

Review on Anti-Aging Cream

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Abstract: *Anti-aging creams have gained widespread popularity as a solution to combat the visible signs of aging, such as wrinkles, sagging, and uneven skin tone. These creams typically contain a variety of active ingredients designed to address different aspects of skin aging, including moisturizing, antioxidant effects, and promoting biological activity. Common ingredients found in anti-aging formulations include retinol, hyaluronic acid, peptides, and various plant extracts, each offering unique benefits in enhancing skin health. Retinol, for instance, is known for stimulating collagen production and improving skin texture, while hyaluronic acid helps retain moisture, reducing the appearance of fine lines. Furthermore, the use of antioxidants protects the skin from oxidative stress caused by free radicals, one of the primary contributors to premature aging. The effectiveness of anti-aging creams is determined through a range of evaluations, such as pH measurement, viscosity testing, spreadability, stickiness, and stability tests. These tests ensure that the product not only delivers the desired results but also remains safe and effective over time. Despite their popularity, the efficacy of these creams can vary depending on the formulation and the active ingredients used. This review explores the current understanding of anti-aging creams, their active components, and the methods used to assess their effectiveness, providing insights into their potential benefits and limitations*

Keywords: Anti-aging, skin care, retinol, hyaluronic acid, antioxidants, skin wrinkles, formulation, efficacy testing, moisturizing, collagen production

I. INTRODUCTION

Anti-aging creams are skincare products designed to reduce or slow down the visible signs of aging, such as wrinkles, fine lines, and age spots. These creams are typically formulated with a variety of active ingredients that aim to improve skin elasticity, hydration, pre, while promoting cell renewal and protecting the skin from environmental damage.(1) These products work by nourishing and protecting the skin, and in some cases, by stimulating the skin's natural repair mechanisms. Their popularity has grown as people seek ways to maintain youthful, healthy-looking skin for longer periods. Anti-aging creams are predominantly moisturizer-based skin care products marketed with unproven claims of making the consumer look younger by reducing, masking or preventing signs of skin aging.(2) Anti-ageing lotions are predominantly moisturizer-primarily based totally pores and skin care merchandise advertised with unproven claims of creating the customer appearance more youthful with the aid of using reducing, covering or stopping symptoms and symptoms of pores and skin ageing. The getting older system of the pores and skin typically has varieties of forms: herbal getting older And mild getting older. The former particularly refers back to the boom with the age, ageing from in the frame Caused through which include genetic, gravity, endocrine and immune feature of impossible to resist factors; while The Latter is specially because of the function of ultraviolet light, a chain of adjustments withinside the climate and environmental Pollution etc. which aggravates the natural aging process(1). Creams are semisolid dosage forms used for topical application to the skin or mucous membranes. They consist of a mixture of water and oil (emulsions), with one of the two being the continuous phase. Creams are primarily used for therapeutic or protective purposes and can deliver active pharmaceutical ingredients (APIs) to a localized area. Anti-aging creams are specialized skincare products designed to reduce or delay the visible signs of aging on the skin, such as fine lines, age spots, and sagging. These creams often contain active ingredients that work to improve skin elasticity, hydration, and texture while promoting cell regeneration and collagen production.(1)

Key Functions of Anti-Aging Creams

- **Reduction of Wrinkles and Fine Lines:** Anti-aging creams are formulated to minimize the appearance of wrinkles by stimulating collagen production, which helps maintain skin firmness and smoothness.
- **Enhanced Hydration:** To combat dryness, a key factor in aging, these creams often contain humectants and emollients to keep the skin moisturized and supple.
- **Improved Elasticity:** Certain ingredients enhance the skin's elasticity, resulting in a firmer and more youthful appearance.
- **Even Skin Tone:** By promoting cell turnover and inhibiting melanin production, anti-aging creams reduce the appearance of age spots, sun damage, and hyperpigmentation.
- **Antioxidant Protection:** Many formulations include antioxidants that shield the skin from environmental damage caused by free radicals, which contribute to premature aging.

Mechanisms of Skin Aging

The process of skin aging can be understood through three primary mechanisms:

- **Protection Against External Stimuli:** Shielding the skin from environmental factors like pollution and ultraviolet rays.
- **Neutralization of Free Radicals:** Reducing oxidative stress by scavenging free radicals within cells.
- **Nourishment and Repair:** Replenishing essential nutrients to support skin cell regeneration and repair.

