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Formulation and Characterization of an Ayurvedic Herbal Face Cream

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ABSTRACT

The present study involves the formulation and characterization of an Ayurvedic herbal face cream incorporating Neem (Azadirachta indica), Aloe vera (Aloe barbadensis), and Honey, which are well-known for their medicinal and cosmetic benefits. These natural ingredients were selected for their proven antibacterial, anti-inflammatory, moisturizing, and skin-soothing properties. The face cream was prepared using a stable oil-in-water emulsion base and evaluated for various physicochemical parameters such as pH, spreadability, viscosity, homogeneity, and stability under different storage conditions. Microbial load and skin irritation tests were also performed to ensure product safety. The results indicated that the formulated cream possessed acceptable consistency, good spreadability, suitable pH for skin application, and excellent stability with no phase separation. The integration of Ayurvedic herbs into a cosmetic formulation supports the development of safe, effective, and natural skincare products, catering to the growing preference for herbal cosmetics.

Keywords- Ayurveda, Herbal Face Cream, Neem, Aloe vera, Honey, Natural Cosmetics, Skin Care, Formulation, Characterization, Stability Testing

I. INTRODCION

Herbal face creams have gained significant attention in the cosmetic and pharmaceutical industries due to their natural composition and potential skin benefits. These formulations incorporate bioactive plant extracts, essential oils, and natural ingredients to provide hydration, nourishment, and therapeutic effects without the harmful effects of synthetic chemicals.

The formulation of herbal face creams involves the selection of suitable herbal ingredients based on their skin benefits, such as anti-aging, moisturizing, anti-inflammatory, and antimicrobial properties. Commonly used herbal components include aloe vera, turmeric, neem, green tea, and sandalwood, which are known for their antioxidant and healing effects.

Characterization of herbal face cream is essential to evaluate its quality, stability, and effectiveness. Various physicochemical parameters such as pH, viscosity, spreadability, homogeneity, and microbial stability are analyzed to ensure the cream is safe and effective for use. additionally, in vitro and in vivo studies may be conducted to assess skin compatibility and therapeutic efficacy.

This study on the formulation and characterization of herbal face cream aims to develop a safe, effective, and stable herbal-based skincare product that aligns with the growing consumer demand for natural and eco-friendly cosmetic alternatives.

1.1 Cream

Creams are a solid preparation for oil and water.

- O/W Creams are made up of tiny droplets of oil dispersed in a continuous water phase. The O/W type is more comfortable and more acceptable in terms of beauty with less oil, easily washed off using water.
- W/O Creams are made up of tiny droplets of Water dispersed by a continuous Oil Phase. W/O types are more difficult to handle and move higher as they provide an oily barrier that reduces water loss in the stratum corneum.
- Face Creams are used as a cosmetic to soften and perform a cleansing action.
- Emollient Non-Cosmetic Moisture Arrangements come in the form of Creams, Oils, Lotions and Gels. Emollient helps the skin to feel relaxed.
- Refreshing action provides a protective film for a patient with conditions such as eczema psoriasis. Emollient is an important part of skin care.

1.2 Uses of cream

- Cleansing
- Beautifying

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- changing the appearance
- softening
- To protect the skin against bacteria, fungal infections to cure cuts, burns, wounds on the skin.

A herbal face cream with aloe vera, neem, and honey can be beneficial for skin offering natural, soothing, and potentially therapeutic benefits. A face cream herbal with aloe vera, neem, and honey is a skincare product that harnesses the natural properties of these ingredients to soothe, moisturize, and potentially address skin concerns like acne and inflammation.

II. PLANT PROFILE

A. NEEM

Neem, scientifically known as Azadirachta indica, belongs to the Meliaceae family. It is a fast-growing, evergreen tree.

