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A Review on Herbal Formulations in Skin Care and Cosmetics

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ABSTRACT:
Herbal formulations have gained significant importance in skin care and cosmetic industries due to their natural origin, safety, and effectiveness. These formulations utilize bioactive compounds obtained from medicinal plants, such as alkaloids, flavonoids, tannins, terpenoids, and phenolic acids, which offer multiple skin benefits including anti-aging, moisturizing, sun protection, and anti-inflammatory effects. Unlike synthetic products, herbal cosmetics are less likely to cause side effects like irritation or allergies, making them suitable for long-term use. Common herbs such as Aloe vera, Turmeric (Curcuma longa), Neem (Azadirachta indica), Sandalwood, and Tulsi (Ocimum sanctum) are widely used in creams, lotions, face packs, and cleansers.

The growing consumer demand for natural and eco-friendly products has driven the cosmetic industry to develop innovative herbal formulations that combine traditional knowledge with modern scientific techniques. Standardization, quality control, and stability testing are essential to ensure the safety, efficacy, and consistency of herbal products. However, challenges such as variation in raw materials, lack of regulatory guidelines, and limited scientific validation still exist. This review focuses on the importance, formulation methods, advantages, and challenges of herbal-based skin care cosmetics. The study emphasizes the need for further research and technological advancement to enhance the global acceptance and reliability of herbal formulations in the cosmetic sector.

Keywords: Herbal cosmetics, skin care, natural ingredients, plant extracts, anti-aging, Aloe vera, Turmeric, formulation, safety, phytochemicals.

I. INTRODUCTION

Herbal formulations in skincare and cosmetics have gained substantial attention in recent years due to increasing consumer awareness of natural, safe, and eco-friendly products. Derived from plants, herbs, and other botanical sources, these formulations harness the bioactive compounds present in nature, such as flavonoids, alkaloids, terpenes, and phenolic acids, which offer a wide range of therapeutic and cosmetic benefits.[1]Unlike synthetic chemicals, which may cause skin irritation, allergic reactions, or long-term health concerns, herbal ingredients are generally considered gentler and compatible with the skin's natural physiology.[2]

Historically, the use of plant-based products for enhancing skin health can be traced back to ancient civilizations. Cultures such as the Egyptians, Greeks, Indians, and Chinese relied on botanical extracts, oils, and powders to cleanse, protect, and rejuvenate the skin.[3] For instance, aloe vera, turmeric, neem, and rose have been widely recognized for their healing, anti-inflammatory, and antioxidant properties. Today, modern cosmetic science integrates these traditional practices with contemporary extraction, formulation, and delivery technologies to enhance the efficacy and stability of herbal products.[4]

Herbal skincare formulations are designed to address a variety of skin concerns, including dryness, pigmentation, aging, acne, and sensitivity. Antioxidant-rich herbs help combat free radical damage, while anti-inflammatory plants reduce redness and irritation.[5] Moisturizing herbs restore the skin’s barrier function, and antimicrobial botanicals protect against infections. Moreover, the growing trend of “clean beauty” emphasizes sustainability, ethical sourcing, and minimizing synthetic additives, further propelling the demand for herbal cosmetic solutions.[6]

In addition to their therapeutic effects, herbal formulations often offer multi-functional benefits, combining nourishment, protection, and

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aesthetic enhancement in a single product.[7] With advances in phytochemistry, nanotechnology, and green extraction methods, modern herbal cosmetics are not only safer but also more effective, appealing to consumers seeking holistic skin wellness. Consequently, the integration of herbal ingredients into skincare and cosmetic formulations represents a convergence of traditional wisdom and scientific innovation, highlighting the potential of nature to meet contemporary beauty and personal care needs.[8]

1.1 NEED FOR HERBAL COSMETICS:

Herbal cosmetics are becoming more and more popular as people become more conscious of environmental, safety, and health concerns. Herbal cosmetics use plant-based substances instead of synthetic ones, which lowers the possibility of long-term health issues, allergies, and skin irritation. [9]

Bioactive substances found in herbs have antibacterial, anti-inflammatory, antioxidant, and skin-nourishing qualities that have both cosmetic and medicinal uses. They promote sustainable practices and lessen environmental damage because they are eco-friendly and biodegradable.[10]

Furthermore, herbal cosmetics combine historic knowledge with contemporary skincare requirements, drawing from systems such as Ayurveda and Unani. They promote safe, natural, and efficient personal care while accommodating a variety of skin types and conditions.[11]

Safety, natural efficacy, environmental sustainability, and customer preference for holistic wellbeing are the main factors driving the trend of herbal cosmetics.[12]

1.2 ADVANTAGES OF HERBAL FORMULATIONS:

Natural plant-based herbal formulations provide a number of advantages, including being typically safe with few adverse effects, being high in bioactive substances like anti-inflammatory and antioxidants, and offering comprehensive health benefits.[13] They assist both preventive and therapeutic healthcare and are economical, eco-friendly, and frequently multipurpose. Furthermore, their efficacy and believability are increased by their lengthy history of traditional use and synergistic effects .[14]

1.3 PHYTOCONSTITUENTS USED IN SKIN CARE:

Herbal cosmetics use plant-derived compounds to promote skin health naturally.

