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Formulation and Evaluation of Phyto Cream a Polyherbal Topical Preparation with Analgesic and Anti -Inflammatory Activity

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Abstract: *Background: Inflammation in the tissues causes redness, swelling, heat, discomfort, and loss of function due to immunological, vascular, and inflammatory cell responses to infection or injury. Pain, or dolor, is a common symptom of acute inflammation. Many synthetic drugs which treat inflammation have shown many side effects. By using natural herbs like turmeric, liquorice, clove, moringa, which treat inflammation fastly without causing any side effects or toxic effects.*
Method: Research study was done using major databases such as PUBMED, ResearchGate, Google Scholar, ScienceDirect etc. Relevant studies were done on herbal remedies for inflammation and pain were selected and reviewed.
Result: Herbal remedies have showed significant effect in treating inflammation and its pain due to its different phytochemical constituents and also due to its various pharmacological actions.
Conclusion: Herbal plants can easily treat inflammation and reduce pain without causing any side effects. It is less expensive than synthetic drugs.

Keywords: Analgesic activity, Anti-inflammatory activity, Moringa oleifera, Curcuma longa (Turmeric),Glycyrrhiza glabra (Licorice), Syzygium aromaticum (Clove), Herbal medicine, Topical cream, Phytochemicals, Natural pain relief, Herbal anti-inflammatory, Phyto Cream, Plant-based formulation, Traditional medicine

I. INTRODUCTION

Although inflammation was recognized as part of the healing process in ancient times, it was seen as an undesired reaction that was damaging to the host until the late nineteenth century. In the 19th century, Metchnikoff and other researchers recognized the role of inflammation in the body's defense and healing processes(1).Inflammation is a necessary defense mechanism for maintaining good health(2).Inflammation in the tissues causes redness, swelling, heat, discomfort, and loss of function due to immunological, vascular, and inflammatory cell responses to infection or damage(3).When the inflammatory process becomes chronic or dysregulated, it can lead to the development of a variety of health problems, including arthritis, cardiovascular disease, and autoimmune illnesses. Effective inflammation management is critical for preventing and treating these disorders.Herbal therapies are a natural alternative to modern chemical treatments, with less side effects and lower toxicity. Traditional medicine has employed herbal remedies for ages, proving their efficacy and safety when applied correctly.

II. LITERATURE REVIEW

Research review	Abstract
Tayyba Saher, Rizwana Manzoor, Khizar Abbas, Jahanzeb Mudassir, M Asif Wazir, Ejaz Ali, Faheem Ahmad Siddique, Akhtar	This study reviews the use of herbal remedies like ginger, turmeric, chili pepper, and cinnamon for managing pain and inflammation. It evaluates two