Fig no.1 Neem

❖ **Scientific Classification:**
- Common Name: Neem
- Botanical Name: Azadirachta Indica
- Kingdom: Plantae
- Division: Magnoliophyta
- Class: Magnoliopsida
- Order: Sapindales
- Genus: Azadirachta
- Species: A. indica
- Family: Meliaceae

❖ **Chemical Constituents:**
- Limonoids (Azadirachtin, Nimbin, Salannin): Insecticidal and antifungal properties
- Flavonoids (Quercetin, Kaempferol): Antioxidant and anti-inflammatory effects
- Tannins and Polyphenols: Astringent and wound-healing properties

❖ **Pharmacological Activities:**
- Antimicrobial activity
- Anti-Inflammatory
- Wound healing
- Antioxidant activity
- Insecticidal & Antiparasitic

B. ALOE VERA

Aloe Vera is a succulent plant species of the genus Aloe. It is widely distributed, and is considered an invasive species in many world regions.

Fig no. 2 Aloe Vera

❖ **Scientific Classification:**
- Botanical name - Aloe Vera (L.) Burm.f.
- Kingdom - Plantae
- Scientific name - Aloe barbadensis
- Clade - Anglo sperms
- Clade - Monocots
- Order - Asparagales
- Family - Xanthorrhoeaceae
- Genus - Aloe
- Species - A. Vera

❖ **Chemical Constituents:**
- Polysaccharides(Acemannan, Glucomannan):Immunostimulatory, wound healing
- Anthraquinones (Aloin, Emodin):Laxative, antimicrobial
- Flavonoids (Quercetin, Kaempferol): Antioxidant, anti-inflammatory
- Vitamins (A, C, E, B12, Folic Acid): Skin protection, wound healing
- Minerals (Calcium, Magnesium, Zinc, Selenium): Enzymeactivation, immune support
- AminoAcids (20essential and non-essential amino acids): Tissue repair and regeneration

❖ **Pharmacological Activities:**
- Wound Healing and Skin regeneration
- Anti-Inflammatory Activity
- Antimicrobial Activity
- Antioxidant Activity

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C. HONEY

Honey is a natural sweet substance produced by bees (Apis mellifera) from flower nectar. It has been widely used in traditional medicine, Ayurveda, and cosmetics for its antibacterial, moisturizing, and antioxidant properties. Due to its rich bioactive composition, honey is an essential ingredient in herbal face creams, promoting skin hydration, wound healing, and anti-aging benefits.

Fig no. 3 Honey

❖ **Chemical Constituents:**

- Carbohydrates (70-80%)
- Fructose (38%) - Primary sugar, responsible for energy and hydration.
- Glucose (31%) - Aids in skin nourishment.
- Sucrose & Maltose (5-10%) - Provide natural exfoliation.
- GlucoseOxidase: Converts glucose into hydrogen peroxide, giving honey its antibacterial properties.
- Catalase & Peroxidase: Help in tissue regeneration
- Vitamin C, B-complex (B1, B2, B6), and Folate: Promote collagen production and skin repair.
- Minerals (Zinc, Magnesium, Potassium, Calcium): Enhance skin hydration and healing.

❖ **Pharmacological Activities**

- Skin Brightening and Anti-Pigmentation
- Antioxidant and Anti-Aging Benefits
- Anti-Inflammatory Properties
- Antimicrobial and Antibacterial Activity

III. AIM AND OBJECTIVES

AIM: Formulation and Characterization of an Ayurvedic Herbal face Cream

OBJECTIVES:

1) To set a formula for herbal cream by using different herbs.
2) To evaluate formulated products by using different tests.
3) Herbal face cream is to nourish, rejuvenate, and protect the skin
4) Herbal creams can help with skin conditions like acne, eczema, and dry skin.

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IV. MATERIALS AND METHOD

❖ **MATERIALS**

Ingredients	Uses
Neem Extract (Azadirachta indica)	Antibacterial, antifungal, anti-inflammatory
Aloe vera Gel (Aloe barbadensis)	Moisturizing, wound healing, anti-inflammatory
Honey	Antimicrobial, humectant, soothing agent
Stearic Acid	Emulsifier, thickening agent
Cetyl Alcohol	Emollient, stabilizer
Glycerin	Humectant, moisturizing agent
Mineral Oil	Skin-conditioning agent
Methylparaben	Preservative
Propylparaben	Preservative
Triethanolamine (TEA)	Ph adjuster, emulsifier
Distilled Water	Solvent

❖ **APPARATUS**

- Breaker
- Pair of tongs
- glass rod
- Measuring cylinder
- Test tube
- Thermometer
- Mortar and pestle
- Water bath
- Wire gauze

