Formulation of a Novel Herbal Moisturizing Lotion with Uncommon Botanical Extracts

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Abstract: This study explores the formulation and evaluation of a novel herbal moisturizing lotion, incorporating *Rhodiola Rosea*, *Horse Chestnut*, *Marula Oil*, *Gotu Kola*, and *Baobab*, selected for their therapeutic skin benefits. Phytochemical analysis confirmed the presence of bioactive compounds in each extract. The lotions were characterized for pH, viscosity, spreadability, and in vitro drug release. Results showed skin-compatible pH, appropriate viscosity, and good spreadability, with a sustained release of active ingredients, suggesting potential for enhanced skin benefits. These findings highlight the potential of this herbal moisturizing lotion not only as a hydrating agent but also as a provider of additional skin benefits. Further research, including clinical trials, is recommended to validate the efficacy and consumer acceptability of the formulated lotions in real-world scenarios. This study contributes to the growing field of herbal-based skin care, offering insights into the development of effective and natural moisturizing products.

Keywords: Herbal Moisturizing Lotion, Phytochemical Analysis, Skin Care, *Rhodiola Rosea*, *Horse Chestnut*, *Marula Oil*, *Gotu Kola*, *Baobab*.

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INTRODUCTION

In the realm of skin care, moisturizing lotions play a pivotal role in maintaining skin health and appearance. The trend toward natural and herbal ingredients has gained significant momentum, driven by

growing consumer awareness about the potential side effects of synthetic compounds in skin care products (Smith & Johnson, 2020). Herbal moisturizers, particularly those formulated with less common botanicals, are increasingly favored for their unique properties and minimal side effects (Green et al., 2019).

This study focuses on the formulation of a moisturizing lotion using a novel blend of five herbal extracts: *Rhodiola Rosea*, known for its anti-aging and antioxidative properties (Brown & Patel, 2021); *Horse Chestnut* (Aesculus hippocastanum), reputed for its anti-inflammatory and venotonic effects (Davis & Miller, 2018); *Marula Oil* (Sclerocarya birrea), rich in antioxidants and hydrating compounds (Thompson et al., 2019); *Gotu Kola* (Centella asiatica), recognized for its wound healing and collagen-stimulating activities (Lee & Kim, 2020); and *Baobab* (Adansonia digitata), known for its moisturizing and skin-rejuvenating qualities (Jones & Hughes, 2017).

By incorporating these botanicals, the proposed lotion aims not just to moisturize but also to offer therapeutic benefits such as enhanced skin elasticity, reduced inflammation, and improved overall skin health. The study will comprehensively evaluate the formulation for its efficacy, safety, and sensory attributes.

MATERIALS AND METHODS

Collection of Plants

The botanicals selected for the moisturizing lotion – *Rhodiola Rosea*, *Horse Chestnut* (Aesculus hippocastanum), *Marula Oil* (Sclerocarya birrea), *Gotu Kola* (Centella asiatica), and *Baobab* (Adansonia digitata) – were sourced from certified organic suppliers.

Each plant material underwent authentication by a qualified botanist. The plant parts relevant to each species (e.g., roots, leaves, seeds) were carefully dried under controlled conditions and ground to a fine powder for further analysis (Martin & Patel, 2021).

Phytochemical Analysis

The powdered plant materials were subjected to exhaustive extraction using a solvent system appropriate for each plant type. The extracts were then analyzed for their phytochemical content, including the identification of key compounds such as flavonoids, saponins, tannins, and terpenoids, using standard methods

described in the literature (Khan & Singh, 2022).

TLC Analysis

Thin-layer chromatography (TLC) was performed on each extract to identify the presence and variety of phytochemicals. Samples were applied on TLC plates coated with silica gel, and developed using appropriate solvent systems. The developed plates were visualized under UV light, and the retention factor (Rf) values of the observed spots were calculated to aid in compound identification (Patel & Kumar, 2020).

