WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
Coden USA: WJPRAP Impact Factor 8.63
Volume 15, Issue 21, 1026-1044. Research Article ISSN 2277–7105

FORMULATION AND EVALUATION OF A POLYHERBAL MULTIPURPOSE CREAM FOR SKIN CARE

Ashwini Bodhane[1]*, Ajay Birajdar[2], Rahim Bagwan[3], Ashwini Pawar[4], Rupali Salunke[5], Satish Mudgade[6]

[1]Department of Pharmaceutical Chemistry, Mahatma Basweshwar College of Pharmacy, Latur, Affiliated to Swami Ramanand Teerth Marathwada University, Nanded, Maharashtra, India.
[2]Department of Pharmaceutical Chemistry, Mahatma Basweshwar College of Pharmacy, Latur, Affiliated to Swami Ramanand Teerth Marathwada University, Nanded, Maharashtra, India.
[3]Department of Pharmaceutical Chemistry, Mahatma Basweshwar College of Pharmacy, Latur, Affiliated to Swami Ramanand Teerth Marathwada University, Nanded, Maharashtra, India.
[4]Mahatma Basweshwar College of Pharmacy , Latur, Affiliated to Swami Ramanand Teerth Marathwada University, Nanded, Maharashtra, India.
[5]Department of Regulatory Affairs, Dayanand College of Pharmacy, Latur, Affiliated to Swami Ramanand Teerth Marathwada University, Nanded, Maharashtra, India.
[6]Department of Pharmacognosy, Mahatma Basweshwar College of Pharmacy, Latur, Affiliated to Swami Ramanand Teerth Marathwada University, Nanded, Maharashtra, India.

Article Received on 02 Oct. 2026,
Article Revised on 22 Oct. 2026,
Article Published on 01 Nov. 2026,

https://doi.org/10.5281/zenodo.23790858

***Corresponding Author**

Ashwini Bodhane

Department of Pharmaceutical Chemistry, Mahatma Basweshwar College of Pharmacy, Latur, Affiliated to Swami Ramanand Teerth Marathwada University, Nanded, Maharashtra, India.

How to cite this Article: Ashwini Bodhane[1]*, Ajay Birajdar[2], Rahim Bagwan[3], Ashwini Pawar[4], Rupali Salunke[5], Satish Mudgade[6] (2026). Formulation And Evaluation Of A Polyherbal Multipurpose Cream For Skin Care. World Journal of Pharmaceutical Research, 15(21), 1026–1044.
This work is licensed under Creative Commons Attribution 4.0 International license.

ABSTRACT

The present study was undertaken to formulate and evaluate a polyherbal multipurpose cream containing Azadirachta indica (Neem), Ocimum sanctum (Tulsi), Vitex negundo (Nirgundi), and Aloe vera for multifunctional skincare applications. These medicinal plants possess reported antimicrobial, anti-inflammatory, antioxidant, moisturizing, soothing, and skin-healing properties. The selected herbal ingredients were incorporated into an oil-in-water (O/W) cream base using beeswax, stearic acid, borax, liquid paraffin, almond oil, glycerine, and methyl paraben. Two formulations, F1 and F2, were prepared using a modified emulsification method, with F2 containing increased beeswax and stearic acid as an optimized emulsifier system. The formulations were evaluated for organoleptic characteristics, pH, spreadability, homogeneity, texture, washability, type of emulsion, centrifugation stability, and phase separation over a 21-day observation period. Formulation F1 showed instability, including phase separation,

poor spreadability, greasy texture, discoloration, and a gradual decrease in pH. In contrast, F2 exhibited a smooth and homogeneous appearance, pleasant herbal odour, good washability, higher spreadability, and stable O/W emulsion characteristics. The pH of F2 remained stable from 6.1 to 6.0 during the observation period. Its spreadability was higher than F1, with a spread diameter of 5.3 cm compared with 4.1 cm for F1. F2 also showed no visible phase separation after centrifugation or during the observation period. The findings indicate that appropriate selection and balance of emulsifiers and herbal ingredients are important for obtaining a physically stable and cosmetically acceptable polyherbal cream. The optimized F2 formulation showed promising physical characteristics and may be considered for further development as a herbal topical skincare formulation.

KEYWORDS: Polyherbal cream, Azadirachta indica, Ocimum sanctum, Vitex negundo, Aloe vera, O/W emulsion.