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Rasul, Muhammad Imran Qadir, Ambreen Aleem, Naeem Qaiser, Adeel Usman, Muhammad Romman& Muhammad Sajid Ali (2022) Analgesic and Anti-Inflammatory Properties of Two Hydrogel Formulations Comprising Polyherbal Extract, Journal of Pain Research, , 1203-1219, DOI: 10.2147/JPR.S351921	hydrogel formulations containing a polyherbal extract (GCTC) for their analgesic and anti-inflammatory effects. Hydrogels are highlighted as effective delivery systems due to their ability to release active compounds gradually. The review concludes that combining herbal extracts in hydrogels may enhance therapeutic efficacy and suggests further research for clinical development.
Anil, Kadam Nikhil, et al. "Review on formulation and evaluation of polyherbal cream." World Journal of Pharmaceutical Research 14.6 (2025):	Ananda, and Rajput Chitra Govind Polyherbal therapies are gaining popularity due to their safety, fewer sideeffects, and holistic benefits. These formulations, combining multiple herbs, are especially effective in topical creams for treating skin issues like infections and wounds. Their localized action avoids systemic side effects. To address this, a polyherbal cream was developed using extracts of tulsi, neem, rose, turmeric. Evaluations of such creams showed favorable physicochemical properties, confirming their stability and effectiveness. Overall, studies support polyherbal creams as natural and effective alternatives for antifungal and antimicrobial skin treatments.
.Modi, J., Rathore, S., Dwivedi, S., & Saraogi, G. (2024). Formulation and Evaluation of Multipurpose Herbal Cream. International Journal of Newgen Research in Pharmacy & Healthcare, 2(1), 129-134.	The study focuses on creating a herbal cream using natural ingredients like turmeric extract, Aloe gel, and rose oil, known for their therapeutic properties. The formulation process included selecting the ingredients, preparing the cream, and assessing its physical properties, stability, and effectiveness. The cream showed promising results in stability and potential effectiveness in treating skin ailments. The study concludes that the herbal cream is a safe and effective treatment option for common skin conditions, emphasizing the benefits of using natural ingredients in pharmaceutical formulations.
Pawar H, Karde M, Mundle N, Jadhav P, Mehra K (2014) Phytochemical Evaluation and Curcumin Content Determination of Turmeric Rhizomes Collected FromBhandara District of Maharashtra (India). Med chem 4: 588-591. doi:10.4172/21	A polyherbal cream was formulated using cardamom,tulsi, liquorice, aloe vera gel, known for their anti- inflammatory and analgesic properties. The cream has off white colour with smooth consistency and ph of 6.83 which is skin friendly.The polyherbal cream formulation was found to be safe, stable, and effective in relieving pain and inflammation. It offers a natural, cost-effective alternative to synthetic products, with the added

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	benefit of improved skin health and patient compliance.
Suryadevara V, Doppalapudi S, Reddivallam LC, Anne R, Mudda M. Formulation and evaluation of anti-inflammatory cream by using Moringa oleifera seed oil. Pharmacogn Res. 2018;10(2):195–204. doi:10.4103/pr.pr_101_17.	This review developed a topical anti-inflammatory cream using Moringa oleifera seed oil, rich in behenic acid. Among twelve formulations, MF4 (with 500 mg potassium hydroxide) showed optimal properties and stability. It exhibited strong anti-inflammatory effects in lab and animal tests, comparable to ibuprofen, indicating its potential as a natural topical treatment for inflammation. The MF4 cream formulation of Moringa oleifera seed oil is effective in reducing inflammation and shows promise as a natural topical anti-inflammatory agent, supported by both pharmacological data and analytical profiling.
Chatur VM, Ansari NM, Joshi SK, Walode SG. Formulation and Evaluation of Polyherbal Cream. Journal of Drug Delivery and Therapeutics. 2022;12(4):1-5. doi:10.22270/jddt.v12i4.5572.	The research articlefocuses on developing a topical cream incorporating extracts from two medicinal plants: Azadirachta indica (Neem) and Nyctanthes arbor-tristis (Night Jasmine). These plants are traditionally recognized for their antibacterial, anti-inflammatory, and analgesic properties. The study aimed to formulate a polyherbal cream using the fusion method and evaluate its physical characteristics, including appearance, pH, spreadability, and stability. The formulation utilized almond oil as a base, contributing to the cream's moisturizing properties. The evaluation results indicated that the cream possessed acceptable physicochemical properties, suggesting its potential as a natural topical formulation for skin care applications.

Aim: To formulate and evaluate phytocream a polyherbal cream with analgesic and anti-inflammatory property.

Objectives:

To extract bioactive constituents from Turmeric (Curcuma longa), Clove (Syzygium aromaticum), Licorice (Glycyrrhiza glabra), and Moringa (Moringa oleifera).

To formulate a topical polyherbal cream using these extracts.

To evaluate the formulated cream for physical parameters such as pH, spreadability, viscosity, and stability.

Plan of work

1. **Literature Review:** Reviews of the literature Gathering and reviewing pertinent research on medicinal plants with analgesic and anti-inflammatory effects. Topical dose forms of herbal formulations. Techniques for evaluation and extraction.