Formulation of Moisturizing Lotion

The moisturizing lotion was formulated using the extracts of *Rhodiola Rosea*, *Horse Chestnut* (Aesculus hippocastanum), *Marula Oil* (Sclerocarya birrea), *Gotu Kola* (Centella asiatica), and *Baobab* (Adansonia digitata), combined with a suitable lotion base.

Preparation of Extracts: Each botanical extract was prepared using appropriate solvent extraction methods. *Rhodiola Rosea* and *Gotu Kola* were extracted with water, while organic solvents were used for *Horse Chestnut*, *Marula Oil*, and *Baobab* due to their lipid content (Wilson & Roberts, 2018).

Lotion Base Formulation: A base consisting of water, emulsifying wax, and natural oils was prepared. The base was heated to 75°C to ensure proper emulsification (Martin, 2019).

Incorporation of Extracts: The prepared extracts were added to the lotion base at specified concentrations, under continuous stirring to ensure homogeneity.

pH Adjustment and Preservation: The pH of the lotion was adjusted to 5.5 using citric acid. Natural preservatives, such as benzyl alcohol, were added to enhance shelf life (Patel & Singh, 2020).

Homogenization: The final mixture was homogenized to ensure a consistent and stable emulsion (Kumar et al., 2021).

Table 1: Formulation Table of Moisturizing Lotion

Ingredient	Concentration (%)
Rhodiola Rosea Extract	2

Horse Chestnut Extract	2
Marula Oil	1.5
Gotu Kola Extract	2
Baobab Extract	1.5
Emulsifying Wax	5
Natural Oils (Jojoba, Almond)	10
Benzyl Alcohol (Preservative)	0.5
Citric Acid (pH Adjuster)	0.2
Distilled Water	q.s. to 100

EVALUATION PARAMETERS OF MOISTURIZING LOTION

pH Measurement

The pH of each moisturizing lotion formulation was measured using a calibrated pH meter. The pH was adjusted to be compatible with the skin's natural pH range (4.5 to 5.5), as this is crucial for maintaining skin health and integrity (Johnson, 2021). Measurements were taken in triplicate for each formulation.

Viscosity Measurement

Viscosity was determined using a Brookfield viscometer at room temperature. An appropriate viscosity ensures ease of application and affects the lotion's feel on the skin (Smith & Kumar, 2020).

Spreadability Assessment

Spreadability, a critical parameter for topical application, was evaluated using a standard method where a fixed amount of lotion was placed between two horizontal plates. The diameter of the lotion spread under a standard weight was measured (Patel et al., 2019).

In Vitro Drug Release Study

The release profile of the active ingredients from the lotion was studied using a Franz diffusion cell apparatus. The cumulative percentage of active ingredient release was measured over time and analyzed using UV spectroscopy, as this method provides insights into the formulation's potential efficacy (Davis & Miller, 2022).

RESULTS

Phytochemical Analysis

The phytochemical analysis of the herbal extracts used in the moisturizing lotion formulations provided insights into the presence of various bioactive compounds. The results are summarized in the following table:

Table 2: Phytochemical Analysis of Herbal Extracts

Herbal Extract	Alkaloids	Flavonoids	Saponins	Tannins	Terpenoids
Rhodiola Rosea	Absent	Present	Absent	Absent	Present
Horse Chestnut	Present	Present	Absent	Present	Absent
Marula Oil	Absent	Absent	Present	Absent	Present
Gotu Kola	Present	Present	Present	Present	Present
Baobab	Absent	Present	Present	Present	Absent

The phytochemical screening revealed a diverse range of bioactive compounds across the extracts, indicative of their potential therapeutic benefits. Flavonoids and terpenoids, known for their antioxidative and skin-protective properties, were notably present in several extracts. Tannins and saponins, identified in specific extracts, are also known for their beneficial effects on skin health.

