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Anti-Aging Herbal Face Serum: An Updated Review

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ABSTRACT:
Our skin suffers from UV damage, leading to wrinkles and other signs of photoaging. Face serums are potent formulas packed with active ingredients that absorb quickly, providing deep nourishment to the skin. This study aimed to harness the benefits of herbal extracts to create a serum that rejuvenates, hydrates, and evens out skin tone, reducing wrinkles and promoting overall skin health. Herbal extracts are rich in antioxidants and nutrients, offering numerous benefits for the skin, including: Rejuvenation and hydration, Improved skin tone and reduced wrinkles , Anti-inflammatory and antioxidant properties , Sebum control, beneficial for acne-prone skin . By incorporating herbal extracts and seeds into a serum, this product can potentially provide:Deep hydration and nourishment , Reduced inflammation and fine lines, Improved skin health and appearance . Overall, herbal serums offer a natural and effective solution for achieving healthier, more radiant skin.

KEYWORDS: Anti ageing, Anti -oxidants, Anti-Inflammatory, face serum , Moisturizer, Rejuvenate, hydrating, Herbal serums.

I. INTRODUCTION:

The skin is a vital protective barrier that shields the body's internal organs from external factors. It's composed of three main layers:

- Epidermis (outer layer): Made up of stratified squamous epithelium, primarily consisting of keratinocyte and dendritic cells (including Merkel, Langerhans, and melanocytes).
- Dermis (middle layer): Contains blood vessels, nerve endings, and hair follicles.
- Subcutaneous tissue (innermost layer): Composed of fat cells and connective tissue.

The skin plays a crucial role in maintaining overall health and function.Skin aging is a complex process influenced by both intrinsic (internal) and extrinsic (external) factors, leading to gradual deterioration of skin structure and function. Intrinsic skin aging is characterized by:Smooth, pale, and dry skin , Reduced elasticity, Fine wrinkles, Typically noticeable in older age(Patil ARet al., 2023).

Antioxidants play a crucial role in combating skin aging by neutralizing free radicals that damage skin cells. They're naturally occurring compounds that help, Prevent oxidative stress , Reduce signs of aging (fine lines, wrinkles) , Improve UV-damaged skin .Plant-based antioxidants like flavonoids are commonly used in topical preparations due to their potent antioxidant properties. Serum formulations are particularly effective due to their high concentration of active ingredients. Some benefits of antioxidants in skincare include: Protecting skin from environmental stressors, Inhancing skin elasticity, Reducing inflammation

The synthesis of anti-aging serum from plant extract has been studied in the past. Thus This review offers an update on skin. Anatomy, a brief synopsis of skin aging that covers both intrinsic and extrinsic aging, and a list of various anti-aging herbs. It also explores an overview of serum, different kinds of serums used in skincare routines to prevent ageing, and essential components found in antiaging face serum.(Felix Bravo et al.,2022)

ANATOMY OF SKIN:

STRUCTURE OF SKIN

1. **Epidermis**:

The epidermis, the outermost skin layer, has varying thickness:0.5 mm (eyelid), 1.5 mm (palms and soles)It's primarily composed of: Melanocytes (produce melanin),Keratinocytes (produce keratin). These cells form a stratified squamous epithelial layer, providing a protective barrier against external factors.. (Kaur L et al.,2021)

2. **Dermis**:

The dermis is a crucial layer of skin, comprising: Elastic and fibrous tissue ,Located between epidermis and subcutaneous tissuecomposed ofGround substance, Fibers (collagen, elastin ,Cells (fibroblasts) .Fibroblasts produce collagen and elastin, essential for skin

International Journal of Pharmaceutical Research and Applications
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elasticity and strength. Collagen makes Up to 30% of dermal volume, 75% of dry weight. The dermis plays a vital role in skin structure and function.(Lee YL et al.,2021)

3. **Hypodermis**:

The hypodermis, also known as the subcutaneous layer, is the innermost layer of skin. Its key functions include: Providing insulation and protection, Serving as an energy reserve (through adipocytes). Allowing skin mobility by gliding over underlying structures.The hypodermis is primarily composed of Adipocytes (fat cells),Fibrous connective tissueLobules of adipocyte .This layer plays a vital role in maintaining skin health and overall bodily function.

