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**Research Paper**

# Formulation And Evaluation of Anti-Aging Cream from Polyherbal Sources

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## ABSTRACT

Aging of the skin is influenced by both intrinsic factors such as increasing age and extrinsicfactors including ultraviolet radiation, environmental pollution, stress, and dehydration. Thesefactors lead to the formation of free radicals, causing wrinkles, dryness, loss of elasticity,pigmentation, and premature skin aging. Herbal formulations have become increasinglypopular in modern cosmetology because they contain natural bioactive compounds with fewerside effects and better skin compatibility than synthetic products. The present study focuses onthe formulation and evaluation of a herbal anti-aging cream containing Green tea extract,Hibiscus extract, and Blueberry extract as the main active ingredients. Green tea is rich incatechins and polyphenols that exhibit strong antioxidant and anti-inflammatory activities,elping to reduce oxidative stress and protect skin cells from damage. Hibiscus contains naturalacids, flavonoids, and anthocyanins that improve skin elasticity and nourish the skin, whileBlueberry is a potent source of antioxidants that help prevent premature aging and maintainhealthy skin appearance. The cream was prepared using the oil-in-water emulsificationtechnique with ingredients such as stearic acid, cetyl alcohol, beeswax, liquid paraffin, glycerin,borax, methylparaben, and rose water to obtain a stable and smooth formulation. The preparedcream was evaluated for different physicochemical and cosmetic parameters including color,dor, texture, homogeneity, pH, spreadability, viscosity, washability, stability, and skinirritation. The formulation exhibited good consistency, smooth texture, easy spreadability,acceptable pH suitable for skin application, and satisfactory stability without phase separation.The cream was also found to be non-greasy, easily washable, and non-irritant on the skin. Thepresence of herbal antioxidants in the formulation may help reduce free radical damage,improve skin hydration, and minimize visible signs of aging such as fine lines and wrinkles

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## INTRODUCTION

Skin aging is a natural process that changes the appearance and structure of the skin over time. As people grow older, the skin becomes thinner, drier, and less elastic. Common signs of skin aging include wrinkles, fine lines, rough texture, dryness, pigmentation, sagging, and dullness of the skin[1].Aging reduces collagen and elastin production in the skin, which are important proteins responsiblefor maintaining skin firmness and smoothness[2]. Skin aging occurs due to both internal and external factors. Natural aging occurs gradually with increasing age, while external factors such as sunlight,pollution, dust, smoking, stress, poor nutrition, and unhealthy lifestyle habits cause premature agingof the skin[3]. Ultraviolet (UV) radiation from sunlight damages skin cells and increases the production of free radicals, leading to wrinkles and skin damage[4]. Free radicals are unstable molecules that damage collagen, elastin, and skin cells, causing early signs of aging[5].

Antioxidants are substances that protect the skin from damage caused by free radicals. They help reduce oxidative stress and prevent premature aging of the skin. Antioxidants improve skin healthby protecting collagen, maintaining skin elasticity, and reducing wrinkles and fine lines[6]. They alsohelp improve skin brightness, hydration, and overall skin appearance. Therefore, antioxidant-richingredients are commonly used in anti-aging skincare products[7].

Herbal cosmetics are becoming increasingly popular because they are made from natural ingredientsand are generally safer than synthetic products. Herbal products usually cause fewer side effectsand are better tolerated by the skin[8]. They contain natural phytochemicals such as flavonoids, polyphenols, vitamins, and essential oils that provide antioxidant, moisturizing, soothing, and protective effects[9]. Due to growing awareness about natural skincare, the demand for herbal cosmetic products has increased worldwide. Herbal anti-aging creams are topical formulations prepared using plant extracts and suitable cream bases. These creams help reduce signs of aging such as wrinkles, fine lines, dryness, and dull skin. They moisturize and nourish the skin, improve elasticity, and protect the skin from environmental damage[10]. Herbal creams are preferred because they provide natural skin protection with fewer harmful effects compared to chemical-based products.Green tea is widely used in skincare formulations because it contains catechins and polyphenols with strong antioxidant and anti-inflammatory properties. Green tea helps protect the skin from UVdamage, reduces oxidative stress, and delays premature aging[11]. Hibiscus is known as a natural skinnourishing plant. It contains flavonoids, anthocyanins, and natural acids that help improve skinelasticity, hydration, and smoothness. Hibiscus also provides antioxidant and anti-aging benefits[12].lueberry is rich in anthocyanins, vitamins, and phenolic compounds that provide excellentantioxidant activity. Blueberry helps protect the skin from free radical damage and improves overallskin health and appearance[13].

