International Journal of Pharmaceutical Research and Applications
Volume 9, Issue 4 July-Aug 2024, pp: 1569-1578 www.ijprajournal.com ISSN: 2456-4494

Formulation and evaluation of Herbal Cold Cream

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Date of Submission: 20-08-2024 Date of Acceptance: 30-08-2024

ABSTRACT
This study focused on developing and evaluating a cold cream enriched with natural extracts of turmeric, orange peel, and aloe vera. The goal was to create a skincare product with multiple benefits, utilizing the anti-inflammatory and antioxidant properties of turmeric, the brightening effects of vitamin C from orange peel, and the moisturizing and soothing qualities of aloe vera. The cream was carefully formulated using emollients, humectants, and herbal extracts to ensure a stable and effective product. Five batches were prepared such as F1, F2, F3, F4 and F5. Comprehensive evaluations assessed the cream's physical, chemical, and sensory properties, including texture, spreadability, and user experience. Results indicated that the batch F4 cream had a smooth texture, good spreadability, and a pleasant feel, with no phase separation and a skin-compatible pH, demonstrating its potential for safe and effective skincare use.

Keywords:Coldcream, Turmeric,Orangepeel, Aloevera,Skincare, herbalextracts

I. INTRODUCTION:

In recent years, there has been a growing interest in harnessing the therapeutic potential of natural ingredients in skincare formulations. The formulation and evaluation of cold cream using turmeric extract, orange peel extract, and aloe vera extract represent an innovative approach to developing skincare products that combine traditional wisdom with modern scientific techniques. [1]

Cold Cream: Cream, a classic skincare formulation, is a versatile emulsion that provides moisturization, nourishment, and protection to the skin. Creams are semi-solid emulsions used in cosmetic technology to deliver various active ingredients to the skin. They typically consist of a mixture of water and oil phases stabilized by emulsifiers. Creams are versatile formulations that can be tailored to different skin types and desired effects. Here's an overview of cream types in cosmetic technology.

Oil-in-Water (O/W) Creams: In O/W creams, oil droplets are dispersed within a continuous phase of water. These creams have a lighter texture and are easily absorbed into the skin, making them suitable for normal to oily skin types. They provide hydration without feeling greasy and are commonly used in moisturizers and day creams.

Water-in-Oil (W/O) Creams:

W/Ocreamshavewaterdropletsdispersedwithinacontinuousphaseofoil.Thesecreamshavea richer texture and provide more intense hydration, making them suitable for dry or mature skin types. They form a protective barrier on the skin, preventing moisture loss, and are often used in night creams and cold creams.[2]

Multiple Emulsion Creams:

Multipleemulsioncreams,suchaswater-in-oil-in-water(W/O/W)oroil-in-water-in-oil(O/W/O) creams, contain multiple layers of emulsions. These creams offer unique properties such as prolonged release of active ingredients or enhanced stability. They are used in specialized skincare products targeting specific skin concerns.

Emulsion Gel Creams:

Emulsion gel creams combine the properties of creams and gels, offering a lightweight and non- greasy texture with the moisturizing benefits of creams. These creams are quickly absorbed into the skin, leaving a refreshing and hydrating sensation. They are ideal for combination or oilyskin types and are commonly used in gel-cream moisturizers and serums.

Waterless Creams:

Waterless creams, also known as anhydrous creams, do not contain water in their formulation. Instead, they are made using a combination of oils, waxes, and butters, providing intense nourishment and hydration to the skin and are suitable for extremely dry or sensitive skin types and are often used in ointments, balms, and body butters.[3]

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BENEFITS OF COLDCREAMS:

- **Moisturizing:** Cold cream is an effective moisturizer, providing hydration to the skin. It helps to prevent dryness, especially during colder months or in harsh environmental conditions.
- **Emollient:** The creamy texture of cold cream makes it an excellent emollient, softening and smoothing the skin's surface. It helps to soothe rough or irritated skin, leaving it feeling supple and comfortable.
- **Barrier Protection:** Cold cream forms a protective barrier on the skin, helpingto seal in moisture and protect against external aggressors such as wind, cold, and pollution. This barrier function can help to prevent moisture loss and maintain the skin's natural hydration levels.
- **Makeup Removal:** Cold cream is often used as a gentle and effective makeup remover. Its emollient properties help to dissolve makeup, dirt, and impurities from the skin's surface, leaving it clean and refreshed.
- **Soothing:** Cold cream can help to soothe sensitive or irritated skin, providing relief from discomfort or irritated skin. Providing relief from discomfort or inflammation. It is often used after shaving or other skincare treatments to calm the skin and reduce redness.[4]

Role of herbal ingredients :

Turmeric:

Anti-inflammatory: Curcumin, the active compound in turmeric, has potent anti-inflammatory properties, making it effective in soothing irritated or inflamed skin. It can help reduce redness, swelling, and discomfort associated with various skin conditions such as acne, eczema, and psoriasis.

