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Formulation and Evaluation of Novel Multipurpose Herbal Moisturizing Cream

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ABSTRACT: Moisturizing creams are essential for maintaining skin hydration, nourishment, and overall health. Many commercial formulations rely on synthetic ingredients, which may not be suitable for all skin types. To provide a natural and effective alternative, this study focuses on the preparation and evaluation of an herbal moisturizing cream formulated with kojic acid, niacinamide, dandelion extract, aloe-vera extract, cucumber extract, cocoa butter, and beeswax. These ingredients not only enhance skin hydration but also help in skin texture, reducing minor blemishes, protecting against sunburn, reducing acne, and brightening the skin. The formulation was developed using an emulsion-based approach to ensure optimal moisture retention while maintaining a lightweight, non-greasy texture. The presence of kojic acid and niacinamide helps in promoting an even skin tone and reducing acne, while dandelion extract offers mild protection against sun-induced damage. The cream was evaluated for pH, viscosity, spreadability, stability, and occlusivity, with results demonstrating good consistency, hydration efficacy, and formulation stability.

This study highlights the potential of herbal-based moisturizing creams as a safer and multifunctional alternative to conventional formulations, offering intense hydration along with skin-brightening, sun protection, and anti-acne benefits.

KEYWORDS: Herbal Moisturizer, Kojic Acid, Niacinamide, Dandelion, Aloe Vera, Skin Hydration, Sunburn Protection, Anti-Acne, Skin Brightening, Emulsion Stability

I. INTODUCTION:

Skin is the largest organ of the human body and serves as a protective barrier against environmental stressors such as pollution, UV radiation, and microbial invasion. Since ancient times, cosmetics have been used to enhance beauty and skin health. The term cosmetics comes from the Greek word kosmesticos, meaning "to beautify." [1] Early civilizations like Egypt and Rome relied on natural ingredients for skincare. Today, herbal-based cosmetics are preferred due to their skin-friendly properties. Among them, moisturizers play a vital role—not only in hydration but also in skin protection, repair, and overall health. [2]

Maintaining skin hydration and integrity is essential for overall skin health, as dehydration can lead to dryness, irritation, and premature aging. Moisturizers play a critical role in restoring and retaining skin moisture while providing additional benefits such as improving skin texture, preventing transepidermal water loss (TEWL), and enhancing the skin's protective barrier. [3]

In recent years, there has been an increasing demand for herbal and natural-based cosmetic formulations due to concerns regarding the long-term effects of synthetic ingredients used in conventional skincare products. Many commercial moisturizers contain artificial emulsifiers, fragrances, and preservatives, which may cause skin irritation, allergic reactions, or disrupt the skin's natural balance. As a result, the formulation of herbal moisturizing creams using naturally derived ingredients has gained significant attention in cosmetic research. [4]

The present study focuses on the preparation and evaluation of an herbal moisturizing cream formulated with kojic acid, niacinamide, dandelion extract, aloe vera, cucumber extract, cocoa butter, and beeswax. These ingredients are chosen not only for their hydrating and emollient properties but also for their additional skin-benefiting effects. Kojic acid and niacinamide are well-known for their brightening and anti-acne properties, helping to even out skin tone and reduce blemishes. Dandelion extract provides antioxidant and mild sun-protective benefits, shielding the skin from UV-induced damage. Aloe vera and cucumber is a well-established soothing and hydrating agent, whereas

International Journal of Pharmaceutical Research and Applications
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cocoa butter and beeswax act as natural occlusives, preventing moisture loss and ensuring prolonged skin hydration.