- Flavonoids (green tea, citrus) – antioxidants, anti-aging, UV protection.
- Tannins (witch hazel, pomegranate) – astringent, tighten pores, anti-inflammatory.
- Alkaloids (berberis, cinchona) – antimicrobial, anti-inflammatory.
- Terpenoids/Essential oils (lavender, tea tree) – antimicrobial, calming, anti-acne.
- Glycosides (aloe vera, licorice) – moisturizing, soothing, skin-brightening.
- Saponins (ginseng, soapwort) – cleansing, anti-inflammatory.
- Phenolic compounds (green tea, turmeric) – antioxidants, reduce wrinkles.
- Carotenoids (carrot, tomato) – UV protection, enhance radiance.
- Plant vitamins (amla, wheat germ) – collagen support, skin repair, brightening.[15]

Fig:1 skin aging exposoms

II. COMMON HERBS USED IN SKIN CARE PRODUCTS:

Since ancient times, herbs have played a crucial role in skincare because of their inherent bioactive substances that support healthy skin. Because of its calming, moisturizing, and restorative qualities, aloe vera is frequently used, particularly for burns and irritated skin.[16] Chamomile is perfect for sensitive or irritated skin because it has soothing and anti-inflammatory properties. Strong antibacterial and antifungal qualities found in neem aid in the treatment of skin infections and acne. Curcumin, a strong antioxidant and anti-inflammatory compound found in turmeric, helps lighten and lighten skin tone. Lavender is well-known for its soothing scent and

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antibacterial properties, which promote skin healing and relaxation. Green tea contains polyphenols that lower inflammation, shield the skin from oxidative damage, and may delay the aging process.Rosemary and Calendula are also popular for their antioxidant, antimicrobial, and soothing properties. These herbs are often incorporated in creams, oils, masks, and serums, providing natural and gentle care while minimizing the risk of harsh chemical side effects. [17]

2.1 FOR CLEANSING:

Herbs are often used in skincare for natural cleansing. Neem and Tulsi help remove impurities and fight bacteria, ideal for acne-prone skin. Rose petals gently cleanse and tone, while Chamomile soothes sensitive skin. Aloe vera hydrates while lightly cleansing. These herbs are commonly used in soaps, face washes, and herbal powders for gentle, chemical-free skin care.[18]

2.2 FOR MOISTURIZING:

Several herbs are valued in skincare for their natural moisturizing properties. Aloe vera deeply hydrates and soothes dry skin, promoting a soft, supple texture. Chamomile and Calendula help retain moisture while calming irritated skin. Lavender nourishes and protects the skin, preventing dryness. Rose extracts and cucumber provide gentle hydration and refresh the skin. These herbs are commonly used in creams, lotions, oils, and serums to maintain skin moisture naturally and gently.[19]

2.3 FOR ANTI-AGING:

Several plants are regarded in cosmetics for their natural hydrating characteristics. Aloe vera promotes a silky, supple texture by deeply hydrating and soothing dry skin. Calendula and chamomile soothe sensitive skin and aid in moisture retention. Lavender prevents dryness by protecting and nourishing the skin. Cucumber and rose ingredients gently hydrate and revitalize the skin. In order to naturally and gently maintain skin moisture, these herbs are frequently utilized in creams, lotions, oils, and serums.[20]

2.4 FOR SKIN WHITENING:

Because of their inherent ability to brighten and reduce pigmentation, a number of herbs are employed in skincare products. Curcumin, which is found in turmeric, evens up skin tone and lightens dark spots. By preventing the synthesis of melanin, licorice extract lessens hyperpigmentation. Aloe vera promotes a glowing appearance while calming the skin. Papaya and sandalwood aid in the removal of dead skin cells and enhance skin clarity. These herbs are frequently used in serums, masks, and creams to promote a more even, radiant complexion and naturally increase skin brightness.[21]

2.5 FOR ACNE TREATMENT:

Because of their antibacterial, anti-inflammatory, and oil-regulating qualities, a number of herbs are useful for treating acne. Tulsi (Holy Basil) and neem help lower inflammation and combat bacteria that cause acne. [22]Tea tree prevents outbreaks because of its potent antibacterial properties. Aloe vera helps acne lesions heal and calms sensitive skin. Calendula and chamomile reduce irritation and redness. These herbs are frequently used to promote smoother skin and naturally reduce acne in face washes, gels, masks, and spot treatments.[23]

2.6 FOR SUN PROTECTION:

Many plants provide natural sun protection by lowering oxidative stress and UV-induced damage. Antioxidants found in green tea and turmeric can shield the skin from sunburn and photoaging.[24] Neem and sandalwood offer light protection and cooling properties, while aloe vera calms and heals sun-damaged skin. To naturally protect the skin from damaging UV rays, these herbs are frequently used to lotions, sunscreens, and after-sun gels.[25]

III. FORMULATION TYPES OF HERBAL COSMETICS

Different kinds of herbal cosmetics are made to naturally provide particular advantages. While ointments and balms offer deep nourishment and protection, creams, lotions, and gels offer hydrating and anti-aging properties. Masks and scrubs for exfoliation and renewal contain powders and pastes. Herbal shampoos, conditioners, and tonics enhance the health of the hair and scalp, while oils and serums provide concentrated plant actives for specific advantages. Plant-based soaps, face washes, and body washes provide mild washing. Every formulation aims to optimize the potency of herbal ingredients in a form that is aesthetically pleasing.[26]

