

EFFECT OF ULTRASOUND PRETREATMENT ON BOVINE SERUM ALBUMIN AND TANNIC ACID INTERACTION AND ITS EFFECT ON IN VITRO PROTEIN DIGESTIBILITY

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The ultrasound has been used in food processing as an alternative to improve the functional properties of various proteins. Therefore, such processing can change the interaction between protein and antinutrients (AN). The tannic acid (TA) presents a diverse binding ability and are considered an AN due to its ability to form complexes with proteins, starch, and digestive enzymes. Thus, the aim of this work was to study the binding of tannic acid (TA) to bovine serum albumin (BSA) after ultrasound treatment and their influence on protein digestibility. The ultrasound was applied for 15 min at the frequency of 40 kHz (500 W; 30 °C) in solutions of BSA and TA at pH 3.0. Isothermal titration calorimetry (ITC) was used for determination of the thermodynamic parameters of the interaction between BSA and TA. The morphology of the complexes was analyzed by scanning electron microscopy (SEM). For the determination of in vitro protein digestibility (IVPD), it was used pepsin and pH 3.0 to simulate the gastric condition and pancreatic enzymes and pH 7.0 to simulate intestinal conditions. Results showed that ultrasound treatment increases the association constant of BSA and TA binding. Regarding the stoichiometry, it was observed that after ultrasound treatment a smaller amount of TA interacted with BSA. Similar values of enthalpy, entropy and Gibbs free energy were observed for both systems studied. The TA and BSA complexes treated with ultrasound presented a thinner thickness with a fragile aspect when compared with the samples without ultrasound treatment. Nevertheless, the size of the complexes was similar. Tannic acid in the molar ratio of 15:1 decreased in vitro protein digestibility of BSA (46% smaller than control sample). The ultrasound treatment in TA and BSA complexes increased the protein digestibility in 17%. The increase in IVPD and affinity of the binding after the ultrasound treatment can be explained by conformational changes in the protein. Besides, ultrasound can increase the exposition of sulfhydryl and hydrophobic groups of the protein changing its stability. The results show that the ultrasound treatment can be a promising technology for increasing the protein digestibility of foods that contain tannins. Nevertheless, there is a need to study

the effect of ultrasound in different proteins and conditions of pH, temperature, and ionic strength.

Palavras-chave: microcalorimetry, tannins, antinutrient, biodisponibility