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Review Article

An Overview on Anti-Aging Cream

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ABSTRACT

Skin aging is a natural biological process caused by intrinsic factors such as genetic and hormonal changes, and extrinsic factors including ultraviolet (UV) radiation, pollution, smoking, and oxidative stress. These factors lead to the degradation of collagen, elastin, and hyaluronic acid, resulting in wrinkles, loss of elasticity, dryness, and uneven skin tone. Anti-aging creams are widely used to reduce the visible signs of aging by improving skin hydration, firmness, elasticity, and overall appearance. Herbal anti-aging creams have gained increasing attention because they contain natural antioxidants and bioactive compounds that provide anti-inflammatory, moisturizing, and photoprotective effects with fewer adverse reactions. This review highlights the causes and mechanism of skin aging, theories of aging, functions of the skin, advantages, disadvantages, and benefits of anti-aging creams. It also summarizes the role of commonly used herbal and pharmaceutical ingredients, formulation by the oil-in-water (O/W) emulsion method, and evaluation parameters such as organoleptic properties, pH, viscosity, spreadability, homogeneity, irritancy, after-feel, and stability. Overall, herbal anti-aging creams represent a promising and effective approach for maintaining healthy, youthful skin and protecting against premature aging.

INTRODUCTION

The skin serves as a protective barrier against damage and pathogens, featuring a layered structure that enhances its resistance. Lacking a protective layer of hair, human skin has evolved to improve its strength and responsiveness to environmental changes. Additionally, like that of other four-limbed animals, human skin shields

against harmful ultraviolet radiation (UVR) and is crucial for the initial synthesis of vitamin D upon UVR exposure.¹

Skin aging results from both intrinsic cellular damage and environmental factors, specifically classified into "sequential skin aging" and "photo-aging." Sequential aging is characterized by predictable deterioration, leading to symptoms

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such as dry, pale skin and wrinkles, primarily due to the impaired function of keratinocytes. In contrast, photo-aging arises from UV exposure, which inflicts deeper skin damage and contributes to the formation of fine wrinkles through the disorganization of skin components. To mitigate these effects, cosmetics play a crucial role in protecting skin health and enhancing appearance, employing either synthetic or natural ingredients aimed at improving elasticity and offering photo-protection.²

The rising popularity of herbal cosmetics highlights ingredients like *Daucus carota*, which is rich in vitamins A and C and is known for its antioxidant properties. These antioxidants are beneficial in slowing the aging process, promoting skin elasticity by stimulating collagen production and neutralizing free radicals. Aging is intrinsically linked to a decline in bodily functions, where oxidative stress from free radicals inflicts damage on vital cellular structures.

Medicinal plants, such as dragon's blood (derived from *Dracaena cinnabari*), exhibit significant health benefits, attributed to their high antioxidant content. Compounds like proanthocyanidins and various flavonoids found in dragon's blood protect cells from free radical damage while also providing anti-inflammatory and wound healing benefits. Despite this, existing anti-aging treatments incorporating dragon's blood extracts remain unevaluated. Researchers are focusing to formulate an anti-aging cream utilizing this extract, assessing its antioxidant efficacy.³

Skin aging is a complex, gradual process influenced by various internal and external factors, significantly impairing skin functionality and leading to various conditions that affect quality of life. Recognizing the pathophysiology of skin aging and incorporating preventative measures is vital for maintaining skin health. Improvements in

the appearance of aged skin can be realized through the application of effective cosmetic ingredients and treatments.