This study aims to develop a stable and effective herbal moisturizing cream while evaluating its physicochemical characteristics, including pH, viscosity, spreadability, stability, and occlusivity. By incorporating natural ingredients with multifunctional properties, the research highlights the potential of herbal-based cosmetic formulations as a safer, effective, and sustainable alternative to conventional moisturizers. The findings of this study contribute to the growing body of knowledge in herbal cosmeceuticals, emphasizing the role of natural compounds in enhancing skin health and providing moisturization, sun protection, and anti-acne benefits. [5]

KOJIC ACID:

Kojic acid (KA) is a natural metabolite derived from various fungal species, including Aspergillus oryzae and Penicillium. It is widely used in cosmetic and pharmaceutical formulations due to its skin-lightening, antimicrobial, and antioxidant properties. Kojic acid primarily functions as a tyrosinase inhibitor, preventing excessive melanin production, making it a popular ingredient in products designed to treat hyperpigmentation, melasma, and age spots. [6, 7]

Apart from its dermatological applications, KA has demonstrated antimicrobial, anti-inflammatory, anticancer, and UV-protective effects, contributing to its use in skincare, dental care, and pharmaceutical preparations. [8]

Mechanism of Action

Kojic acid primarily acts by inhibiting tyrosinase, the key enzyme involved in melanin biosynthesis. The mechanism involves:

1. Tyrosinase Inhibition – KA chelates copper ions present in the active site of tyrosinase, preventing its catalytic function in melanin synthesis.
2. Reduction of Melanin Formation – By suppressing tyrosinase activity, KA reduces the conversion of L-tyrosine to L-DOPA and DOPA-quinone, which are essential precursors for melanin production.
3. Antioxidant Properties – KA exhibits free radical scavenging activity, which helps prevent oxidative stress-induced skin damage.
4. Anti-Inflammatory Effects – KA may modulate NF-kB signaling, reducing inflammatory responses in keratinocytes, which contributes to its anti-melanogenic effect.[9]

These mechanisms make KA an effective depigmenting agent, widely used in whitening creams, serums, and dermatological formulations for hyperpigmentation disorders.

Kojic Acid protects the skin from harmful sunlight, lightens dark spots and blemishes, and the skin even tone and soft. Kojic Acid contains 'Kojic acid' is a skin-lighting agent used to treat skin problems like acne scars, melasma, hyperpigmentation, and photoaging. It also used to treat freckles (small brown spots on the skin), age spots, and chloasma (darkened skin caused by hormonal changes). It is a skin-lightening product that reduces melanin production and improves skin tone, texture, sensitivity, and reduces skin uneven colour. [10]

NIACINAMIDE:

Niacinamide (nicotinamide) is the amide form of vitamin B3 (niacin), a water-soluble compound with multiple dermatological benefits. It is a precursor to NADH and NADPH, essential cofactors in cellular metabolism and energy production, which help maintain skin homeostasis. [10-11]

Key Skin Benefits of Niacinamide:

- Barrier Function & Hydration:
  - Enhances ceramide synthesis, leading to improved stratum corneum barrier function.
  - Reduces transepidermal water loss (TEWL), improving skin hydration.
- Anti-Aging & Collagen Production:
  - Stimulates collagen synthesis in fibroblasts, aiding in wrinkle reduction and skin elasticity.
  - Helps replenish declining NADPH levels in aged skin, restoring youthful cellular function.
- Hyperpigmentation & Skin Tone Improvement:
  - Inhibits melanosome transfer from melanocytes to keratinocytes, leading to a reduction in hyperpigmentation and uneven skin tone.
  - Clinical studies show visible skin lightening and improvement in dark spots with regular use.
- Anti-Inflammatory & Acne Treatment:
  - Reduces sebum production, making it beneficial for oily and acne-prone skin.
  - Exhibits antimicrobial and anti-inflammatory properties, reducing acne lesions and redness.
- Photoprotection & DNA Repair:

International Journal of Pharmaceutical Research and Applications
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- Protects skin against UV-induced oxidative stress and immune suppression.
- Helps reduce DNA damage and supports skin repair mechanisms.

➢ Sebum Regulation:

- Decreases sebaceous lipid synthesis, reducing excessive oil production and preventing clogged pores.

➢ Texture & Skin Appearance:

- Improves overall skin smoothness by enhancing keratinocyte differentiation.
- Reduces the appearance of pores and refines skin texture. [12-13]

DANDELION ROOT EXTRACT:

✧ Family: Asteraceae (Daisy family)
✧ Genus: Taraxacum
✧ Native Region: Eurasia (now widespreadacross temperate North America)
✧ Kingdom: Plantae
✧ Species: Taraxacum officinale

Dandelion (Taraxacum officinale), often seen as a common weed, is a nutrient-rich botanical with exceptional skin benefits. Its root is packed with antioxidants, vitamins, and minerals that promote healthy, radiant skin.

