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RESEARCH ARTICLE

FORMULATION AND EVALUATION OF HERBA GLOW SKINCARE CREAM

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Abstract

Background and aims: Nowadays consumers are now more aware of the possible hazards associated with synthetic formulations, thus there is a greater demand for skincare products based on herbs. Using herba glow containing *Capparis spinosa*, *Morus nigra*, and *Rhodiola rosea*, all of which are known for their strong antioxidant qualities. This study attempts to develop and assess the stability, physicochemical characteristics, and antioxidant activity of Herba Glow skincare cream.
Methods: Herba Glow cream was developed as an oil-in-water emulsion using pharmaceutical-grade excipients. The formulation underwent comprehensive evaluation, including organoleptic assessment, homogeneity, viscosity, spreadability, and pH measurement. Stability was tested through a cycling test, while the DPPH radical scavenging test was used to measure antioxidant activity.
Results: All formulations exhibited homogeneity and acceptable viscosity, with pH values within the skin's natural range. Stability testing indicated minor changes in viscosity and pH, yet the formulations remained stable. Antioxidant analysis revealed that higher concentrations of Herba Glow extract enhanced free radical scavenging activity, with the 20% extract formulation showing the highest potency (IC_{50}=1.117 ppm), comparable to well-established antioxidants.
Conclusions: These findings suggest that Herba Glow cream is a promising herbal-based skincare product with significant antioxidant activity and stable physicochemical properties. This research bridges the gap between traditional herbal knowledge and modern cosmetic science, supporting the development of natural skincare alternatives.
Keywords: Herbal skincare, antioxidant activity, evaluation, Herba Glow.

INTRODUCTION

The skincare industry has witnessed significant advancements over the years, with a growing demand for herbal-based cosmetic formulations. Consumers are increasingly aware of the potential adverse effects associated with synthetic skincare products, leading to a surge in interest toward herbal-based alternatives[1]. Herbal skincare formulations are preferred due to their natural origin, biocompatibility, and potential therapeutic benefits, including antioxidant activity, which plays a crucial role in combating skin aging and oxidative stress[2].

Antioxidants are molecules that play a crucial role in minimizing or preventing oxidative damage by neutralizing reactive oxygen species (ROS) and free radicals[3]. These free radicals are known to accelerate skin aging, leading to the appearance of wrinkles, hyperpigmentation, loss of skin elasticity, and other dermatological concerns[4]. Skincare products with antioxidant properties help mitigate oxidative stress, enhance skin barrier function, and promote a youthful complexion[5]. Despite the availability of numerous antioxidant-containing skincare products, many commercial formulations incorporate synthetic antioxidants, which may pose risks of skin irritation, sensitization, or long-term toxicity[6].

The formulation of topical skincare products such as creams presents several challenges. Achieving an optimal balance between effectiveness, stability, and consumer acceptability requires careful selection of active ingredients, excipients, and formulation techniques[7]. Cream-based formulations offer advantages, including ease of application, enhanced hydration, and improved penetration of active compounds. However, issues such as phase separation, pH instability, and oxidative degradation remain prevalent in cosmetic formulations[8].

To address these concerns, this research focuses on the formulation, evaluation, and antioxidant activity assessment of Herba Glow skincare cream. Herba Glow is an herbal extract blend derived from caper flower buds (*Capparis spinosa* germen), mulberry leaves (*Morus nigra* folium), and golden root

(*Rhodiola rosea* radix), all of which have been recognized for their potent antioxidant properties[9]. The natural origin of these botanical extracts aligns with the increasing consumer preference for safe, eco-friendly, and effective skincare solutions. Despite the extensive research on herbal-based skincare formulations, there remains a lack of comprehensive studies focusing on the synergistic effects of *Capparis spinosa*, *Morus nigra*, and *Rhodiola rosea* in a single cream formulation. Previous studies have primarily investigated these botanical extracts individually for their antioxidant properties, yet little attention has been given to their combined efficacy in a semi-solid topical formulation[8]. Moreover, many herbal creams in the market lack standardized evaluation methods, leading to inconsistencies in product performance, stability, and antioxidant effectiveness.

Another significant research gap pertains to the stability and bioavailability of herbal antioxidants in topical formulations. The challenge lies in ensuring that the active compounds remain stable and bioavailable throughout the product's shelf life while maintaining an optimal pH, viscosity, and homogeneity[10]. Given these considerations, this study aims to formulate and evaluate a stable Herba Glow skincare cream while assessing its antioxidant activity through validated methodologies. By addressing the identified research gaps and ensuring the development of a scientifically validated herbal skincare cream, this study aims to bridge the gap between traditional herbal knowledge and modern cosmetic science, ultimately benefiting both researchers and consumers in the field of dermatological care.