3.1 CREAMS AND LOTIONS:

Creams

Herbal actives are frequently applied topically via creams, which are semi-solid

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emulsions of water and oil. They might be water-in-oil (W/O), which are richer and offer superior skin barrier protection,[27] or oil-in-water (O/W), which are light, non-greasy, and readily absorbed. Creams with herbal compositions that aim for moisturizing, calming, anti-inflammatory, or anti-aging properties may include oils or extracts from plants like calendula, neem, aloe vera, or turmeric. Creams are appropriate for specific skin therapy and provide a regulated release of herbal active ingredients.[28]

Lotions

Lotions are fluid emulsions with a low viscosity, often oil in water, that are easy to apply to large body parts. They are perfect for everyday moisturizing, sun protection, or moderate skin issues because they absorb rapidly and are less greasy than creams. Herbal lotions incorporate plant extracts like chamomile, lavender, or green tea to provide calming, antioxidant, or anti-acne benefits. Due to their lighter texture, lotions are often preferred in hot and humid climates.[29]

3.2 FACE WASHES AND CLEANSERS:

Herbal face washes and cleansers are gaining popularity for their gentle yet effective cleansing properties, often free from harsh chemicals. These formulations harness the natural benefits of plants to cleanse, soothe, and nourish the skin. Here's an overview of popular herbal face wash ingredients and some noteworthy products.[30]

1. Neem (Azadirachta indica)

Known for its antibacterial and antifungal properties, neem helps combat acne and skin infections.

Often used in formulations targeting oily or acne-prone skin.

2. Aloe Vera

Soothes and hydrates the skin, reducing inflammation.

Ideal for sensitive or sun-exposed skin.

3. Turmeric (Curcuma longa)

Contains curcumin, which has anti-inflammatory and antioxidant effects.

Brightens the complexion and evens skin tone.

4. Tulsi (Holy Basil)

Offers antibacterial and anti-inflammatory benefits.Helps purify the skin and reduce redness.

5. Orange Peel Extract

Rich in vitamin C, it helps brighten the skin and provides antioxidant protection**.**

6. Rose Extract

Known for its soothing and anti-inflammatory properties.

Balances the skin's pH and adds a pleasant fragrance.[31]

3.3 FACE PACKS AND MASKS:

Herbal face packs and masks use natural ingredients to cleanse, nourish, and revitalize skin safely. They cater to various skin types, offering hydration, detoxification, anti-aging, and brightening benefits.[32]

Common Ingredients:

- Clays & Powders: Multani mitti (oil control), neem (acne), sandalwood (soothing), turmeric (brightening).
- Herbal Extracts: Aloe vera (moisturizing), tulsi (antimicrobial), rose (toning), cucumber (refreshing).
- Oils: Almond (nourishing), jojoba (balances oil), coconut (moisturizing).

Types & Benefits:

- Cleansing: Remove dirt and oil (e.g., Multani mitti + rose water).
- Moisturizing: Hydrate and soften (e.g., aloe vera + honey).
- Anti-aging: Reduce fine lines (e.g., banana + almond oil).
- Brightening: Improve glow (e.g., turmeric + sandalwood).
- Acne Treatment: Control inflammation and bacteria (e.g., neem + tulsi).

Advantages:

- Gentle and natural, suitable for sensitive skin.
- Rich in antioxidants and nutrients.
- Customizable for specific skin concerns.[33]

3.4 SOAPS AND SHAMPOOS:

Natural plant-based ingredients are used to make herbal soaps and shampoos, which are personal care products that protect, nourish, and cleanse skin and hair without using harsh chemicals. They are appropriate for sensitive skin and all skin and hair types since they use the benefits of herbs, essential oils, and botanical extracts to provide gentle care.[34]

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 5 Sept - Oct 2025, pp: 1237-1247 www.ijprajournal.com ISSN: 2456-4494

Common Ingredients:

- Soaps: Neem, turmeric, aloe vera, sandalwood, tulsi – provide antibacterial, anti-inflammatory, and soothing properties.
- Shampoos: Amla, bhringraj, hibiscus, shikakai, reetha – strengthen hair, prevent dandruff, promote hair growth, and add shine.
- Oils and Extracts: Coconut oil, almond oil, aloe vera, jojoba oil – moisturize, nourish, and prevent dryness.

Benefits:

- Free from synthetic detergents, parabens, and sulfates.
- Maintain natural pH balance of skin and scalp.
- Reduce irritation, hair fall, and dandruff.
- Provide antioxidant protection and enhance skin/hair health.[35]

3.5 OILS AND SERUMS:

Concentrated formulations of herbal oils and serums use bioactive plant extracts to nourish, protect, and improve the skin and hair. Their natural makeup, medicinal advantages, and adaptability in cosmetic applications have led to their growing popularity. [36]

Herbal Oils

Usually made from medicinal plants, seeds, fruits, or flowers, herbal oils can be utilized either on their own or as a vehicle for other active components. Almond, coconut, jojoba, argan, sesame, neem, and guava seed oils are examples of common herbal oils.