1. INTRODUCTION

1.1 Background on Herbal Formulations in Skincare

Skincare has evolved from basic cleansing and protection to advanced cosmetic and therapeutic applications. As awareness of synthetic chemical-related side effects grows, the demand for herbal and natural alternatives has increased significantly. Herbal formulations, derived from medicinal plants, have been used for centuries in traditional medicine systems like Ayurveda, Unani, and Siddha to treat skin ailments. In recent years, these formulations have gained global popularity for their safety, efficacy, and skin compatibility.

Herbal skincare products are rich in bioactive compounds such as flavonoids, alkaloids, terpenoids, tannins, and polyphenols, which possess diverse pharmacological activities including antimicrobial, anti-inflammatory, antioxidant, and wound-healing properties. The integration of medicinal herbs into cosmetic products commonly referred to as cosmeceuticals has revolutionized skincare by offering both cosmetic and therapeutic benefits.[1]

1.2 Advantages of Polyherbal Approaches

Polyherbal formulations involve the combination of two or more medicinal plant extracts in a single product. The rationale behind this approach lies in the principle of synergism, where the therapeutic effects of individual herbs are enhanced when used together. Mukherjee et al.

noted that polyherbal systems are more effective due to the presence of multiple bioactive compounds that act on different targets or support each other's action.[2]

Such formulations can provide broader therapeutic coverage, improved efficacy, reduced toxicity, and minimized resistance in the case of antimicrobial applications. Polyherbal creams, in particular, are ideal for addressing multiple skin conditions simultaneously, such as dryness, irritation, microbial infections, and oxidative damage.

1.3 Types of Multipurpose Herbal Creams

Multipurpose herbal creams are semi-solid topical preparations that combine various herbal ingredients to serve multiple functions in one application. These can be categorized based on their intended therapeutic and cosmetic roles.

- Moisturizing Herbal Creams: Designed to hydrate the skin using natural humectants like Aloe vera and glycerine.
- Antiseptic/Antimicrobial Creams: Incorporate herbs like Neem and Tulsi to combat skin infections.
- Anti-inflammatory Creams: Include ingredients such as Nirgundi to relieve irritation and redness.
- Antioxidant and Anti-aging Creams: Contain botanicals like Tulsi and Aloe vera to protect against free radical damage.
- Wound-healing Creams: Formulated with plant-based agents that accelerate tissue repair and skin regeneration.

These formulations serve as comprehensive skincare solutions for both preventive and therapeutic use.

1.4 Actions Produced by Multipurpose Herbal Creams

Polyherbal multipurpose creams offer a range of actions due to the synergistic effects of their ingredients. These actions include.

- Moisturization: Replenishing and retaining skin moisture to prevent dryness.
- Anti-inflammatory Effects: Reducing swelling, redness, and irritation in inflammatory skin conditions.
- Antimicrobial Activity: Preventing and treating infections caused by bacteria and fungi.
- Antioxidant Protection: Neutralizing free radicals and preventing premature skin aging.
- Wound Healing: Accelerating the healing of cuts, abrasions, and burns.

- Soothing and Cooling: Calming irritated or sun-damaged skin.

These actions make such creams ideal for both routine skincare and management of minor dermatological issues.[3]

1.5 Advantages of Multipurpose Herbal Creams

Multipurpose herbal creams offer several practical and therapeutic advantages over conventional single-purpose or synthetic products.

- Multifunctionality: One product can perform several actions, reducing the need for multiple products.
- Natural Origin: Herbal ingredients are generally biodegradable, non-toxic, and environmentally friendly.
- Mild and Skin-friendly: Lower chances of irritation, especially for sensitive skin types.
- Cost-effective: Combines the benefits of various skincare treatments into a single formulation.
- Cultural and Traditional Acceptance: Based on time-tested medicinal systems and widely accepted in many cultures.

Herbal cosmeceuticals are increasingly favoured due to these combined advantages, contributing to their global market expansion.[1]

Therefore, it is essential to optimize the formulation using appropriate herbal extracts, emulsifiers, and stabilizers.

In this study, a polyherbal multipurpose cream was developed using four medicinal plants Azadirachta indica (Neem), Ocimum sanctum (Tulsi), Vitex negundo (Nirgundi), and Aloe vera.

1.6 Scope of the Study

The present study focuses on the development of a polyherbal cream formulation for preliminary physical evaluation intended for topical application with multifunctional skin care benefits.

The scope includes the selection of herbs known for their antibacterial, antifungal, anti-inflammatory, antioxidant, and moisturizing properties, and their incorporation into a semi-solid base suitable for cosmetic and therapeutic purposes.