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2. **Selection of Medicinal Plants**: Choosing Therapeutic Plants Identifying plants that have been demonstrated to Analgesic and anti-inflammatory properties.
3. **Collection and Authentication of Plant Materia**l: purchasing illicit substances from a trustworthy supplier and having them verified by a trained botanist or herbarium.
4. **Preparation of Herbal Extracts**: Making Herbal Extracts Plant material is dried, powered, and extracted with a solvent.
5. **Phytochemical Screening**: Initial phytochemical examination of extracts to determine their active composition.
6. **Formulation of Cream**: choosing an appropriate cream basis (such as water in oil or oil in water). Using hebal extracts in varying proportions. Application of excipients, such as humectants, preservatives, and emulsifiers. Preparing several batches for optimization.
7. **Evaluation of formulation Cream**: Color, odor, appearance, spreadibility, pH, consistency, and viscosity are all evaluated.
8. **Result.**
9. **Discussion.**
10. **Conclusion.**

Herb :the polyherbal formulation phytocream was prepared by the use of following herbs

Moringa:

Family: moringaceae

Biological source: derived from the leaves,seeds,roots of the plant moringa oleifara.

Phytochemical constituent: flavonoids,isothiocynate,flavonoids,phenolicacid,tannins

Pharmacological mechanisms:itsactiom is mainly attributed to its ability to regulate the production of inflammatory mediators,such as cytokines(TNF-alpha,IL-1beta,IL-6) and enzymes(COX-2,LOX). (5,6)By scavenging free radicals, which cause inflammation and tissue damage, the shown that moringa improves symptoms of inflammatory conditions such as rheumatoid arthritis,by reducing pain and swelling.(4)

Turmeric:

Family: zingiberaceae

Biological source: derived from the rhizomes of the curcuma longa plant

Phytochemical constituent: curcumin,volatileoils,phenolic co mpounds

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Medicinal properties:

Pharmacological mechanism:helps to modulate inflammation.It reduces inflammation by reducing the production of pro-inflammatory cytokines, including TNF-α and IL-1 and IL-6. (7)Hewlings and Kalman (2017) in the journal Foods emphasized clinical investigations that endorse the efficacy of curcumin for inflammatory conditions such as arthritis.(9)

Clove:

Family: Myrtaceae

Biological source: they are the dried flower buds of eugenia caryophyllus

Phytochemical constituents: eugenol,isoeugenol,tannins,gum

Pharmacological mechanism:Eugenol suppresses inflammatory mediators such prostaglandins and cytokines via regulating the COX and LOX pathways.

Clove, with its powerful bioactive qualities, is a popular natural therapy for inflammatory diseases and is often utilized in topical analgesic formulations.(10)

Clove extracts can reduce edema, control oxidative stress, and limit the generation of nitric oxide, a key factor in inflammation.when demonstrated in animal models clove extract significantly inhibited inflammatory resonses.(8)

Liqorice:

Family: Leguminosae

Biological source: it is obtained from dried roots,rhizomes,or stolon of glycyrrhiza glabra

Phytochemical constituents: glycyrrhizin a saponin derivative,flavonoids,isoflavones,glabridin,liquiritin

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Pharmacological mechanism:Glycyrrhizin reduces inflammation by suppressing pro-inflammatory cytokines (e.g. TNF-α, IL-1β, and IL-6) and inhibiting NF-κBactivation(11). Experimental studies have shown that extracts of licorice can reduce nociceptive responses in animal models.(12)

Material and methods:

1.**Liquorice**: Liquorice root powder was collected from local botanical/local shop. Use 100g of dried liquorice root powder. Add to 500-800 ml of distilled water. Let it soak overnight at room temperature. Strain the mixture using filter paper to remove the residue. We get the liquorice extraction in the container by the filteration method.

2. **Moringa**: Moringa powder was collected from local area or botanical area. Weight 100g of dried Moringa leaf powder. Add 70ml ethanol in a clean flask. Seal and shake occasionally. let it stand for 24-48 hours at room temperature.filter through whatman filter paper. Collect the filtrate – this is your 1:8w/V extract.