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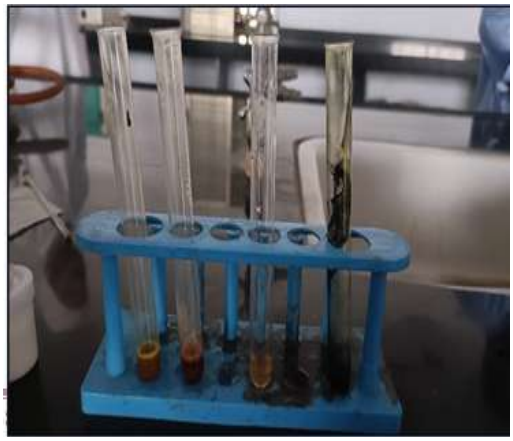
❖ **Method of Preparation**

➢ **Step 1: Preparation of Herbal Extracts**

1. Neem leaves are dried and ground into a fine powder
2. The powder is subjected to maceration with ethanol (70%) for 24-48 hours.
3. The extract is filtered, evaporated, and stored.
4. Aloe vera gel is extracted from fresh leaves and filtered
5. Pure honey is used without modifications

➢ **Step 2: Cream Base Preparation**

1. Oil Phase: Stearic acid, cetyl alcohol, and mineral oil are melted at 75°C
2. Aqueous Phase: Distilled water, glycerin, and TEA are heated separately at 75°C.
3. Emulsification: The oil phase is slowly added to the aqueous
4. Neem extract, Aloe vera gel, and honey are added to the emulsion at around 40°C.
5. Preservatives Addition: Methylparaben and propylparaben are dissolved in warm water and added.
6. Cooling and Packaging: The final mixture is cooled while stirring and transferred into suitable containers.



Figno. 4Extraction of sample

V. PREFORMULATION STUDY

1.1 Organoleptic Evaluation:

Appearance: Examined for color, texture, and uniformity

Odor: Herbal aroma due to neem and essential oils

Texture: Smooth and creamy consistency for easy application

5.2 Solubility Studies:

Each ingredient's solubility is tested to ensure proper mixing

Neem extract - Soluble in ethanol and partially in water

Aloe vera gel - Completely water-soluble

Honey - Water-soluble but requires blending for uniformity

Oils (Coconut, Almond, Essential Oils) - Soluble in oil phase

Beeswax - Required to mix oil and water phases

5.3 pH Determination:

Measured using a digital pH meter* to ensure skin compatibility (ideal range: 5.5 - 7.0)

Neem Extract: ~6.5

Aloe Vera Gel: ~6.0

Honey: ~4.5

VI. EVALUATION PARAMETERS

- Color
- Odor
- Appearance
- pH
- Viscosity
- Spreadability
- Washability
- Skin irritation test

➢ **Physical Parameters:**

Thecolor, odor, texture, and overall state of the cream were observed.

➢ **Irritancy Test:**

The left-hand dorsal surface was marked with a designated area of 1cm2. The cream was gently applied to ensure uniform coverage, and the application time was meticulously recorded for accurate assessment. Following intervals of up to 24 hours, any signs of irritant effects, erythema, or edema were carefully checked and reported.

➢ **Wash Ability Test:**

In the washability test, a small portion of the cream was gently applied to the hand, followed by rinsing with tap water

➢ **Determination of pH:**

The pH of the creams was assessed using pH paper. A small amount of cream was mixed with distilled water to create a solution. pH paper was then dipped into the solution, and the color change was observed and compared to a pH color chart to determine the pH level of each cream.

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➢ **Spreadability Test:**

The spreadability test for the cream involved placing a small amount of cream between two glass slides. One glass slide was then gently moved horizontally over the other.