Antioxidant: Turmeric is rich in antioxidants that help protect the skin from damage caused by free radicals and environmental stressors. Regular use of turmeric in skincare formulations can help prevent premature aging, including the formation of wrinkles, fine lines, and age spots.

Brightening: Turmeric has skin-brightening properties that can help improve skin tone and complexion.

Fig1.Turmeric

AloeVera:

Hydration: Aloe Vera gel is a natural humectant, meaning it helps attract and retain moisture in theskin. This makes it an excellent ingredient for hydrating dry, dehydrated skin and restoring itsnatural moisture balance.

Soothing: Aloe Vera has anti-inflammatory properties that help calm and soothe irritated or sunburned skin. It can alleviate redness, itching, and discomfort,providing relief to sensitive or inflamed skin.

Wound Healing: Aloe Vera contains compounds that promote wound healing and skin regeneration.

Fig2.Aloe vera

Neem :

Antibacterial:

Neem oil has strong antibacterial properties that make it effective in combating acne-causing bacteria and preventing breakouts. It helps reduce inflammation and redness associated with acne, while also preventing the formation of new blemishes.

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Antifungal:
Neem oil has antifungal properties that help treatfungalinfections such as athlete's foot, ringworm,and nail fungus. It inhibits the growth of fungi and promotes the healing of affected skin.

Anti-inflammatory:
Neem contains compounds that have anti-inflammatory effects, making it beneficial for soothing and calmingirritated or inflamed skin.

Orange Peel:

Exfoliation: Orange peel contains natural alpha hydroxy acids (AHAs) that help exfoliate the skin, removing dead cells and promoting cell turnover.
Antioxidant: Orange peel is rich in antioxidants such as vitamin C, which help protect the skin from oxidative stress and damage caused by free radicals.
Oil Control: Orange peel has a stringent properties that help control excess oil production and tighten enlarged pores.


Fig3. OrangePeel

Beeswax:
Emollient and Moisturizing: Beeswax acts as a natural emollient, forming a protective barrier on the skin's surface to lock in moisture. This helps to prevent dryness and maintain skin hydration, making it an essential ingredient in cold cream formulations.
Texture and Consistency: Beeswax contributes to the creamy texture and smooth consistency of cold cream.
Skin Protection: The occlusive nature of beeswaxhelps to shield the skin from environmental stressors such as wind, cold, and pollution.
Healing Properties: Beeswax contains natural compounds with anti-inflammatory and antibacterial properties, which can help soothe and heal minor skin irritations, cuts, and wounds.
Compatibility with Herbal Extracts: Beeswax is Compatible with a wide range of herbal extract and botanical ingredients commonly used in cold cream formulation.


Fig4. Bees Wax

Liquid paraffin:
Moisturization: Liquid paraffin acts as an occlusive agent, forming a protective layer on the skin's surface to prevent moisture loss.
Emollient: It softens and smoothes the skin by filling in gaps between skin cells, resulting in improved texture and appearance. This makes the skin feel softer, reducing roughness andflakiness.
Barrier Function: Liquid paraffin creates a barrier on the skin that helps to shield it from external irritants, pollutants, and allergens.
Stability: It enhances the stability of the cream formulation by preventingseparationof theoiland waterphases. Liquidparaffin helps to maintain the consistency and homogeneity of the cream, ensuring uniform distribution of active ingredients.
Compatibility: Liquid paraffin is well-tolerated by most skin types and is unlikely to cause irritation or allergic reactions.
Texture Improvement: It contributes to the creamy texture and smooth application of the cold cream.

Fig5.Liquid Paraffin

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Borax:

Emulsification: Borax acts as an emulsifier in the formulation of herbal cold cream, helping to stabilize the oil-in-water emulsion by reducing the surface tension between the oil and water phases.