The formation of wrinkles correlates with decreasing densities of collagen and elastin, particularly at the dermis-epidermis junction. Notably, Types I and III collagen, which are prevalent within the skin, decrease with age, alongside substantial reductions in hyaluronic acid and elastin, adversely affecting skin elasticity and firmness. External factors such as UV radiation, alcohol consumption, tobacco use, and environmental pollution contribute significantly to skin deterioration, resulting in issues like wrinkling and loss of elasticity.⁴

Natural compounds, particularly those with antioxidant properties, have gained popularity for their protective roles. Rambutan (*Nephelium lappaceum*), a fruit native to Southeast Asia, is recognized for its antioxidant content, including ellagic acid and Vitamin C. Previous studies have documented its beneficial effects on skin; however, its inclusion in anti-aging formulations requires further exploration. Studies were done to incorporate Rambutan extract into a skincare cream designed to combat oxidative damage, affirming the efficacy of herbal extracts as effective skin protectants.⁵

ADVANTAGES

- Anti-aging creams, especially those with retinol, peptides, and hyaluronic acid, reduce wrinkles and fine line by promoting collagen production and enhancing skin elasticity.
- Ingredients like hyaluronic acid after intense hydration, making skin look youthful.⁶



- Peptides improve firmness and prevent sagging, while vitamin C and niacinamide brighten the skin and even out tone.
- Antioxidant protect against environmental damage, and regular use with spf helps prevent premature aging.
- Alpha hydroxy acids (AHAs) exfoliate for smoother texture, and use creams can boost self-confidence and reduce age spots, improving overall skin appearance.⁷
- Improves skin hydration.
- Enhances skin radiance.
- Improves overall skin texture.
- Reduces fine lines and wrinkles.
- Enhances skin firmness.¹⁰
- Improves skin elasticity.
- Supports collagen production.

DISADVANTAGES

- May cause skin irritation such as redness, itching, burning, peeling, or dryness, especially with retinoids or acids.
- Some ingredients, fragrances, or preservatives can trigger allergies or rashes.
- Ingredients such as retinol and alpha hydroxy acids make the skin more prone to sunburn, so sunscreen is essential.
- Most over-the-counter creams reduce only the appearance of fine lines and cannot reverse deep wrinkles or significant skin aging, hence less effective.⁸
- Anti-aging products are mostly expensive and require long-term use to maintain any benefits.
- Noticeable improvements often take several weeks to months of consistent use leading to delayed results.
- Excessive application can damage the skin barrier, causing dryness, irritation, and increased sensitivity.⁹
- Protects against oxidative stress.
- Helps prevent age spots.
- Reduces skin discoloration.
- Nourishes the skin with herbal ingredients.
- Promotes a healthy complexion.
- Boosts self-confidence.
- May reduce the need for costly cosmetic procedures.¹¹

FUNCTIONS OF SKIN

The skin serves multiple functions, including:

- Protection as an anatomical barrier from pathogens, involving Langerhans cells in immune defence.
- Sensation through nerve endings that respond to various stimuli.¹²
- Heat regulation via blood supply adjustments for energy control.
- Control of evaporation to prevent fluid loss.

BENEFITS OF ANTI-AGING CREAM



- Aesthetic value and communication of mood and physical state.
- Storage of lipids and water, and synthesis of vitamin D.
- Absorption, primarily as an oxygen source for the outer skin layer.
- Water resistance to retain essential nutrients.¹³

THEORIES OF AGING

Theories of aging can be categorized into programmed and damage/error theories. Programmed theories suggest aging follows a biological timetable, influenced by gene expression, while damage/error theories focus on environmental factors causing cumulative damage. The programmed theory includes three sub-categories:

Programmed Longevity - Aging results from specific gene expressions, with discussions on genetic instability by Dr. Davidovic.

Endocrine Theory - Hormones regulate the aging process, especially through the insulin/IGF-1 signaling pathway, as explained by Dr. van Heemst.

