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Research Paper

Formulation and Evaluation of Moringa Oil-Enriched Anti-Aging Cream

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ABSTRACT

The rising demand for natural skincare has spurred interest in harnessing plant-based ingredients known for their antioxidant and rejuvenating properties. This research paper explores the formulation and evaluation of a moringa oil-based along with green tea oil and rose oil anti-aging cream, aimed at counteracting the visible effects of aging such as wrinkles and skin elasticity loss. This study aimed to develop and assess the efficacy of a synergistic blend of these botanical oils, each contributing unique bioactive properties: moringa oil for its nutrient-rich profile and potent fatty acids; green tea oil for its high antioxidant content and anti-inflammatory benefits; and rose oil for its soothing, cell-regenerative, and hydrating effects. An optimized oil-in-water emulsion technique was employed to integrate these oils into a stable cream formulation. Comprehensive evaluations were conducted to determine the formulation's physicochemical stability, including assessments of viscosity, pH, spread-ability etc. Overall, the results underscore the potential of combining moringa, green tea, and rose oils into an anti-aging cream, presenting a alternative in cosmetic formulations aimed at combating the effects of aging.

INTRODUCTION

Aging, in scientific terms is referred to the progressive and cumulative biological changes occurring in an organism over time, which results in the gradual decline of physiological functions and an increased vulnerability to diseases and death. It is a complex, multifactorial process

influenced by both intrinsic and extrinsic factors, and it manifests at cellular, molecular, and systemic levels. Aging is characterized by a reduction in the ability of cells and tissues to maintain homeostasis, repair damage, and adapt to environmental changes. Aging is mainly driven by intrinsic and extrinsic factors, leading to visible

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and microscopic changes that affect the skin's appearance, texture, and resilience:

Intrinsic Skin Aging:

- Reduced Collagen Production
- Thinning Epidermis and Dermis
- Decline in Cellular Functions
- Telomere Shortening

Extrinsic Skin Aging:

- Ultraviolet (UV) Radiation
- Oxidative Stress
- Glycation
- Pollution

All of these leads to visible and microscopic changes in skin structure such as: Fine lines, Wrinkles, Hyperpigmentation and age spots, Dryness and rough texture, Sagging.

Moringa oleifera: Moringa oleifera, often referred to as the "miracle tree", is widely celebrated for its rich nutritional profile and diverse therapeutic properties. Native to South Asia, Moringa has been utilized in traditional medicine for centuries. In recent years, it has gained significant attention in dermatology and cosmetic science for its remarkable anti-aging potential. Moringa is a powerhouse of bioactive compounds that contribute to its efficacy as an anti-aging agent:

1. Antioxidants: Moringa leaves, seeds, and oil contain high levels of antioxidants, such as quercetin, kaempferol, and chlorogenic acid. These compounds neutralize reactive oxygen species (ROS) and reduce oxidative stress, which is a major driver of skin aging.
2. Vitamins: Rich in vitamins A, C, and E, moringa supports collagen synthesis, protects against UV-induced damage, and enhances skin hydration.

3. Polyphenols: These plant-based compounds exhibit anti-inflammatory properties and protect against cellular damage caused by environmental stressors.

4. Fatty Acids: Moringa seed oil contains oleic acid, which nourishes the skin, improves barrier function, and promotes elasticity.

Green Tea: Green Tea serves as another essential antioxidant here, derived from the leaves of *Camellia sinensis*. Remarkable antioxidant properties of green tea are primarily attributed to its high content of polyphenolic compounds, especially catechins, and the key catechin includes: Epigallocatechin gallate (EGCG): It is the most potent antioxidant in green tea, EGCG plays a central role in neutralizing reactive oxygen species (ROS). These compounds belong to the flavonoid family and are characterized by multiple hydroxyl (–OH) groups. This structural feature enables them to donate hydrogen atoms or electrons, thus stabilizing free radicals and interrupting oxidative chain reactions. Using these anti-aging products offers us a comprehensive range of benefits from reducing wrinkles, promoting hydration, improved skin elasticity, antioxidant protection, even skin tone, pigmentation reduction and enhancing skin renewal. All these benefits work together to create a multi-faceted approach to skin care—addressing both cosmetic concerns and the preservation of skin health at a cellular level.

INTRODUCTION TO PLANT PROFILE:

● Moringa:

Biological source: Moringa oleifera commonly known as “drumstick tree” or “horseradish tree” is a versatile topical tree.