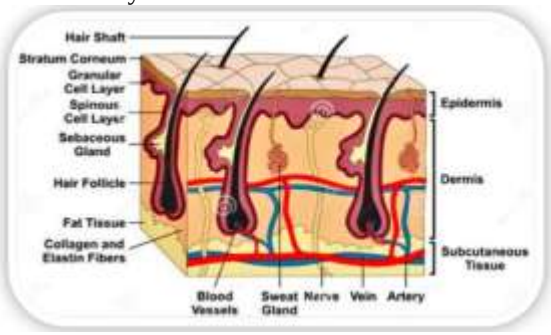

FIG:1STRUCTURE OF SKIN

OVERVIEW ON SKIN AGING

Aging skin is characterized by various signs, including: Wrinkles ,Uneven pigmentation , Darkening ,Thinning ,Sagging ,Roughening . These changes can be attributed to either intrinsic (internal) or extrinsic (external) factors. Theories suggest that DNA damage and repair processes contribute to aging, leading to: Epigenetic changes, Cell senescence, Loss of cell function , Genomic abnormalities . Extrinsic aging is driven by environmental factors like: UV radiation , Pollution ,Reactive oxygen species production . Intrinsic aging is linked to:Programmed aging ,Cellular senescence ,Endogenous oxidative stress , Cellular damage. (Thorat P Set al.,2023)

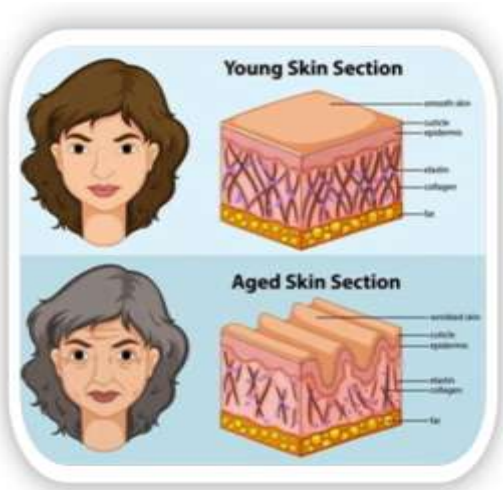

FIG:2 Difference Between Young Skin & Aged Skin

INTRINSIC SKIN AGING

It is a chronologically-driven physiological transformation process. Essentially, intrinsic skin aging is a condition that only appears in old age and is symbolized by smooth, unblemished, pale,dry, less elastic skin that has fine wrinkles. Intrinsic aging is characterized by a decline in dermal fibroblast count, which lowers the synthesis of collagen and elastin, especially types I and III collagen, and results in skin thinning, wrinkles, and loss of elasticity. Skin aging is partly caused by increased expression of matrix metalloproteinases (MMPs), which break down collagen and elastin in the dermal skin layer. Antioxidants such as resveratrol and isoorientin can reduce its expressionboth intrinsic and extrinsic variables can contribute to skin aging. (Kolarsick PS et al.,2011)

FIG:3 INTRINSIC FACTOR RESPONSIBLE FOR SKIN AGEING

International Journal of Pharmaceutical Research and Applications
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EXTRINSIC SKIN AGING

Low-grade chronic UVR exposure is responsible for over 80% of the aging process of facial skin, while exposure can also result in sunburn, tanning, inflammation, and damage to dermal connective tissue. Extrinsically aged skin, primarily from UVR rays, has sallow complexion with uneven pigmentation, rough texture, coarse wrinkles, and decreased skin elasticity.(Farahe MA et al.,2007)

Accelerated skin aging can be caused independently by long-term exposure to UV radiation and cigarette smoking. ROS produced by UV exposure lead to harmful oxidative stress. Because 02 can take electrons, it produces extremely reactive chemical compounds known as ROS. Reactive oxygen species (ROS) are produced when the skin is exposed to photoaging stimuli. These ROS subsequently stimulate dermal enzymes such as collagenase and elastase. These enzymes speed up premature skin aging by breaking down elastin and collagen, respectively. Signs of this process include deep furrows or severe atrophy, wrinkles, freckles, sallowness, laxity, and a leathery appearance .(Poljsak B et al.,2012)

