Physicochemical properties of sesame cake protein isolates prepared by two different isolation techniques

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Sesame cake is the main by-product received from the cold press sesame oil extraction and is usually used as animal feed or fertilizer but, due to its high protein has the potential to be used as functional food ingredient. In this context, isoelectric precipitation (SCIP) and micellization (SCM) procedures were employed to obtain protein isolates from defatted sesame cake and compare their physicochemical properties. Protein purity was similar in both SCIP and SCM isolates (90.3±0.50% and 90.1±0.78%, respectively). Color of SCIP powders were darker (lower L* values) than SCM preparations probably due to the higher phenolics content of the former that are co-extracted upon alkaline extraction with this method. Protein solubility, examined in the range of pH=2.0-10.0, was higher for the SCM than SCIP isolate for pH<4.0 and pH>7.0, with both protein preparations exhibiting the lowest solubility at pH 5.0-6.0. Water retention and fat absorption capacity were higher for SCIP, which could be ascribed to protein conformational changes during protein isolation using this technique. On the other, hand, in vitro protein digestibility, which is an index to evaluate the nutritional quality of a food protein was found to be higher for SCM protein isolate than SCIP (58.30±6.1% and 33.40±3.6%, respectively). Foaming capacity and stability were dependent on pH and NaCl concentration in the aqueous phase. In general, SCM proteins exhibited higher foaming capacity than SCIP, whereas for both isolates, the foaming capacity increased with increasing NaCl concentration from 0-1.0 M. In general, the highest foaming capacity and stability was found at pH 2.0 and 10.0 for all examined NaCl concentrations. Concerning emulsifying capacity and stability, both isolates showed similar behavior, showing their lowest values at pH 6.0. Overall, both isolation protocols were proven efficient techniques for providing sesame protein isolates with promising functional and physicochemical properties. Comparative evaluation of these techniques indicates that the SCM isolate may be more suitable for industrial food applications and fulfilling consumers' nutritional requirements as it showed similar or in some cases improved functionalities than the SCIP preparation, such as higher solubility, foaming capacity, and protein digestibility.