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Formulation and Evaluation of Anti-Ageing Cream From *Centella Asiatica*, *Benincasa Hispida* and *Punica Granatum*

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ABSTRACT

Skin aging is a natural process influenced by intrinsic and extrinsic factors, leading to wrinkles, dryness, and reduced elasticity. This study aims to formulate and evaluate an anti-aging cream using natural extracts of *Centella asiatica*, *Benincasa hispida*, and *Punica granatum*, which are rich in flavonoids, tannins, glycosides, and antioxidants. These phytoconstituents possess anti-aging, anti-inflammatory, and emollient properties. A single cream formulation was prepared using juicy and pulpy extracts of the three plants in equal proportions. The cream was evaluated for physical appearance, viscosity, spreadability, and skin irritation. Results showed that the formulation was homogenous, stable, and exhibited good spreadability and permeability. No signs of erythema or edema were observed in the skin irritation test, confirming the formulation's safety and non-toxic nature. The combination of extracts showed enhanced anti-aging effects compared to individual plant extracts, demonstrating synergistic activity. The use of topical delivery for this formulation also ensures better patient compliance and targeted action. In conclusion, the developed herbal anti-aging cream is effective, safe and offers a promising natural approach to managing skin aging.

Keywords: Anti-ageing, Topical formulation, *Centella asiatica*, *Benincasa hispida*, *Punica granatum*.

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INTRODUCTION

The skin is the most visible indicator of aging. With the rise in the elderly population, there has been increasing interest in anti-aging preparations, also known as cosmeceuticals, due to their ability to enhance youthful appearance and improve quality of life (QOL). ¹Anti-aging medicine, a form of preventive healthcare, aims to delay or reverse age-related physiological changes and promote overall well-being in aging individuals. Over the past decade, there has been significant progress in understanding the fundamental causes of human skin aging, forming the basis for current and future developments in anti-aging therapies. ²An ideal anti-aging intervention should contribute not only to an age-appropriate, healthy appearance but also help prevent degenerative diseases, optimize brain and tissue function, and act on biological systems known to impact longevity. ³Although there remains debate over the precise definition of anti-aging medicine and the existence of definitive anti-aging therapies, there is growing consensus around the biological mechanisms underlying aging. ⁴One key contributor is the collapse of fibroblasts in aging skin, which leads to decreased collagen production and increased collagen degradation—creating a self-perpetuating cycle of skin deterioration. The appearance and texture of a person's skin significantly influence how old they look. Wrinkled, leathery skin can make someone appear years older, while smooth, hydrated skin can maintain a youthful appearance. Therefore, proper skincare, particularly anti-aging regimens, can make a notable difference. Anti-aging creams, often containing antioxidants such as alpha-tocopherol and ascorbic acid, reduce wrinkles and blemishes by scavenging free radicals—highly reactive molecules that contribute to cellular aging and tissue damage. These topical treatments are preferred due to their safety, lower penetration, and ease of removal with mild washing.⁵

MATERIALS AND METHOD

Indian Pennywort (Centellaasiatica)

Biological Source: It is derived from leaves of Centellaasiatica plant.

Family: Apiaceae.

Pharmacological Activity: Centellaasiatica exhibits Antioxidants, Anti- ageing, Anti ulcer, Cardioprotective, Radioactive activity, Immunomodulating activity and also supports Slimming effect⁶

Ash gourd (Benincasahispida)

Biological source: It is derived from fruit of Benincasahispida plant.

Family: Curcubitaceae.

Pharmacological Activity: Benincasahispida demonstrates Antioxidants, Anti-ageing effects, Antihypertensive activity, Anti depressant activity, Antiulcer activity and also Anti diabetic activity⁷

Pomegranate (Punicagranatum)

Biological Source: It is derived from the fruit of Punicagranatum .

Family: Lythraceae.