The study encompasses the following

- Formulation and optimization of a batch using naturally derived and pharmaceutically accepted ingredients.
- Evaluation of physicochemical parameters such as appearance, pH, viscosity, spreadability, and stability to determine product quality.
- Assessment of herbal actives like neem oil, tulsi extract, aloe vera gel, and nirgundi oil for their synergistic benefits in skin care.
- Comparison of formulation stability by altering key excipients such as emulsifiers (e.g., beeswax and stearic acid), aiming to analyse their effect on emulsion integrity and shelf life.
- Exploration of natural preservatives and humectants, reducing reliance on synthetic additives and enhancing safety for prolonged use.

The findings from this study can contribute to the development of herbal-based, cost-effective, and consumer-friendly skin care products

1.7 Herbal Cosmetics and Their Growing Importance

Herbal cosmetics, also referred to as cosmeceuticals, are products that combine cosmetic and therapeutic benefits derived from natural plant sources. These products are becoming increasingly popular due to the rising awareness of the potential risks associated with long-term use of synthetic chemicals in personal care formulations. Herbal products are generally considered safer, more compatible with the skin, and less likely to cause adverse effects such as irritation, allergies, or toxicity. According to Dureja et al., cosmeceuticals represent a growing segment of the cosmetic industry that bridges the gap between beauty and health care by delivering medicinal benefits through topical application.[1]

The skin, being the outermost organ, is vulnerable to oxidative stress, infections, and environmental damage. Phytochemicals such as flavonoids, alkaloids, saponins, terpenoids, and polyphenols found in many medicinal plants have demonstrated multiple skin-protective actions including antimicrobial, anti-inflammatory, antioxidant, and wound-healing effects (Mukherjee et al.[2]). These properties make herbal ingredients ideal for inclusion in skincare formulations aimed at addressing issues like acne, eczema, hyperpigmentation, and aging.

1.8 Medicinal Plants Used in the Study

A. Neem

- Biological source:- It consists of fresh or dried leaves and seed oil of Azadirachta indica.
- Family: - Meliaceae.
- Synonyms:- Margosa, nimtree or India lilac.



Figure.1: Azadirachta indica (Neem).

Neem has a well-established reputation in Ayurvedic medicine for its powerful antimicrobial properties. The leaves, bark, and oil of the plant are rich in compounds such as nimbin, nimbidin, and azadirachtin, which have been shown to possess antibacterial, antifungal, and anti-inflammatory effects (Subapriya and Nagini[4]).

Neem oil is frequently used in skin preparations to treat infections, reduce acne, and promote wound healing.

B. Tulsi

- **Biological source: -** It is derived from the Ocimum sanctum plants.
- **Family**:- lamiaceae.
- **Synonyms:** - Holy Basil oil, Ocimum sanctum oi, indian basil oil.

Tulsi, commonly known as Holy Basil, is another widely used medicinal plant known for its adaptogenic, antimicrobial, and antioxidant properties. Mondal et al. reported that Tulsi contains essential oils such as eugenol and caryophyllene, which contribute to its antibacterial

and antifungal activity.[5] Its regular use is believed to purify the skin, reduce inflammation, and prevent infections. Tulsi extract also protects skin cells from oxidative damage, making it useful in anti-aging formulations.



Figure. 2: Ocimum sanctum (Tulsi).

C. Vitex negundo (Nirgundi)

- **Biological source: -** It is derived from the seeds and leaves of the Vitex negundo plant.
- **Synonyms: -** Vitex oil or Chaste Tree oil.
- **Family: - Verbenaceae.**

Nirgundi is traditionally used for treating inflammation, swelling, and joint pain. It contains bioactive flavonoids and iridoid glycosides that exhibit anti-inflammatory, analgesic, and antimicrobial properties. When applied topically, Nirgundi oil helps relieve skin irritation and supports healing. Its incorporation into skincare formulations can enhance the anti-inflammatory effect and soothe conditions such as dermatitis and eczema.



Figure 3: Vitex Negundo.

D. Aloe vera

- **Biological source:- It is obtained from the dried juice of the leaves of Aloe barbadensis Miller.**
- **Family:-**Asphodelaceae.
- **Synonyms:-** Aloe, Musabbar, Lolesara (in kannada).

Aloe vera is a widely known plant in both traditional and modern skincare systems. It contains mucopolysaccharides, enzymes, vitamins, and amino acids that hydrate, soothe, and heal the skin. Aloe vera gel has a cooling effect and promotes the regeneration of skin tissue. Surjushe et al. reported that Aloe vera helps in the treatment of wounds, burns, psoriasis, and other inflammatory skin conditions.[3] Its inclusion in creams enhances moisturization and provides a pleasant texture.