Key Skin Benefits:

1. **Anti-Aging Protection** – Rich in polyphenols and flavonoids, it fights free radicals, reducing fine lines and UV damage.
2. **Soothes Sensitive Skin** – Its anti-inflammatory properties calm irritation, redness, and conditions like eczema and psoriasis.
3. **Detoxifies & Clears Skin** – Flushes out impurities, unclogs pores, regulates oil, and combats acne with antibacterial effects.
4. **Accelerates Healing** – Speeds up wound healing, reduces scars, and promotes skin regeneration.
5. **Deep Hydration & Nourishment** – Packed with Vitamins A, C, and E, along with essential minerals for soft, moisturized skin. [14]

ALOEVERA:

Aloe Vera (Aloe barbadensis Miller) is a well-known medicinal plant with a wide range of therapeutic and cosmetic benefits. It belongs to the Liliaceae family and is widely used for its soothing, moisturizing, and healing properties. This succulent plant has thick, fleshy, grey-green leaves that store water, allowing it to thrive in arid conditions. Originally native to Eastern Europe, Aloe Vera is now cultivated and used worldwide.

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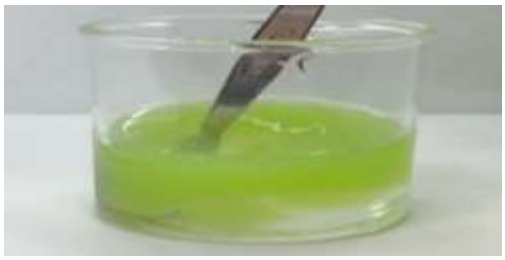
Scientific Classification

- Family: Liliaceae
- Genus: Aloe
- Species: Aloe barbadensis Miller
- Synonyms: Aloe, Musabbar, Kumari

Uses of Aloe Vera on Skin

1. **Moisturizing and Hydration**
   - Acts as a natural humectant, drawing moisture into the skin.
   - Helps in maintaining skin hydration without making it greasy, making it ideal for all skin types.
2. **Soothing and Anti-Inflammatory Effects**
   - Reduces redness, irritation, and inflammation, making it beneficial for sensitive skin.
   - Helps in conditions like sunburn, eczema, and rashes by providing a cooling effect.
3. **Healing and Wound Repair**
   - Speeds up the healing process of minor cuts, burns, and wounds.
   - Contains compounds that promote collagen synthesis, improving skin regeneration.
4. **Anti-Aging Properties**
   - Rich in antioxidants such as vitamins C and E, which help reduce oxidative stress on the skin.
   - Improves skin elasticity and reduces the appearance of fine lines and wrinkles.
5. **Acne Treatment and Oil Control**
   - Has antibacterial properties that help combat acne-causing bacteria.
   - Regulates excess oil production, reducing breakouts.
6. **Hyperpigmentation and Brightening**
   - Helps in fading dark spots and uneven skin tone.
   - Promotes a natural glow by enhancing cell turnover. [15-16]

CUCUMBER EXTRACT:



Cucumis sativus (Cucumber) is a widely cultivated plant from the Cucurbitaceae family, primarily consumed as a raw fruit. It holds significant medicinal value in Ayurveda, where it is used for hydration, soothing burns, swollen eyes, dermatitis, and skin whitening due to the presence of flavonoids, glycosides, and tannins.

Native to Asia, cucumber exists as wild varieties in India and the eastern Himalayas. It is an annual monoecious herb with trailing or climbing stems up to 5m long, simple tendrils, and a superficial root system. The leaves are triangular-ovate, lobed, and covered with fine hairs. Flowers are unisexual and yellow, with staminate flowers in clusters and pistillate flowers solitary. The elongated, cylindrical fruit can grow up to 60cm in length, containing seeds within.