To address aging, personal care products play a significant role by enhancing the skin's appearance and functionality.

II. TYPES OF SKIN AGING

Skin aging can be categorized into two primary processes: intrinsic and extrinsic aging.

- **Intrinsic Aging:** This natural process occurs over time and manifests as fine lines and wrinkles. Intrinsic aging is influenced by complex internal mechanisms, including:
- **Free Radical Theory:** Proposed by Harman in 1956, this theory suggests that free radicals—highly reactive molecules—cause cellular damage when their production exceeds the body's ability to neutralize them. This damage affects chromosomes, mitochondria, cell membranes, and connective tissues, accelerating aging.
- **Genetic Theory:** Aging is viewed as a genetically programmed process. Factors like telomere shortening, reduced DNA repair capability, and chromosomal mutations contribute to the decline in cellular function over time.
- **Mitochondrial DNA Damage Theory:** Introduced by Miquel and Cowiker in 1980, this hypothesis posits that mitochondrial DNA damage impairs energy production, leading to cellular dysfunction and tissue degeneration, which are hallmarks of aging.
- **Extrinsic Aging:** This process is driven by environmental factors, such as prolonged sun exposure, extreme weather conditions, and pollution. These external stressors exacerbate the natural aging process, leading to visible changes like sagging, pigmentation, and deeper wrinkles.

Different Types of creams:-

Anti-aging creams come in a variety of types depending on their key ingredients and targeted effects. Some popular types and their key ingredients include:

- **Retinol-based creams:** Retinol is one of the most effective ingredients for combating wrinkles and fine lines by promoting skin cell turnover and increasing collagen production. Examples include Neutrogena Rapid Wrinkle Repair and Olay Regenerist Micro-Sculpting Cream, which also contain hydrating ingredients like hyaluronic acid.
- **Hyaluronic acid-based creams:** These are great for hydration and plumping the skin. Hyaluronic acid can hold up to 1,000 times its weight in water, making it ideal for those with dry skin or who want an immediate plumping effect.(1)

- **Peptide-rich creams:** Peptides help stimulate collagen production, improving skin firmness and elasticity. Products like Olay Regenerist and No7 Lift & Luminate Triple Action incorporate peptides for more youthful-looking skin.
- **Vitamin C creams:** Vitamin C is an antioxidant that helps brighten skin, reduce hyperpigmentation, and boost collagen. It is often combined with other antioxidants like ferulic acid to increase effectiveness.
- **Bakuchiol creams:** For those with sensitive skin or who cannot tolerate retinol, bakuchiol is a natural alternative with similar anti-aging benefits without the irritation.
- **Antioxidant creams:** Formulated with Vitamin C, E, green tea, or other antioxidants, these protect against free radical damage and help brighten the skin.
- **Collagen-boosting creams:** Designed to stimulate collagen synthesis to improve skin elasticity and reduce sagging.
- **Alpha Hydroxy Acid (AHA) creams:** AHAs like glycolic acid exfoliate the skin, improving texture, fine lines, and pigmentation.
- **Niacinamide creams:** Niacinamide (Vitamin B3) helps to even out skin tone, minimize pores, and reduce dullness.
- **Sunscreen-infused creams:** Anti-aging creams with SPF help prevent further sun damage, which is a major cause of premature aging.
- **Stem cell creams:** These use plant-based or other types of stem cells to promote skin regeneration and repair damaged cells.
- **Coenzyme Q10 creams:** CoQ10 is an antioxidant that helps protect the skin and boosts energy production in skin cells, reducing wrinkles.