Figure 4: Aloe vera.

Table 1: Ingredient Table.

Ingredient	Function
Beeswax	Emulsifier, thickener, barrier agent
Stearic Acid	Co-emulsifier, stabilizer, thickener
Borax	Emulsifying agent (natural emulsifier system with beeswax)
Liquid Paraffin	Emollient, moisturizes and softens skin
Almond Oil	Rich in Vitamin E, improves skin texture
Neem Oil	Antibacterial, antifungal properties
Nirgundi Oil	Anti-inflammatory activity
Aloe Vera Gel	Hydrating, soothing effect
Tulsi Extract	Antioxidant, antimicrobial
Glycerine	Humectant, retains skin moisture
Methyl Paraben	Preservative
Rose Oil	Fragrance, soothing
Distilled Water	Aqueous vehicle and volume adjuster

1.9 Role of Excipients in Herbal Cream Formulation

In addition to herbal extracts, excipients such as oils, waxes, emulsifiers, and preservatives play a crucial role in the formulation of stable and effective creams. A multipurpose cream typically includes both oil and water phases, which require proper emulsification to form a uniform and stable product. Beeswax acts as a natural emulsifier and thickener, helping to blend oil and water phases while forming a protective barrier on the skin. Borax is often used in combination with beeswax to improve emulsifying efficiency by forming a soap-like structure at the oil-water interface.

Stearic acid serves as a co-emulsifier and stabilizer, imparting consistency and enhancing the mechanical strength of the cream. According to Klein, stearic acid not only thickens the emulsion but also helps prevent phase separation during storage. Glycerine, a commonly used humectant, attracts water to the skin, improving hydration and smoothness. Liquid paraffin and almond oil function as emollients, softening the skin and preventing moisture loss.

Preservatives like methyl paraben are added to prevent microbial contamination and extend shelf life. As herbal creams contain aqueous components and natural extracts, they are especially prone to microbial growth, making the inclusion of a preservative essential (Elder et al.[6]).

1.10 Stability Issues in Herbal Emulsions

Stability is a major challenge in herbal cream formulations due to the inherent variability of natural ingredients and the presence of both hydrophilic and lipophilic components. Physical instability can manifest as phase separation, discoloration, or changes in viscosity. According to Poucher et al., maintaining the correct ratio of emulsifiers and selecting compatible excipients are key to achieving a stable emulsion.[7] Temperature fluctuations during storage can also accelerate instability, making it important to test creams under different conditions such as heating-cooling cycles and centrifugation.

2. MATERIALS AND METHODS

2.1 Collection of Materials

All the ingredients and herbs used in the preparation of the polyherbal multipurpose cream were collected from college chemical store or procured from authenticated vendors in the local market. Herbal components were selected based on their traditional usage and pharmacological relevance in skincare.

The following materials were used.

Table 1. Ingredient Table

2.2 Equipment Used

- Digital weighing balance (±0.001 g)
- Glass beakers
- Hot water bath with temperature control
- Glass rod and stainless-steel spatula
- Magnetic stirrer / mechanical homogenizer
- Thermometer
- Storage containers

2.3 Method of Formulation

The polyherbal multipurpose cream was formulated using a modified oil-in-water (O/W) emulsification method with controlled heating and homogenization. Both the Formulations F1 and F2 were prepared using this method.[8]

Table 2: Formulation Table.

Ingredient	Formula F1 (g)	Formula F2 (g)
Beeswax	1.5	2.0
Stearic Acid	–	0.2
Borax	0.06	0.06
Liquid Paraffin	1.6	1.6
Almond Oil	2.0	2.0
Neem Oil	0.8	0.8
Nirgundi Oil	0.3	0.3
Aloe Vera Gel	2.6	2.6
Tulsi Extract	0.4	0.4
Glycerine	0.6	0.6
Methyl Paraben	0.06	0.06
Rose Oil	0.04	0.04
Distilled Water	10.04	9.34
Total	20.00	20.00

- **Preparation of Oil Phase**

In a 100 mL borosilicate beaker, the following ingredients were accurately weighed and added: Beeswax, Stearic acid, Liquid paraffin, Almond oil, Neem oil, and Nirgundi oil.