Pharmacological Activity: It possesses Hepatoprotective effect, Gastroprotective activity, Anticancer activity, Antidiarrhoeal activity, Antioxidants, Anti-inflammatory and also Antibacterial activity⁸

CHEMICALS

Cetyl alcohol, Stearic acid, Mineral oil, Glycerine, Sodium Benzoate and Triethanolamine were collected from chemical store room of Faculty of Pharmacy, SBMCH.

Cetyl alcohol :

It acts as an emollient, creamy texture to the product and enhances spreadability on the skin. Cetyl alcohol also helps in stabilizing oil-thickener, and co-emulsifier in cream formulations. It provides a smooth and in-water emulsions. Its presence improves the feel and consistency of the cream.⁹

Stearic acid:

It is used as a surfactant and emulsifying agent that helps blend oil and water phases. It reacts with triethanolamine to form a soap-based emulsifier that stabilizes the cream. It also contributes to the cream's viscosity and gives a rich, pearly appearance. This improves both the texture and the aesthetic of the final product.¹⁰

Mineral oil:

It is a non-polar emollient that forms an occlusive layer on the skin surface. This layer prevents transepidermal water loss and helps retain skin moisture. It imparts a smooth, silky feel and enhances the lubricity of the cream. Mineral oil also helps dissolve oil-soluble active ingredients.¹¹

Glycerine:

It acts as a humectant by attracting water from the environment into the skin. It maintains skin hydration, keeping it soft, smooth, and supple. Glycerine improves the moisture content of the cream and reduces dryness. It also enhances the spreadability and absorption of the formulation.¹²

Sodium benzoate:

It is used as a preservative to protect the cream from microbial contamination. It is especially effective against fungi and bacteria in acidic environments. By preventing spoilage, it extends the shelf life of the cream. It ensures product safety and stability during storage and use.¹³

Triethanolamine (TEA):

It serves as a pH adjuster and emulsifying agent. It neutralizes stearic acid to form a stable oil-in-water emulsion. This reaction helps maintain the consistency and stability of the cream. TEA also ensures that the final product remains within a skin-compatible pH range.¹⁴

METHODS**Collection and Authentication of the Plants**

Centellaasiatica, Benincasahispida and Punicagranatum were collected from local market, Chennai. They were identified as Centellaasiatica, Benincasahispida and Punicagranatum and specimens were authenticated by National Institute of Siddha, Ministry of Ayush (Govt. of India), Chennai -600047.

Extraction of the Plants

The pulpy extract of Benincasahispida and Punicagranatum and the juicy extract of Centellaasiatica were processed to remove earthy matter and residual materials carefully from the fruits and leaves, then washes and cleaned.

FORMULATION OF ANTI-AGEING CREAM

- **Herbal Extract Preparation:** Pulp extract of Benincasahispida, Punicagranatum & juicy extract of Centellaasiatica.
- **Base cream Preparation:** Cetyl alcohol, Stearic acid, Glycerol, Sodium Benzoate & Triethanolamine are mixed thoroughly in appropriate proportions to form a base cream
- **Herbal Extract Incorporation:** The prepared herbal extracts are added to the base cream mixture and stirred thoroughly until the homogenize is achieved.
- **Final adjustments:** Distilled water is added gradually to attain the desired consistency. Rose oil essence is added for fragrance.
- **Homogenization:** The mixture is homogenized to ensure uniform distribution of ingredients.
- **Quality control:** The cream is subjected to quality control tests including pH, Measurement, Viscosity assessment, Stability testing and microbial analysis.
- **Packaging:** The final cream is packaged in suitable containers under sterile conditions to maintain its quality.

Procedure

Stearic acid and other oil soluble components Cetyl alcohol and mineral oil were dissolved (oil Phase) and heated to 75 °c. The preservative sodium Benzoate were added and stirred. Soluble components are glycerol and juicy & pulp extracts are added and heated up to 75 °c. After heating,

the aqueous phase was added in portions to the oil phase with continuous stirring. Triethanolamine was added to adjust the pH. Finally rose oil essence was added and packed.