Cucumber's high water content and bioactive compounds make it beneficial for skin hydration, soothing irritation, and improving complexion, making it a valuable ingredient in cosmetic and dermatological formulations. [16, 17]

Uses for Skin [17, 18]:

- Hydration & Moisturization: High water content helps in deep hydration and moisture retention.
- Skin Soothing & Cooling: Reduces inflammation, irritation, and sunburn effects.
- Skin Brightening & Lightening: Helps in reducing pigmentation and uneven skin tone.
- Anti-Aging Properties: Contains antioxidants that help in reducing fine lines and wrinkles.
- Oil Control & Acne Reduction: Acts as a mild astringent, helping in pore tightening and reducing excess oil.

Botanical Classification [19, 20, 21]

- Kingdom: Plantae
- Division: Magnoliophyta
- Class: Magnoliopsida
- Order: Cucurbitales
- Species: C. sativus
- Family: Cucurbitaceae
- Genus: Cucumis

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II. MATERIALS AND METHODS:

Preparation of Moisturizing Cream

The formulation was prepared by combining two different phases as follows:

Phase 1 – Oil Phase:

Beeswax, cocoa butter, and liquid paraffin were melted together using gentle heat until completely liquefied.

Phase 2 – Aqueous Phase:

Borax was dissolved in distilled water with continuous heating. Aloe vera extract, glycerin, and vitamin C were then added to the heated solution.

While still hot, Phase 1 was gradually added to Phase 2 under continuous stirring. The mixture was maintained under heat and stirred continuously for 5 minutes to ensure proper emulsification.

The emulsion was then removed from heat and allowed to cool gradually. Once the temperature lowered, methyl paraben, niacinamide, kojic acid, and lavender oil were incorporated into the formulation with constant stirring until a uniform, smooth moisturizing cream was obtained.

Table 1: Formulation table for Herbal moisturizing cream

SR. NO	INGREDIENTS	FOR 30ML	CATEGORY
1	Niacinamide	0.5 gm	Skin brightening, anti-acne
2	Dandelion Extract	0.2 gm	Antioxidant, protect from UV rays
3	Kojic Acid	0.5 gm	Skin-brightening
4	Aloe Vera Gel	7 ml	Moisturizing, soothing
5	Cucumber Extract	4 ml	Cooling agent
6	Cocoa butter	8 gm	Emulsifier
7	White Beeswax	1.5 gm	Thickening agent
8	Glycerin	2 ml	Humectant
9	Liquid Paraffin	3 ml	Emollient
10	Vitamin C	1.2 gm	Antioxidant
11	Lavender Oil	q.s	Fragrance/Calming
12	Borax	0.5 gm	Perfuming agent
13	Distilled Water	2 ml	Vehicle

III. EVALUATION OF CREAM:

1. Physical Characteristics

The cream was visually examined for colour, odour, texture, and overall appearance to assess its homogeneity and consistency. A uniform, smooth texture without phase separation indicates proper formulation.

2. Washability Test

A small quantity of cream was applied to the skin and rinsed under running tap water. The ease of removal was observed to determine washability, an essential factor in consumer preference.

3. pH Measurement

The pH of the cream was measured to ensure skin compatibility. 0.5 g of cream was dispersed in 50 mL of distilled water, and the pH was recorded using a calibrated digital pH meter. The acceptable range for topical formulations is typically 4.5 to 7.0 to maintain skin balance.

4. Viscosity Determination

The viscosity was analyzed using a Brookfield viscometer at a constant speed of 100 rpm with an appropriate spindle. This test determines the spreadability, texture, and ease of application of the cream.

5. Spreadability Test

A defined amount of cream was placed between two glass slides, and a 100 g weight was applied for 5 minutes to achieve a uniform layer. The distance covered by the upper slide in a given time was recorded, indicating the ease of spread across the skin. The spreadability was calculated using the equation:

$$S = \frac{\text{Weight applied} \times \text{Distance moved}}{\text{Time taken}}$$

6. Irritancy Test

To evaluate skin compatibility, 1 cm^2 of cream was applied to the dorsal surface of the hand, and the area was monitored for redness, erythema, or edema at regular intervals for 24 hours. Absence of irritation indicates the formulation's safety for topical use.

International Journal of Pharmaceutical Research and Applications
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7. Microbial Contamination Test

To assess microbial stability, the cream was streaked onto agar media and incubated at 37°C for 24 hours. Growth was observed and compared with a control sample (agar without cream). A lack of microbial growth confirms the preservation efficacy of the formulation.