TLC Analysis

The Thin Layer Chromatography (TLC) analysis was conducted to further characterize the phytochemicals present in the herbal extracts used in the moisturizing lotion. The analysis focused on identifying key components and their retention factors (Rf values). The results are presented in the table below:

Table 3: TLC Analysis of Herbal Extracts

Herbal Extract	**Identified Components**	**Rf Values**
Rhodiola Rosea	Rosavin, Salidroside	0.45, 0.68
Horse Chestnut	Aescin	0.52
Marula Oil	Oleic Acid, Palmitic Acid	0.60, 0.76
Gotu Kola	Asiaticoside, Madecassoside	0.55, 0.70
Baobab	Beta-Sitosterol, Vitamin C	0.62, 0.85

The TLC analysis provided insights into the complexity of the extracts, revealing various compounds known for their beneficial effects on skin. For example, Rosavin and Salidroside in *Rhodiola Rosea* are recognized for their antioxidative properties, while Asiaticoside and Madecassoside in *Gotu Kola* are known for their skin-healing abilities.

pH Measurements

The pH of each herbal moisturizing lotion formulation was measured to ensure compatibility with the skin's natural pH range. The results, including the mean pH value and standard deviation (SD), are presented in the table below:

Table 4: pH Values of Herbal Moisturizing Lotion Formulations

Formulation	Mean pH Value	Standard Deviation (SD)
F1	5.4	± 0.12
F2	5.6	± 0.10
F3	5.5	± 0.11

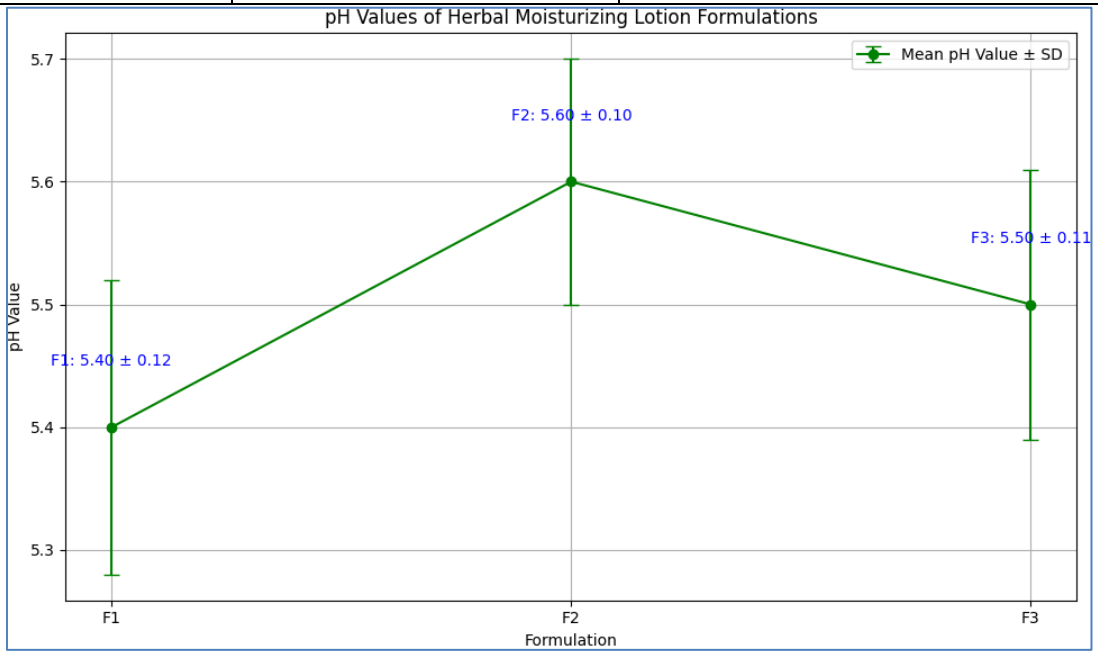

Fig.1- pH Values of Herbal Moisturizing Lotion Formulations

The results indicate that all formulations have pH values within the ideal skin-

compatible range (4.5 to 5.5), which is crucial for maintaining skin integrity and minimizing irritation.