- Moisturization – They help maintain skin hydration and softness.
- Antioxidant Activity – Protect skin from free radicals and premature aging.
- Anti-inflammatory and Healing Properties – Useful in soothing irritated skin, reducing redness, and promoting wound healing.
- Hair Care – Oils like amla, bhringraj, and fenugreek help strengthen hair, reduce dandruff, and prevent hair fall.[37]

Herbal Serums

Herbal serums are lightweight, fast-absorbing formulations enriched with concentrated plant extracts, essential oils, or bioactive compounds. Unlike oils, serums are designed for targeted treatment, delivering high potency ingredients to specific skin or hair concerns.

- Anti-aging – Ingredients like vitamin C-rich plant extracts, green tea polyphenols, and aloe vera help reduce wrinkles and fine lines.
- Brightening and Skin Tone Improvement – Licorice, turmeric, and mulberry extracts enhance complexion.
- Hydration and Barrier Repair – Serums restore moisture and strengthen skin barrier function.
- Non-greasy Formulation – Ideal for all skin types, especially oily or acne-prone skin.[38]

IV. MECHANISM OF ACTION OF HERBAL INGREDIENTS

The bioactive chemicals found in herbal components in cosmetics work by interacting with skin and hair at the cellular and molecular level to produce both medicinal and cosmetic effects. By neutralizing free radicals, antioxidants such as flavonoids and polyphenols stop oxidative damage and early aging. Antimicrobial components like alkaloids and essential oils stop the growth of bacteria and fungi, preventing acne and scalp infections, while anti-inflammatory substances lessen redness, inflammation, and swelling. Some herbs improve moisture, increase skin suppleness, encourage wound healing, and boost collagen formation. By increasing scalp circulation and providing vital nutrients, herbal extracts in hair care help to strengthen hair follicles, lessen hair loss, avoid dandruff, and promote healthy hair development. Through these combined actions, herbal ingredients ensure safe, natural, and effective skin and hair care.[39]

V. EVALUATION OF HERBAL COSMETICS FORMULATIONS

Before herbal cosmetic formulations are made available to consumers, it is essential to evaluate them to guarantee their quality, safety, and effectiveness. To evaluate characteristics like appearance, color, odor, texture, pH, viscosity, spreadability, and stability under various storage circumstances, a variety of physical, chemical, and biological tests are used. Chemical assays measure the concentration of active herbal ingredients, while microbial analysis makes sure products are free of dangerous germs and fungi. Furthermore, certain tests are carried out based on the type of product—for example, investigations of skin irritation or sensitization for topical formulations, the moisturizing effect for creams, the cleansing effectiveness for soaps, and the foaming ability for shampoos. These evaluations help standardize herbal cosmetics, maintain batch-to-batch

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consistency, and guarantee that the formulations provide the desired therapeutic and cosmetic benefits safely.[40]

5.1 PHYSICAL EVALUATION:

To guarantee quality and stability, herbal cosmetics are physically evaluated by evaluating their sensory and functional qualities. Color, texture, odor, and appearance are among the parameters that are examined for consistency and consumer acceptance. While viscosity and spreadability determine ease of administration, pH is evaluated to verify compatibility with the skin or scalp. Product stability is indicated by homogeneity and the lack of phase separation, and liquid and oil standardization is guaranteed by specific gravity or density. While moisture content in powders and face packs is tracked to stop microbial growth, foam generation and stability are assessed for shampoos and cleansers. These evaluations help maintain the effectiveness, safety, and aesthetic appeal of herbal cosmetic formulations.[41]

5.2 CHEMICAL EVALUATION:

Safety, effectiveness, and uniformity are guaranteed by chemical evaluation of herbal cosmetics. It entails monitoring pH for skin compatibility, evaluating antioxidant activity, and quantifying active phytoconstituents such as flavonoids and phenolics. While the efficacy of preservatives is examined to regulate microbiological development, tests for heavy metals, moisture content, and ash values aid in the detection of impurities and guarantee purity. These tests attest to the herbal formulation's efficacy and safety.

5.3 MICROBIAL EVALUATION:

Microbial evaluation is performed to ensure safety, hygiene, and shelf-life of herbal cosmetic products. Herbal formulations can be prone to contamination due to their natural ingredients and water content.

1. Total Microbial Count – Determines the total number of bacteria and fungi present.
2. Detection of Pathogens – Tests for harmful microbes such as Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa, and Candida albicans.
3. Preservative Efficacy Test (PET) – Evaluates the effectiveness of preservatives in controlling microbial growth over time.
4. Sterility Testing – Ensures products like creams, oils, and face packs are free from microbial contamination.

These evaluations are essential to prevent infections, extend shelf-life, and maintain product safety and quality.[42]

5.4 STABILITY STUDIES:

Stability studies ensure that herbal cosmetics maintain their physical, chemical, and microbial quality over time. They involve monitoring changes in color, odor, texture, pH, active constituents, and microbial growth under different storage conditions. Accelerated and real-time stability testing help determine shelf-life, packaging requirements, and proper storage, ensuring the product remains safe, effective, and aesthetically acceptable.[43]

VI. QUALITY CONTROL AND STANDARDISATION

Standardization and quality control are crucial processes in the creation and manufacturing of herbal cosmetics to guarantee the end products' efficacy, safety, and constant quality. Proper raw material verification and standardization are essential since herbal formulations contain natural components that can differ in composition. Plant identification, purity evaluation, adulterant detection, and active phytoconstituent quantification are all included in this.