8. Emulsion Type Identification (Dilution Test & Dye Test)

Dilution Test: A small quantity of cream was mixed with water. O/W emulsions disperse readily in water, while W/O emulsions remain undispersed.

Dye Test: The cream was mixed with scarlet red dye and observed under a microscope. If the dye stained the dispersed phase, the emulsion was O/W type; if the continuous phase retained the dye, it was W/O type.

9. Homogeneity Assessment

The cream was examined for uniform texture and absence of phase separation through visual inspection and microscopic analysis. A smooth and consistent formulation ensures proper emulsification.

10. Greasiness Evaluation

The cream was applied to the skin, and the residue was observed to determine whether it leaves a greasy or non-greasy finish. A lightweight, non-greasy feel is desirable for consumer preference.

11. Stability & Phase Separation Test

The formulation was subjected to accelerated stability conditions by storing it at temperatures ranging from 30°C to 80°C for 24 to 30 hours. Any signs of phase separation, precipitation, or instability were recorded.

12. Saponification Value

To determine the Saponification value, 2 g of cream was refluxed with 25 mL of 0.5N alcoholic KOH for 30 minutes. After cooling, 0.1 mL of phenolphthalein was added, and the solution was titrated against 0.5N HCl. The Saponification value was calculated using:

$$\text{Saponification Value (SV)} = \frac{(B-A) \times 28.05}{W}$$

Where:

- A = Volume of titrant for sample
- B = Volume of titrant for blank
- W = Weight of cream sample (g)

13. Acid Value

The acid value was determined by dissolving 10 g of cream in 50 mL of a 1:1 mixture of ethanol and ether, followed by refluxing. After cooling, 1 mL of phenolphthalein was added, and titration was carried out using 0.1N NaOH. The acid value was calculated as:

$$\text{Acid Value} = \frac{N \times 5.61}{W}$$

Where:

- N = Volume of NaOH used (mL)
- W = Weight of sample (g) [18-19-20-21]

IV. RESULT AND DISCUSSION:

The prepared formulation was golden in colour. It has the fragrance of lavender oil and has smooth texture. The physical properties of formulated cream were judged by colour, odour and texture. In wash ability, the cream applied on skin was easily removed by washing with tap water. The pH of the cream was found to be in range of 6.5 to 7.2 which is good for skin pH. The herbal formulation was shown pH nearer to skin required i.e. pH 7.1.Viscosity of formulated cream was determined by brook field viscometer at 20 rpm using spindle no. LV-4(64). The viscosity of cream was in the range of 499990 to 30000cp which indicates that the cream is easily spreadable by small amount of shear. The formulated cream shows the viscosity within range i.e. 48880cp.The spread ability test showed that the formulated cream has good spreadable properties. The formulated cream shows no redness, oedema, irritation and inflammation during studies. The formulated cream is safe to use. In dilution test, the cream was found to be w/o type of emulsion and the homogeneity of the formulated cream was judged by the visual appearance and touch. The appearance and touch of the cream was good.

V. CONCLUSION:

Thus, from the results of the study, it can be concluded that the formulated moisturizing cream effectively enhances skin hydration and provides additional skincare benefits. The inclusion of cucumber extract and Aloe vera significantly improves skin moisture retention, making them essential hydrating agents. Dandelion extract contributes protective benefits by shielding the skin from UV damage, potentially reducing photo damage and oxidative stress. Additionally, Kojic acid and Niacinamide offer brightening effects while also exhibiting anti-acne properties, making

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the formulation suitable for improving skin tone and texture. The combined action of these ingredients, along with other emollients and humectants in the formulation, demonstrates the potential of the developed cream as an effective moisturizer with multifunctional skincare benefits.

REFERENCE:

[1]. MV Vishvanathan, PM Unnikrishnan, Kalsuko Komatsu, Hirotoshi Fushimi. A brief introduction to Ayurvedic system of medicine and some of its problems. Indian J Traditional Knowledge 2003; 2:159-69.