Thickening Agent: Borax functions as a thickening agent in the cold cream formulation, contributing to its creamy consistency and texture. It enhances the viscosity of the cream, making it easier to apply and spread on the skin.

Preservation: Borax exhibits mild antiseptic properties, which can help to preserve the cold cream by inhibiting the growth of microorganisms and extending its shelf life.

pH Adjustment: Borax acts as a pH buffer in the formulation, helping to maintain the desired pH level of the cold cream. By regulating the acidity or alkalinity of the formulation, borax ensures optimal skin compatibility and stability of the product.

Skin Conditioning: Borax has mild astringent properties, which can help to tone and condition the skin when incorporatedinto the cold cream formulation.

Fig6.Borax

Methylparaben:

Preservation: Methylparaben acts as a preservative, preventing microbial growth and extending theshelflifeofthecreambyinhibitingthegrowthofbacteria,fungi,andmolds.

Microbial Stability: It helps maintain themicrobiological stability of the cream, ensuring that it remains safe for use over an extended period, especially in products containing water or water-based ingredients which are susceptible to microbial contamination.

Ingredient Protection: By preventing microbial spoilage, Methylparaben helps protect the integrity and efficacy of other active and botanical ingredients in the cream, ensuring their potency and effectiveness over time.

Fig7.Methylparaben

Orchid & Jasmine Perfume:

Aromatic Enhancement: Orchid jasmine perfume adds a pleasant and refreshing fragrance to the cold cream, enhancing the overall sensory experience during application.

Aesthetic Appeal: The delicate floral scent of orchid jasmine perfume contributes to the aesthetic appeal of the cold cream, making it more enticing and desirable for use.

Masking Unpleasant Odors: In some cases, herbal ingredients or natural extracts used in cold cream formulations may have distinct or earthy odours. Orchid jasmine perfume can help mask these odors, resulting in a more pleasant fragrance profile for the cold cream. [5-7]

Material and Methods :-

PlantMaterialCollectionandExtractPreparation:

Healthy neem trees from nearby areas were carefully harvested to collect neem leaves. Only the leaves that were free from any kind of damage, discoloration, or signs of pest infestation were chosen for collection. When collecting Aloe Vera leaves, only mature leaves were plucked from the base of the plant.Leaves that were firm, plump, and free from blemishes or damage were selected. Fresh turmeric rhizomes were obtained from the local food market. Ripe organic oranges were chosen to collect fresh orange peels. Only oranges that were free from wax or pesticides were selected.

Preparation of neem extract:

Wash the neem leaves thoroughly under running water to remove any dirt, debris, or contaminants. Pat the leaves dry with a clean towel or paper towel to remove excess moisture. Air-dry

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the neem leaves in a well-ventilated area away from direct sunlight until they are completely dry. Once dried, powder the neem leaves and take 5 gm neem powder in 20 ml Dimethyl sulfoxide at 100°C for 5 to 10 minutes. Then filter it by filter paper and a clear solution is obtained. [8]

Fig8. Neem Powder

Preparation of aloevera extract:

The Aloe Vera leaves were washed thoroughly under cold running water to remove any dirtordebris. The leaves were then sliced lengthwise to expose the gel inside, and the gel wasgently scooped out using a spoon or knife. To remove anyfibers, the gel was filtered through a muslin cloth and collected in a clean bowl. Finally, the Aloe Vera gel was transferred to an airtight container and stored in the refrigerator until it was ready to be used. [9]

Fig9. Aloe vera Extract

Preparation of turmeric extract:

Weighed 15 grams of ground turmeric powder, which was then placed in a thimble and inserted into the Soxhlet apparatus. Gradually, acetone was filled in the apparatus as the extraction solvent. The extraction process was carried out at a temperature of 60 °C for 8 hours. After the extraction was completed, the extract was separated from the acetone using a rotary evaporator under a vacuum at a temperature of 35 °C and allowed to reflux through the sample for a period of6hours. During this time, approximately44 cycles were conducted, with each cycle consisting of solvent evaporation, condensation, and re-percolation through the sample. This repeated process ensured thorough extraction of the desired compounds from the turmeric sample into the solvent. [10]

Fig10.Turmeric Extraction using Sox let Apparatus

Fig 11. Turmeric extract

Preparationof orangepeelextract:

The oranges were washed thoroughly under running water to remove any dirt, wax, or residue from the peel. Then, using a knife or citrus peeler, the peel was separated from the fruit flesh and collected in a clean bowl. Next, the peel was air-dried in a well-ventilated area awayfrom direct sunlight. Once completely dried, the orange peel was ground into a fine powder using a spice grinder. Finally, the orange peel powder was stored