Advantage of Anti-ageing cream:-

Anti-aging creams offer several advantages for maintaining skin health and reducing visible signs of aging. Here are some key benefits:

- **Reduction of Wrinkles and Fine Lines:** Many anti-aging creams, especially those containing retinol, peptides, and hyaluronic acid, help reduce the appearance of wrinkles by promoting collagen production and improving skin elasticity.
- **Improved Hydration:** Ingredients like hyaluronic acid provide intense hydration, which helps plump the skin and smooth out fine lines. Well-hydrated skin looks more youthful and vibrant.
- **Enhanced Skin Firmness and Elasticity:** Peptides and other collagen-boosting ingredients can improve the firmness of the skin, preventing sagging and giving the face a more lifted appearance.
- **Brightening and Even Skin Tone:** Many anti-aging creams contain Vitamin C or niacinamide, which can reduce hyperpigmentation, brighten dull skin, and even out the skin tone.
- **Protection from Environmental Damage:** Antioxidants like Vitamin C and ferulic acid protect the skin from free radical damage caused by environmental stressors like UV rays and pollution, which can accelerate aging.
- **Preventative Care:** Regular use of anti-aging creams, particularly those with SPF, can help prevent future damage from sun exposure, one of the primary causes of premature aging.
- **Smoother Skin Texture:** Ingredients such as AHAs (alpha hydroxy acids) help exfoliate dead skin cells, improving skin texture and giving a smoother, more refined appearance.
- **Improves Skin Tone and Tackles Hyperpigmentation:** Many formulations target dark spots and uneven skin tone, helping to create a more radiant and uniform complexion.
- **Improved self-confidence:** Anti-aging creams can help improve self-confidence by helping to improve your appearance.
- **Reduced age spots:** Anti-aging creams can help prevent age spots and discoloration.
- **Protection from sun damage:** Many anti-aging creams contain antioxidants and protect against UVA and UVB rays.

Anti-aging creams contain a variety of active ingredients aimed at addressing specific signs of aging, such as wrinkles, sagging, and uneven skin tone. These ingredients can be categorized into three main types: moisturizing, antioxidant, and biologically active cosmetics. As research into bioactive components advances, the range of active ingredients in anti-aging products continues to expand, with a focus on those that scavenge free radicals, repair cells, moisturize, and provide UV protection.

The Genetic Theory of Aging:

The genetic theory of aging suggests that the aging process is determined by a genetic program that governs life. As we age, processes such as gene modification, DNA methylation, and phosphorylation reactions decrease. Additionally, telomeres shorten, the ability for DNA repair diminishes, and mutations in chromosomes may occur. Changes in the regulation of oncogenes and tumor suppressor genes can also lead to normal cell differentiation issues, contributing to the aging process.

III. KEY ACTIVE INGREDIENTS IN ANTI-AGING COSMETICS:

1. **Retinol (Vitamin A derivative):** Known for its ability to stimulate skin cell turnover, retinol enhances skin texture, promotes collagen production, and reduces the appearance of fine lines and wrinkles.
2. **Hyaluronic Acid:** This ingredient plays a crucial role in retaining moisture within the skin, contributing to a plumper appearance and helping to minimize the visibility of fine lines and wrinkles.

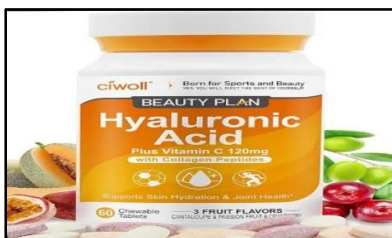
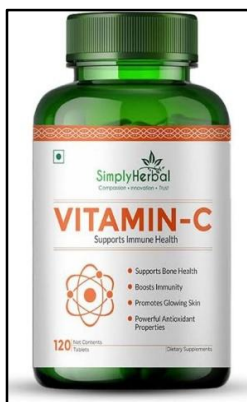


Figure : Hyaluronic acid

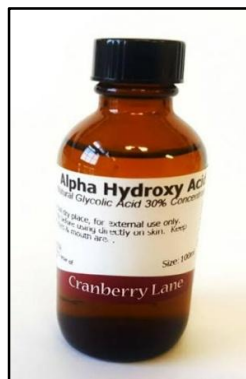
3. **Peptides:** Peptides stimulate collagen production, improving skin firmness and elasticity while reducing sagging.
4. **Vitamin C:** An antioxidant that brightens the skin, evens out skin tone, and fights free radicals, which helps prevent further damage from environmental factors like UV rays and pollution.