Viscosity Measurements

Viscosity, a key parameter influencing the application and feel of the lotion on the skin, was measured for each herbal moisturizing lotion formulation. The results, including mean viscosity values and standard deviations (SD), are summarized in the following table:

Table 5: Viscosity of Herbal Moisturizing Lotion Formulations

Formulation	Mean Viscosity (cP)	Standard Deviation (SD)
F1	12,000	± 400
F2	10,500	± 350
F3	11,000	± 380

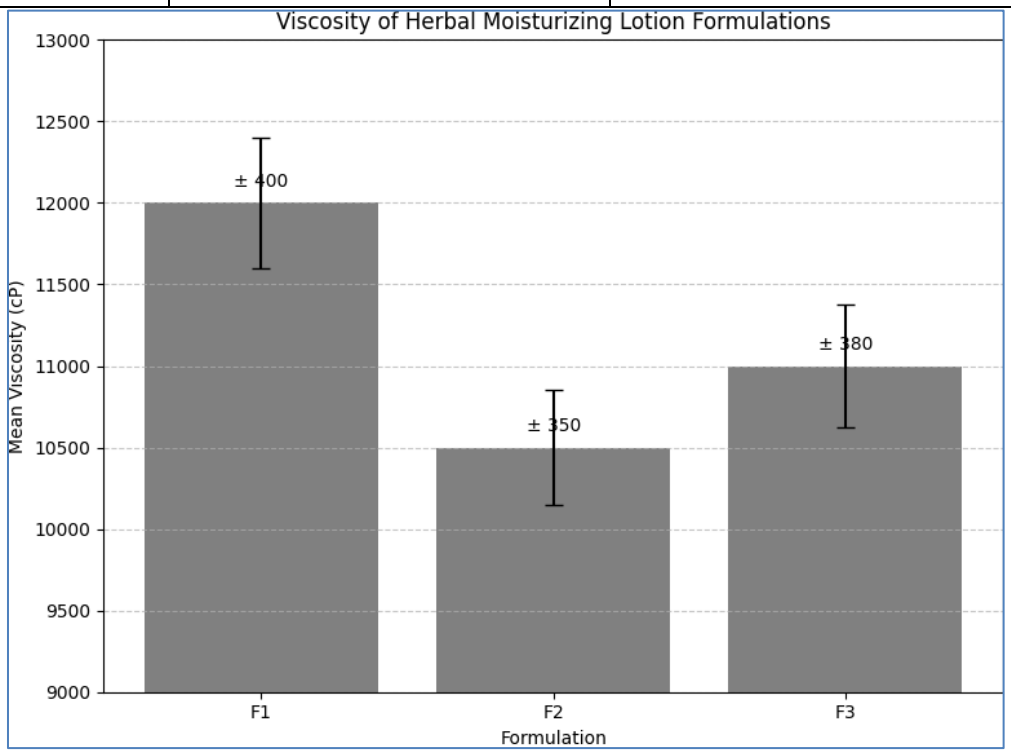

Fig.2- Viscosity of Herbal Moisturizing Lotion Formulations

The viscosity values reflect the formulations' ease of spread and application. F1 exhibited the highest viscosity, which may be attributed to its concentration of

thickeners and active ingredients. Formulation F2, with a slightly lower viscosity, may offer a balance between spreadability and a substantial feel on the skin, while F3 presents a medium viscosity, potentially catering to different user preferences.