A. The mixture was heated in a water bath at 70–75°C for approximately 15–20 minutes until the waxes and solids completely melted.

b. The contents were stirred continuously using a glass rod to ensure a uniform and clear oil phase**.**

- **Preparation of Aqueous Phase**

a. In a separate beaker, distilled water was heated to 70–75°C**.**

b. Borax and Methyl paraben were added and stirred until fully dissolved (10 minutes).

c. Glycerine, Aloe vera gel, and Tulsi extract were then added sequentially while stirring.

d. The aqueous phase was stirred continuously until a homogeneous, clear solution was obtained (10–15 minutes).

- **Emulsification**

a. The hot aqueous phase was slowly added to the hot oil phase in a thin stream with continuous stirring at 70°C.

b. A mechanical stirrer or homogenizer was used at moderate speed for 15–20 minutes to ensure complete emulsification.

c. The emulsion was stirred further for another 10–15 minutes until a uniform, creamy base was formed, indicating the formation of a stable O/W emulsion.

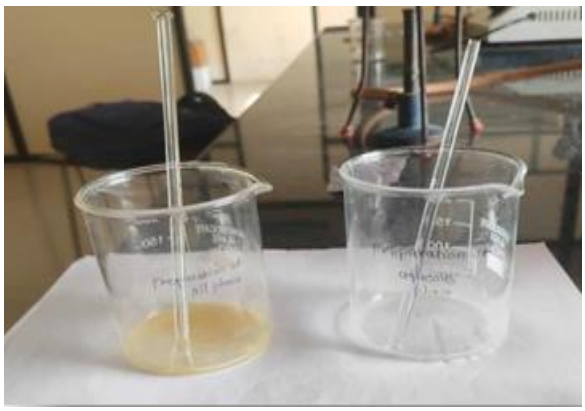


Figure 5: preparation of aqueous phase.

- **Cooling and Fragrance Addition**

a. The emulsion was allowed to cool gradually to 40–45°C**,** with continuous stirring to avoid air entrapment.

b. Rose oil (0.04 g) was added as a natural fragrance and therapeutic aroma enhancer.

c. Stirring continued until the cream reached room temperature (30°C) and attained a **s**mooth and uniform texture**.**

- **Storage of Final Formulation**

The final polyherbal cream was transferred into an airtight container to prevent degradation due to light and oxidation. The formulation was stored under room temperature for evaluation.

2.4 EVALUATION OF FORMULATION

The formulated polyherbal multipurpose cream was subjected to a series of organoleptic, physicochemical, and stability tests to evaluate its aesthetic qualities, spreadability, viscosity, stability, and overall suitability for topical application. The evaluation was carried out using standard procedures from pharmacopeial and research-based references.

2.4.1 Organoleptic (Basic) Evaluation

Organoleptic or sensory evaluation involves the assessment of the formulation's aesthetic and sensory characteristics through visual, olfactory, and tactile perception. These parameters help to evaluate the product's acceptability, usability, and immediate quality. The following organoleptic properties were assessed.

- **Colour**

The colour of the cream was evaluated visually under natural daylight and compared to a standard white background. Any discoloration, darkening, or inconsistency in color was noted. An ideal cream should have a uniform and appealing color that reflects the natural ingredients used and does not indicate degradation. The consistency in color is an important indicator of formulation stability and user acceptance.[9]

- **Odour**

Odour was assessed manually through direct smelling of the cream sample. The fragrance was expected to be mild, herbal, and pleasant, reflecting the natural essential oils and extracts present in the formulation (e.g., rose oil, neem oil). A strong or foul odour may indicate microbial contamination or ingredient incompatibility. A non-irritating, acceptable odour is essential for patient compliance in topical applications.[9]

- **Appearance**

The physical appearance of the cream was examined for clarity, gloss, consistency, and smoothness. A good formulation should appear semi-solid, uniform, non-lumpy, and free

from visible particulate matter. Smooth and glossy appearance indicates well-blended ingredients and stable emulsion.[9]

- **Texture / Feel on Skin**

Texture was evaluated by gently applying a small amount of cream to the back of the hand or forearm. The formulation was assessed for smoothness, softness, grittiness, and stickiness. An ideal cream should feel smooth and non-gritty, and it should not leave a greasy or sticky residue. This parameter ensures cosmetic elegance and comfort upon use. A soft, non-irritating feel is a crucial sensory requirement for topical products.[9]

- **Washability**

Washability was determined by applying a small quantity of cream to the skin and then attempting to wash it off using lukewarm water without soap. The ease of removal without leaving a sticky or oily residue was evaluated. A good O/W emulsion-based cream should be easily washable with water, making it suitable for regular use. Water washable formulations are preferred for their non-occlusive nature and ease of removal.[9]

2.4.2 Type of Emulsion

To confirm whether the cream was oil-in-water (O/W) or water-in-oil (W/O) emulsion, simple test were performed.

