

Formulation and Evaluation of Herbal Moisturizing Lotion Using Green Tea Leaves Extract and Marula Oil

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Abstract—The skin is the body's largest organ it has constantly exposed to environmental stressors like UV radiation, pollution, and dry air. All of which strip away moisture and accelerate premature aging. While it can be synthetic moisturizer domination the market, aware the consumer. All growing around chemical-laden cosmetics has sparked a renewed interest in plant-based alternatives that are gently safer, and equally efficacy. This study is about the formulation and evaluation of herbal moisturizing lotion using green tea (*Camellia sinensis*) leaves extract and marula oil (*Sclerocarya birrea*) oil, these two botanical properties as used skin-nourishing properties. Green tea leaves were extracted using a hot aqueous infusion method and screened for phenolic content and antioxidant potential through the DPPH radical scavenging assay. A marula oil containing naturally rich in oleic acid and vitamin E, it had ability to repairing skin-barrier and lending the formulation excellent emollient. Several batches are prepared with different ratio concentration to identify the most stable and cosmetic elegant formulation. And each batch was evaluated for physical appearance, pH, skin irritation, viscosity, stability studies under different conditions to assess long-term performance. The study has been showed a skin-friendly, good spread ability and smooth consistency, there is no sign of phase separation over the period. It also contains an antioxidant property and suggests the green tea polyphenols remain functionally intact with the lotion. Overall, the study indicates that green tea and marula oil can be successfully combined into a stable, herbal moisturizer with antioxidant and emollient benefits, with offering natural, skin friendly and alternative conventional synthetic formulation.

I. INTRODUCTION

A lotion is a semi solid topical emulsion, it contains two types of oil-in-water (O/W), water-in-oil (W/O). It is used for applying external skin. It is functioning

primarily by forming a semi occlusive or thin occlusive film on the skin surface that can reduce trans epidermal water loss (TEWL), while simultaneously supplying emollients and humectants it helps to soften the skin and restore suppleness. When compared to creams, lotions have lower viscosity and higher water content, make them easier to spread and better suited for larger body surfaces areas and daily uses.

An herbal moisturizer lotion is one of the active moisturizing or therapeutic components which is derived wholly or partly from plant sources. Such as vegetable oils, butters, standardized plant extracts or rather than synthetic emollients.

It can be typically combined:

- An oil phase, it can be contributing emollient, occlusive, and moisturizing properties (or it often a plant derived fixed oil rich in fatty acids).
- An active herbal extract contributes additional function on its benefits such as antioxidants and anti-inflammatory.
- Conventional excipients like emulsifiers, humectants, stabilizers, preservatives. It requires maintaining physical stability and acceptability on its formulation.

ADVANTAGES

- It can be skin friendly and low irritation risk.
- It added antioxidant or anti-inflammatory benefits from plant actives.
- It should be biodegradable and eco-friendly.
- Strong consumer demand for natural products or often traditionally used it.

DISADVANTAGES

- It has shorter shelf life, prone to rancidity or oxidation.
- It can still cause allergies despite being natural.

- In extract quality has batch to batch variability.
- Weaker guidance of regulatory and pharmacopoeia.

IDEAL PROPERTIES

- It was smooth, spread ability and non- greasy texture.
- It can be skin friendly PH (~4.5-6.5)
- It has stable emulsion and no phase separation.
- Non-irritant and also non comedogenic.
- It has reasonable shelf life.

TYPES OF LOTION

Lotion can be classified based on their formulation base, intended base, and then application sites.

BY EMULSION TYPE:

Oil-in -water(o/w) lotions, which are light, non-greasy and washable, making them ideal for daily moisturization.

Water-in-oil (w/o) lotions, which are heavier and more occlusive, offer deeper hydration for damaged skin.

TYPES:

- Moisturizing lotions are hydration and barrier repair.
- Sunscreen lotions (UV protection).
- Medicated lotions (treatment of specific skin conditions).
- Soothing lotions.
- Anti-aging lotions.

SKIN

Skin is the largest organ of the human body, and it covers the entire external surface. It acts as a shield that says nope to germs, dirt, chemicals. At the same time, it helps keep our body temperature studying and prevents it. Keratinocytes produce protective protein keratin, while collagen and lipocytes make up the dermis and subcutaneous tissue. The thickness of these layers varies depending on location.

STRUCTURE OF SKIN

It is made up of three main layers of skin protecting and supporting the body

- Dermis
- Hypodermis
- Epidermis

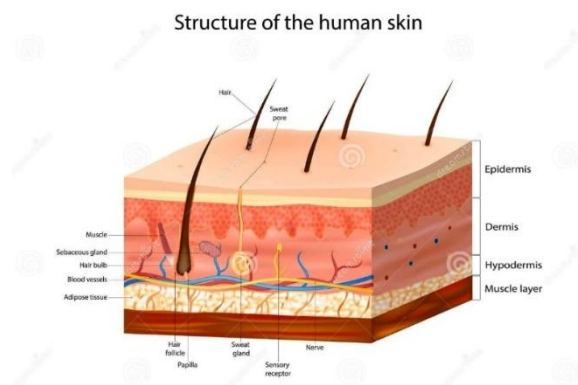


FIGURE NO:01

II. AIM AND OBJECTIVES

AIM: The aim of the present study was undertaken with the aim of formulating and evaluating a herbal moisturizer lotion with green tea extract and marula oil, to develop a safe and effective topical formulation with potent antioxidant and emollient properties.