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in an airtight container in a cool, dry place until it was ready for use.[11]

Fig12.OrangePeelPowder

Method of Preparation of CreamFormulation:

- Heat liquid paraffin and beeswax in a china dish at 75℃and maintain that heating temperature (Oil phase).
- In another china dish, dissolve borax, methyl paraben in distilled water and heat thisbeaker to75℃ to dissolve borax and methyl paraben and to get a clear solution. (Aqueous phase).
- Thenslowlyadd this aqueous phaseto theheatedoilyphasein a mortar and pestle.
- Stirinasingledirection toavoid lumps.
- Then add a measured amount of Aloe Vera gel, Neem extract, and Turmeric extract and orange peel powder extract and stir vigorously until it forms a smooth cream.
- Add few drops of Rose oil as fragrance to impart the aroma and mix all the ingredients properly.

Fig13.Formulation of cold creams

Batches of Cream Formulation

S. No	Ingredients	F1	F2	F3	F4	F5
1.	Aloe-Veraextract	5 ml	4 ml	3 ml	4 ml	4.5 ml
2.	Turmericextract	2 ml	1.5 ml	1.5 ml	1.45 ml	1.43 ml
3.	NeemExtract	3 ml	2.5 ml	1 ml	1.5 ml	1.7 ml
4.	Orangepeelextract	2 ml	2 ml	2 ml	2.5 ml	2.2 ml
5.	Beeswax	1 g	1 g	5 g	5.2 g	5.5 g
6.	Liquidparaffin	15 ml	16 ml	16 ml	15 ml	15 ml
7.	Borax	0.5 g	0.4 g	0.36 g	0.5 g	0.6 g
8.	Methylparaben	0.2 g	0.2 g	0.2g	0.3 g	0.4 g
9.	Distilled water	q.s	q.s	q.s	q.s	q.s
10.	RoseWater	q.s	q.s	q.s	q.s	q.s

Table1: Formulation table

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EvaluationofColdCream

Physical Characteristics: The formulated herbal cream underwent a thorough examination to assess its color, odor, texture, and state, providing insights into its physical properties.

Irritancy: To evaluate irritancy, a designated area on the left-hand dorsal surface was marked and the cream was applied, with subsequent monitoring over a 24-hour period.

Wash ability Test: The wash ability test involved assessing the herbal cream's ability to be easily removed from the skin during washing. Cream samples were applied and allowed to dry before washing with water.

pH Test: A meticulous pH test was conducted using a calibrated pH meter and standard buffer solution. Cream samples were dissolved in distilled water, and their pH levels were accurately measured, offering crucial information regarding skin compatibility and formulation stability.

Viscosity: The viscosity of the cream was meticulously measured using a Brookfield viscometer under standardized conditions, providing essential data on its flow properties and consistency, aiding in formulation optimization.

Phase Separation: The cream underwent rigorous storage conditions to assess its phase separation behavior over a 30-day period.

Spreadability Test: The spreadability test involved a carefully executed procedure using glass slides and weights to measure the cream's spreading ability.

Greasiness: The assessment of greasiness involved applying the cream in a smear format on the skin surface and evaluating any oily or grease-like residues. [12]

II. RESULTS &DISCUSSION:

1. **Physical Characteristics:** Visual examination revealed a faint yellow hue, indicative of the cream's natural appearance. The scent emitted bythe cream was noted to be pleasant. In terms of its physical state, the cream exhibited a semisolid consistency. Manual testing further confirmed its smooth texture, ensuring ease of application and absorption into the skin.

S. No	Characteristics	F1	F2	F3	F4	F5
1.	Color	Muesli	Muesli	Light yellow	Pale yellow	Pale yellow
2.	Odor	Pleasant	Pleasant	Pleasant	Pleasant	Pleasant
3.	Texture	Smooth	Smooth	Smooth	Smooth	Smooth
4.	State	Liquid	Liquid	Semi-solid	Semi-Solid	Semi-solid

Table2.PhysicalCharacteristics

2. **Irritancy Test:** Based on the irritancy test results, the cream can be deemed safe and non-irritating for topical application.