Dye Solubility Test: A water-soluble dye (methylene blue) was added to a sample of the cream. Uniform coloring indicated a water-continuous phase, confirming an O/W emulsion.[9]

2.4.3 pH Determination

The pH of the formulation was measured to ensure compatibility with human skin. About 1 g of cream was dispersed in 10 mL of distilled water in a clean beaker and stirred well. The pH was measured using a digital pH meter calibrated with standard buffer solutions. The measurement was performed at room temperature (25 ± 2°C) on Day 0, 7, 14, and 21**.**

Topical products should ideally have a pH between 4.5 and 7.0 to avoid irritation and maintain skin barrier function.[9]

2.4.4 Spreadability Test

Spreadability indicates how easily the cream spreads on the skin, which directly affects user comfort and application.

- A circle of 2 cm diameter was marked on a clean glass plate.

- About 0.5 g of cream was placed at the centre.
- Another glass plate was placed on top, and a 20 g weight was gently placed for 1 minute**.**
- The diameter of the spread cream was measured in cm. Larger diameter indicates better spreadability.[9]

The cream was examined visually and by touch to assess:

- Homogeneity**:** Absence of lumps, grittiness, and phase separation.

2.4.5 Centrifugation Test

To evaluate the physical stability of the emulsion, approximately 5 g of cream was placed in a centrifuge tube and centrifuged for 30 minutes**.**

The sample was observed for.

- Phase separation
- Sedimentation or creaming

Absence of separation indicates good emulsion stability.[9]

2.4.6 Observation for Phase Separation

The cream was stored at room temperature and observed on Day 0, 7, 14, and 21 for:

- Oil separation
- Layer formation
- Discoloration

No visible separation indicates emulsion integrity and product stability over time [2

3. RESULTS AND DISCUSSION

The formulated polyherbal multipurpose creams F1 and F2 were evaluated for organoleptic characteristics, physicochemical properties, and physical stability using standard parameters. Among the two, Formulation F1 showed signs of instability**,** including phase separation and poor consistency during tests. In contrast, Formulation F2 remained physically stable**,** with superior spreadability, texture, and appearance throughout the study period.

The results of the evaluation are discussed below:

Table 3: Organoleptic Evaluation of Formulation F1 and F2.

Parameter	F1 (Basic)	F2 (Optimized)
Colour	Discoloration from Day 7	Consistent for 21 days
Odour	Rancid smell by Day 14	Herbal fragrance maintained
Appearance	Oil layer by Day 14	Smooth and uniform

Texture/Feel	Greasy and uneven	Soft, smooth, non-sticky
Washability	Difficult; greasy residue	Easy; no oily residue
Emulsion Type	Unstable after Day 7	Stable O/W emulsion*

3.1 Organoleptic Basic Evaluation

- **Colour**

F1: Slight discoloration and uneven tone were observed, especially by Day 14, likely due to poor emulsification and possible degradation of herbal components.

F2: Maintained a consistent cream colour throughout the evaluation period, indicating good stability and uniform distribution of ingredients.

A consistent colour is considered an important parameter for cosmetic acceptability and product stability.

- **Odour**

F1: The odour became slightly rancid by Day 14, possibly due to the breakdown of oils or microbial growth linked to instability.

F2: Retained an herbal fragrance throughout the testing period, indicating good preservative action and stable oil incorporation.

- Appearance

F1: Showed non-uniformity, dull texture, and slight oil separation visible from Day 7 onward.

F2: Appeared smooth, semi-solid throughout, with no visible separation.

- **Texture / Feel on Skin**

F1: Felt slightly greasy and left an oily residue, making it cosmetically less acceptable.

F2: Provided a soft, smooth, and non-sticky feel, ideal for regular application.

- **Washability**

F1: Required more water and effort to remove; left a greasy layer after washing.

F2: Easily washable with water and left the skin soft and clean.

3.2 Type of Emulsion

F1: Failed the dye solubility test consistently after Day 7, indicating phase separation and breakdown of O/W emulsion structure.

F2: Passed test, confirming that it remained a stable oil-in-water (O/W) emulsion throughout the 21-day period

3.3 pH Determination

Table 4: pH determination.