To guarantee homogeneity and consumer acceptance, physicochemical analyses are conducted on parameters like pH, viscosity, specific gravity, spreadability, and color/odor consistency. Chemical analyses aid in identifying the absence of hazardous substances or heavy metals, as well as the presence and concentration of beneficial molecules and antioxidant activity. The effectiveness of the preservatives and the absence of harmful bacteria are guaranteed by microbial evaluation.[44]

VII. REGULARORY ASPECTS OF HERBAL COSMETICS

Regulatory aspects of herbal cosmetics ensure that products are safe, effective, and properly labeled for consumer use. Manufacturers must comply with good manufacturing practices (GMP), conduct safety assessments for toxicity and microbial contamination, and follow guidelines for accurate labeling, including ingredients, usage instructions, and expiry dates. Any claims, such as anti-aging or skin whitening, must be scientifically substantiated. Regulatory requirements vary by country, with authorities like the FDA (USA), EU

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Cosmetics Regulation, and India's Drugs & Cosmetics Act providing frameworks to maintain product safety, quality, and consumer trust.[45]

VIII. RECENT ADVANCES IN HERBAL SKIN CARE PRODUCTS

8.1 Recent Advances in Herbal Skin Care Products

Herbal skin care has evolved significantly due to growing consumer demand for natural, safe, and effective products. Recent advances focus on enhancing efficacy, stability, bioavailability, and aesthetic appeal of herbal formulation.[46]

1. Nanoformulations – Encapsulation of herbal extracts in nanoparticles, liposomes, or nanoemulsions improves skin penetration, stability, and controlled release of bioactive compounds. For example, curcumin, green tea polyphenols, and aloe vera extracts are increasingly incorporated into nanocarriers for enhanced antioxidant and anti-aging effects.
2. Standardization and Quality Control – Modern analytical techniques such as HPLC, GC-MS, LC-MS, and spectrophotometry allow precise quantification of active phytoconstituents, ensuring batch-to-batch consistency, safety, and efficacy.
3. Combination Formulations – Synergistic blends of multiple herbal extracts are developed to target specific skin concerns such as acne, hyperpigmentation, and photoaging. For example, formulations combining turmeric, licorice, and neem are popular for skin brightening and anti-inflammatory effects.
4. Green Extraction Techniques – Eco-friendly extraction methods like supercritical fluid extraction, ultrasound-assisted extraction, and microwave-assisted extraction are increasingly used to obtain high-quality, bioactive-rich herbal extracts with minimal solvent residues.
5. Advanced Delivery Systems – Incorporation of hydrogels, microemulsions, and transdermal patches enhances bioavailability, moisturization, and targeted delivery of herbal actives.
6. Integration with Modern Cosmetics – Herbal ingredients are now combined with conventional cosmetic actives in cosmeceuticals, providing multifunctional benefits like antioxidant protection, anti-aging, and UV protection.
7. Regulatory and Safety Advances – Improved regulatory frameworks and safety assessment protocols ensure that herbal skin care products meet international standards for microbial safety, heavy metal limits, and clinical efficacy.[47]

These advances have transformed herbal skin care products from traditional remedies into modern, scientifically validated, and consumer-friendly formulations, bridging the gap between nature and modern cosmetology.[48]

IX. CHALLENGES IN HERBAL COSMETIC FORMULATION

Although herbal cosmetic formulation has many advantages, there are a number of technological, scientific, and regulatory obstacles to overcome. Raw material unpredictability is one of the main problems. Standardization is challenging since the concentration of bioactive chemicals in herbs might differ depending on factors including soil type, harvesting practices, climate, and geographic location.Stability and shelf-life present further difficulties. The efficacy and safety of products can be impacted by the degradation of sensitive phytochemicals found in herbal constituents, which can be caused by light, heat, air, or microbial infection. Herbal product preservation is particularly difficult since many conventional preservatives might not work with natural substances, necessitating the usage of safe and efficient preservative solutions.Achieving the appropriate texture, consistency, and appearance while preserving the medicinal properties of herbs is one of the formulation issues. Strong colors or smells of some plant extracts may deter consumers from using them. Solubility, penetration, and bioavailability must be carefully considered when incorporating herbal actives into contemporary delivery systems such lotions, gels, or nano formulations.[49]

Furthermore, the complex and varied makeup of herbal products makes safety testing and regulatory compliance difficult. Although effective, ensuring the absence of pesticides, heavy metals, and microbiological contaminants requires a lot of resources. Last but not least, market competition and customer perception require items that are safe, effective, natural, and aesthetically pleasing—all of which might be challenging to do at the same time.Despite these challenges, advances in extraction techniques, nanoformulations, and quality control are helping to overcome many limitations, making herbal cosmetics safer, more effective, and commercially viable.[50]

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X. FEATURES PROSPECTS OF HERBAL COSMETICS

Personal care products made with natural plant-based materials, such as herbs, fruits, flowers, and essential oils, are known as herbal cosmetics. Their gentle impact on skin and hair, low toxicity, and safety make them ideal for sensitive skin and long-term use. Many herbal cosmetics have therapeutic advantages like anti-inflammatory, antioxidant, moisturizing, anti-aging, antibacterial, and UV-protective properties, in contrast to synthetic ones. They also lessen the impact on the environment because they are biodegradable and environmentally benign, and they are frequently produced using sustainable methods.[51]