[2]. R.N. Shah, B.M.Methal, (2006) A Handbook of Cosmetic, Vallabh Prakashan.

[3]. Saraf, S., & Kaur, C. D. (2010). Phytoconstituents as photoprotective nove cosmetic formulations. Pharmacognosy reviews, 4(7), 1.

[4]. Draelos ZD. Active agents in common skin care products. Plast Reconstr Surg 2010: **125** (2): 719–724.

[5]. Formulation And Evaluation of Herbal Moisturizing Cream. Miss. Valhekar Dipali B, Miss. Ingavale Rutuja R, Prof. Giramkar Ankita A, Dr. Khedekar Amol N, Mr. Bhor Sanket S. 2024. IJIRCT, Volume 10, Issue 3. Pages 1-11. https://www.ijirct.org/viewPaper.php?paperId=2405011

[6]. F. Oyedeji, G. Hassan, B. Adeleke Hydroquinone and heavy metals levels in cosmetics marketed in Nigeria Trends Appl. Sci. Res., 6 (7) (2011), p. 622

[7]. M. Cario- André, et al. In vivo and in vitro evidence of dermal fibroblasts influence on human epidermal pigmentation Pigment Cell Melanoma Res., 19 (5) (2006), pp.

[8]. F. Oyedeji, G. Hassan, B. Adeleke Hydroquinone and heavy metals levels in cosmetics marketed in Nigeria Trends Appl. Sci. Res., 6 (7) (2011), p. 622

[9]. T.L. Reddy, et al.Simultaneous delivery of Paclitaxel and Bcl-2 siRNA via pH-Sensitive liposomal nanocarrier for the synergistic treatment of melanoma Sci. Rep., 6 (2016), p. 35223

[10]. Kirkland J.B. Niacin Status, NAD Distribution and ADP-Ribose Metabolism. Curr. Pharm. Des. 2009;15:3–11. doi: 10.2174/138161209787185823.

[11]. De Figueiredo L.F., Gossmann T.I., Ziegler M., Schuster S. Pathway analysis of NAD+ metabolism. Biochem. J. 2011;439:341–348. doi: 10.1042/BJ20110320.

[12]. Matts P, Oblong J, Bissett DL. A Review of the range of effects of niacinamide in human skin. Int Fed Soc Cosmet Chem Mag. 2002;5:285–9.

[13]. Boo YC. Mechanistic basis and clinical evidence for the applications of nicotinamide (niacinamide) to control skin aging and pigmentation. Antioxidants. 2021;10(8):1315.

[14]. Medically reviewed by Katherine Marengo LDN, R.D., Nutrition — Written by Rachael Ajmera, MS, RD and Ansley Hill, RD, LD — Updated on October 9, 2023.

[15]. Fox LT, du Plessis J, Gerber M, van Zyl S, Boneschans B, Hamman JH. In vitro wound healing and cytotoxicity activity of the gel and whole-leaf materials from selected Aloe species. Journal of Ethnopharmacology. 2017;200:18-26.

[16]. Draelos ZD. Botanicals as topical agents. Clinics in Dermatology. 2001;19(4):501-508.

[17]. Chu, Y. F., Sun, J., Wu, X. and Liu, R. H. (2002) Antioxidant and antiproliferative activities of common vegetables. J Agric. Food Chem., 50: 6910-6916.

[18]. Sk. Uddandu Saheb*, Aduri Prakash Reddy, K. Rajitha, B. Sravani, B. Vanitha,(2018). Formulation and Evaluation of Cream from containing plant extracts, World Journal of Pharmacy and Pharmaceutical Sciences, 7(5) :851-862.

[19]. N. R. Patel, H. U.Momin, R.L. Dhumal, K, L. Mohite, (2017), Prepara preparation and evaluation of multipurpose herbal cream , Adv Pharm Life sci Res;5(1);27-32.

[20]. Himaja, N. (2017). Formulation and Evaluation of Herbal Cream from Azadirachta indica Ethanolic Extract. I Journals: Int J Res Drug Pharm Sci, 1(1), 23-6.

[21]. Mukherjee, P. K. (2002). Quality control of herbal drugs: an approach to evaluation of botanicals. Business Horizons.