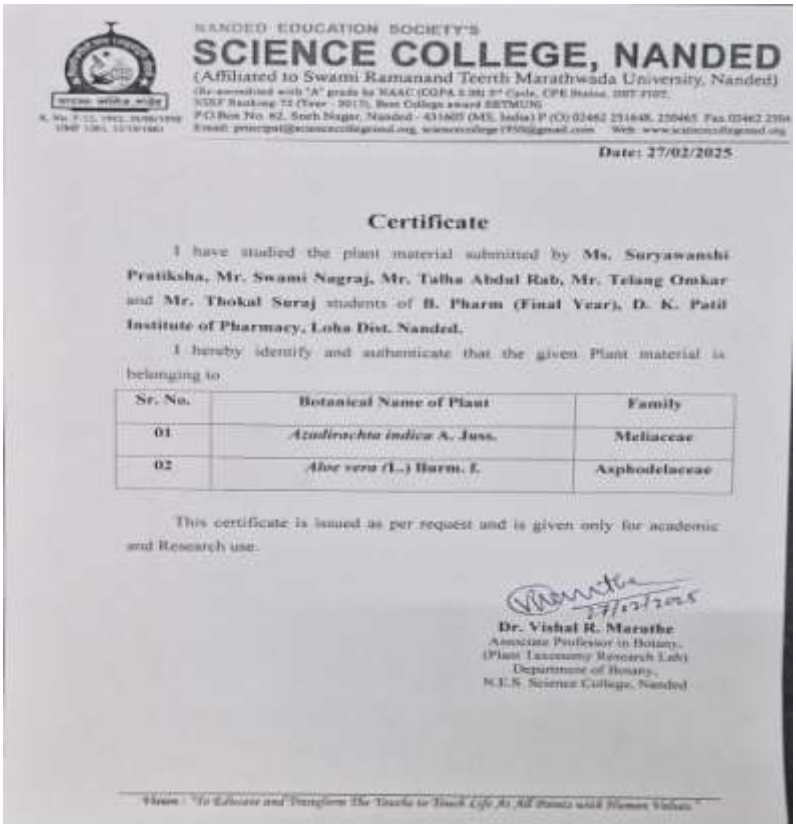
➢ **Viscosity:**

The viscosity of the formulation was assessed using a Brookfield viscometer with spindle No. 63 at a temperature of 25°C and a rotational speed of 100 rpm.

VII. RESULT AND DISCUSSION

A. PROCUREMENT: The Neem and Aloe Vera leaves are collected from fresh plant and fresh Honey is collected from local market of Nanded and other ingredients from laboratory and ayurvedic shop.

B. AUTHENTICATION:



NANDED EDUCATION SOCIETY'S
SCIENCE COLLEGE, NANDED
(Affiliated to Swami Ramanand Teerth Marathwada University, Nanded)

Date: 27/02/2025

Certificate

I have studied the plant material submitted by **Ms. Suryawanshi Pratiksha, Mr. Swami Nagraj, Mr. Talha Abdul Rab, Mr. Telang Omkar** and **Mr. Thokal Suraj** students of **B. Pharm (Final Year), D. K. Patil Institute of Pharmacy, Loha Dist. Nanded.**

I hereby identify and authenticate that the given Plant material is belonging to

Sr. No.	Botanical Name of Plant	Family
01	*Azadirachta indica* A. Juss.	Meliaceae
02	*Aloe vera* (L.) Burm. f.	Asphodelaceae

This certificate is issued as per request and is given only for academic and Research use.

27/02/2025

Dr. Vishal R. Marathe
Associate Professor in Botany,
(Plant Taxonomy Research Lab)
Department of Botany,
N.E.S. Science College, Nanded

The sample was authentified by Dr. V. R. Marathe, HOD (Botany dept.) of NES Science College, Nanded.

C. Formulation Table

Table No. 1

S.No	Ingredients	F1	F2	F3	F4	F5
1	Honey	2.8 ml	2.6 ml	**1.6 ml**	1.5 ml	1.42 ml
2	Aloe Vera extract	2.7 ml	2.8 ml	**1.9 ml**	1.4 ml	1.30 ml
3	Neem	0.7 ml	0.8 ml	**0.5 ml**	0.3	1 ml
4	Beeswax	5.3 g	5.4 g	**5.5 g**	4.9 g	5.6 g
5	Liquid paraffin	17 ml	18.5 ml	**19.2 ml**	20 ml	21 ml
6	Borax	0.55 g	0.45 g	**0.5 g**	0.59 g	0.4 g
7	Methylparaben	0.04 g	0.03 g	**0.2 g**	0.55g	0.4 g
8	Distilled water	q.s	q.s	**q.s**	q.s	q.s
9	Rose oil	q.s	q.s	**q.s**	q.s	q.s

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D. Irritancy test of prepared creams

After applying all the herbal cream formulas, the skin test showed no signs of irritation like redness or swelling.