MATERIALS AND METHODS

Formulation of Herba Glow cream

The Herba Glow skincare cream was formulated as an oil-in-water (O/W) emulsion. The oil phase consisted of lanolin, cetyl alcohol, stearic acid, and propylparaben, which were heated at 70°C until homogenized. The aqueous phase contained triethanolamine, Herba Glow liposomes, methyl-paraben, and distilled water, which were also heated to 70°C and stirred until fully mixed. The oil phase was gradually added to the aqueous phase while stirring with a homogenizer at 2000 rpm until a uniform cream formulation was obtained**.**

Evaluation of physical and chemical properties

The formulated cream underwent several tests to evaluate its physical properties:

Organoleptic test

The cream was observed for phase separation, rancid odor, and color changes.

Homogeneity test

A small sample was spread on a glass slide and examined for the presence of lumps or undispersed particles.

Viscosity test

The viscosity of the cream was measured using a Brookfield viscometer to assess its consistency and flow properties.

Spreadability test

A measured amount of cream was placed between two glass plates, and the spreading diameter was recorded.

pH Measurement

A digital pH meter was used to measure the cream's pH level, ensuring its suitability for skin application.

Cycling test

The cream was subjected to six cycles of alternating temperatures (4°C and 40°C) to evaluate its stability.

Antioxidant activity assay

The antioxidant potential of the formulated cream was evaluated through the DPPH (2,2-diphenyl-1-picrylhydrazyl) radical scavenging assay. A 0.1 mM DPPH solution was prepared in methanol and kept in a dark environment at 4°C. The cream samples were diluted in ethanol to obtain concentrations of 8, 16, 24, and 32 ppm.

During the assay, 2 mL of the prepared sample solution was combined with 2 mL of DPPH solution, vortexed for thorough mixing, and left to incubate in the dark for 30 minutes. The absorbance was then recorded at 517 nm using a UV-Vis spectrophotometer. The percentage of DPPH radical inhibition was determined using the appropriate formula:

$$\% \text{ Inhibition} = \frac{\text{Acontrol} - \text{Asample}}{\text{Acontrol}} \text{x100}$$

where $A_{control}$ represents the absorbance of the DPPH solution without the sample, and A_{sample} is the absorbance of the test sample.

Statistical analysis

All experiments were performed in triplicate, and the data were expressed as mean±standard deviation (SD). Statistical differences were analyzed using one-way ANOVA, followed by Tukey's post hoc test, with significance set at $p<0.05$. Data processing was conducted using SPSS software.

RESULTS AND DISCUSSION

Organoleptic evaluation

The organoleptic assessment of the Herba Glow cream formulations (F1, F2, F3) revealed a semi-solid texture across all samples. Formulations F1 and F2 exhibited an ivory white hue, whereas F3 presented a cream color. Notably, none of the formulations emitted any characteristic odor.

Homogeneity test

Evaluating the homogeneity of the cream formulations is crucial to ensure uniform distribution of active ingredients. All three formulations demonstrated satisfactory homogeneity, indicating consistent mixing and stability of the components. Homogeneity ensures that active compounds are evenly distributed, providing consistent therapeutic effects with each application. The uniformity observed in all formulations indicates effective mixing processes and stability of the emulsions, which is crucial for maintaining efficacy throughout the product's shelf life.

Viscosity measurement

The viscosity of a topical formulation is a key factor in influencing its application characteristics. The measured viscosities for F1, F2, and F3 were 8,280 cps, 8,560 cps, and 5,460 cps, respectively.

Table 1: **Cycling test results of Herba Glow cream.**

Formulation	Properties	Cycling test	
		Before test	After test
F1(5% Herba Glow)	Organoleptic	homogenous, odorless	homogenous, odorless
	Spreadability	7.5 cm	6.4 cm
	Viscosity	5460 cps	12900 cps
	pH	5.8	5.0
F2 (10% Herba Glow)	Organoleptic	homogenous, odorless	homogenous, odorless
	Spreadability	6.4 cm	5.8 cm
	Viscosity	8280 cps	14100 cps
	pH	6.3	5.5
F3 (20% Herba Glow)	Organoleptic	homogenous, odorless	homogenous, odorless
	Spreadability	6.3 cm	5.8 cm
	Viscosity	8560 cps	15200 cps
	pH	6.1	5.0

These variations suggest differences in the internal structure and consistency of each formulation. Viscosity influences the application, spreadability, and overall user experience of topical formulations. The observed viscosities suggest that F1 and F2 have a thicker consistency compared to F3. This variation can impact the rate of drug release and absorption. Earlier research has emphasized that viscosity is an essential factor influencing the stability and effectiveness of topical creams.