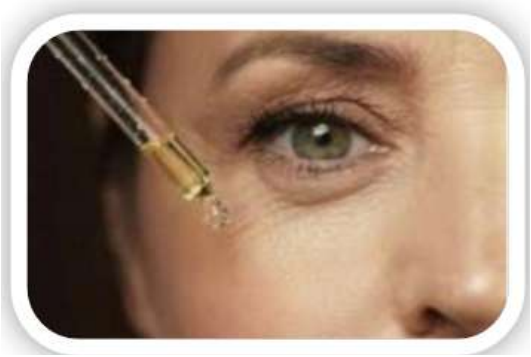
FIG:4 EXTRINSIC FACTOR RESPONSIBLE FOR SKIN AGING

FUNCTION OF SKIN

1. Provide a barrier of defense against harmful substances, mechanical, thermal and physical harm.
2. Prevents moisture loss.
3. Minimizes the negative effects of UV light.
4. Aids in temperature regulation.
5. Serves as a sense organ .(Sharma RR et al.,2022)

FACE SERUM

Their lightweight nature and Concentrated formulation indeed make them effective for addressing skin concerns at a deeper level. Face serums are formulated to deliver a high concentration of active ingredients without unnecessary additives. Their thinner consistency and absence of heavy oils enhance absorption and penetration, making them effective for nourishing and layering on the skin. The focus on essential ingredients without emulsifier optimal **FIG:5 Face Serum** optimal delivery of active agents, such as vitamins or botanical extracts.(McCall-perez F et al.,2022)



ADVANTAGES OF HERBAL FACE SERUM

1. Keep skin moisturised
2. Help remove skin blemishes
3. Anti-aging benefits
4. Helps protect against the future.
5. Not effective for all skin issues.
6. Can be pricey.
7. Difficult to select the proper one.
8. If not used effectively, it risked being wasted. (Mursyid AM et al.,2021)

DISADVANTAGES OF HERBAL FACE SERUM

1. Overuse and Irritation
2. Ingredient Compatibility and Reactions.
3. Increase photosensitivity, making the skin more prone to sun damage.
4. An underlying skin condition like eczema or psoriasis might be the cause
5. Applying too much serum can overwhelm the skin and lead to clogged pores and breakouts.
6. Sensitive skin may experience irritation, redness, or breakouts from certain serum formulations.
7. Skin rashes
8. Skin allergies for particular ingredient
9. It can also lead to dryness, flaking, or peeling if not used correctly. (Juan CA etal.,2021)

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 4 July-Aug 2025, pp: 106-116 www.ijprajournal.com ISSN: 2456-4494

TABLE:1 FIVE TYPES OF FACIAL SERUM.(Ngo HT et al.,2017)

Serum Type	Description	Image
Anti-Aging Serums	These components, such as Aloe vera, and various herbs, aim to address different aspects of skin aging and promote a more youthful Appearance	
The Oil Serum	Oil serums often used in skincare routines to provide hydration and nourishment to the skin. They contain various oila, such as olive oil, coconut oil, which can help moisturize and improve the skin texture. When incorporating an oil serum into your routine, apply a few drops after cleansing and before moisturizing for added hydration and a healthy glow.	
The Gel Serum	Gel Serums are lightweight skincare products that often combine the benefits of a gel and a serum. They're designed to provide hydration, target specific skin concerns, and absorb quickly without a heavy feel. Popular ingredients include hyaluronic acid for. Moisture and various antioxidants for skin nourishment.	

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 4 July-Aug 2025, pp: 106-116 www.ijprajournal.com ISSN: 2456-4494

The Water Based Serums	Skincare product formulated with water as its main ingredient? It's lightweight and suitable for various skin types, providing hydration without a heavy feel. Look for serums containing hyaluronic acid or glycerin for effective moisturization	
The Emulsion Serums	Emulsion Serums typically combine water and oil components to provide hydration and nourishment to the skin. They're versatile for various skin types, offering a lightweight feel with moisturizing benefits.	