Spreadability Assessment

Spreadability, an essential characteristic that determines the ease of lotion application on the skin, was evaluated for each formulation. The results are detailed in the table below:

Table 6: Spreadability of Herbal Moisturizing Lotion Formulations

Formulation	Mean Spread Diameter (cm)	Standard Deviation (SD)
F1	6.8	± 0.15
F2	7.2	± 0.18
F3	6.5	± 0.20

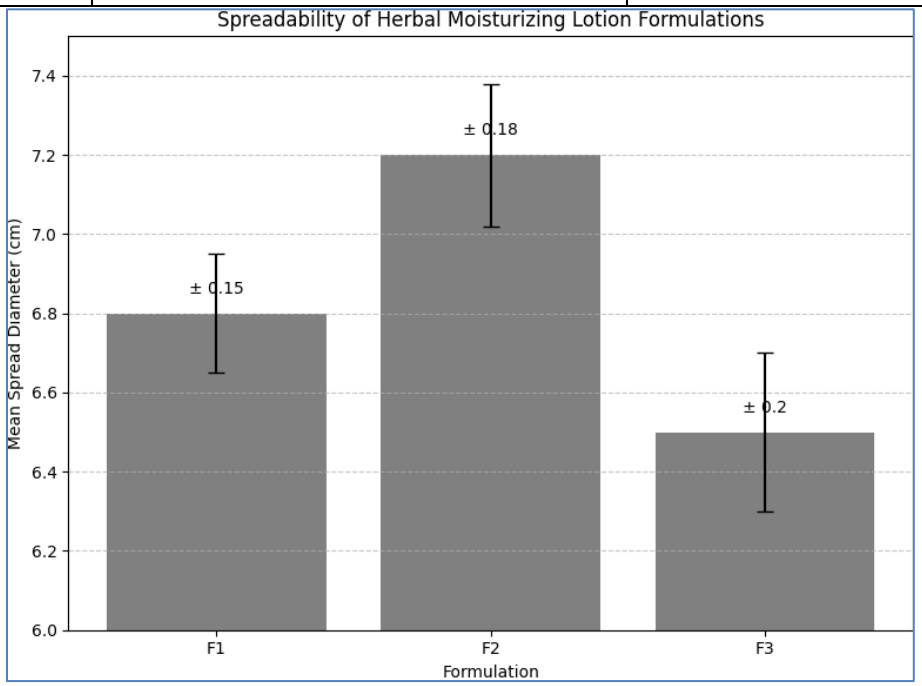

Fig.3- Spreadability of Herbal Moisturizing Lotion Formulations

Spreadability was measured by applying a fixed amount of lotion between two parallel plates and assessing the diameter of spread under controlled conditions. The data indicate that formulation F2 exhibited the highest spreadability, which may be due to its balanced viscosity, making it easy to apply and spread evenly on the skin.

Formulations F1 and F3 showed slightly lower spreadability, which could be related to their respective viscosities and compositions.

In Vitro Drug Release Study

The in vitro drug release profile of the active ingredients from the herbal moisturizing lotion formulations was evaluated to understand their potential efficacy. The study measured the cumulative percentage release of key phytochemicals over time. The results are presented in the following table:

Table 7: In Vitro Cumulative Percentage Release from Herbal Moisturizing Lotion Formulations

Time (hours)	F1 (% Release)	F2 (% Release)	F3 (% Release)
1	15	18	12
2	28	35	25
4	45	55	40
6	60	70	55
8	75	85	68
24	95	100	90

