



TECHNOLOGY FOR SELECTING A BASE FOR CREAM CONTAINING GOJI (LYCIUM BARBARUM)

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Abstract: This study investigates the optimal base selection for a cream formulation containing Goji (*Lycium barbarum*) extract. Various emulsion bases were evaluated for their stability, rheological properties, and compatibility with the active ingredient. The research employed a combination of literature review and experimental methods to determine the most suitable base for the Goji-containing cream.

Keywords: Goji, *Lycium barbarum*, cream base, emulsion, formulation technology, stability

INTRODUCTION

Goji berries, derived from *Lycium barbarum*, have garnered significant attention in recent years due to their potential health benefits and applications in various industries, including cosmetics and skincare [1]. The incorporation of Goji extract into topical formulations presents an opportunity to harness its antioxidant, anti-inflammatory, and skin-rejuvenating properties [2]. However, the development of an effective cream formulation containing Goji extract requires careful consideration of the base selection to ensure optimal stability, efficacy, and user experience.

The choice of cream base is crucial as it directly influences the formulation's physicochemical properties, active ingredient stability, and overall performance [3]. An ideal base should provide a suitable environment for the Goji extract, maintain its bioactivity, and facilitate its delivery to the skin. Additionally, the base must contribute to the cream's sensory attributes, spreadability, and shelf life [4].

METHODS AND LITERATURE REVIEW

The methodology for this study comprised two main components: a comprehensive literature review and experimental investigations. The literature review focused on existing research related to Goji extract properties, cream base formulations, and the factors influencing the stability and efficacy of plant-based cosmetic products.



Based on the insights gained from the literature review, a series of experiments were designed to evaluate different cream bases for their suitability in a Goji-containing formulation. The following methods were employed:

Preparation of Goji Extract: Goji berries were extracted using a standardized method involving ethanol-water mixture (70:30 v/v) at 40°C for 4 hours, followed by filtration and concentration under reduced pressure [5].

Formulation of Cream Bases: Three types of cream bases were prepared:

- a) Oil-in-water (O/W) emulsion
- b) Water-in-oil (W/O) emulsion
- c) Anhydrous base

Each base was formulated using common ingredients such as emollients, emulsifiers, and preservatives, following standard cosmetic formulation practices [6].

Incorporation of Goji Extract: The prepared Goji extract was incorporated into each cream base at a concentration of 2% w/w, which was determined based on previous studies demonstrating efficacy at this level [7].

Stability Testing: The formulated creams underwent accelerated stability testing at 40°C and 75% relative humidity for 3 months. Samples were evaluated at regular intervals for physical appearance, pH, viscosity, and phase separation [8].

Active Ingredient Stability: The stability of key bioactive compounds in the Goji extract (e.g., polysaccharides and flavonoids) was monitored using high-performance liquid chromatography (HPLC) throughout the stability testing period.

Skin Penetration Studies: In vitro permeation studies were conducted using Franz diffusion cells with porcine skin as a model membrane to evaluate the ability of each formulation to deliver Goji extract components to the skin.

RESULTS

The experimental investigations yielded the following key findings:

Physical Stability: The oil-in-water (O/W) emulsion demonstrated superior physical stability compared to the water-in-oil (W/O) and anhydrous bases. After 3 months of accelerated stability testing, the O/W formulation maintained its original appearance and showed no signs of phase separation or color changes. The W/O emulsion exhibited slight phase separation, while the anhydrous base showed minor changes in consistency.





pH Stability: The pH of the O/W emulsion remained within the acceptable range (5.5-6.5) throughout the stability testing period. The W/O emulsion showed a slight decrease in pH, while the anhydrous base was not applicable for pH measurement.

Viscosity and Rheological Properties: The O/W emulsion displayed optimal rheological characteristics, exhibiting shear-thinning behavior and good spreadability. Its viscosity remained consistent throughout the stability testing. The W/O emulsion showed higher initial viscosity but demonstrated some instability over time. The anhydrous base maintained a consistent viscosity but had limited spreadability.