Formulation	Day 0	Day 7	Day 14	Day 21
F1	6.4	6.2	5.9	5.7
F2	6.1	6.1	6.0	6.0

F1 showed a continuous drop in pH, indicating potential degradation or microbial contamination.

F2 maintained a stable pH in the skin-compatible range (4.5–7.0), suggesting better formulation stability.

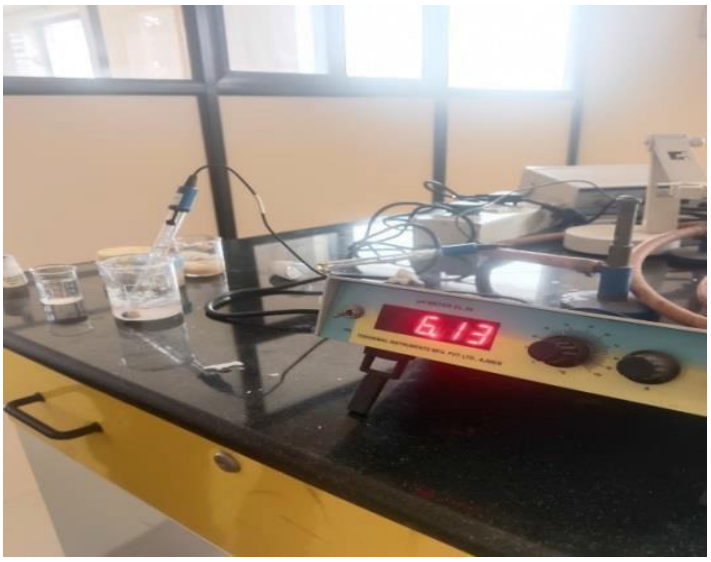


Figure 6: pH determination.

3.4 Spreadability

- F2 had higher spreadability, indicating better ease of application, attributed to its optimized emulsifier system (beeswax + stearic acid).
- F1 spread poorly and unevenly, likely due to partial phase separation and thicker consistency.

3.5 Homogeneity and Texture Analysis

- **F1**: Visual and tactile examination revealed lumps and gritty texture after Day 7, with oil separation evident by Day 14.
- **F2: Smooth and homogeneous texture persisted through all testing points. No grittiness or separation was observed.**

A homogeneous cream reflects proper emulsification and enhances user satisfaction.

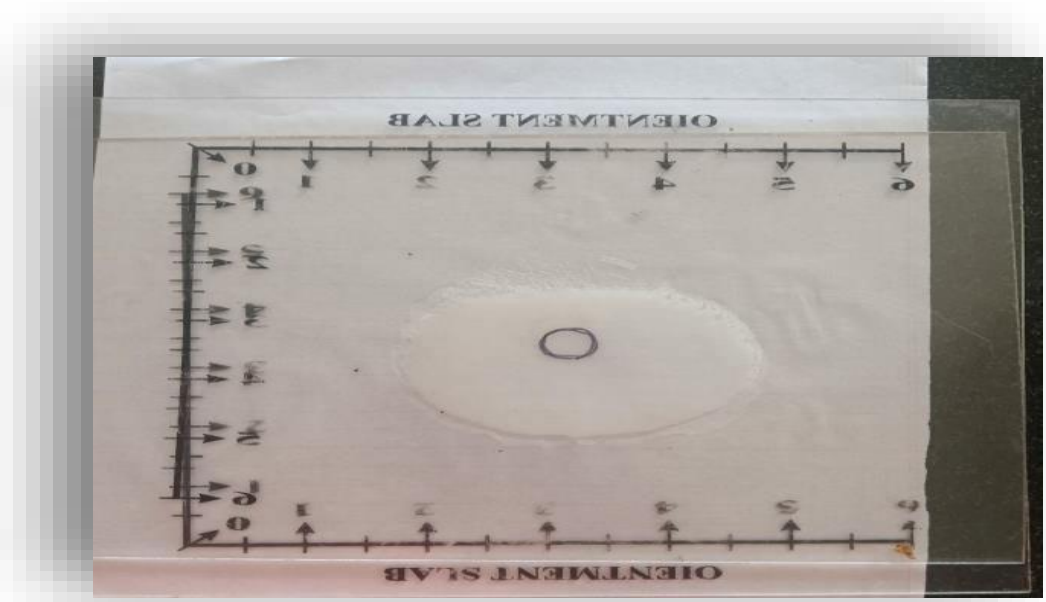


Figure 7: Separation Phase.

3.6 Centrifugation Test

Table 5: Centrifugation Test.