Immunological Theory - Aging weakens the immune system's effectiveness, increasing vulnerability to diseases and contributing to cellular stress and death. The immune system's decline has links to various diseases, though not all relationships are directly causal.¹⁴

MECHANISM OF SKIN AGING

Skin aging is influenced by factors such as DNA repair, mitochondrial function, and hormonal changes, with Ultraviolet Radiation being a significant contributor, causing about 80% of skin

issues. UVR accelerates collagen breakdown and disrupts collagen and elastin production, leading to wrinkles and sagging skin. UVB exposure enhances elastase activity in fibroblasts, degrading elastin fibers and diminishing skin suppleness.¹⁵

SIGNS OF SKIN AGING

Signs of skin aging are primarily indicated by wrinkles and sagging. The underlying causes involve the degradation of collagen bundles in the dermis and the accumulation of altered elastic fibers. UVB light contributes to skin wrinkling by activating elastase in fibroblasts, leading to the formation of cytokines that increase elastase production. This ultimately reduces the skin's elasticity and results in the formation of wrinkles.¹⁶

HERBAL INGREDIENTS USED IN ANTI AGING CREAM^{17,18,19}

Aloevera - Moisturizer, soothing and anti-aging agent.

Curcuma longa (turmeric) - Antioxidant, Anti-inflammatory.

Neem - Antibacterial and Antifungal.

Glycerine - Humectant.

Stearic acid - emulsifying agent, cream base.

Cetyl alcohol - Thickening agent improves consistency.

Vitamin E - Antioxidant protect against free radical.

Olive oil (liquid paraffin) - Emulsifying agent.

Methyl paraben / propyl paraben - preservatives.



METHOD OF PREPARATION²⁰

Ingredients are classified into oil phase, aqueous phase and heat sensitive ingredients. Oil phase includes stearic acid, cetyl alcohol, liquid paraffin (or olive oil), and beeswax. Purified water, glycerin, and herbal extracts are categorised as aqueous phase. Heat-sensitive ingredients, which are added later includes Vitamin E, preservatives, fragrance, and essential oils.

Separately heat both the oil phase and the aqueous phase to a temperature of 70–75°C. Gradually add the heated aqueous phase into the oil phase while continuously stirring to create a uniform, smooth emulsion. Allow the mixture to cool down gradually. Once the temperature drops to 40°C, add the heat-sensitive ingredients (Vitamin E, preservatives, fragrance, and essential oils) and mix well. Store the final product in airtight containers to maintain stability.

EVALUATION OF ANTI-AGING CREAM^{21,22,23}

Organoleptic evaluation

Organoleptic assessment includes visual inspection for colour, odour, appearance and texture.

pH

pH was measured after dispersing 0.5 g of cream in 50 ml distilled water using a calibrated digital pH meter.

Viscosity

Viscosity was determined with a Brookfield viscometer at room temperature.

Spreadability

Spreadability was assessed using the glass slide method, measuring the time for upper slide to move under a specified weight.

Homogeneity

Homogeneity was evaluated visually and by touch for uniformity.

Irritancy test

An irritancy test is performed by applying the cream to a marked skin area and monitoring for erythema and oedema. Key attributes of the cream formulation were analysed, including spreadability assessed using a glass slide method; homogeneity, evaluated visually and by touch; irritancy tested on skin for irritation signs over 24 hours.

After – feel test

Judged for smoothness and residue; and stability, monitored under ICH condition for changes in color, odor, pH, viscosity and appearance.

CONCLUSION

Skin aging is an inevitable biological process influenced by both intrinsic and extrinsic factors, with oxidative stress and ultraviolet (UV) radiation playing major roles in accelerating premature aging. Anti-aging creams help improve skin hydration, elasticity, firmness, and overall appearance while reducing the appearance of fine lines and wrinkles. Herbal anti-aging creams containing natural antioxidants and bioactive compounds offer additional benefits such as photoprotection, anti-inflammatory activity, and reduced oxidative damage with fewer side effects than many synthetic products. Appropriate formulation and evaluation ensure the quality, safety, stability, and effectiveness of the final product. Overall, anti-aging creams, particularly



those based on herbal ingredients, represent a promising and effective approach for maintaining healthy, youthful skin and preventing premature skin aging.

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