Evaluation Parameters

1. Physical Appearance

The formulated anti-ageing cream was inspected visually for their color, odour, spreadability and consistency. All developed creams were tested for spreadability by visual inspection after cream has been set in the container. They were tested for their appearance of any aggregates.

2. Measurement of pH

The pH of formulation was determined by using digital pH meter. One gram of cream was dissolved in 100ml of distilled water and stored for 2 hours. The measurement of pH was done in triplicate.

3. Determination of Viscosity

The measurement of Viscosity of prepared cream was carried out with Brookfield Viscometer. (Brookfield Viscometer RVT) with spindle No.62.

4. Spreadability

The spreadability of the system on the skin surface was evaluated to ensure even distribution, promoting optimal absorption for an effective healing response.

5. Washability Test

Removal of the applied anti-ageing cream from the skin was conducted by gentle washing under the tap water, ensuring minimal force to effectively cleanse the skin.

6. Irritation Study

Examination of the cream revealed no signs of redness, irritation, swelling or inflammation during irritation tests, indicating their safety for skin application.

7. Dye Test

The methylene blue dye was mixed with the cream. Place a drop of cream on a microscope slide covers with cover slip, and examined under microscope. If the dispersed globules appear as colourless in blue background, the cream is oil in water type. The reverse condition occurs in O/W type cream. I.e. the dispersed globules appear in colorless ground.

8. Viscosity

The viscosity of cream was determined using Brooke field Viscometer and it was found to be in a range of 27019-27023.

9. Homogeneity

The formulation were tested for the homogeneity by visual appearance and by touch.

10. After feel

Emolliency, slipperiness and amount of residue left after the application of fixed amount of cream was checked

RESULTS AND DISCUSSION

The Anti-ageing cream was prepared and evaluated.

Table 1: Composition of anti-ageing cream

S.No	Ingredients	Quantity For 100g (%)
1	Plant extracts	25:25:25
2	Stearic Acid	12
3	Cetyl Alcohol	3
4	Mineral Oil	4
5	Glycerol	4
6	Sodium Benzoate	0.02
7	Triethanolamine	Qs
8	Rose oil	Qs

Phytochemical Evaluation of Plant Extracts

Table 2: Phytochemical Investigation of the Centellaasiatica extract

Constituents	Test	Endpoint	Result
Flavanoids	Shinoda Test	Red colour	+
Saponins	Foam Test	Appearance of persistent foam	+
Phenols	Ferric chloride test	Blue colour	+
Alkaloids	Mayer's test	Cream colour	+
Tannins	NaOH Test	Formation of emulsion	+

Table 3: Phytochemical Investigation of Benincasahispida

Constituents	Test	End point	Result
Flavanoids	Shinoda Test	Red colour	+
Tannins	Foam Test	Appearance of persistent foam	+
Alkaloids	Ferric chloride test	Blue colour	+
Phenols	Mayer's test	Cream colour	+
Glycosides	Keller- kiliani Test	Formation of reddish brown ring	+

Table 4: Phytochemical Investigation of Punicagranatum extract

Constituents	Test	Endpoint	Result
Flavanoids	Shinoda Test	Red colour	+
Saponins	Foam Test	Appearance of persisitent foam	+
Phenols	Ferric chloride test	Blue colour	+
Alkaloids	Mayer's test	Cream colour	+
Tannins	NaOH Test	Formation of emulsion	+

DISCUSSION:

The phytochemical screening indicated that *Centellaasiatica*, *Benincasahispida* and *Punicagranatum* are rich sources of bioactive constituents. All three extracts tested positive for flavonoids and phenolic compounds, which are well documented for their antioxidant and anti-aging properties.

Physical Evaluation of Cream

The formulated anti-aging cream was evaluated for its appearance, consistency and odour. These organoleptic properties are important indicator of consumer acceptability and overall product quality.

