Development of cosmetic formulations containing pequi oil: rheological behavior, physical-mechanical and sensorial properties

Poster ID: 464

*KAKUDA, Leticia[1]; MAIA CAMPOS, Patrícia M.B.G, PhD[1]**
[1]Department of Pharmaceutical Sciences, School of Pharmaceutical Sciences of Ribeirão Preto, University of São Paulo, Ribeirão Preto, São Paulo, Brazil.

Introduction

The search for natural cosmetics has increased over the years. In this context, Brazilian biodiversity has the potential for application in developing innovative products. The oil extracted from *Caryocar brasiliense* Cambess, (pequi-oil) native to the Cerrado is known as an antioxidant due to its rich composition of secondary and primary metabolites. Thus, the study aims to develop a formulation containing 5% pequi-oil and evaluate the physical-mechanical and sensory properties.

Materials & Methods

Caryocar brasiliense Cambess
SisGen: A15D96E

Development of formulations

Vehicle

Vehicle + 5%of pequi oil

Texture profile

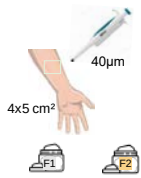
Texturometer®

Room temperature: 25°C

Rheological behavior

Rheometer®

Sensorial analysis



- 16 health participants, men and women;
- aged 20 to 29 years;

Questionnaire:

- perception after the application: spreadability and smoothness sensation
- perception after 5 minutes of application: hydration sensation, stickiness, and white residue.

Ethics Committee in Clinical Research at FCFRP/USP
(CAAE nº CAAE: 45620321.2.0000.5403)

Results & Discussion

All the rheograms showed a non-Newtonian pseudoplastic flow behavior, presenting a flow index lower than 1. F2 presented a significant ($p<0.05$) larger hysteresis area, which means that the viscosity recovers slowly after the shear than F1. Besides, the rheograms showed a reproducible rheological behavior, with no alterations or pick formations after 28 days of study at room temperature (Figure 1).

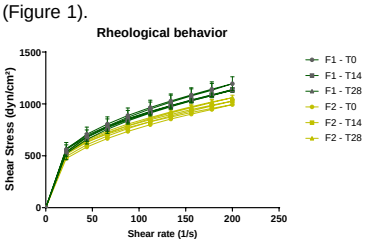


Figure 1. Rheograms of F1 (vehicle) and F2 (vehicle added with 5% of pequi oil) after 24 hours (T0), 14 (T14), and 28 (T28) days of preparation

The results of the texture profile showed that the F2 significantly ($p<0.05$)-reduces the texture parameters (Figure 2). However, the work of shear did not change between the formulations. Although, in the sensorial analysis, the F2 presented a good spreadability and increased the sensation of hydration, with no white residue or stickiness touch. The presence of oils in cosmetic products usually are known for the oily sensation that the formulations leave on the skin.

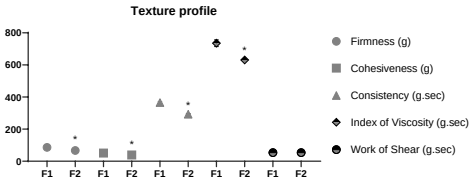


Figure 2. Texture profile of F1 (vehicle) and F2 (vehicle added with 5% of pequi oil) after 24 hours of preparation
*Significant difference compared to vehicle formulation ($p<0.05$)

Conclusions

The formulation added with 5% of the pequi oil showed stability after 28 days of analysis. The rheograms showed a thixotropic and pseudoplastic rheological behavior. Besides, the parameters obtained from the texture profile were significantly lower when compared to the vehicle, indicating that the oil interacts with the microstructure of the formulation. However, the parameter work of shear from the spreadability test showed that pequi oil's presence did not influence this parameter, which reflects directly in the sensorial performance. In addition, the formulation added with pequi oil did not change sensorial properties, showing a good spreadability, no oily or white residue, and the study participants perceived the moisturizing effect. Thus, pequi oil is an effective natural ingredient from Brazilian biodiversity to be applied in cosmetic products since it can bring significant benefits to a skincare formulation, such as improving sensorial properties and skin hydration.

References

César FC, Maia Campos PMBG (2020) Influence of vegetable oils in the rheology, texture profile and sensory properties of cosmetic formulations based on organogel. Int J Cosmet Sci, 42(5), 494-500.
Pegorin GSA, Marques MOM, Mayer CRM, Santos L (2020) Development of a Phytocosmetic Enriched with Pequi (*Caryocar brasiliense* Cambess) Oil. Braz. arch. biol. technol, 63.
Silva GT, Di Pietro Fernandes C, Hiane PA et al. (2020) *Caryocar brasiliense* Cambess. Pulp Oil Supplementation Reduces Total Cholesterol, LDL-c, and Non-HDL-c in Animals. Molecules, 25(19), 4530.
Gore E, Picard C, Savary G (2018) Spreading behavior of cosmetic emulsions: Impact of the oil phase. Biotribology, 16, 17-24.
Eudier F, Savary G, Grisel M, Picard C (2019) Skin surface physico-chemistry: Characteristics, methods of measurement, influencing factors and future developments. Adv. Colloid Interface Sci., 264, 11-27.
Calixto LS, Infante VHP, Maia Campos PMBG (2018) Design and characterization of topical formulations: correlations between instrumental and sensorial measurements. AAPS PharmSci. Commercial yoghurts. Braz J Food Technol, 16(1), 12-20.

Acknowledgements

We thank Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP; process number: 2021/11000-8) for providing financial support and Coordenação de Aperfeiçoamento de Pessoal de Nível – CAPES (financial code 001).