III. OBJECTIVES

1. To extract green tea leaves using a hot aqueous infusion method for lotion formulation.
2. To formulate the four batches (F1-F2) of herbal moisturizing lotion by different concentrations of green tea extract and marula oil.
3. To evaluate the physicochemical properties of the prepared formulations, it includes viscosity, PH, spread ability, homogeneity and washability.
4. To assess the organoleptic properties such as color, odor and the appearance.
5. To compare the evaluation parameters across the four formulations (F1-F4) and then it identifies the batch with optimum characteristics.
6. To determine whether the incorporation of green tea extract and marula oil provides the formulation with antioxidant and skin-moisturizing benefits, and then supporting its Suitability as a natural alternative to synthetic moisturizing properties.

IV. MATERIALS AND METHOD

MATERIALS

The selection of herbal ingredients was based on their traditional use, availability, safety purpose and

scientific literature. Supporting their anti-aging, antioxidant properties it useful in the management of moisturizing the skin.

PLANT PROFILE:

1.GREEN TEA (*Camellia sinensis*):



FIGURE NO: 02

Kingdom: Plantae

Family: Theaceae

Species: Sinensis

Order: Ericales

Uses:

- Rich in antioxidant.
- It helps to premature skin aging by protecting collagen.
- Regular use helps even out skin tone.

2.MARULA OIL (*Sclerocarya birrea*):



FIGURE NO: 03

Kingdom: Plantae

Family: Anacardiaceae

Species: birrea

Order: Sapindales

Uses:

- Rich in oleic acid.
- It provides intense hydration without greasy feeling.

- It strengthens the skin's lipid barrier to reduce water loss and improve elasticity.

TABLE NO 01: INGREDIENTS

Ingredients	Uses
Green tea extract	Antioxidant
Marula oil	Moisturizing property
Stearic acid	Emulsifying agent
Cetyl alcohol	Emulsifying agent
Glycerin	Humectant
Methyl paraben	Preservative
Propyl paraben	Preservative
Triethanolamine	pH adjuster
Ceto stearyl alcohol	Emulsifying agent
Liquid paraffin	Skin softness
Vitamin E	Supporting moisturizer
Rose water	Fragrance
Distilled water	Base medium

TABLE NO 02: FORMULATION

INGREDIEN TS	F1	F2	F3	F4
Green tea extract	1ml	1.5ml	2ml	2.5ml
Marula oil	2.5ml	3.5ml	4.5ml	6ml
Stearic acid	1.8g	2.1g	2.3g	2g
Cetyl alcohol	0.9g	0.8g	1.2g	1g
Ceto stearyl alcohol	2.2g	2.3g	2.6g	2.5g
Glycerin	2.2ml	2.4ml	2.6ml	2.5ml
Liquid paraffin	2.2ml	2.5ml	2.5ml	2.5ml
Triethanolami ne	0.3ml	0.6ml	0.5ml	0.4ml
Methyl paraben	0.08g	0.07g	0.11g	0.09g
Propyl paraben	0.02g	0.03g	0.02g	0.01g
Vitamin E	0.25 ml	0.25+ ml	0.25 ml	0.25 ml

Fragrance(rose)	1-2drops	1-2drops	1-2drops	1-2drops
Distilled water	q. s	q. s	q. s	q. s

PROCEDURE:

- Prepare the oil phase, take required quantity of stearic acid, cetyl alcohol, ceto stearyl alcohol, marula oil and liquid paraffin in a beaker.
- Heat at water-bath up to 70-75°C to maintain the temperature.
- Prepare the water phase, take required quantity in another beaker of glycerin, triethanolamine, methyl paraben, propyl paraben, add sufficient distilled water.
- Heat at water-bath up to 70-75°C to maintain the temperature.
- To pour a water phase into an oil phase slowly with continuous stirring.
- To use speed stirrer and allow to cool at 40-45°C.
- To add active ingredients such as green tea extract, vitamin E.
- Add a fragrance required drops.
- Add the remaining water to enough.
- To check lotion was homogenous mixture and there is no lump present.



FIGURE NO: 04

V. EVALUATION PARAMETERS

1. Organoleptic evaluation:

It involves the sensory assessment of the formulated lotion using visual and tactile examination.

Color: All four formulations (F1-F4) exhibited a F1 light cream, F2 cream, F3 light beige, F4 pale beige and characteristics of the incorporated green tea

extract and marula oil. A slight variation was observed across the batches due to the increasing concentration of the herbal extract.