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3. **Clove**: Collect Clove form local area or Botanical area. Then grind the clove buds into fine powder. Now take 2% of clove into 98 ml of ethanol (2% of clove = 2g of clove). Put clove powder & 98 ml of ethanol in a container, seal the container, & shake. Leave it for about 7-10 days in a cool place. Now filter the solution with the help of filter paper. We get the clove extraction in the container with the help of filteration method.

4.**Turmeric**: Collect the Tumeric from local/botanical shop. Take 100g of turmeric powder. Add ethanol in a conical flask enough to fully submerge the powder. Seal the flask and let itsit for 72 hours at room temperature. Shake it

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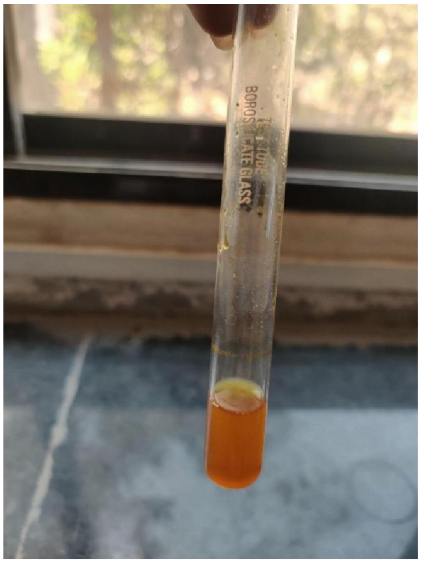
occasionally to enhance extraction.After 3 days, filter the mixture using filter paper. Collect the ethanolic extract i.e., We get the turmeric extraction.

Phytochemical constituent testing:

Liqorice:

Test for flavonoids: alkaline reagent test. Add few drops of sodium hydroxide (Naoh) to the liqorice extract if flavonoids arepresent , the solution will turn yellow or orange and the color will disappear upon adding an acid.

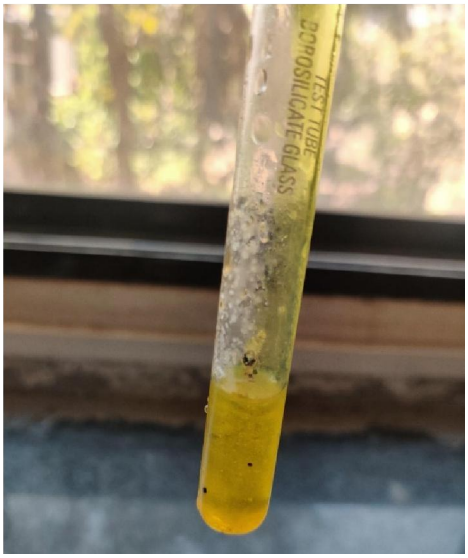


Result: orange color obtained

Moranga:

Test for flavanoids: shinoda test

Add a magnesium turnings and a few drops of concentrated hcl to the extract if flavonoids are present pink,red,or orange to yellow color is seen



Result: yellow color is observed

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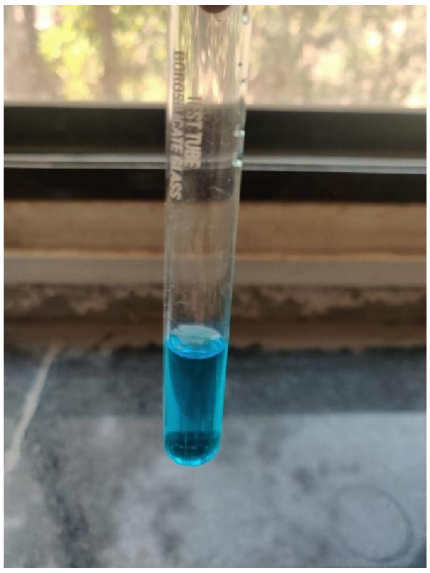
Clove :

Test for phenols : ferric chloride test

Add a few drops of clove oil or eugenol containing extract to 5 ml of distilled water.then add 1-2 drops of neutral ferric chloride solution(1%).appearance of blue,green or violet coloration indicates the presence of phenolic compound like eugenol.