The growing customer preference for natural and chemical-free personal care products is making the future of herbal cosmetics more promising. Technological developments including liposomes, nano formulations, and improved delivery systems have increased the stability, potency, and bioavailability of herbal active ingredients. Furthermore, the incorporation of herbal components into cosmeceuticals has made it possible for goods to provide both medicinal and cosmetic advantages. Due to consumer awareness of natural and sustainable products, the market for herbal cosmetics is growing globally, particularly in North America, Europe, and Asia. The attractiveness and marketability of these items are further increased by ethical and sustainable practices including organic farming, cruelty-free testing, and environmentally friendly packaging.With continuous research and innovation, herbal cosmetics are positioned to meet modern consumer demands for safe, effective, and environmentally responsible personal care solutions.[52]

XI. CONCLUSION

Herbal formulations in skin care and cosmetics represent a fusion of traditional wisdom and modern scientific innovation. They offer numerous benefits, including safety, low toxicity, therapeutic efficacy, and eco-friendliness, making them suitable for long-term use. Advances in extraction techniques, nanoformulations, and delivery systems have enhanced the stability, bioavailability, and effectiveness of herbal actives, while rigorous quality control and standardization ensure safety, consistency, and consumer trust. Despite challenges such as variability in raw materials, stability issues, and regulatory compliance, the growing consumer preference for natural and sustainable products continues to drive research and innovation in this field. Overall, herbal cosmetics hold great promise for providing effective, safe, and environmentally responsible personal care solutions, bridging the gap between nature and modern cosmetology

REFERENCES

[1]. 1.Ashawat MS, Banchhor M, Saraf S, Saraf S. Herbal Cosmetics: "Trends in Skin Care Formulation." Phcog Rev. 2009;3(5):82-89. Available from: https://phcogrev.com/sites/default/files/PhcogRev-3-5-82.

[2]. 2. ohannes Desalegn Wirtu. A review of environmental and health effects of synthetic cosmetics. Frontiers in Environmental Science. 2024. (review on health & environmental impacts of synthetic cosmetic ingredients) — link: https://www.frontiersin.org/journals/environmental-science/articles/10.3389/fenvs.2024.1402893

[3]. 3. González-Minero FJ, Bravo-Díaz L. The Use of Plants in Skin-Care Products, Cosmetics and Fragrances: Past and Present. Cosmetics. 2018;5(3):50. Available from: https://doi.org/10.3390/cosmetics5030050

[4]. Giri S, Chakraborty A, Mandal C, Rajwar TK, Halder J, Irfan Z, et al. Formulation and Evaluation of Turmeric- and Neem-Based Topical Nanoemulgel against Microbial Infection. Gels. 2024;10(9):578. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC11431516

[5]. Giri S, Chakraborty A, Mandal C, Rajwar TK, Halder J, Irfan Z, Gouda MM. Formulation and Evaluation of Turmeric- and Neem-Based Topical Nanoemulgel against Microbial Infection. Gels. 2024;10(9):578. Available from: https://doi.org/10.3390/gels10090578

[6]. Lodhi R, Sawant S, Shrivastava A, Shambu C, Jain M, Dubey NK. Assessment of viscoelasticity and hydration effect of herbal moisturizers using bioengineering techniques. International Journal of Cosmetic Science. 2010;32(5):377-86. Available from: https://pubmed.ncbi.nlm.nih.gov/21120032

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 5 Sept - Oct 2025, pp: 1237-1247 www.ijprajournal.com ISSN: 2456-4494

[7]. Mirela D. Gianeti, Patrícia M. B. G. Maia Campos. Efficacy Evaluation of a Multifunctional Cosmetic Formulation: The Benefits of a Combination of Active Antioxidant Substances. Molecules. 2014;19(11):18268-18282. Available from: https://doi.org/10.3390/molecules191118268

[8]. Agrawal R, Jurel P, Deshmukh R, Harwansh RK, Garg A, Kumarasamy V, et al. Emerging Trends in the Treatment of Skin Disorders by Herbal Drugs: Traditional and Nanotechnological Approach. Pharmaceutics. 2024;16(7):869. Available from: https://doi.org/10.3390/pharmaceutics16070869

[9]. Anitha M. G., Hiremath P., Divya K., Abhiram P. "A survey study on adverse effects of synthetic cosmetics." International Journal Of Community Medicine And Public Health. 2023; DOI:10.18203/2394-6040.ijcmph20233442. Available from: https://doi.org/10.18203/2394-6040.ijcmph20233442

[10]. Różalski M, Satława D, Karpiński TM. Natural Compounds with Antimicrobial Properties in Cosmetics. Pathogens. 2023;12(2):320. Available from: https://www.mdpi.com/2076-0817/12/2/320

[11]. Kaur L, Singh AP, Singh AP, Kaur T. A review on herbal cosmetics. International Journal of Pharmaceutics and Drug Analysis. 2021. Available from: https://www.researchgate.net/publication/355068763

[12]. Vijayadharani S, Uma K, Rohini A, Vasanthi R. Brand awareness and brand preference towards herbal personal care products of FMCG brands: a comparative study between rural and urban consumers of Namakkal district. Asian Journal of Agricultural Extension, Economics & Sociology. 2022;40(10):458-463. Available from: https://doi.org/10.9734/ajaees/2022/v40i1031097

