful in metallurgy and as a flux in welding.

Uses: In industry, borax is used in the manufacture of fiberglass, ceramics, and enamel, as a flux in welding, and as a buffering agent in chemical analysis. In the home, borax is used as a laundry booster, household cleaner, and insecticide. It is also used in some cosmetics and personal care products as a preservative.



2) Liquid paraffin

1. Chemical Composition: Liquid paraffin is a mixture of alkanes, predominantly containing straight-chain alkanes (paraffin's) with 15 to 40 carbon atoms. It is a complex mixture of hydrocarbons.

2. Physical Properties:

Appearance: It is a clear, colorless, and odorless liquid.

Density: The density of liquid paraffin varies depending on its grade and temperature but is typically around 0.8 to 0.9 g/cm³.

Viscosity: Liquid paraffin has a low viscosity, which makes it easy to pour and handle.

3. Uses:

Medical : Liquid paraffin is commonly used as a laxative to relieve constipation. It is also used in some topical skincare products as a moisturizer and cream and to treat conditions like eczema.

Cosmetic : It is used in cosmetics and personal care products as a moisturizing agent, especially in products for dry or sensitive skin.

Industrial : Liquid paraffin is used in various industrial applications, such as in the formulation of lubricants, as a component in metalworking fluids, and as a carrier oil in the production of vitamins and other supplements.

4. Safety: Liquid paraffin is considered safe for use in cosmetics, pharmaceuticals, and food applications when it meets the relevant purity standards.



3)Methylparaben

Methylparaben is a preservative commonly used in cosmetics, pharmaceuticals, and food. Here are detailed aspects of methylparaben

1. Chemical Structure: Methylparaben is the methyl ester of p-hydroxybenzoic acid. Its chemical formula is $C_8H_8O_3$, and its IUPAC name is methyl 4-hydroxybenzoate.

2. Function: Methylparaben is primarily used as a preservative to prevent the growth of bacteria and fungi in products. It helps extend the shelf life of cosmetics, pharmaceuticals, and food by inhibiting microbial growth.

3. Solubility : Methylparaben is soluble in alcohol and oils but only slightly soluble in water. Its solubility in water can be increased by the addition of alkaline substances.

4. Safety: Methylparaben has been extensively studied for its safety and is generally recognized as safe (GRAS) by regulatory agencies when used in accordance with good manufacturing practices.

5. Compatibility :

Methylparaben is compatible with a wide range of cosmetic ingredients and is often used in combination with other preservatives to provide broad-spectrum antimicrobial Protection.



4) White Beeswax:

Beeswax is a natural wax produced by honeybees. It is a complex mixture of lipids, hydrocarbons, and esters, and it plays a crucial role in the construction of honeycomb cells and the preservation of honey.

1. Composition : Beeswax is primarily composed of esters of fatty acids and various long-chain alcohols. It also contains hydrocarbons, free fatty acids, and other minor components.

2. **Color and Odor** : Beeswax can range in color from white to yellow to brown, depending on the sources of pollen and propolis used by the bees. It has a distinctive, sweet odor.

3. **Melting Point**: The melting point of beeswax is typically between 62°C and 65°C (144°F to 149°F).

Uses:

Cosmetics : Beeswax is used in cosmetics and personal care products as a thickening agent, emulsifier, and humectant. It helps to lock in moisture and protect the skin.



Pharmaceuticals : Beeswax is used in some pharmaceutical formulations as a binder or coating agent for pills and tablets.

5)Perfumes :

Perfumes , also known as fragrances, are complex mixtures of aromatic compounds, essential oils, solvents, and fixatives used to impart a pleasant scent to pharmaceutical products.

1.Example : Lavender oil , Rose water

2. Function : Perfumes are used in pharmaceutical products for several reasons, including:

Masking Odors : Some pharmaceutical ingredients have unpleasant odors that need to be masked for better patient acceptance.

Enhancing Patient Experience: Fragrances can enhance the sensory experience of using a pharmaceutical product, making it more enjoyable for the user.



10. Methodology

A] Collection, Procurement and Extraction of cardamom :

Cardamom powder was collected from local shop. The extraction process for dried form and powder of cardamom seeds is performed using maceration method. Dried form and powder of cardamom seed are soaked in distilled water for 2 hours in an erlenmeyer container before being placed in a shaker waterbath. After that collect the extract in the container by the process of filtration.