Formulation	Result After Centrifugation (30 min)
F1	Visible phase separation and oil layer formation
F2	No separation or instability observed

3.7 Physical Stability Evaluation of Formulation F1 and F2

The results confirm F2's superior physical stability compared to F1, which failed under stress conditions.

3.8 Observation for Phase Separation

- **F1**: Oil separation, layer formation, and discoloration were noted from Day 7 onward.
- **F2**: No signs of separation or physical degradation during the 21-day observation period.

These results show that the presence of stearic acid and extra beeswax in F2 improved emulsification and stabilized the cream over time.

4. CONCLUSION

The present study was undertaken to develop and evaluate a polyherbal multipurpose cream using selected medicinal plant known for their antimicrobial, anti-inflammatory, antioxidant, and soothing properties. The herbs used included Azadirachta indica (Neem), Ocimum

sanctum (Tulsi), Vitex negundo (Nirgundi), and Aloe vera, all of which have been scientifically recognized for their beneficial effects on skin health.

Two formulations were prepared.

- **F1**: An emulsion using beeswax and borax.
- **F2**: An optimized formulation with added stearic acid and increased beeswax quantity for enhanced emulsification and stability.

Both formulations were evaluated for organoleptic properties, pH, spreadability, homogeneity, texture, centrifugation stability, and resistance to phase separation. The results showed clear differences:

- **F1 exhibited instability**, with phase separation, poor spreadability, and signs of degradation over the 21-day observation period.
- **F2 remained stable**, maintaining uniform texture, pH, and emulsion integrity, and performed well in all evaluation parameters.

The study successfully demonstrated the importance of proper formulation design including the selection of stabilizers and emulsifiers in ensuring product stability and consumer acceptability.

From the study, following conclusions can be drawn.

- **F1**, which lacked a co-emulsifier (stearic acid) and having less emulsifier (beeswax quantity showed physical instability, reduced shelf-life, and poor user acceptability due to phase separation and greasy texture.
- **F2**, developed with an optimized emulsifier system, proved to be physically stable, aesthetically pleasing, and functionally suitable for regular topical use.
- The use of polyherbal extracts provided multifunctional skin benefits such as antimicrobial, anti-inflammatory, and moisturizing actions, supporting the rationale behind multipurpose herbal cream development.
- The study highlights the importance of emulsifier balance and the combined therapeutic effect of herbal extracts in producing effective and stable herbal skincare formulation.

Hence, Formulation F2 may be taken forward for further formulation optimization and appropriate safety and efficacy testing.

5. REFERENCES

1. Dureja H, Kaushik D, Gupta M, Kumar V, Lather V. Cosmeceuticals: An emerging concept. Indian J Pharmacol, 2005; 37(3): 155–159. doi:10.4103/0253-7613.16211.
2. Mukherjee PK, Maity N, Nema NK, Sarkar BK. Bioactive compounds from natural resources against skin aging. Phytomedicine, 2011; 19(1): 64–73. doi:10.1016/j.phymed.2011.10.003.
3. Surjushe A, Vasani R, Saple DG. Aloe vera: A short review. Indian J Dermatol, 2008; 53(4): 163–166. doi:10.4103/0019-5154.44785.
4. Subapriya R, Nagini S. Medicinal properties of neem leaves: a review. Curr Med Chem Anticancer Agents, 2005; 5(2): 149–156. doi:10.2174/1568011053174828.
5. Mondal S, Mirdha BR, Mahapatra SC. The science behind sacredness of Tulsi (Ocimum sanctum Linn.). Indian J Physiol Pharmacol, 2009; 53(4): 291–306.
6. Elder RL, editor. Final report on the safety assessment of methylparaben, ethylparaben, propylparaben, and butylparaben. J Am Coll Toxicol. 1984; 3(5): 147–209. doi:10.3109/10915818409021274.
7. Poucher WA, Butler H. Poucher's Perfumes, Cosmetics and Soaps. 10th ed. Dordrecht: Springer, 2000.
8. Lachman L, Lieberman HA, Kanig JL. The Theory and Practice of Industrial Pharmacy. 3rd ed. Philadelphia: Lea & Febiger, 1986.
9. Allen LV, Popovich NG, Ansel HC. Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems. 9th ed. New Delhi: Wolters Kluwer, 2011.
10. Vyas J, Vyas P, Sawant K. Formulation and evaluation of topical niosomal gel of erythromycin. Int J Pharm Pharm Sci, 2011; 3(1): 123–126.