Different excipients are added during cream formulation to improve texture, stability, consistency,nd effectiveness of the product. Stearic acid acts as an emulsifying and stiffening agent, whilebeeswax improves the consistency of the cream. Cetyl alcohol works as a thickening and emollient agent, and glycerin acts as a humectant that helps retain skin moisture[14]. Liquid paraffin provides moisturization and smoothness to the skin, while borax helps in emulsification. Rose water is used as the aqueous phase and also provides a pleasant fragrance and soothing effect.

It is important to prepare a stable and effective anti-aging cream with good skin compatibility. Theprepared cream must be evaluated to ensure its quality, safety, and performance. Evaluation parameters such as pH, spreadability, viscosity, homogeneity, washability, stability, and skin irritation are checked to determine whether the cream is suitable for topical application[15].

## 2. Aim and objectives :-

### 2.1 Aim :-

To prepare and evaluate a herbal anti-aging cream containing Green tea, Hibiscus, and Blueberry extracts for improving skin health and reducing signs of aging naturally.

### 2.2 Objectives:-

- **To formulate a herbal anti-aging cream** using Green tea, Hibiscus, and Blueberry extracts along with suitable excipients to obtain a smooth and stable topical formulation.
- **To study the anti-aging and antioxidant properties of the selected herbal ingredients** and understand their role in protecting the skin from oxidative stress, free radical damage, wrinkles, fine lines, and premature aging.
- To prepare the cream by the emulsification method using ingredients such as stearic acid, beeswax, cetyl alcohol, glycerin, liquid paraffin, borax, and rose water to achieve proper consistency, texture, and stability.
- To evaluate the physicochemical properties of the prepared cream such as appearance, color, odor, pH, homogeneity, spreadability, viscosity, washability, and consistency to ensure good quality and ease of application.
- To evaluate the stability of the formulation by observing any changes in color, odor, texture, phase separation, or consistency during storage under suitable conditions.
- To assess the skin compatibility and safety of the formulation by performing skin irritation tests to ensure that the cream is safe and non-irritant for topical use.
- To develop a herbal cosmetic formulation with improved skin benefits such as moisturization, nourishment, skin protection, improved elasticity, and reduction of visible signs of aging.
- To provide a natural alternative to synthetic anti-aging creams that may offer effective skincare benefits with fewer side effects and better patient acceptability.

## 3.Literature review:-

Green tea is widely used in skincare and cosmetic products because it contains strong antioxidants called catechins and polyphenols. The main active compound present in green tea is epigallocatechin gallate (EGCG), which helps protect the skin from free radical damage and premature aging[1]. Green tea also helps reduce wrinkles, fine lines, inflammation, and skin damage caused by ultraviolet (UV) rays[2]. Studies have shown that green tea improves skin elasticity, hydration, and overall skin appearance[3]. Due to its antioxidant and anti-inflammatory properties, green tea is considered an important ingredient in anti-aging formulations[4–5].

**Figure 1 :- Dried Green Tea leaves**

**Hibiscus** is known as a natural skin nourishing and rejuvenating plant. Hibiscus flowers contain

flavonoids, anthocyanins, vitamins, and natural acids that help improve skin hydration, elasticity, and smoothness[11]. Hibiscus extracts also show antioxidant and anti-inflammatory activities that help protect the skin from oxidative stress and premature aging[12]. Research studies have reported that hibiscus possesses anti-collagenase and anti-elastase activities, which help reduce wrinkle formation and maintain skin firmness[13]. Because of these benefits, hibiscus is commonly used in herbal cosmetic and anti-aging products[14–15].

**Figure 2 :- Hibiscus Flower**

**Blueberry** is rich in anthocyanins, phenolic compounds, and vitamins that provide strong antioxidant activity[16]. These antioxidants help protect the skin from free radical damage and environmental stress[17]. Blueberry extracts help improve skin nourishment, hydration, softness, and brightness[18]. Studies have also shown that blueberries possess anti-inflammatory and photoprotective properties that help maintain healthy skin and reduce visible signs of aging[19]. Blueberry extracts are widely used in skincare products because they support skin protection and rejuvenation[20–22].