5. **Niacinamide (Vitamin B3):** Known for its anti-inflammatory properties, niacinamide helps improve skin elasticity, enhances the skin barrier, and evens out pigmentation.(3)



6. **Alpha Hydroxy Acids (AHAs):** AHAs like glycolic acid and lactic acid help exfoliate dead skin cells, improve skin texture, and stimulate skin renewal.(3)



7. **Coenzyme Q10 (CoQ10):** This antioxidant helps protect the skin from oxidative damage and boosts the skin's natural regeneration process.
8. **Antioxidants** (e.g., Vitamin E, Green Tea Extract): Antioxidants protect the skin from damage caused by free radicals, which contribute to premature aging.



9. **Bakuchiol:** A plant-based alternative to retinol, bakuchiol offers similar anti-aging effects like collagen boosting and wrinkle reduction without causing irritation, making it suitable for sensitive skin.



10. **Ceramides:** These lipids help restore and strengthen the skin's natural barrier, preventing moisture loss and protecting against environmental damage. Ceramides are especially helpful in maintaining skin hydration as it ages.
11. **Resveratrol:** Found in grapes and berries, this potent antioxidant helps protect the skin from environmental damage, promotes cell regeneration, and improves skin elasticity.
12. **Ferulic Acid:** Often combined with Vitamin C and E, ferulic acid enhances the efficacy of these antioxidants and helps protect the skin from UV damage and pollution.
13. **Stem Cells (Plant or Fruit-Based):** Stem cell extracts are believed to promote cell regeneration and improve the overall texture and firmness of the skin. Apple stem cells, in particular, are popular in anti-aging formulations.
14. **Glycolic Acid:** An AHA that exfoliates the skin, glycolic acid helps reduce hyperpigmentation, fine lines, and rough texture by promoting the turnover of dead skin cells.



Methods for preparation of anti-ageing cream:-

There are several methods to prepare anti-aging creams, depending on the formulation, equipment, and ingredients used.

Methods are:-

1. Emulsion Method (Most Common)
2. Cold Process Method
3. One-Pot Method
4. High-Shear Mixing Method (for Large-Scale Production)
5. Ultrasonic Emulsification (Advanced Method)

Emulsion methods (most common) to prepare anti-ageing cream:-

The emulsion method is the standard technique for preparing creams. It involves blending water-based and oil-based ingredients, which are naturally immiscible, into a stable mixture.(3)

Steps are :-

Prepare the Water Phase:

In a heat-safe container, combine water-soluble ingredients like distilled water, glycerin, and humectants (e.g., hyaluronic acid, aloe vera). Heat this mixture to around 70°C to ensure all ingredients dissolve properly.(4)

Prepare the Oil Phase:

In a separate container, combine oil-soluble ingredients like oils (e.g., squalane, rosehip oil), butters (e.g., shea butter), and emulsifiers (e.g., cetearyl alcohol). Heat to around 70°C until all solids have melted and mixed well.(5)

Emulsification:-

Slowly add the hot water phase to the hot oil phase while stirring constantly. This can be done manually or using an emulsifier (high-shear mixer or hand blender) to ensure thorough blending and formation of a stable emulsion.

Cool Down Phase:

Once the mixture has been emulsified, let it cool to around 40°C. This is when you add heat-sensitive active ingredients like retinol, peptides, vitamin C, or botanical extracts.

Add Preservatives & Fragrances:

Add preservatives (like phenoxyethanol) and any essential oils or fragrance at this stage. Stir continuously until the cream has completely cooled to room temperature.

Packaging:

Once the cream has fully cooled, transfer it into jars or tubes for storage. Ensure the containers are sanitized to prevent contamination.

Key Equipment:-

- Double Boiler (for heating phases)
- Mixing Tools (spatula, whisk, hand blender)
- High-Shear Mixer (for large-scale production)
- Ultrasonic Homogenizer (for nanoemulsions)
- Heat-Proof Beakers (for heating phases)
- Sterile Packaging Containers

V. EVALUATION TEST FOR ANTI-AGEING CREAM

The following parameters were used to evaluate the antiaging cream. The standard procedure was followed to evaluate all the parameters(6)

On evaluation, the creams possessed the appropriate specifications for cream preparations as observed in the organoleptic test.