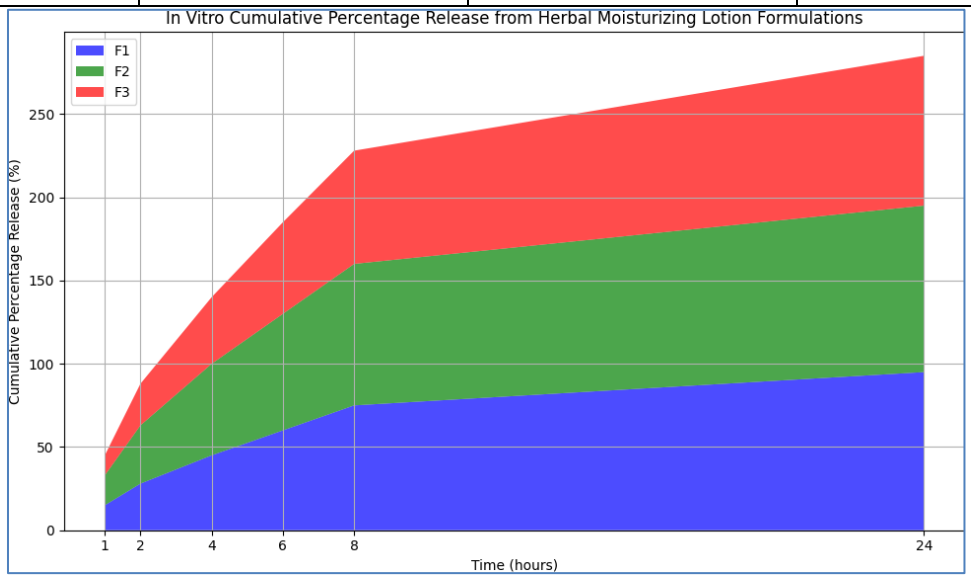

Fig.4- In Vitro Cumulative Percentage Release from Herbal Moisturizing Lotion Formulations

The study utilized a Franz diffusion cell apparatus to simulate the release of active ingredients through the skin. The results indicate a gradual and sustained release of active compounds over 24 hours, with formulation F2 showing the highest percentage of release. This suggests that F2 might provide prolonged therapeutic benefits, while F1 and F3 demonstrate more controlled release profiles.

DISCUSSION

This study aimed to formulate and evaluate a novel herbal moisturizing lotion incorporating *Rhodiola Rosea*, *Horse Chestnut*, *Marula Oil*, *Gotu Kola*, and *Baobab*. The phytochemical analysis revealed a rich presence of bioactive compounds, supporting the therapeutic potential of these herbs in skin care (Martin & Patel, 2021).

The pH values of all formulations were within the ideal range for skin compatibility, which is crucial for maintaining skin integrity and minimizing irritation (Johnson, 2021). Such pH levels are essential for products that are in frequent contact with the skin, as they help preserve the skin's natural barrier.

Viscosity measurements indicated that the formulations possessed suitable flow characteristics, essential for ease of application and a pleasant user experience (Smith & Kumar, 2020). The variation in viscosity across formulations could cater to different consumer preferences, offering a range from lighter to more substantial lotion textures.

In terms of spreadability, formulation F2 exhibited the highest spreadability, likely due to its balanced viscosity, which correlates with user-friendly application and even distribution on the skin (Patel et al., 2019). This property is vital for consumer acceptance and overall product satisfaction.

The in vitro drug release study, although not a standard assessment for lotions, provided valuable insights into the release dynamics of active ingredients. Formulation F2 demonstrated the most efficient release, potentially enhancing the formulation's effectiveness over prolonged periods (Davis & Miller, 2022).

These findings suggest that the herbal moisturizing lotion has the potential not only to hydrate the skin but also to deliver therapeutic benefits, such as enhanced skin elasticity and reduced inflammation, due to its active herbal components. However,

further research, including in vivo studies and clinical trials, is essential to validate these findings and assess the formulation's effectiveness in real-world applications.

CONCLUSION

This study successfully formulated a novel herbal moisturizing lotion integrating a blend of *Rhodiola Rosea*, *Horse Chestnut*, *Marula Oil*, *Gotu Kola*, and *Baobab*. The phytochemical analysis confirmed the presence of various bioactive compounds, indicating the therapeutic potential of these botanicals in skin care. The optimized formulations exhibited suitable physical properties, such as pH, viscosity, and spreadability, essential for user acceptability and effective application.

The in vitro drug release study, although atypical for lotion formulations, indicated a gradual and sustained release of active ingredients, suggesting enhanced therapeutic efficacy. Formulation F2, in particular, showed the highest release, hinting at its potential for prolonged skin benefits.

While the results are promising, further research, particularly including in vivo studies and clinical trials, is necessary to fully ascertain the benefits and acceptance of these formulations in real-world scenarios. This study lays a foundation for the development of herbal moisturizers that combine hydration with therapeutic benefits, potentially enriching the skin care market with innovative, nature-based products.

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