**Figure 3 :- Blueberry Fruit**

The combination of green tea, hibiscus, and blueberry extracts in herbal anti-aging creams provides antioxidant, moisturizing, and skin protective effects[21]. These herbal ingredients help reduce oxidative stress, improve skin elasticity and hydration, and minimize signs of aging such as wrinkles, fine lines, and dullness[22]. Therefore, these plant extracts are considered useful natural ingredients for the preparation of herbal anti-aging cosmetic formulations[23]

## 4.Plant profile Polyherbal extracts:-

**Table 1:- Plant Profile**

| Sr.No | Extract | Biological Source | Family | Chemical Constituents | Uses |
|---|---|---|---|---|---|
| 1 | Green tea extract | Dried leaves of Camellia Sinesis | Theaceae | Catechins, Polyphenols, Flavonoids, EGCG, | Antioxidant, anti-Inflammatory, protects skin from UV damage reduces fine lines wrinkles |
| 2 | Hibiscus extract | Flowers of Hibiscus rosa-sinensis | Malvaceae | Antocyanins, Flavonoids, vit.C, Organic acids | Skin nourishing,Improves elasticity, moisturizes skin, anti-aging activity |
| 3 | Blueberry extract | Fruits of Vaccinium corymbosum | Ericacaea | Anthocyanins, phenolic compounds, vitamins, | Strong antioxidant, protects skin from free radicals, improves skin health and brighteness. |

## 5.Mechanism of action of skin:-

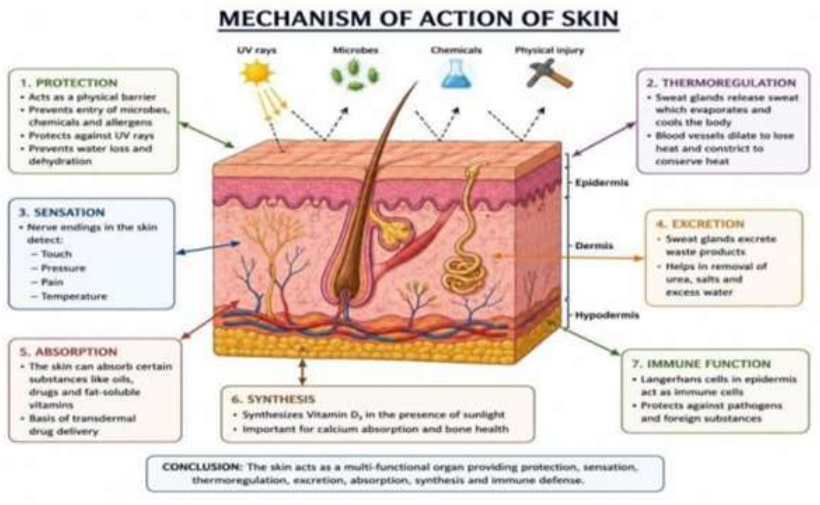


**Figure 4 :- MOA of skin**

➢**Structure:** Cross-sectional view showing epidermis, dermis, and hypodermis.

➢**Key Functional Labels**:

- **Protection:** Acts as a barrier against UV rays, microbes, and chemicals.
- **Thermoregulation**: Maintains body temperature via sweat and blood flow.
- **Sensation**: Nerve endings detect touch, pain, and temperature.
- **Excretion**: Sweat glands remove waste products.
- **Absorption**: Allows uptake of oils, fat-soluble vitamins, and drugs.
- **Vitamin D Synthesis**: Produces Vitamin $D_3$ under sunlight exposure.
- **Immune Defense**: Langerhans cells protect against pathogens.

## 6.Materials and Methodology :-

### 6.1 Ingredients used :-

**Table 2 :- List of ingredients**

| Ingredients | Category |
|---|---|
| Stearic acid | Emulsifying agent |
| Cetyl alcohol | Emollient,Thickening agent |
| Liquid paraffin | Moisturizer |
| Methylparaben | Preservative |
| Triethanolamine | pH adjuster |
| Green tea extract | Antioxidant |
| Blueberry extract | Nourishing agent |
| Hibiscus extract | Anti-inflammatory |
| Rose water | Fragrance |

**6.2 Methodolgy :-**

**6.2.1 Preparation of Green tea extract by Boiling Method :-**

- Collect fresh or dried green tea leaves.
- Wash the leaves properly with clean water.
- Take the leaves in a beaker containing distilled water.
- Boil the mixture for about 15–20 minutes.
- Allow the solution to cool.
- Filter the mixture using filter paper or muslin cloth.
- Collect the filtrate containing the green tea extract.
- Concentrate the extract by gentle heating if required.
- Store the prepared extract in an airtight container for further use.