S. No	Formulations	Irritancy
1.	F1	No irritation
2.	F2	No irritation
3.	F3	No irritation
4.	F4	No irritation
5.	F5	No irritation

Table3. IrritancyTest

3. **Washability test:** The skin felt clean and refreshed after washing, with no noticeable traces of the cream remaining.

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Formulation	EaseofRemoval	ResidueLeft on Skin	Post-WashSensation
F1	Easy	Minimal	Skinfeltslightlygreasy
F2	Easy	No residue	Skinfeltslightlygreasy
F3	Easy	No residue	Skinfeltcleanandrefreshed
F4	Easy	No residue	Skinfeltmoisturized
F5	Easy	No residue	Skinfeltmoisturized

Table4. Washabilitytest

4. pH Test: The pH test results for the cold creams indicated a pH level of 6.3. This falls within the acceptable range for skincare products, typically between 4.5 to 6.5, this is conducive to maintaining the skin's natural acidity and minimizing the risk of irritation.

S. No	Formulation	pH
1.	F1	6.9
2.	F2	6.7
3.	F3	6.54
4.	F4	6.3
5.	F5	6.5

Table5.pH Test

5. Viscosity: The viscosity test for the cream was carried out (cP). In this case, the viscosity of 24957 cP suggests a moderate thickness, facilitating smooth application and absorption into the skin without being overly runny or too thick.

S. No	Formulation	Viscosity(cP)
1.	F1	27025
2.	F2	30053
3.	F3	24894
4.	F4	24957
5.	F5	23578

Table6.ViscosityTest

6. Phase separation: The phase separation test was conducted on the herbal cream formulation to assess its stability. After allowing the cream to stand undisturbed for 30 days, no evidence of phase separation was observed.

S. No	Formulation	Phaseseparationafter30days
1.	F1	Phaseseparationobserved
2.	F2	Nophase separation
3.	F3	Nophase separation
4.	F4	Nophase separation
5.	F5	Nophase separation

Table7.Phase separation

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7. Spreadability Test: Upon application, the cream exhibited excellent spreadability, covering the skin with ease and uniformity.

S. No	Formulation	Time(sec)	Spreadability(gcm/sec)
1.	F1	8	25.2
2.	F2	5	22.3
3.	F3	6	20.4
4.	F4	4	18.2
5.	F5	7	19.4

Table8. SpreadabilityTest

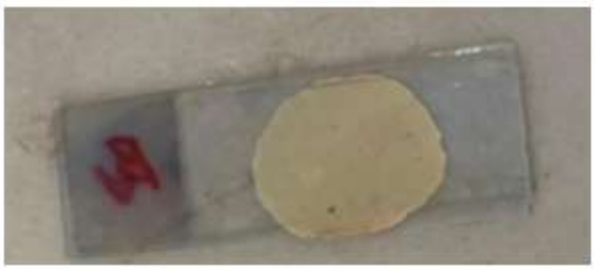

Fig15. Spreadability test

7. Greasiness: The greasiness of the cream was evaluated by applying a small amount to the skin and assessing the residual feel.

S. No	Formulation	Greasiness
1.	F1	Slightlygreasy
2.	F2	Non-greasy
3.	F3	Non-greasy
4.	F4	Non-greasy
5.	F5	Non-greasy

Table9.Greasiness test

Formulation F4 Emerged Excellent across all Evaluation Parameters

S. No	Parameters	Results
1.	Color	PaleYellow
2.	Odor	Pleasant
3.	Texture	Smooth
4.	State	Semisolid
5.	Irritancytest	NoIrritation
6.	Wash Ability	Easywashable
7.	pH	6.3
8.	Viscosity	24957 cP
9.	Spreadability	18.2 gcm/sec
10.	Phase Separation	Nophase separation
11.	Greasiness	Non-greasy

Table10.FormulationF4

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III. SUMMARY AND CONCLUSION

The evaluation of cold creams, with a particular focus on formulation F4, revealed promising results across various parameters. Visual examination of the cream unveiled faint yellow color, indicative of its natural composition. The pleasant odor further enhanced its sensory appeal, while the cream's semisolid consistency suggested suitability for application. Manual testing affirmed its smooth texture, facilitating effortless spread ability and absorption into the skin.

Based on these findings, formulation F4 emerged as a standout candidate, demonstrating favorable attributes in terms of color, odor, and consistency. Its well- rounded performance suggests potential efficacy and user satisfaction. As such, formulation F4 holds promise as a viable option for skincare applications, offering both aesthetic appeal and functional benefits.

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