Family: Moringaceae



Synonyms: Anoma moringa, Guilanda moringa, Moringa zeylanica, “Mungana” in Hindi.

Habitat: Originally from northern India, it is now extensively grown in tropical and subtropical areas.

Active phytoconstituents: Niazinin, Niazirin, Glucomoringin, Quercetin, Kaempferol, Cinnamic acid, Syringic acid, Vitexin, Stigmasterol, Caffeic acid, Isothiocyanate.

Benefits of Moringa for skin:



Fig No. 1: Moringa seeds

● Green Tea:

Biological source: Green tea is biologically referred to as Camellia sinensis.

Family: Theaceae

Synonyms: Thea sinensis, Thea viridis, Thea bohea.

Habitat: It is native to the mountainous, humid regions of Southwest China, but is widely cultivated in Asia (notably in China, Japan, India, and Sri Lanka), as well as in Africa and Latin America.

1. Anti-aging properties: Stimulates collagen production.
2. Anti-inflammatory properties: Treats acne and blemishes.
3. With vitamins A and C, moringa promotes wound healing and scar reduction.
4. Protection of the skin from pollution and UV-related damage.
5. Detoxification by reducing toxins that cause dullness.



Fig No.2: Moringa seed oil

Active phytoconstituents: The major catechin includes - Epigallocatechin-3-gallate (EGCG), other polyphenolic compounds include flavonoids like Quercetin, Kaempferol, and Myricetin.

Benefits of Green Tea for skin:

1. Fights oxidative stress.
2. Soothes irritation and reduces redness.
3. Prevents photoaging.
4. Calms active breakouts.
5. Improves skin barrier function.



Fig No.3: Green Tea leaves



Fig No.4: Green Tea oil

● Rose:

Biological source: The rose plant belongs to the Rosaceae family and includes more than a hundred species.

Habitat: In woodlands, grasslands and along the edges of water bodies.

Benefits of Rose for skin:

1. Soothes sensitive skin.
2. Improves complexion.
3. Fades hyperpigmentation.
4. Balances sebum.
5. Supports a supple, plumped appearance.



Fig No.5: Rose petals



Fig No.6: Rose oil

MATERIALS:

Table No 1: List of Ingredients and Their Roles:

Sr.No.	Ingredients	Role
1	Moringa oil	Antioxidant-API
2	Green tea oil	Antioxidant
3	Rose oil	Antioxidant + Perfume
4	Stearic acid	Oil-base
5	Glyceryl monostearate	Thickener
6	Polysorbate 60	Emulsifier
7	Titanium dioxide	Photoprotective agent
8	Glycerine	Humectant + Softener
9	Methyl paraben	Preservative
10	Propyl paraben	Preservative
11	Water	Vehicle

METHOD OF PREPARATION:

1. Prepare the Oil Phase: Combine the oil-base ingredients - stearic acid, glyceryl monostearate, polysorbate 60, titanium dioxide together. Heat this mixture to around 70°C to melt all the ingredients properly and blend the oils.

2. Prepare the Water Phase: Combine the water-base ingredients – glycerine, methyl paraben, propyl paraben and water together. Heat this mixture too, to around 70°C and mix well.

3. Combine both the phases: Slowly add the water phase to the oil phase while continuously stirring. Use a blender or a homogenizer for uniform mixing and to create a stable emulsion.

4. Cooling phase: Allow the mixture to cool to around 40°C, after cooling add heat-sensitive ingredients – moringa oil, green tea oil, rose oil and the preservatives.

5. Final Mixing: Finally, blend the mixture thoroughly to ensure that there are no lumps and that the uniformity is maintained.

6. Packaging: Transfer the cream formulation into sterilized, air tight, glass containers. Store the formulation in a cool, dry place away from direct sunlight.

FORMULATION:**Table No 2: Formulation of the anti-aging cream**

Sr. No	Ingredients	F1	F2	F3	F4
1	Moringa oil	3ml	3.5ml	4ml	5ml
2	Green Tea oil	3ml	3ml	3.5ml	4ml
3	Rose oil	2ml	2ml	2ml	2ml
4	Stearic acid	3gm	3gm	2gm	2gm
5	Glyceryl monostearate	2gm	2gm	3gm	3gm
6	Polysorbate 60	-	0.2gm	0.2gm	0.2gm
7	Titanium dioxide	0.2gm	0.2gm	0.2gm	0.2gm
8	Glycerine	1ml	2ml	1.5ml	2ml
9	Methyl paraben	0.2gm	0.2gm	0.2gm	0.2gm
10	Propyl paraben	0.1gm	0.1gm	0.1gm	0.1gm
11	Water	Quantity sufficient	Quantity sufficient	Quantity sufficient	Quantity sufficient

**Fig no 7: Formulation batches (F1, F2, F3 and F4)**

Of all the tested formulations, (F3) formulation exhibited the most favourable characteristics and was the most suitable for use in a cream.