**6.2.2 Preparation of Hibiscus Extract by Boiling Method:-**

- Collect fresh hibiscus flowers.
- Wash the flowers properly with clean water.
- Dry the flowers.
- Cut or crush the flowers into small pieces.
- Take the flowers in a beaker containing distilled water.
- Boil the mixture for about 15–20 minutes.
- Allow the solution to cool.
- Filter the mixture using filter paper or muslin cloth.
- Collect the filtrate containing the hibiscus extract.
- Concentrate the extract by gentle heating if required.
- Store the prepared extract in an airtight container for further use.

**6.2.3. Preparation of Blueberry Extract by Boiling Method:-**

- Collect fresh blueberries.
- Wash the fruits properly with clean water.
- Crush or mash the blueberries into small pieces.
- Take the crushed blueberries in a beaker containing distilled water.
- Boil the mixture for about 15–20 minutes.
- Allow the solution to cool.
- Filter the mixture using filter paper or muslin cloth.
- Collect the filtrate containing the blueberry extract.
- Concentrate the extract by gentle heating if required.
- Store the prepared extract in an airtight container for further use.

**6.2.4 Preparation protocol :-**

Weighing of Ingredients
↓
Preparation of oil phase (Stearic acid+Cetylalcohol+Liquid paraffin heated together)
↓
Preparation of Aqueous Phase (Glycerin+Methylparaben dissolved in Rosewater and heated)
↓
Addition of Aqueous Phase into Oil Phase with Continuous Stirring
↓
Formation of Cream Base (Emulsification)
↓
Cooling of the Cream with Continuous Stirring
↓
Addition of Green tea Extract, Hibiscus Extract, and Blueberry Extract
↓
Mixing Until Uniform Cream is Formed
↓
Filling into Suitable Container
↓
Storage and Evaluation of Prepared Anti-Aging Cream

**6.2.5 Packaging and labelling :-**

**Packaging**

- Fill cream into clean airtight containers.
- Close the containers tightly.
- Store in a cool and dry place.

**Labelling**

- Product name
- Ingredients
- Date of preparation
- Expiry date
- Directions for use

### 6.3 Formulation Of Anti-Aging cream :-

The formulation contains Green tea, Hibiscus, and Blueberry extracts, which provide antioxidant, moisturizing, and skin nourishing effects. Excipients such as stearic acid, beeswax, glycerin, and liquid paraffin help improve the texture, stability, and consistency of the cream. A herbal anti-aging cream is a semisolid preparation used to reduce wrinkles, fine lines, dryness, and other signs of skin aging.

Formulation of Herbal Anti-Aging Cream (50 g)

**Table 3:- Composition of Anti-Aging cream**

| Sr No. | Ingredients | Role | Quantity |
|---|---|---|---|
| 1 | Stearic acid | Emulsifying agent, stiffening agent | 6 g |
| 2 | Cetyl alcohol | Emollient, thickening agent | 2 g |
| 3 | Liquid paraffin | Moisturizer, oil phase | 5 mL |
| 4 | Glycerin | Humectant | 3 mL |
| 5 | Methylparaben | Preservative | 0.1 g |
| 6 | Green tea Extract | Antioxidant, anti-aging agent | 1 g |
| 7 | Hibiscus Extract | Skin nourishing agent | 1 g |
| 8 | Blueberry Extract | Antioxidant | 1 g |
| 9 | Rose water | Aqueous phase, fragrance | Q.S to 50 g |
| 10 | Triethanolamine | Ph adjuster | 1 g |

## 7.Evaluation Parameters :-

**Table 4 :- Evaluation parameters for Anti-aging**

| Category | Parameters | Methods | Acceptance Range/Observation |
|---|---|---|---|
| **Physical apperance** | Colour | Observe the cream under natural daylight or white light | Creamish white or light brown |

| | | | |
|---|---|---|---|
| | Odor | Evaluated by Smelling the formulation | Pleasant characteristic aromatic odor |
| | Texture | Observed by touch and visual inspection | Smooth,soft and non-gritty texture with good spreadability |
| | Consistency | Press and spread gently | Check the thickness and flow property |
| **Physiochemical properties** | Washability | By applying cream on skin observing its ease of removal | Washable and left no greasy residue on skin |
| | pH | Dipping Ph paper into the cream dipersion and comparing the change in colour with standard ph chart | Ideal Ph for skin cream 5.5-6.5 |