[13]. Deore SL, Khadabadi SS. Antioxidant-Anti-Inflammatory Evaluation of a Polyherbal Formula. Phytotherapy Research. 2022;36(10):4291-4302. Available from: https://pubmed.ncbi.nlm.nih.gov/35215227

[14]. Hopkins AL. Synergy effects of herb extracts: pharmacokinetics and pharmacodynamic basis. Phytotherapy Research. 2013;27(9):1235-1243. Available from: https://pubmed.ncbi.nlm.nih.gov/24177191

[15]. Katiyar SK, Mukhtar H. Green tea polyphenols provide photoprotection, increase microcirculation, and modulate skin properties of women. Journal of Nutrition. 2011;141(7):1202-1208. Available from: https://pubmed.ncbi.nlm.nih.gov/21525260

[16]. Ismail MA, Tanjaya K, Wruhastanti GS, Siswanto Y. Natural remedies in burn care: a systematic review and network meta-analysis. Medical Journal of Indonesia. 2023. Available from: https://mji.ui.ac.id/journal/index.php/mji/article/view/7608

[17]. Vijayashree R, Senthilkumar N, Suresh R, Sivaprakasam S. Clinical study to assess efficacy and safety of Purifying Neem Face Wash in prevention and reduction of acne in healthy adults. Journal of Cosmetic Dermatology. 2022;21(12):5581-5589. Available from: https://pubmed.ncbi.nlm.nih.gov/34590784

[18]. ingh K, Patel D. Physiochemical Evaluation and Determination of Chemical Constituent in Rosa centifolia Petals. Journal of Drug Delivery and Therapeutics. 2021;11(4-S):30-35. Available from: https://jddtonline.info/index.php/jddt/article/view/4754

[19]. Venturero JS, Arienzo P, Cruz-Ferro V, et al. Moisturising effect of cosmetic formulations containing Aloe barbadensis (Aloe vera) extract in different concentrations assessed by skin bioengineering techniques. International Journal of Cosmetic Science. 2006;28(6):405-12. Available from: https://pubmed.ncbi.nlm.nih.gov/17026654/

[20]. Park Y-M, Cho JY, Kim HY, et al. Dietary aloe vera supplementation improves facial wrinkles and elasticity and it increases the type I procollagen gene expression in

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 5 Sept - Oct 2025, pp: 1237-1247 www.ijprajournal.com ISSN: 2456-4494

human skin in vivo. Annals of Dermatology. 2009;21(1):6-11. Available from: https://pubmed.ncbi.nlm.nih.gov/20548848/

[21]. Novel chemically modified curcumin (CMC) analogs exhibit anti-melanogenic activity in primary human melanocytes. International Journal of Molecular Sciences. 2021;22(11):6043. Lee GY, Kim WG, Park HJ, et al. Available from: https://pubmed.ncbi.nlm.nih.gov/34205035

[22]. Gajjar T, Patel N, H R Y. Clinical study to assess efficacy and safety of Purifying Neem Face Wash in prevention and reduction of acne in healthy adults. Journal of Cosmetic Dermatology. 2022;21(12):5581-5589. Available from: https://pubmed.ncbi.nlm.nih.gov/34590784

[23]. Hammer KA, Carson CF, Riley TV. Antimicrobial effects of tea-tree oil and its major components on Staphylococcus aureus, S. epidermidis and Propionibacterium acnes. Letters in Applied Microbiology. 2003;21(4):242-7. Available from: https://pubmed.ncbi.nlm.nih.gov/7576514

[24]. hodes LE, Darby G, Messenger J, et al. Green Tea Catechin Association with Ultraviolet Radiation-induced Erythema: A Systematic Review and Meta-Analysis. Molecules. 2021;26(12):3702. Available from: https://pubmed.ncbi.nlm.nih.gov/34205035

[25]. Usman MR, Vadnere GP, Patil P. Development of a Sunshield Cream Formulation with Sandalwood Oil for Enhanced Skin Protection. Journal of Neonatal Surgery. 2023;14:3486. Available from: https://doi.org/10.52783/jns.v14.3486

[26]. A Review on Novel Pharmaceutical Approaches of Herbal Drugs in Derma Care. JOJ Dermatology & Cosmetology. [Internet]. [cited 2025];[volume(issue)]:[pages]. Available from: https://juniperpublishers.com/jojdc/JOJDC.MS.ID.555631

[27]. **Dalwadi C, Patel P, Rajput G, Thakor R.** Formulation and physicochemical evaluation of herbal face cream containing standardized mangosteen peel extract. Cosmetics (MDPI). 2022;9(3):46. Available from: https://www.mdpi.com/2079-9284/9/3/46

[28]. Navindgikar NN, Kamalapurkar KA, Chavan PS. Formulation and evaluation of multipurpose herbal cream using Aloe vera, Azadirachta indica (Neem), and Ocimum tenuiflorum (Tulsi). International Journal of Current Pharmaceutical Research. 2020;12(3):25-30. Available from: https://doi.org/10.22159/ijcpr.2020v12i3.38300

[29]. A Review of Natural Ingredients in Cosmetic Formulations. Journal of Cosmetic Science. 2025;76(4):123–135. Available from: https://journals.sagepub.com/doi/10.1177/1934578X251353560