Result: blue color observed

Turmeric: Test for alkaloids: alkaline testWhen you add an alkaline solution such as sodium hydroxide to a turmeric extract it will turn bright yellow in the presence of the alkaline reagent.

Result: yellow color observed

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Method of preparation of polyherbal cream

Base Formula 1 for polyherbal cream

Table no.1

Ingredients	Quantity	Uses
Liquorice	1%	Anti-inflammatory,skin soothing,
Moringa	1%	Anti -inflammatory, moisturizer and nourishes the skin
Clove	1%	Analgesic, anti-microbial
turmeric	6%	Anti-inflammatory ,anti-microbial
Borax	1%	Emulsifying agent
Bees wax	20%	Thickening agent, forms protective barrier
Liquid paraffin	50%	Emollient and moisturizes the skin
Methyl Paraben	0.1	Preservative
Rose water	q.s	Adds fragrance
Water	q.s	Diluent

Result: Strong colour, Slight phase separation.

Base formula 2 for polyherbal cream

Table no.2

Ingredients	Quantity	Uses
Liquorice	4%	Anti-inflammatory,skin soothing,
Moringa	4%	Anti -inflammatory, moisturizer and nourishes the skin
Clove	2%	Analgesic, anti-microbial
turmeric	2%	Anti-inflammatory ,anti-microbial
Borax	1%	Emulsifying agent
Bees wax	20%	Thickening agent, forms protective barrier
Liquid paraffin	50%	Emollient and moisturizes the skin
Methyl Paraben	0.1	Preservative
Rose water	q.s	Adds fragrance
Water	q.s	Diluent

Result: Greasy, unstable emulsion, irritation.

Base formula 3 for polyherbal cream

Ingredients	Quantity	Uses
liqorice	3%	Anti-inflammatory,skin soothing,
Moranga	3%	Anti -inflammatory, moisturizer and nourishes the skin
Clove	1 %	Analgesic, anti-microbial
Turmeric	2 %	Anti-inflammatory ,anti-microbial
Borax	1%	Emulsifying agent
Bees wax	20%	Thickening agent, forms protective barrier
Liquid paraffin	50%	Emollient and moisturizes the skin
Methyl paraben	0.1%	Preservative
Rose water	q.s	Adds fragrance
Water	q.s	Diluent

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1. Preparation of the Oil Phase:

Begin by accurately weighing 12 grams of beeswax and 30 milliliters of liquid paraffin. Transfer both ingredients into a clean petri dish or beaker .Place the container on a hot plate and heat the mixture at 70°C. Allow the beeswax to completely melt into the liquid paraffin to form a uniform oil phase. Stir gently during heating to ensure complete fusion and homogeneity of the oil components.

2. Preparation of the Aqueous Phase:

Take a clean beaker and add 0.5 grams of borax (sodium borate). Add a sufficient quantity of distilled water to the beaker to dissolve the borax. Heat this mixture to 70°C on a hot plate while stirring gently. Ensure the borax is completely dissolved in water, forming a clear aqueous phase.

Maintain the temperature to match that of the oil phase for better emulsion formation.

3. Emulsification (Combining Both Phases):

Slowly add the prepared aqueous phase into the oil phase maintained at 70°C. Add this dropwise or in small portions with continuous stirring to form a stable emulsion. After the full addition, continue stirring until a smooth, creamy consistency is achieved. Stirring helps in proper emulsification and prevents phase separation.

4. Incorporation of Herbal Extracts:

Accurately measure and prepare extracts of the following herbs:

Licorice (3%)

Turmeric (2%)

Moringa (3%)

Clove (1%)

Slowly add these herbal extracts to the warm cream base with gentle stirring.Ensure even distribution of the extracts within the cream for uniform therapeutic effect.

5. Cooling and Final Additives:

Allow the cream to cool down gradually to room temperature while stirring occasionally. Once the cream is lukewarm or cool, add:

Methyl paraben (0.1%) as a preservative

A few drops of rose water or perfume for fragrance

Mix thoroughly to incorporate these final ingredients.