## 8.RESULTS AND DISCUSSIONS:-

### 8.1 Evaluation paramaters:-

**Table 5 :- Evaluation result of Polyherbal anti-aging cream**

| Parameter | Observation | Discussion |
|---|---|---|
| **Color** | Creamish white/light brown | Indicates uniform mixing of herbal extracts; visually acceptable for cosmetic use. |
| **Odor** | Pleasant, characteristic aromatic fragrance | Rose water and natural extracts impart a soothing fragrance, enhancing user acceptability. |
| **Texture** | Smooth, soft, non-gritty | Proper emulsification achieved; ensures easy application and consumer satisfaction. |
| **Consistency** | Semi-solid with good thickness and flow | Balanced oil-water phase ratio provides stable consistency suitable for topical cream. |
| **Washability** | Easily washable, leaves no greasy residue | Non-greasy formulation improves user compliance and comfort. |
| **pH** | 5 (within ideal range 5.5–6.5) | Matches skin's natural pH, minimizing irritation and ensuring compatibility. |
| **Stability** | No change in color, odor, or phase separation after 2 months | Stable formulation suitable for storage and commercial use. |

**Overall Observation:-**

The formulation is stable, safe, non-irritant, cosmetically acceptable, and skin-friendly, making it a promising natural alternative to synthetic anti-aging creams.

### 8.2 Discussion Summary:-

The polyherbal anti-aging cream formulated with Green tea, Hibiscus, and Blueberry extracts demonstrated excellent physicochemical and cosmetic properties. The cream exhibited a

smooth, non-gritty texture, a pleasant odor, and a creamish-white appearance, which are essential attributes for consumer acceptance in cosmetic formulations.These qualities reflect successful emulsification and uniform distribution of herbal extracts, ensuring that the product is both effective and aesthetically appealing.

The pH evaluation showed that the cream maintained a value of 5, which lies within the ideal range of 5.5–6.5 for topical formulations. This is significant because maintaining skin compatible pH prevents irritation and supports the skin's natural acid mantle, which plays a protective role against microbial invasion and environmental stress.A formulation outside this range could potentially disrupt skin homeostasis, but the observed pH confirms that the cream is safe for long-term use. Similar findings have been reported in herbal cosmetic studies where pH balance was directly linked to product safety and consumer preference.

The stability studies conducted over two months demonstrated that the cream remained unchanged in terms of color, odor, and phase separation. This suggests that the emulsification process was robust and the preservative system effective. Stability is a crucial parameter in cosmetic formulations, as unstable products can lead to phase separation, microbial growth, or loss of efficacy.The absence of such changes in this formulation indicates that the selected excipients, including stearic acid, cetyl alcohol, and methylparaben, worked synergistically to maintain product integrity. Comparable studies on herbal emulsions have reported similar outcomes, reinforcing the reliability of natural formulations when prepared with proper excipient ratios.

The washability test confirmed that the cream was easily removable and left no greasy residue, which enhances user compliance and comfort. Non-greasy formulations are particularly important in anti-aging creams, as consumers prefer lightweight products that do not clog pores or leave an oily film.This property was achieved through the balanced use of liquid paraffin and glycerin, which provided moisturization without excessive oiliness. The extrudability test further validated the cream's convenience, as it could be dispensed easily from the tube without requiring excessive force, ensuring practicality in packaging and daily use.

The skin irritation test revealed no redness, itching, or irritation after 24 hours of application, confirming the safety of the formulation. This is a critical finding, as many synthetic anti-aging creams are associated with adverse effects such as dryness, peeling, or allergic reactions. The absence of irritation in this herbal formulation highlights the advantage of using natural plant extracts, which are generally better tolerated by the skin.Previous studies have emphasized that herbal cosmetics, due to their phytochemical composition, often exhibit superior safety profiles compared to synthetic alternatives.

From a therapeutic perspective, the inclusion of polyphenols, catechins, anthocyanins, and flavonoids provided strong antioxidant activity, neutralizing free radicals that contribute to collagen degradation and premature aging.Green tea extract contributed anti-inflammatory and photoprotective effects, reducing UV-induced oxidative stress and protecting skin cells from damage.Hibiscus extract improved skin elasticity and hydration, owing to its natural acids and flavonoids, which support collagen and elastin preservation.Blueberry extract enhanced skin brightness and nourishment, supported by its anthocyanin and vitamin content, which are knownto improve skin tone and reduce oxidative stress.