TABLE-2 DIFFERENT TYPES OF SERUMS AND THEIR FEATURES (Juliana C et al.,2020)

Type	Technology	Features
Transparent or semi-transparentlotion type	Solubilization, micro emulation, liposomes, Dice like capsule	It contains more humectant than lotion. The texture may be lotion type solubilization, transparent adjusted through the selection of micro granulation or semi transparenthumectant and water soluble polymer, liposomes and varying their combination. this is most general form of serum preparation
EmulsionType	o/w type w/o type w/o/w type	As the type of contain large amount of emollient it is suitable for preparation containing large amount of U. V absorber and oily ingredients the w/o type is Oil Type suitable for preparation requires water

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 4 July-Aug 2025, pp: 106-116 www.ijprajournal.com ISSN: 2456-4494

		repellence
Oil Type	O/w type	In which the texture is adjusted by solid or semi-solid oils and animal's fats or plants oils in different proportions as texture of this type is not good as thatof other preparation it is disappearing from market
Two agents mix together type	In addition to above spray, dry, microcapsule technology are used	In order to prevent instability in pharmaceutical agent and preparation or to affect a visual change two agents are mixed together to use they are liquid powder combination
Other	Lotion with powder type much alcohol types	Serum for t-zone which secrets including sebum absorbing powder increases lasting powder of makeup essence having a germicidal effect for ace preparation

TABLE-3 FORMULATIONTABLE. (Karsono AH et al.,2021)

Name Of Ingredients	**Biological Source**	**Parts Used**	**Images**
Fig Fruit (Ficus Carica)	F. carica L. Is an important member of the genus Ficus. It is ordinarily deciduous and commonly referred to as "fig". The common fig is a tree native to southwest Asia and the eastern Mediterranean	Whole fruit	
Flaxseeds (linum usitatissimum)	Flax, also known as common flax or linseed, is a flowering plant, Linum usitatissimum, in the family Linaceae. It is cultivated as a food and fiber crop in regions of the world with temperate climates. In 2022, France produced 75% of the world's supply of flax.	Gel used	

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 4 July-Aug 2025, pp: 106-116 www.ijprajournal.com ISSN: 2456-4494

Sandalwood oil(Santalum album L.)	The heartwood of the Santalum album L. Tree, also known as East Indian Sandalwood, This evergreen, semi-parasitic tree is native to southern parts of India, Sri Lanka, and the Malay Archipelago, and is a member of the Santalaceae family.	Powder	
Castor oil	Castor oil is sourced from the seeds of the Ricinus communis plant, commonly known as the castor plant. This plant belongs to the spurge family (Euphorbiaceae) and is primarily cultivated in tropical and subtropical regions worldwide	Oil	
Glycerin	Glycerine, also known as glycerol, is commonly obtained from natural sources like plant and animal fats and oils. It's a by product of the saponification or transesterification of triglycerides, which are esters of glycerol with long-chain fatty acids.	Raw glycerin	

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 4 July-Aug 2025, pp: 106-116 www.ijprajournal.com ISSN: 2456-4494

Rose water (Rosa damascena)	Derived from rose petals, specifically the hydrosol portion of the distillate. It's a byproduct of producing rose oil, typically obtained from Rosa damascena, also known as the Damask rose. The rose petals are steamed or distilled, and the resulting water, rich in volatile oils, is called rose water.	Petals	
Sodium Benzoate	____	____	

GENERALMETHOD OF PREPARATION: (Sheljul TS et al.,2023)

- **Step 1-Prepare the Ingredients**

Measure out the fig fruit extract, glycerin, rose water, flaxseed gel, castor oil, sandalwood oil, tea tree oil & sodium benzoate according to the formulation.

- **Step 2-Mix the Liquid Ingredients**

Combine fig fruit extract & rose water in a bowl.

- **Step 3- Add the Flaxseed Gel**

Add the gel into mixture, stir continuously to avoid lumps.

- **Step 4-Add the Oils**

Add castor oil, sandalwood oil, & tea tree oil to the mixture Mix them well.

- **Step 5-Add the Preservatives**

Add sodium benzoate or methyl paraben. Mix it well.

- **Step 6-Filter the Serum**

Use a filter or cheesecloth to remove impurities. Filter the serum into a clean container.

- **Step 7-Fill and Store**

Fill the serum in clean sterilized bottles, Label it and Store the bottles in a cool, dry place.

SYNTHETIC PREPARATIONOF HERBAL FACE SERUM.(Rattan awiwatpong P et al.,2020)

- **Step1-Prepare the ingredients**

Accurately weigh green tea extract, jojoba oil, cetearyl olivate and vitamin C.

- **Step 2-Mix Jojoba Oil and Cetearyl Olivate:**

Heat jojoba oil to around 50-60°C. Add cetearyl olivate and mix until fully incorporated.

- **Step 3- Add Green Tea Extract:**

Mix green tea extract with the oil blend.