Table 5: Physical Evaluation of Cream

S.No	Parameters	Observation
1	Appearance	Homogenous texture
2	Consistency	Semisolid
3	Odour	Pleasant herbal aroma



Figure 1 : Appearance of Anti-ageing Cream

Based on the proceeding table, it was observed that the formulation has no changes in texture, consistency and odour.

Determination of pH

The pH of the formulated anti-aging cream was measured using a digital pH meter. The evaluation was carried out at room temperature (32 ± 2 °C) to ensure compatibility with skin physiology.

Table 6: Determination of pH

Time Interval	pH Value
Day 0	6.1
Day 7	6.3
Day 14	6.1
Day 21	6.2
Day 30	6.2

Based on the findings, the pH of the formulation was found to be in the range of 6.1 to 6.3, which falls within the range for topical products.

Determination of Viscosity

The viscosity of the formulated anti-aging cream was measured using a Brookfield Viscometer (Brookfield Viscometer RVT) with spindle No.62.

The viscosity values obtained over a 28 day observation period are shown in the succeeding table.

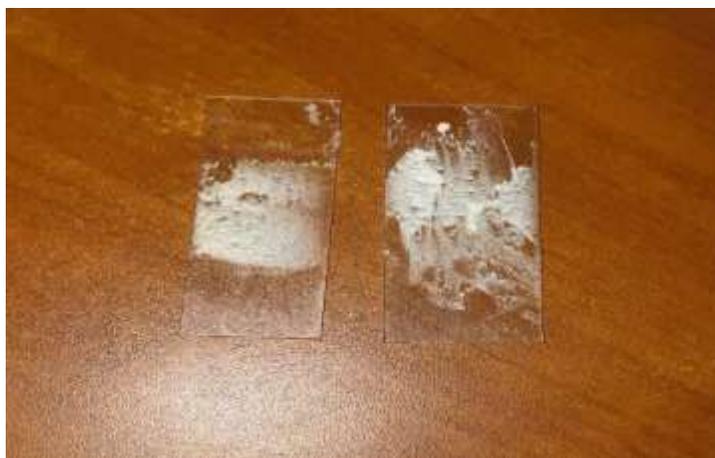
Table 7 Determination of Viscosity

Time Interval	Viscosity(cP)
Day 0	27110
Day 7	25480
Day 14	27140
Day 21	26110
Day 30	27000

The viscosity of the cream was found to be stable over the 28-day period, ranging from 27019-27023cP. This indicates that the formulation maintained its semi-solid consistency without the signs of phase separation.

Spreadability Test

The spreadability of the formulated cream was determined using a simple slip-and-drag method was used, and the spreadability was found to be 24.32

**Figure 2: Spreadability Test**

Based on the findings, the formulation had better spreadability, which is crucial for patient compliance and even application over the skin surface.

CONCLUSION

Only one formulation in combination of three different plant constituents was prepared as cream and they were evaluated for Physical appearance, viscosity, Spreadability and skin Irritation test. Formulated Creams were Homogenous, Stable and permeation. All these investigations have brought out ultimate results which leads to the following conclusions:

1. The juicy and pulpy extract of *Centellaasiatica*, *Benincasahispida* and *Punicagranatum* in same composition of cream were prepared to get various effect on skin such as anti-ageing, Emolliency, anti-wrinkling and anti-oxidant activity.
2. We know that it is not possible to get efficacy effect with single herb but taking combinations of different extracts can be possible to increase the anti-ageing effect of extracts effectively.
3. In this regard, we mixed the juicy & pulpy extracts of *Centellaasiatica*, *Benincasahispida* & *Punicagranatum* to improve the well anti-ageing effect when compared to individual extract.
4. No erythema or edema was observed in the skin irritation test confirming the cream was non - toxic and safe.
5. Overall, this study reports concluded that the formulation of anti-ageing cream may offer an effective and safe dosage form which leads to patient adherence and compliance to the therapy as topical drug delivery.

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