Collectively, these findings suggest that the cream is safe, stable, effective, and cosmetically

acceptable, offering a promising natural alternative to synthetic anti-aging creams. The synergistic action of the three herbal extracts provides moisturization, nourishment, antioxidant protection, and improved elasticity, making the formulation suitable for longterm use in skincare.

## 9. CONCLUSION

The formulation and evaluation of the polyherbal anti-aging cream showed that natural herbal ingredients can be effectively used to prepare a safe, stable, and beneficial cosmetic product for skin care. The cream was prepared using different herbal extracts containing antioxidants, vitamins, flavonoids, and other natural compounds that are helpful in protecting the skin from damage and delaying the aging process. The prepared cream showed good physical properties such as smooth texture, uniform appearance, pleasant odor, suitable pH, proper viscosity, good consistency, andeasy spreadability, which made it suitable and comfortable for topical application on the skin. During stability studies, the formulation remained stable under different storage conditions without any significant changes in color, odor, texture, or phase separation, indicating good compatibility among all the ingredients used in the preparation. The evaluation tests also confirmed that the cream was non-irritant, safe, and skin friendly. The herbal ingredients present in the formulation helped tomoisturize and nourish the skin, improve skin softness and elasticity, reduce dryness, and protectthe skin from harmful free radicals and environmental pollutants that cause premature aging.Regular use of such herbal formulations may help in reducing wrinkles, fine lines, dullness, pigmentation, and other visible signs of aging, thereby improving the overall appearance and healthof the skin. The antioxidants present in the polyherbal formulation play an important role in reducing oxidative stress and maintaining healthy skin cells. Compared to synthetic anti-aging creams, polyherbal creams are generally considered safer because they contain natural ingredients and produce fewer side effects. In addition, the combined action of multiple herbs provides better therapeutic and cosmetic benefits due to their synergistic effects. The study therefore concludes thatthe formulated polyherbal anti-aging cream is an effective, economical, stable, and promising herbalcosmetic preparation for maintaining healthy, soft, glowing, and youthful skin. However, further clinical studies and long-term evaluations may be carried out to confirm its effectiveness and commercial usefulness on a larger scale.

## 10. FUTURE SCOPE

The future scope of polyherbal anti-aging cream is highly promising because of the growing awareness and preference for natural and herbal cosmetic products among consumers worldwide. As people become more concerned about the harmful effects and side effects associated with synthetic cosmetic products, the demand for safe, effective, and plant-based skin care formulations is continuously increasing. In the future, more research can be carried out to improve the effectiveness and quality of the polyherbal anti-aging cream by incorporating advanced herbal extracts rich in antioxidants, vitamins, flavonoids, and essential oils that provide better nourishment and protection to the skin. Further studies can also focus on identifying new medicinal plants with strong anti-aging, anti-inflammatory, moisturizing, and skin-rejuvenating properties for use incosmetic formulations. Clinical trials on a larger population and for longer durations can help toscientifically prove the safety, stability, and therapeutic effectiveness of the cream in reducing

wrinkles, fine lines, pigmentation, dryness, and other visible signs of aging. Research may also be performed to evaluate the effect of the cream on different skin types such as dry, oily, sensitive, and combination skin. Modern technologies such as nanotechnology, liposomes, microencapsulation, and novel drug delivery systems can be used in future formulations to improve skin penetration, enhance the stability of active herbal constituents, and provide prolonged therapeutic action. The formulation can also be modified into different dosage forms like gels, lotions, serums, face masks,and night creams to improve patient convenience and consumer acceptance. In addition, naturalpreservatives and eco-friendly packaging materials can be introduced to increase product safety andenvironmental sustainability. Large-scale manufacturing, standardization of herbal ingredients,quality control studies, and shelf-life determination can further help in developing a commerciallysuccessful herbal cosmetic product. With the rapid growth of the herbal cosmetic industry andincreasing consumer trust in herbal products, polyherbal anti-aging creams have excellent marketpotential both nationally and internationally. Therefore, future advancements in herbal research, cosmetic technology, and clinical evaluation may help in developing more effective, affordable, stable, and scientifically validated anti-aging formulations for maintaining healthy, youthful, and glowing skin.

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