- **Step 4- Add Vitamin C:**

Incorporate vitamin C into the mixture.

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 4 July-Aug 2025, pp: 106-116 www.ijprajournal.com ISSN: 2456-4494

- **Step 5- Cool and Mix:**

Allow the mixture to cool to around 40°C. Continue mixing until homogeneous.

- **Step 6- pH Adjustment:**

Use citric acid to adjust the pH to 5.5.

- **Step 7- Final Mixing:**

Ensure all ingredients are well-mixed and the serum is homogeneous.

- **Step 8-Filtration:**

Filter the serum to remove impurities (if necessary).

- **Step 9 -store:**

Fill dark glass bottles and store in a cool, dry place.

EVALUATION OF HERBAL FACE SERUM

1.**PHYSICAL ASSESSMENT:** The water-based serum exhibited a brownish yellow and homogeneous , with its ingredients uniformly dispersed throughout.(Galvez-Martin P et al.,2023)

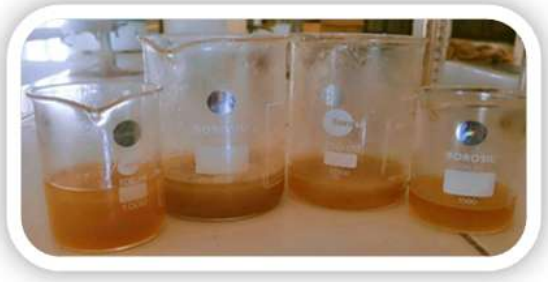


Fig-6 Appearance of serum

1. **Odour**: The formulation's scent was evaluated by applying it to the hand, revealing a distinct aroma.
2. **Consistency**: Upon visual inspection, the face serum displayed a liquid consistency, smooth &non greasy in nature.(Bukhari SN et al.,2018)

FIG-7 CONSISTENCY OF SERUM

3. **Spread To assess spreadability**, a slide was laden with an appropriate amount of water-based serum, upon which another slide was placed with 20 grams of weight for five minutes to measure detachment time. (West BJ et al.,2021)

FIG-8 SPREADIBILTY

4. **Homogenicity**: this will be confirmed by the put some of the serum formulation on the transparent glass and observe.The formulation must produce uniform distribution of serum .(Jalapure et al.,2007)
5. **Ph Examination**: Using pH paper, the serum's pH was determined by mixing an appropriate quantity in a suitable solvent. Skin serum ideally falls within a pH range of 4.1 to 6.7 the ph was found to be 6.3. (Sayyed et al.,2011)

FIG-9 PH TESTING

6. **Irritancy**: Following application to the skin, observations were made over 24 hours for signs of inflammation, erythema, and edema, indicating the formulation's performance in the irritancy test. (Mish Ashwini R et al.,2023)

FIG-10 BEFORE TESTING.
FIG-11 AFTER TESTING

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 4 July-Aug 2025, pp: 106-116 www.ijprajournal.com ISSN: 2456-4494

7. **Washability**: The serum's ability to be washed off the skin was evaluated after a period of application, confirming its effectiveness in the washability test.
8. **Phase Separation;**Stored in a sealed container at room temperature away from light, the formulation underwent examination for phase separation after 2-4 hours. The absence of phase separation indicated successful passage of this test.
9. **Temperature Cycling Test**: Varied temperatures were applied daily to simulate environmental changes, with results showing the serum's stability across all temperature fluctuations. (Aishwarya Vishnukant Gite et al.,2023)

II. CONCLUSION

The aim of the study was to develop a serum that could nourish and safeguard the skin from ageing. The serum comprised ficus Carica oil, green tea extract, and flaxseeds, known for their anti-inflammatory, anti-aging, and skin-healing properties, including treating burns caused by heat and sun exposure.(Patil J.K et al.,2019) .Flaxseeds, rich in vitamins and minerals, provides moisturization and anti-aging benefits, maintaining youthful, healthy skin. Green tea extract, containing catechin and flavonoids, contributes to skin radiance and youthfulness. The water-based serum was easy to apply and rinse off, leaving no oily residue. Being herbal-based, the serum exhibited no adverse effects on the skin. It maintained an optimal pH and facilitated cell regeneration, aiding in skin repair. Consequently, this serum holds promise for addressing various skin concerns.(Sonti S et al.,2013)

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