RESULTS:

1) pH of the cream: The pH of the prepared anti-aging cream (F1-F4) was found to be in the range of 4 to 5.5, which is an ideal pH required.

2) Viscosity: The viscosity of the anti-aging cream was found to be in the range of 1200-1600 cps, which indicates that the cream was easily spreadable on the skin with minimum amount of shear required. F3, F4 showed highest viscosity as compared to other formulations. F1 showed very poor viscosity as compared to other formulations.

3) Spread ability: A cream with optimal spread ability glides smoothly onto the skin, allowing even distribution with minimal rubbing or effort. In topical formulations, spread ability plays a significant role in the overall appearance of the formulation product. F2, F3 and F4 showed greater spread ability than other formulations.

4) Washability: Washability of the cream refers to the removal of the cream from the skin surface by washing the applied part with water. The cream applied on the skin was easily removed from the

skin surface by washing with water in case of all the formulations.

5) Homogeneity: Homogeneity was determined by visual inspection of the formulation through visual appearance, touch, phase separation and clumps. F1 showed poor homogeneity while F2, F3 and F4 showed good homogeneity.

6) Irritancy test: Irritancy was determined by applying the formulation on a specific part of skin and was left on skin for some time and the time was noted. Formulations (F1-F4) didn't show any type of irritation or redness on skin.

7) Dilution test: Dilution test was performed by dispersing the cream formulation into the medium of water. In the dilution test, all the formulations remained stable and mixed with water indicating the o/w type of emulsion.

8) Grittiness: There were no gritty particles or any coarse particles with lumps observed in F2, F3 and F4 formulations except than F1. F1 showed presence of some amount of gritty particles.

9) Stability study: In stability studies, formulations (F1-F4) were observed to be stable after one month of storage at room temperature (27-30°C).

Table No 3: Result of evaluation of cream formulation

Tests	F1	F2	F3	F4
pH	4.5	4.7	5.0	5.2
Viscosity	1263cps	1505 cps	1590 cps	1596 cps
Spread ability	Fair	Good	Good	Good
Dilution	o/w	o/w	o/w	o/w
Washability	+	+	+	+
Irritancy	No	No	No	No
Homogeneity	No	Yes	Yes	Yes
Stability at RT	Yes	Yes	Yes	Yes

Table No 4: Organoleptic evaluation of cream

	F1	F2	F3	F4
Appearance	Cream	Cream	Cream	Cream
Colour	Off- white	Off- white	White	White
Odour	Floral/ Rosy	Floral/ Rosy	Floral/ Rosy	Floral/ Rosy
Texture	Slightly greasy	Smooth	Smooth	Smooth
Post application feel	Lightweight, moisturised skin	Lightweight, moisturised skin	Lightweight, moisturised skin	Lightweight, moisturised skin

CONCLUSION:

The anti-aging cream formulated using active ingredients- moringa oil, green tea oil, rose oil has good appearance, consistency, homogeneity, spread ability, viscosity, pH and showed lightweight texture on the skin post application. Also, the cream didn't show any phase separation upon storage for one month. From the study, it can be concluded that the anti-aging cream prepared is safe to use on the face and skin. The prepared anti-aging cream possess antioxidant effect, and leaves a soothing effect on the skin post application. During the study, it was determined that the cream in addition to its anti-aging benefits, demonstrated a subtle whitening effect on skin. Through literature survey studies, it was found that this type of anti-aging formulation has not been prepared earlier in the market that possess combined antioxidant benefits. The formulated cream was checked and was evaluated for efficacy, safety. Evaluation and results shows that the cream prepared can be used for various skin benefits providing glow appearance to the skin, smooth texture and reduction in dark spots and wrinkles over consistent use. Through the observation and evaluation parameters conducted, I conclude that, F3 and F4 are found to be ideal, optimum and suitable.

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