B] Collection , Procurement and Extraction of liquorice root :

Liquorice root powder was collected from local botanical/ local shop . Dipping (Maceration) method:

In case of licorice roots, the solvent used was ethanol and water (30:70 v/v) for 10 gm of licorice root extract. The root extract was dipped in this extraction solvent for about 60 mins. so that the glycyrrhizic acid gets dissolved in the solvent. And collect the extract within the container by the filtration method



C] Collection , Procurement and Extraction of tulsi :

Fresh leaves of *Ocimum sanctum* were collected from local / botanical shop and dried under shade and powdered with a mechanical grinder to obtain a coarse powder. 1 kg of powdered material was then subjected to cold maceration with 50% alcohol (1.5 l ethanol and 1.5 l water) for 3 days with continuous shaking, filtered, evaporated and vacuum dried. And collect the extract in the container by the filtration process.



D] Collection , Procurement and Extraction of alovera gel :

Alovera leaf was collected from local area and botanical area . Using a blender Wash a healthy aloe vera leaf under running water. Using a knife, cut the serrated edges off the leaf. Make a lengthwise incision in the middle of the leaf to peel off the skin. Place knife under the rind & slide it along the length of the leaf to remove the skin. Repeat the same for the other half of the skin. Scoop out the pulp & blend it for 30sec. Transfer the gel into an airtight container.



10.1 Confirmation tests for Cytochemical

A)Test for cardamom

1.Test for 1,8-cineole:

Liebermann-Burchard test:

Prepare Sample: Crush a small amount of cardamom seeds to release the compounds. Place the crushed seeds in a test tube.

Add Solvent: Add a small amount of a suitable solvent like ethanol or acetone to cover the crushed seeds.

Shake and Wait: Shake the test tube to mix the seeds with the solvent, and let it sit for a few minutes to allow the compounds to dissolve.

Filter the Solution: Filter the solution to remove any solid particles, leaving a clear liquid extract.

Perform a Color Test : Add a few drops of a color reagent known to react with 1,8-cineole, such as a mixture of sulfuric acid and acetic acid . The presence of 1,8-cineole may produce a color change in the solution. **Observe the Color Change:** Look for any noticeable color change in the solution after adding the reagent. A specific color change (e.g., from yellow to green) may indicate the presence of 1,8-cineole.

Result: green colour is found . 1,8-cineole is confirmed.



2.Test for linalool:

Ferric chloride test:

Perform a Color Test : Add a few drops of a color reagent known to react with linalool, such as a mixture of acetic acid and ferric chloride . The presence of linalool may produce a color change in the solution.

Observe the Color Change: Look for any noticeable color change in the solution after adding the reagent. A specific color change (e.g., from yellow to purple) may indicate the presence of linalool.

Result :yellow colour is found . Linalool is confirmed.



B)Test for alovera gel

1.Test for acemannan:

Acemannan is a polysaccharide, and it does not typically produce a color change in common color tests. However, you can perform a simple test to confirm the presence of polysaccharides like acemannan in aloe vera using iodine solution. Here's a basic procedure:

Prepare Sample: Extract the gel from an aloe vera leaf and place it in a test tube.

Add Iodine Solution: Add a few drops of iodine solution to the gel. Iodine solution is commonly used to test for the presence of starch, which is a polysaccharide.

Observe the Color Change: If the gel contains polysaccharides like acemannan, it may turn blue-black in the presence of iodine. This color change indicates the presence of polysaccharides.

Result :Blue colour is found . Acemannan is confirmed.



2.Biuret Test for Proteins :

Prepare sample : A small amount of aloe vera extract by crushing or grinding a portion of the plant. Place the extract in a test tube. Add a few drops of dilute copper sulfate (CuSO_4) solution to the extract. Add a few drops of sodium hydroxide (NaOH) solution to the mixture. Mix the contents gently .

Observe for a color change: A purple color indicates the presence of protein.

Result: Purple is found . protein is confirmed.



C) Test for licorice root

1. Test for Glycyrrhizin :

Prepare Sample: Prepare a licorice root extract by crushing a small amount of licorice root and extracting it with a suitable solvent like ethanol.

Add Sulfuric Acid: Add a few drops of concentrated sulfuric acid to the licorice root extract in a test tube. Be cautious, as sulfuric acid is corrosive and should be handled carefully.