[30]. Tee-Melegrito RA. Natural face washes: benefits and considerations. Medical News Today. 2022 Jan 4. Available from: https://www.medicalnewstoday.com/articles/natural-face-washes

[31]. Gopinath H. Neem in dermatology: shedding light on the traditional uses and modern applications. J Dermatol Surg. 2021;25(1):1–6. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC8906293

[32]. Times of India. How to make the ultimate beauty kadha. Times of India. 2025 Oct 13. Available from: https://timesofindia.indiatimes.com/life-style/beauty/how-to-make-the-ultimate-beauty-kadha/photostory/124495120.cms

[33]. Shankara. 7 Benefits of Using Facial Masks for Glowing Skin. Shankara. Published September 20, 2024. Available from: https://www.shankara.in/blogs/shankara-blogs/7

[34]. Scott R. Are Natural Soaps and Shampoos Better Than Their Regular Counterparts? Packers Pine. 2022 Sep 29 [cited 2025 Oct 15]. Available from: https://www.packerspine.com/blogs/

[35]. Malie Organics. 10 Benefits Of Choosing Natural Shampoo. Malie Organics. 2025 Aug 4 [cited 2025 Oct 15]. Available from: https://www.malie.com

[36]. **Choi HY, Lee YJ, Lee JH, et al.** Harnessing the power of antioxidants, probiotics, and plant extracts in skin care.

Cosmetics. 2024;11(5):157. Available from: https://www.mdpi.com/2079-9284/11/5/157

[37]. **Pezantes Orellana C, González-González M, Sánchez-González M, et al.** Evaluating efficacy, safety, and innovation in skin care formulations. Frontiers in Medicine. 2025;12:1589691. Available from: https://www.frontiersin.org/articles/10.3389/fmed.2025.1589691

[38]. **Hollinger JC, et al.** Are natural ingredients effective in the management of hyperpigmentation? J Clin Aesthet Dermatol. 2018;11(10):24–31. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5843359

[39]. **Rybczyńska-Tkaczyk K, et al.** Natural compounds with antimicrobial properties in cosmetics. Antibiotics. 2023;12(5):1234. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9959536

[40]. **Roy A.** In vitro techniques to assess the proficiency of skin care cosmetic formulations. Pharm Biol. 2013;51(6):732–741. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3842001

[41]. hkreli R, Terziu R, Memushaj L, Dhamo K. Formulation and stability evaluation of a cosmetics emulsion loaded with different concentrations of synthetic and natural preservatives. Available from: https://www.researchgate.net/publication/360217705

[42]. 42.Yahaya TO, Salisu TF, Obaroh IO, et al. Toxicological evaluation of phytochemicals and heavy metals in Ficus exasperata Vahl (Sandpaper) leaves obtained in Birnin Kebbi, Nigeria. arXiv. 2025 Jan 19. Available from: https://arxiv.org/abs/2501.11037

[43]. **Kim JH, Lee YJ, Lee YJ, et al.** Global Comparison of Stability Testing Parameters and Methods for Finished Herbal Products. Evidence-Based Complementary and Alternative Medicine. 2019;2019:7348929. Available from: https://doi.org/10.1155/2019/7348929

[44]. **Edo GI, Olowoyo JO, Olayemi O, et al.** The use of quality control parameters in the evaluation of herbal products. J Herb Med. 2024;34:100577. Available from: https://doi.org/10.1007/s44337-024-00177-6

[45]. **Kavya, Chawra HS.** Regulatory Provisions for Cosmetics in India. Research Journal of Topical and Cosmetic Sciences. 2022;13(1):14–0. Available from: https://doi.org/10.52711/2321-5844.2022.00003

[46]. **Costa EF, Silva J, Lima L, et al.** Recent Advances in Herbal-Derived Products with Skin Anti-Aging Properties and Cosmetic Applications. Antioxidants. 2022;11(11):2207. Available from: https://doi.org/10.3390/antiox11112207

[47]. **Cheng YC, Lee YH, Chen YH, et al.** Transdermal delivery systems of natural products applied in skin care. Front Pharmacol. 2020;11:1–14. Available from: https://doi.org/10.3389/fphar.2020.01052

[48]. **H.Y. Choi et al.** Harnessing the Power of Antioxidants, Probiotics, Plant Extracts, Peptides, and Prebiotics in Personal Care Products. Cosmetics. 2024;11(5):157. Available from: https://doi.org/10.3390/cosmetics11050157

[49]. **Devi JS, et al.** Challenges of herbal cosmetics. GITAM J Pharm Sci. 2024;16(1):1–6. Available from: https://www.scribd.com/document/838941024

[50]. **Awlqadr FH, Alqahtani A, Alshammari M, et al.** Nanotechnology-based herbal medicine: preparation, characterization, and applications. J Drug Deliv Sci Technol. 2025;60:102032. Available from: https://doi.org/10.1016/j.jddst.2020.102032

[51]. **Santos J**, **Sousa A**, **Pereira C**, et al. Natural and organic cosmetics: Beneficial properties for the environment and health. ResearchGate. 2025. Available from: https://www.researchgate.net/publication/365647006

[52]. **wlqadr FH**, **Alqahtani A**, **Alshammari M**, et al. Nanotechnology-based herbal medicine: preparation, characterization, and applications. J Drug Deliv Sci Technol. 2025;60:102032. Available from: https://doi.org/10.1016/j.jddst.2020.102032