Spreadability test

The spreadability of a cream influences its ease of application and user experience. Under incremental loading, the spread diameters for F1, F2, and F3 were 6.7 cm, 6.4 cm, and 7.5 cm, respectively. These findings indicate that F3 possesses the highest spreadability among the tested formulations. Spreadability reflects the ease with which a cream can be applied to the skin, influencing user satisfaction and the effectiveness of the active ingredients. F3 exhibited the highest spreadability, which could enhance its application over larger skin areas with minimal effort. However, excessive spreadability might lead to thinner layers, potentially affecting the delivery of active compounds.

pH measurement

Maintaining an appropriate pH is essential for skin compatibility and product stability. The pH values recorded for F1, F2, and F3 were 5.8, 6.3, and 6.1, respectively, aligning with the skin's natural pH range. The pH of topical formulations should align with the skin's natural pH (approximately 4.5 to 6.5) to prevent irritation and maintain the skin barrier function. The initial pH values of all formulations were within this range, indicating suitability for skin application.

However, significant pH reductions observed after the cycling test suggest potential instability under temperature fluctuations, which could compromise product safety and efficacy.

Cycling test

The cycling test results data for the preparation are shown in Table 1.

Antioxidant activity of Herba Glow cream

Antioxidant testing was carried out by a UV-VIS spectrophotometer using three cream samples containing herbaglow active ingredients with different concentrations, namely 10%, 15% and 20%. The maximum DPPH wavelength obtained for measuring the antioxidant activity of herbaglow cream was 517 nm, with a standard solution absorbance value of 0.1969. The Inhibition Concentration (IC_{50}) is a key parameter used to measure antioxidant activity. This value represents the concentration of antioxidants required to suppress 50% of free radical activity. The antioxidant efficacy of the formulations was evaluated using the DPPH radical scavenging method. The percentage inhibition and corresponding IC_{50} values were as follows: F1**:** IC_{50}=9.853 ppm, F2: IC_{50}=2.346 ppm, and F3: IC_{50}=1.117 ppm (Table 2). Based on the results of the antioxidant activity test carried out on F1, F2 and F3 cream preparations, the highest percentage inhibition values were obtained, with IC_{50} values of 9.853 ppm, 2.346 ppm, and 1.117 ppm.

Table 2: **Antioxidant activity test results using the DPPH method.**

Formulation	Concentration Ppm	Absorbance	% Inhibition	IC_{50} Ppm
F1, Herba Glow cream 5%	8	0.1309	33.51	9.853
	16	0.1305	33.72	
	24	0.129	34.48	
	32	0.1239	37.07	
F2, Herba Glow cream 10%	8	0.1038	46.28	2.346
	16	0.0903	54.13	
	24	0.0792	59.77	
	32	0.0721	63.38	
F3, Herba Glow cream 20%	8	0.0824	58.15	1.117
	16	0.0742	62.31	
	24	0.0624	68.30	
	32	0.0618	68.51	

From the results it can be seen that the higher the concentration of herbaglow used, the higher the percentage inhibition and the smaller the IC_{50} produced. The antioxidant activity produced by Herba Glow cream is equivalent to vitamin C and E. According to Hasna (2017), the results of the anti-oxidant activity test using a UV-Vis vitamin E spectro-photometer obtained an IC_{50} of 7.15 µg/mL. According to Pratasik (2019) the comparison compound vitamin C has an IC_{50}<50 ppm, included in very active antioxidant activity[12].

As stated by Molyneux, a compound is considered to have very strong antioxidant activity when its IC_{50} is less than 50 ppm, strong when ranging between 50-100 ppm, moderate if between 101-150 ppm, and weak when the IC_{50} exceeds 150 ppm. From the literature, it is proven that Herba Glow cream has very strong antioxidant activity, and is equivalent to vitamin C because it has an IC_{50} of less than 50 ppm[13]. The antioxidant potential of the formulations was quantified by their IC_{50}, with lower values indicating higher activity. F3 demonstrated the most potent antioxidant activity (IC_{50}=1.117 ppm), followed by F2 and F1.

Limitations of the study

This study has several limitations including the lack of real-world environmental testing, long term stability evaluation, and *in vivo* assessment of antioxidant efficacy. Future research should include extended stability studies, additional antioxidant assay and human trials to validate the formulation's long-term effectiveness and commercial viability.

CONCLUSIONS

The study successfully formulated and evaluated the Herba Glow skincare cream, demonstrating favorable physicochemical properties and potent antioxidant activity. All formulations exhibited good homogeneity, appropriate viscosity, and acceptable pH levels before and after stability testing. Antioxidant analysis confirmed that higher concentrations of Herba Glow extract resulted in stronger radical scavenging activity, with F3 exhibiting the highest potency (IC_{50}=1.117 ppm). These findings suggest that Herba Glow cream has potential as an effective antioxidant skincare product.

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AUTHOR'S CONTRIBUTION

Tungadi R: writing original draft, methodology, investigation. **Putri FD:** formal analysis, data curation, conceptualization. Final manuscript was checked and approved by both authors.

DATA AVAILABILITY

Upon request, the accompanying author can furnish the empirical data used to bolster the findings of the study.

CONFLICT OF INTEREST

None to declare.

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