PRELIMINARY STUDIES FOR THE EXTRACTION OF CHIA MUCILAGE

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Introduction

The research and development of medicines aim to improve treatment adherence and minimize side effects without compromising efficacy, by using simple and low-cost alternatives. Matrix tablets are part of the controlled/modified release concept, providing slow, uniform, and continuous release, which offers several advantages over conventional tablets[1]. These systems typically use synthetic polymers, such as hydroxypropyl methylcellulose (HPMC). However, the interest in new excipients has grown in order to avoid incompatibilities and adverse reactions, especially with the development of biopolymer-based excipients[2][4].

Chia mucilage (*Salvia hispanica*), a biopolymer, has shown excellent retention capacity, gel, and film formation, in addition to being highly water-soluble and generating viscous solutions even at low concentrations. These characteristics make it a promising material for the formulation of such systems and other pharmaceutical products[3][4]. Studies have reported the influence of extraction conditions on mucilage yield[3][5][6]. It is described that higher temperatures result in better yields[3][5]. Similarly, the seed-mucilage separation process alters the physicochemical properties of the hydrocolloid, where greater viscosity leads to stronger molecular interactions and consequently greater swelling capacity[6].

This work aimed to conduct a preliminary study of the extraction parameters to standardize the process by evaluating yield and swelling capacity.

Material and Methods

The chia seed was purchased at the local market, and distilled water was used as the extracting solvent. The mucilage extraction was carried out in water for 60 minutes at 50°C under constant stirring, using a seed-to-solvent ratio of 1:30. The separation methods tested included vacuum filtration, microfiber cloth filtration, and ultrasonication, while the drying methods tested included oven drying and freeze-drying. The parameters evaluated were yield and swelling. The yield was calculated by dividing the mass (g) of the seed used in the extraction by the mass (g) of the mucilage obtained. For the swelling index, sufficient amounts of mucilage were weighed to reach approximately 1 mL in a 10 mL graduated cylinder. Water was then added until the volume reached 2 mL, and the mixture was gently stirred. The final volume was measured after a 24-hour period.

Results and Discussion

The highest yield obtained during the separation in the standardization stage was through ultrasonication (4.36%), while the lowest yield was with microfiber cloth filtration (1.14%), as shown in Table 1. Regarding swelling, there was no difference between the separation methods. As for drying, freeze-drying was chosen due to its higher reproducibility.

Amostra	Rendimento(%)
U1	4,36
FV1	3,12
FM1	1,14

Table 1: Results of Different Seed-Mucilage Separation Methods. Ultrasonicated (U1); Vacuum Filtration (FV1); and Filtration with Microfiber Cloth.

Conclusion

Chia mucilage demonstrated potential for retention and gel formation, suggesting that this material could be suitable for use in pharmaceutical formulations. The preliminary results of the extraction standardization will allow the optimization of this process, thereby providing a viable excipient with satisfactory yield.

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Bibliographic References

[1]Auton, ME; Taylor, KMG; Delineamentos de Formas Farmacêuticas. 4ª ed. Rio de Janeiro: Elsevier, 2016. cap 31.

[2] Prajapati, VD; Jani, GK; Moradiya, NG; Randeria, NP. Pharmaceutical applications of various natural gums, mucilages and their modified forms. Carbohydr Polym, 2013.

[3]Ramos, IFS; Fernandes, VL; Lucena, MA; Geronço, MS; et.al. Mucilagem de sementes de chia (Salvia hispanica L.): Um biopolímero emergente para aplicação industrial. Revista Brasileira de Desenvolvimento, 2022.

[4]Jania ,GK; Shahb, DP; Prajapatia, VD; Jainb, VC. Gums and mucilages: versatile excipients for pharmaceutical formulations. Asian Journal of Pharmaceutical Sciences, 2009.

[5]Campos, C; Santos, PP; Costa, TMH; Paese, K; et.al. Nanoencapsulation of chia seed oil with chia mucilage (Salvia hispanica L.) as wall material: Characterization and stability evaluation. Food Chemistry, 2016.

[6]Rocha, MS. Desenvolvimento de sistema de liberação modificada utilizando a mucilagem da semente de Linum usitatissimum L. (linhaça). Dissertação de Mestrado. Universidade Federal Fluminense. Niterói: Faculdade de Farmácia, 2017.