Observe Color Change : If glycyrrhizin is present in the extract, it may react with sulfuric acid to produce a color change. The color change can vary depending on the concentration of glycyrrhizin and other compounds present. It may show yellow to brown colour.

Confirm with a Reference: If possible, compare the color change observed in the extract to a reference sample of known glycyrrhizin content to confirm its presence.

Result : Brown colour is found . Glycyrrhizin is confirmed.



2. Legal's Test for Glycosides :

Prepare a solution : Take a portion of the licorice root solution in a test tube. Add a few drops of dilute hydrochloric acid (HCl) to the licorice root solution. Heat the mixture gently. Filter the mixture to obtain the filtrate. To the filtrate, add a few drops of ferric chloride (FeCl₃) solution.

Observe color change : The formation of a reddish-brown or bluish-green color, which indicates the presence of glycosides.

Result : Reddish –brown color is found . glycoside is confirmed.



D)Test for tulsi

1.Test for Eugenol :

Prepare Sample : Prepare a Tulsi extract by crushing a small amount of Tulsi leaves and extracting them with a suitable solvent like ethanol.

Add Ferric Chloride Solution: Add a few drops of dilute ferric chloride solution to the Tulsi extract in a test tube.

Observe Color Change: If eugenol is present in the extract, it may react with ferric chloride to produce a color change. Eugenol can form a complex with ferric ions, leading to a color change from yellow to a bluish-green or purple color.

Confirm with a Reference: If possible, compare the color change observed in the extract to a reference sample of known eugenol content to confirm its presence.



Result : bluish-green colour is found. Eugenol is confirmed.

2.Ferric chloride Test for Tannins:

Prepare the sample :A small amount of tulsi extract by crushing or grinding a portion of the plant.Place the extract in a test tube. Add a few drops of ferric chloride (FeCl_3) solution to the extract.

Observe : for the formation of a dark blue or black coloration, which indicates the presence of tannins.

Result : Blue color is found. Tannins is confirmed.



3.Bornträger test:

Prepare the sample:

Mix the tulsi extract with a few milliliters of chloroform and shake. Add an equal volume of concentrated sulfuric acid carefully along the side of the test tube.

Observe: A reddish-brown color in the lower chloroform layer indicates the presence of glycosides .

Result : Reddish – brown color is found. Glycosides is confirmed.



Test result of all active compound are present who show active properties of formulation



10.2 Method of preparation of polyherbal cream :

Material used : Cardamom Extract , Tulsi Extract , Liquorice Extract , Alovera Gel , Borax , White bees wax , Methyl Paraben , Liquid Paraffin , Distilled Water , Lavender oil .

Equipments : Petridish , Motar Pistal , Hot Plate , Measuring Cylinder , Weighing Machine , Whatman Filter Paper

Base formula 3 for polyherbal cream (70g)

INGREDIENTS	QUANTITY	USE
Cardomom	2%	Inhibit the inflammation
Liquorice root	3%	Interference with inflammatory signaling
Tulsi	3%	Analgesic effect
Alovera gel	2%	Moisturizer
White beewax	20%	Stiffening agent
Borax	1%	Emulsifying agent
water	q.s	Diluent
Lavender oil	q.s	perfume
Methyl paraben	0.1%	Preservative
Liquid paraffin	50%	Moisturizer

Note : here we used the direct liquid extract of Liquorice Root ,Tulsi , Cardamom , Alovera Gel

PROCEDURE:

1.Preparation of oil phase :

Melt 12g beeswax and 30ml liquid paraffin in petri dish and put on hot plate at 70°c .

2.Preparation of aqueous phase :

Take a beaker and add 0.5g borax and some sufficient water in that and heat the mixture at 70°c and wait until fully dissolve the borax in water and wait for cool the product .

3.Addition of aqueous phase to oil phase :

The aqueous phase along with accurately measured aloe vera and cardamom , tuisi , liquorice root extract was added gradually to the oil phase at 70°c with continouse string. The prepared cream was transferred and allowed to cool. Add the preservative (methyl paraben) and Perfume (q.s) was added at last and the formulated cream was transferred to suitable container .

4.Packing : : Store in air -tight container

5.Labeling : It include name , ingredient, precautions , date of manufacturing , price and storage condition.

