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EFFECT OF PURIFICATION ON THE FUNCTIONAL PROPERTIES OF PROTEINS OBTAINED FROM CHIA SEED WASTE

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Introduction. Recently, the valorization of food wastes has seen success in the production of different bioactive compounds including proteins, pigments, polyphenols, polysaccharides, and others. This process is mostly facilitated by microbial fermentation or chemical approach. Chia which is an herbaceous annual plant produces seeds which are rich in fibers (23 – 35%), proteins (15-20%), polyphenols, and polyunsaturated fatty acids (PUFA), mainly α-linoleic acids [1]. As such, has become a prominent candidate in the production of oils with functional properties. This has led to the increase in demand of the chia oil market, which in turn has led to the generation of large amounts of waste in the form of meal. Research has indicated the meal to be rich in proteins, however, key challenges such as the yield and purity implicates its production [2]. Therefore, the main of the study was to extract proteins from chia meal with good yield and prominent purity.

Methods. The study first involved the defatting of chia seed powder with hexane, after which proteins were extracted using the chemical method with HCl and NaOH and series of centrifugation. After extraction, proteins were purified using dialysis and chromatographic techniques and the composition of extracts compared to identify the purity. Also, the effect of purification on the functional properties such as solubility, emulsification stability, hydrophobicity, water- and oil-holding capacities, and foaming capacity and stability of proteins were studied. Proteins were also characterized using Fourier-Transform infrared (FT-IR), UV/Vis spectrophotometer, and dynamic light scattering (DLS).

Results. Preliminary results indicated the production of proteins from chia meal with a pronounced yield. The main composition of proteins included traces of carbohydrates, oils, and polyphenols. After purification on the other hand, the yield of proteins decreased, as well as other components. Nonetheless, the functional properties of the purified proteins were pronounced compared to the unpurified extract. Emulsification ability and stability was mainly due to the protein negative charges and its hydrophobicity which interacted with the positive ions on the oil interphase. Additionally, these proteins extracts showed significant peaks at 1653 and 1560 cm^{-1} from FT-IR analysis indicating the presence of amide I and II bonds which are characteristic of proteins.

Conclusion. This study contributes valuable insights into the valorization of chia meal for protein production, emphasizing tailored functional properties. Future investigations will delve into the production of bioactive peptides from these proteins and their assessment for potential biological activities.

References

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