Table No. 2

Sr.No	Formulation	Irritancy	Edema	Erythema
1	F1	No Irritation	No Irritation	No Irritation
2	F2	No Irritation	No Irritation	No Irritation
3	**F3**	**No Irritation**	**No Irritation**	**No Irritation**
4	F4	No Irritation	No Irritation	No Irritation
5	F5	No Irritation	No Irritation	No Irritation

E. Washability test of the prepared creams

In the washability test, the herbal creams were easy to wash off with water. No leftover cream was seen on the skin after rinsing

S.No	Formulation	Washability
1	F1	Cream easily washed off with water
2	F2	Cream easily washed off with water
3	**F3**	**Cream easily washed off with water**
4	F4	Cream easily washed off with water
5	F5	Cream easily washed off with water

Table No. 3

F. pH of the prepared creams

The pH of the creams was checked using pH paper. A small amount of cream was mixed with distilled water, and pH paper was dipped into the mixture. The color change on the paper was matched with a pH chart to find out the pH level of each cream.

Table No. 4

Sr.No	Formulation	pH
1	F1	6.8
2	F2	6.25
3	**F3**	**6.0**
4	F4	6.5
5	F5	6.69

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G. Viscosity of the prepared creams

The thickness (viscosity) of the cream was measured using a Brookfield viscometer with spindle No. 63 at 25°C and a speed of 100 rpm.

Table No. 5

Sr.No	Formulation	Viscosity
1.	F1	20190
2.	F2	23010
3.	**F3**	**24766**
4.	F4	30656
5.	F5	30779

H. Spreadability test of prepared cream

Spreadability tests were done for all five cream batches (F1, F2, F3, F4,F5). A higher spreadability value means the cream spreads more easily.

Table No. 6

Formulation	Consistency	Ease ofspread	Coverage	Residue	Spreadability
F1	Thin	Spread smoothly	Left patches	Small residue	1.42 cm^2s
F2	Thick	Spread smoothly	Spread evenly	No residue	1.6 cm^2s
F3	**Thick**	**Spread smoothly**	**Spreadevenly**	**No residue**	**2.0 cm^2s**
F4	Thick	Spread smoothly	Spread evenly	No residue	1.85 cm^2s
F5	Thick	Spread smoothly	Spread evenly	No residue	1.65 cm^2s

I. Phase Separation test

Prepared creams were observed for phase separation for 24 hours for 30 days.

Table No. 7

Sr.No	Formulation	Phase Separation
1.	F1	Phase separation observed
2.	F2	No phase separation observed
3.	**F3**	**No phase separation observed**
4.	F4	No phase separation observed
5.	F5	No phase separation observed

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VIII. SUMMARY

This study focuses on developing and analyzing an Ayurvedic herbal face cream using Neem, Aloe vera, and Honey, known for their skin-healing and protective properties. The cream was prepared using a natural emulsion base and tested for key parameters like pH, viscosity, spreadability, and stability. The formulation showed good consistency, was safe for skin use, and remained stable under various conditions. The results support the effectiveness of herbal ingredients in creating a natural, skin-friendly cosmetic product that aligns with Ayurvedic principles.

IX. CONCLUSION

The Formulated Herbal face cream has a pleasant odor, a smooth consistency, and a semi solid state. It also has good rheological properties and physical properties such as pH, viscosity, spreadability, washability, after-feel, non-irritancy, and no greasiness. Additionally, it's stable and doesn't undergo phase separation, making it a great choice for skincare. The formulation and evaluation of herbal cream yielded promising results, with formulation F3 emerging as the preferred formulation due to its superior consistency and stability. The enhanced texture and spreadability of F3 make it an ideal candidate for skincare applications, offering a smooth and uniform application experience. Overall, the formulation and evaluation of herbal cream, with F3 as the standout formulation

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