PHYSICOCHEMICAL CHANGES, DIGESTIBILITY, AND ANTIOXIDANT ACTIVITY OF PROTEIN HYDROLYSATE SOUP UNDER SIMULATED GASTROINTESTINAL CONDITIONS

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Abstract

This study investigated the physicochemical characteristics, in vitro digestibility, and functional properties of protein hydrolysate essence soup from Buk-Siam Maejo hybrid catfish under simulated gastrointestinal conditions. The product was evaluated in terms of amino acid composition, storage stability, molecular breakdown, and antioxidant activity. The amino acid profile indicated the presence of essential amino acids, with glutamic acid, arginine, and lysine as major components. Shelf-life prediction based on an accelerated storage model (Q_{10}) suggested product stability of approximately 2 years at 30 °C. In vitro digestion revealed progressive protein degradation, with the degree of hydrolysis exceeding 90% after the intestinal phase. Molecular size distribution analysis indicated a reduction of peptides to sizes below 0.2 kDa, suggesting enhanced solubility and potential absorption. Total amino acid release increased significantly throughout digestion. In parallel, antioxidant activity (DPPH assay) increased markedly, reaching approximately 90% after complete digestion, indicating the release of bioactive peptides. Comparative evaluation demonstrated that the hydrolyzed protein system exhibited faster and more efficient degradation than non-hydrolyzed protein structures, highlighting the influence of pre-hydrolysis on structural accessibility and digestion behavior. Overall, the findings provide insight into the structural transformation, digestion kinetics, and functional properties of protein hydrolysate soup, supporting its application as a value-added protein system in processed food products.

Keyword: Protein hydrolysate, In vitro digestion, Digestibility kinetics, Bioactive peptides, Antioxidant activity, Physicochemical properties