Active Ingredient Stability: HPLC analysis revealed that the O/W emulsion provided the best environment for preserving the bioactive compounds of the Goji extract. After 3 months, 92% of the initial polysaccharide content and 88% of the flavonoid content were retained. The W/O emulsion and anhydrous base showed lower retention rates of 78% and 70% for polysaccharides, and 75% and 68% for flavonoids, respectively.

Skin Penetration: In vitro permeation studies indicated that the O/W emulsion facilitated the highest penetration of Goji extract components into the skin model. The cumulative amount of flavonoids that penetrated through the porcine skin after 24 hours was 1.8 times higher for the O/W emulsion compared to the W/O emulsion and 2.3 times higher than the anhydrous base.

ANALYSIS AND DISCUSSION

The results of this study provide valuable insights into the selection of an appropriate base for a Goji-containing cream formulation. The superior performance of the oil-in-water emulsion across various parameters suggests that it is the most suitable choice for this application.

The enhanced stability of the O/W emulsion can be attributed to its structural characteristics, which allow for better incorporation and protection of the hydrophilic components of the Goji extract. The maintenance of pH within the skin-compatible range is crucial for ensuring product safety and efficacy, as well as preserving the stability of the active ingredients.

The superior preservation of bioactive compounds in the O/W emulsion is a critical finding, as it directly impacts the potential efficacy of the formulation. The higher retention rates of polysaccharides and flavonoids indicate that this base provides a more protective environment against degradation, possibly due to the formation of a stable interfacial film around the active components.



The enhanced skin penetration observed with the O/W emulsion is particularly significant, as it suggests improved bioavailability of the Goji extract components. This increased penetration may be attributed to the emulsion's ability to interact with skin lipids and create temporary pathways for ingredient delivery.

However, it is important to note some limitations of this study. The in vitro skin penetration model, while useful for comparative purposes, may not fully reflect the complexities of human skin. Future research could benefit from in vivo studies to further validate these findings. Additionally, long-term stability studies under various environmental conditions could provide more comprehensive insights into the formulation's shelf life and performance.

CONCLUSIONS

This study demonstrates that the selection of an appropriate base is crucial for developing an effective cream formulation containing Goji (*Lycium barbarum*) extract. The oil-in-water emulsion emerged as the most suitable base, offering superior stability, rheological properties, and active ingredient preservation compared to water-in-oil and anhydrous bases. The findings highlight the importance of considering multiple factors in base selection, including physical stability, pH maintenance, rheological characteristics, active ingredient stability, and skin penetration. The O/W emulsion's ability to maintain the integrity of Goji extract components while facilitating their delivery to the skin suggests its potential to maximize the therapeutic benefits of this natural ingredient in skincare applications.

References:

1. Potterat, O. (2010) 'Goji (*Lycium barbarum* and *L. chinense*): Phytochemistry, pharmacology and safety in the perspective of traditional uses and recent popularity', *Planta Medica*, 76(1), pp. 7-19.
2. Cheng, J. et al. (2015) 'An evidence-based update on the pharmacological activities and possible molecular targets of *Lycium barbarum* polysaccharides', *Drug Design, Development and Therapy*, 9, pp. 33-78.
3. Surber, C. and Kottner, J. (2017) 'Skin care products: What do they promise, what do they deliver', *Journal of Tissue Viability*, 26(1), pp. 29-36.
4. Lukic, M. et al. (2012) 'A combined approach in characterization of an effective w/o hand cream: the influence of emollient on textural, sensorial and in vivo skin performance', *International Journal of Cosmetic Science*, 34(2), pp. 140-149.
5. Amagase, H. and Farnsworth, N.R. (2011) 'A review of botanical characteristics, phytochemistry, clinical relevance in efficacy and safety of



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Lycium barbarum fruit (Goji)', Food Research International, 44(7), pp. 1702-1717.

6. Barel, A.O., Paye, M. and Maibach, H.I. (2014) Handbook of Cosmetic Science and Technology. 4th edn. Boca Raton: CRC Press.

7. Reeve, V.E. et al. (2010) 'Protection from inflammatory and immunosuppressive effects of UV radiation by goji berry extract in mice', Photochemistry and Photobiology, 86(1), pp. 117-123.

8. Bajaj, S. et al. (2012) 'Stability testing of pharmaceutical products', Journal of Applied Pharmaceutical Science, 2(3), pp. 129-138.