Evaluating an anti-aging cream involves a series of scientific tests to ensure its efficacy, safety, and overall performance. The following tests are commonly used in the cosmetic industry for both internal and regulatory purposes.(6)

Tests are :-

- PH determination
- Spreadability
- Viscosity
- Stickiness
- Stability

PH determination test :-

The pH measurement also met the specifications for skin pH, as cream preparations must have a pH that matches the pH of the skin in the range of 4.5–6.5.

Anti-aging creams are usually formulated to have a pH close to the skin's natural pH, which is typically between 4.5 and 6.5. This is to maintain the skin's acid mantle, a protective barrier that helps prevent irritation and infections. Deviating too far from this range could cause skin irritation, sensitivity, or a decrease in product efficacy.

Spreadability test:-

Spreadability also affects the nature of the cream when used as a topical preparation because it increases the contact of cream with skin. This ensures easy distribution of active substances.

It Influences the user experience and the product's performance in delivering active ingredients evenly across the skin. The spreadability of a cream affects its ease of application, absorption, and overall effectiveness.(4)

Spreadability can be calculate by the formula that is:-

$$S = M.L/T$$

M:- weight Applied

L:-distance traveled by the upper plate or diameter of the spread cream

T:-time taken.

Result:-Higher values indicate better spreadability.

Viscosity teste:-

The viscosity test for anti-aging creams is essential for determining the cream's thickness and flow properties. It helps ensure that The product has the appropriate consistency for easy application, stability, and user satisfaction. Viscosity is influenced by the cream's ingredients, such as oils, emulsifiers, and thickeners, and can also affect the product's spreadability and absorption.

The viscosity test results of the three creams according to the specifications for semi-solid preparations are 4000–40,000 cps.(3)

Factors Affecting Viscosity:

- Temperature
- Shear rate
- Ingredients

Importance of Viscosity Testing for Anti-Aging Creams:

- Product consistency
- Stability
- Uses experience
- Active ingredient delivery

Stickiness:-

Stickiness is related to the duration of time the cream stays in contact with the skin, and the longer the cream sticks to the skin, the more effective the active substance will be. The results of the three creams showed almost similar stickiness.

Sticky cream can lead to discomfort, while a non-sticky or mildly tacky texture is typically more desirable. Stickiness can affect user satisfaction and compliance, so testing is an essential part of product development and quality control.(7)

VI. FACTORS INFLUENCING STICKINESS

- Formulations ingredients
- Absorption Rate
- Humidity and temperature

Importance of stickiness testing:-

- User comfort
- Spreadability
- Consumer preference

Stability testing:-

Stability results for the third organoleptic test indicated that the cream was stable because there were no changes in colour odour, or texture.

For the third pH test, the cream was also stable in the skin pH range, and therefore it is safe to use. (7)

Stability testing for anti-aging creams is a critical process to ensure that the product remains safe, effective, and aesthetically pleasing over its intended shelf life.

Stability tests assess how the cream's physical, chemical, microbiological, and sensory properties change under various environmental conditions. This helps to determine the cream's expiration date, packaging compatibility, and storage requirements.

Parameter monitored during stability testing:-

- Appearances
- Viscosity
- Active ingredients potency
- Microbial load
- Odour

Importance of stability test:-

- Product safety
- Efficacy
- Aesthetic qualities
- Regulatory compliance

Marketed product:-

1. Nivea cellular Anti-ageing cream:-

Nivea Cellular Anti-Ageing Cream is a skincare product designed to help reduce the visible signs of aging. It is often formulated with ingredients like hyaluronic acid, collagen, and antioxidants to hydrate, plump, and protect the skin.

2. Himalaya Anti-wrinkle cream :-

Himalaya Anti-Wrinkle Cream is a skincare product designed to help reduce the appearance of wrinkles and fine lines. It's formulated with natural ingredients like aloe vera and grapes, which are known for their moisturizing and anti-aging properties.

3. L'oreal Revitalift anti-ageing cream:-

L'Oréal Revitalift Anti-Aging Cream is a skincare product designed to help reduce the visible signs of aging. It's formulated with ingredients like hyaluronic acid, pro-retinol, and fragranced water, which work together to. L'Oréal Revitalift Anti-Aging Cream:

- Reduces the appearance of wrinkles and fine lines
- Hydrates the skin
- Improves skin texture

- Suitable for all skin types

4. Lizabeth Arden Pervade anti-ageingcream:-

Elizabeth Arden Prevage Anti-Aging Cream is a high-end skincare product designed to combat the visible signs of aging. It's formulated with a patented antioxidant complex, idebenone, which is known for its powerful anti-aging properties.