6. Packaging:

Transfer the finished cream into airtight containers to avoid contamination. Use sterilized jars or tubes to maintain shelf stability and hygiene.

7. Labelling:

Properly label the containers with the following:

Product name

List of ingredients

Date of preparation

Expiry date

Usage instructions and storage conditions

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Evaluation parameter

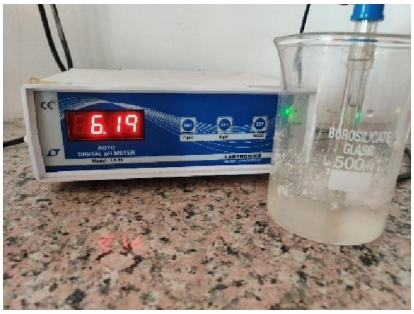
1.**Organoleptic evaluation**: An organoleptic examination seeks to determine the outward appearance. Cream formulated was taken . This evaluation were examined by the visual examination .

colour : The color of formulation is slightly yellow

Texture: The formulation has smooth texture.

smell : Rose fragrence due to use of rose water.

Determination of spreadability: About Ig 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.



3. **PH test**: the ideal ph range of skin cream should be between 4.5 to 6.5 and the ph pf the phyto cream was found to be 6.19,as it matches the skins ph so it is unlikely to cause any irritation,it is ideal for preserving the skin barrier and also helps to maintain stability of the herbs.

4. **Irritancy study**: Applied cream on uper surface of hand for 24 hr .

Result : It cannot cause any irritation.

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Washability: After applying cream , it can be easily remove when we clean with water .
Result : the cream is easily removed from skin by washing tge skin with water.
Thermal stability : Cosmetic formulation's thermal stability is one of the prime parameters that affect the formulation'sAmongst all the
formulations, formulations should have thermal stability at 20 0 C, 30 o c, and 40 o c. Based on the physicochemical parameters less thermal stability andless spread ability resulted in cracking and phase separation of formulations.
Result : thermal stabhility test is pass .
Stability testing : It evaluates the stability of the herbal cream 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 stable .
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.

II. RESULT AND DISCUSSION

The phytocream was successfully prepared. various physiochemical and organoleptic properties were evaluated to determine its suitability for topical preparation.
The ph of phytocream was measured to be 6.19 which is the ideal ph range which confirms the compatibility with the skin
Cream exhibited good spreadability,ensuring ease of application
Texture of the skin was smooth,homogenous and consistent.
Washability was excellent with the cream being easily removed without leaving residue on the skin
No irritarion was observed
Combination of all the four ingredients offers a synergistic effect for pain relief and anti-inflammatory action.this herbal ingredients are well documented for their therapeutic benefits in tradtional medicine and modern studies.
Overall phytocream demonstrates the potential as a natural,effective and safe alternative for topical pain management and anti – inflammatory applications.

II. CONCLUSION

The formulated phytocream, developed using a combination of Moringa oleifera, Glycyrrhiza glabra (licorice), Curcuma longa (turmeric), and clove, demonstrated significant potential as a natural topical formulation for pain relief and anti-inflammatory activity. The cream showed favorable physicochemical characteristics, including an ideal pH value of 6.19, which aligns well with the natural pH of human skin, ensuring compatibility and minimizing irritation risks.
Organoleptic properties such as smooth texture, homogeneity, spreadability, and easy washability were observed, indicating high user acceptability and convenience for topical application. The absence of any irritation further supports the formulation’s safety profile.
The synergistic effect of the four herbal ingredients provided enhanced analgesic and anti-inflammatory effects, which are well-supported by existing literature in both traditional and modern medicine. The therapeutic benefits of these natural components were evident in the product's effectiveness and stability.
Overall, this phytocream formulation holds strong potential as a safe, stable, and effective alternative to conventional topical medications for managing pain and inflammation. It presents a promising avenue for further research and development in the field of herbal and natural therapeutics.

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