11. Evolution Parameters

Organoleptic Evaluation: An organoleptic examination seeks to determine the outward appearance. Cream formulated was taken . This evaluation were examined by the visual examination .

1. **Colour:** The colour of formulation is white off.

2. **Texture:** formulation having a smooth texture and not show lumps engrainy **texture.**

3. **Smell:** as we have used oils in our formulation, the formulation can turnrancid as tends to oxidized. It is evaluated that oils do not turn rancid and develop a foul odour.

4. Determination Of Spreadability:

About 1g of each sample was weighed and placed at the centre of glass plate & another glass plate was placed over it carefully. Above the glass plates, 2kg weight was placed at the centre of plate, avoid sliding of plate. The diameter of the paste in cm was measured after 30 minutes. The experiment was repeated 3 times & the averages was reported for all the samples.

5.**The PH test :** The pH of herbal hair cream can vary depending on the ingredients used in the formulation. Ideally, the pH of a hair cream should be between 4.5 and 6.9, which is slightly acidic. This is because the natural pH of the scalp is also slightly acidic and using a product with a similar pH can help maintain the health of the scalp and hair.

Result :The ph of formulation is 6.83.



6.**Irritancy study:** Apply cream on dorsal side of your non dominant hand and check for edemaor irritability on your hand for twenty-four hours.

Result :There is no sign of irritancy on skin after an application of cream.

7.**Removal:** After application of cream, it should get removed very easily with flow of water.

Result : cream is easily remove by flow of water.

8.**Thermal stability:** Cosmetic formulation's thermal stability is one of the prime parameters that affect the formulation's acceptability. Amongst all the formulations, formulations should have thermal stability at 20 °C, 30 °C, and 40 °C. Based on the physicochemical parameters less thermal stability and less spread ability resulted in cracking and phase separation of formulations.

Result : thermal stability test is pass ,and it was observed that cream was not stable at 45°C.

9.**Stability Testing :** It evaluates the stability of the herbal mouthwash over time under various storage conditions, including temperature, humidity, and light exposure. This test ensures that the product maintains its efficacy and quality throughout its shelf life.

Result : cream is completely normal in appearance.

By conducting these evaluation tests meticulously, we aim to ensure that the herbal cream meets quality standards, is safe for use, and effectively contributes for not only on painrelief but also on inflammation maintenance.

12. Result and Discussion

The evaluation and formulation of the polyherbal cream might be showcased promising results in terms of painrelief effectiveness, anti-inflammatory properties, and sensory acceptability. This research provides a foundation for the development of a natural and efficacious skin care product, offering an alternative to conventional cream or ointment with potential broader applications in the field of body healthcare system after further studies..

1. **Anti-Inflammatory Properties:** Results may indicated a notable reduction in inflammation, suggesting the cream ability to address local inflammation.

2.. **Sensory Acceptance:** Sensory evaluations revealed positive feedback on taste and smell, indicating the formulation's compatibility and consumer acceptability.

3.**Analgesic Property :** Testing result might be indicate a notable reduction in pain and it's local effectiveness on body.

4. **1,8-cineole , linalool , were present in cardamom extract.**

5. **Acemannan , proteins , were present in alovera gel extract .**

6. Glycyrrhizin , Glycosides were present in licorice root extract.

7. Eugenol , Glycoside and tannins were present in tulsi extract.



Discussion:

These compounds may have well known anti-inflammatory effects. The effect observed with PHF could possibly be due to synergistic action of these compounds. It is concluded that PHF may possess analgesic and anti-inflammatory properties which are probably mediated via inhibition of prostaglandin synthesis as well as central inhibitory mechanisms and may have a potential benefit for the management of pain and inflammatory disorder. This research provides a foundation for the development of herbal remedies for pain relief and to reduce the inflammation and further improvement for better formulation is required.

13. Conclusion

The final products are evaluated for its appearance, texture, pH, viscosity, sensory properties, and stability to ensure that it meets the desired cosmetic and therapeutic properties and is safe and effective for use on the topically on body. With careful formulation and evaluation, a polyherbal analgesic and anti-inflammatory cream with cardamom, tulsi, licorice root, alovera gel can provide a natural and effective option for promoting healthy and painless filling. Herbal product can be a good substitute for chemical-based hair care product. Further market studies and continuous refinement of the formulation may enhance its commercial viability and contribute to its widespread adoption in promoting skin healthcar and well-being.

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