5. Olay Regenerist anti-ageingcream:-

Olay Regenerist Anti-Aging Cream is a popular skincare product designed to help reduce the appearance of wrinkles and fine lines. It's formulated with a blend of ingredients, including peptides and niacinamide, which work together to Stimulate collagen production, to improve texture and hydrate the skin.

6. Boitique saffron Youth, Anti-ageing cream:-

Boitique Saffron Youth Anti-Aging Cream is a skincare product designed to help reduce the visible signs of aging. It's often formulated with saffron extract, a natural ingredient known for its antioxidant properties.

Boitique Saffron Youth Anti-Aging Cream: Reduces wrinkles and fine lines, Improves skin tone and texture, and Protects against environmental damage. (8)



7. Ponds Age Miracle Wrinkle corrector cream:-

Ponds Age Miracle Wrinkle Corrector Cream is a skincare product designed to help reduce the appearance of fine lines and wrinkles. It contains ingredients like Retinol-C, which is known for its anti-aging properties. The cream also includes Vitamin B3 and a Prebiotic Complex to brighten skin and fade dark spots. Additionally, Collagen helps to plump up the skin, and SPF 15 PA++ protects against UV rays and sun damage. (8)

VII. DRAWBACK OF MARKETED PRODUCTS

1. Exaggerated Claims:

- **Instant results:** Some products may promise immediate, dramatic results, which are often unrealistic. (9)
- **Miracle cures:** Claims of complete wrinkle reversal or age reversal can be misleading

2. Limited Effectiveness:

- **Temporary results:** The effects of many anti-aging creams may be temporary.
- **Individual variation:** Results can vary significantly based on skin type, age, and lifestyle factors. (9)

3. Potential Side Effects:

- **Allergic reactions:** Some ingredients in anti-aging creams can cause allergic reactions in certain individuals.
- **Skin irritation:** Products that are too harsh or contain irritating ingredients can lead to redness, dryness, or other skin problems.

4. High cost:-

- **Expensive ingredients:** Many anti-aging creams contain expensive ingredients, which can drive up the price.
- **Limited affordability:** The high cost of some products may make them inaccessible to many consumers.

5. Lack of Scientific Evidence:

- **Unproven claims:** Some anti-aging creams may make claims that are not supported by scientific evidence.
- **Limited research:** The efficacy of certain ingredients or formulations may not have been adequately studied.

VIII. FUTURE SCOPE

The market for anti-aging creams has significant growth potential, driven by factors like aging populations, technological advancements in skincare, and increasing consumer awareness about skincare solutions. Here are some key aspects of the future scope for anti-aging creams:

1. Growing Demand from Aging Populations

- The global population of individuals aged 50 and older is increasing, particularly in developed regions. This demographic often seeks products that minimize wrinkles, fine lines, and other signs of aging.
- The rise in disposable income among this group supports the purchase of premium anti-aging products.

2. Technological Advancements in Ingredients and Formulations

- **Bioactive Ingredients:** Increased use of peptides, retinoids, and antioxidants like vitamin C, which are scientifically proven to enhance skin health.
- **Nanotechnology:** Enhanced delivery systems, such as nanoemulsions, enable deeper penetration of active ingredients for better efficacy.
- **Biotechnology:** Advancements in stem cell technology and growth factors are creating highly effective formulations.

3. Customization and Personalization

- Companies are leveraging AI and skin analysis tools to create personalized anti-aging products tailored to individual skin needs.
- Customized skincare regimens are becoming popular, where consumers can select products based on their specific concerns like hyperpigmentation, loss of elasticity, or dullness.

4. Shift Toward Natural and Sustainable Products

- Consumers are increasingly seeking eco-friendly and clean-label products.
- Anti-aging creams with natural ingredients like hyaluronic acid, green tea extracts, and bakuchiol (a natural alternative to retinol) are gaining popularity.

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