Odour: Formulations possess a mild and characteristics herbal odour attributed to the green tea extract, without any unpleasant.

Appearance: All formulations appeared smooth, glassy and homogeneous and there is no present any phase separation, lumps.

Texture: All formulations are soft, smooth, and cream texture and non-greasy, easily spreadable.

2. PH evaluation:

All four formulations exhibited pH values within the range of 5.5-6.1. The slight increase in pH from F1-F4 may be to the increase concentration of green tea extract and marula oil across the batches.

3. Viscosity determination:

The viscosity determination of the formulation was found to be increased progressively from F1 to F4. It gradually increases in viscosity can be attributed to the increasing concentration of green tea extract and marula oil across all batches.

4. Spread ability evaluation:

In spread ability evaluation is a gradual decrease was observed from F1 to F4, corresponding to the progressive increase in viscosity across all the batches.

5. Homogeneity evaluation:

F1 and F3 was not satisfactory, formulations F2 and F4 were found to be smooth, homogeneous, and free from any visible aggregates, lump, or gritty particles noticed in visual examination, F2 and F4 formulations are satisfactory.

6. Washability evaluation

All four formulations(F1-F2) are easily washable with water and there is no noticeable oily or sickly residue on the skin after rinsing

7. Phase separation

In phase separation, F1 and F2 occur phase separation, remaining formulations F3 and F4 exhibited any visible sign of phase separation, creaming and sedimentation during the observation period or either under normal condition.

8.Irritation test:

There are no signs of erythema, edema, itching, or any other visible skin reaction were observed on the application site at 24-hour or 48-hour observation points for all four formulations.

9.Stability studies:

There all four-formulation stored at room temperature and refrigerator conditions showed no significant changes in color, odour, texture, pH, or viscosity. Throughout the 28-day observation period there is good physical and chemical stability under this condition.

10.Moisture content:

All four formulation F1 to F4 a noticeable increase in skin moisture content in following applications, with the effect being more formulation containing higher concentrations marula oil F3 and F4.

VI. RESULT AND DISSCUSION**1.Organoleptic evaluation:**

PARAMETER	F1	F2	F3	F4
Color	Light cream	cream	Light beige	Pale beige
Odour	Mild herbal	Mild herbal	Characteristic herbal	Characteristic herbal
Appearance	Smooth, glossy	Smooth, glossy	Smooth, glossy	Smooth, glossy
Texture	Light, non-greasy	Light, smooth	Moderately rich	Rich
State	Semi-solid emulsion	Semi-solid emulsion	Semi-solid emulsion	Semi-solid emulsion

2.PH Determination:

FORMULATION	PH value
F1	5.5
F2	5.7
F3	5.9
F4	6.1

3.Viscosity Determination:

FORMULATION	VISCOSITY (cP)
F1	4180 cP
F2	4590 cP
F3	5240 cP
F4	5510 cP

4.Spread ability evaluation:

FORMULATION	SPREADABILITY (g cm/sec)
F1	6.8
F2	6.3
F3	5.7
F4	5.2

5.Homogeneity evaluation:

FORMULATION	HOMOGENEITY
F1	Not Satisfactory
F2	Satisfactory
F3	Not Satisfactory
F4	Satisfactory

6.Washability evaluation

FORMULATION	WASHABILITY
F1	Easily washable
F2	Easily washable
F3	Easily washable
F4	Easily washable

7.Phase separation

FORMULATION	PHASE SEPARATION
F1	Phase separation observed
F2	Phase separation observed
F3	No separation
F4	No separation

8.Stability studies:

STORAGE CONDITION	COLOR	TEXTURE	pH	VISCOSITY	PHASE SEPARATION
ROOM TEMP	No Change	No Change	No Change	No Change	None
REFRIGERATOR	No Change	No Change	No Change	No Change	None

ELEVA TED	No Cha nge	No Chan ge	No Ch ang e	Slight ly Chang e	None
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9. Moisture content:

FORMULATION	MOISTURE CONTENT(Hr.)
F1	14
F2	17
F3	21
F4	24

VII. CONCLUSION

An herbal moisturizing lotion was successfully formulated using green tea extract and marula oil, as the primary ingredient, employing the oil-in-water emulsion system. All four formulations F1-F4 developed with varying concentrations of green tea extract and marula oil to study their effect on the physicochemical properties of the lotion. All four formulations were evaluated organoleptic characteristics pH, viscosity, spreadability, homogeneity, washability, phase separation, irritation, and stability. However, formulations F1 and F3 showed unsatisfactory homogeneity, and then F1 and F2 showed occur phase separation on storage, indicating comparatively poor stability in these batches, where F2 and F4 those are satisfactory homogeneity and F3 and F4 showed no phase separation. Based on overall evaluation and formulation F4 consistently performed compare to all parameters. It can be concluded that F4 is the optimized formulation and the developed herbal moisturizer lotion enriched with the antioxidant and emollient properties of green tea extract and marula oil is a safe, stable, effective, formulation suitable for regular topical use.

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