Characterization of Acidic Tuna Protease and Its Application for Extraction of Tilapia Collagen Hydrolysate

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ABSTRACT

Thailand is a leading exporter of canned tuna globally. Many by-products are created during processing, including head, bone, blood and stomach. The stomach can serve as a promising source of pepsin, while collagen hydrolysate can be obtained as a new value-added product with high market value. The objectives of this study were to characterize pepsin from tuna stomachs and evaluate its application for extraction of collagen hydrolysate from tilapia skin. Pepsin from the stomachs of albacore tuna, skipjack tuna, and yellowfin tuna was characterized. Pepsin from all tuna species was extracted with phosphate buffer (pH 7) at 4°C for 3 h then mixed with 2 M acetic acid at 1:1 (w/v) for 30 minutes. The characterization of crude enzyme was determined. The optimum pH of all tuna pepsin was 2, and stable at pH2-3. Optimum temperature of all tuna pepsin was 50 °C, and it was stable at 10-50 °C. This enzyme responded to EDTA, urea, copper sulfate and magnesium sulfate. Albacore tuna (3.52±1.09 unit/ml), skipjack tuna (3.42±1.008 unit/ml), yellowfin tuna (3.51±0.29 unit/ml) and porcine pepsin (3.96±0.00 unit/ml) were applied for collagen hydrolysate extraction at 50 °C for 0-3 h. Degree of hydrolysis (%DH) of yellowfin tuna pepsin was highest (75.99±0.02%) at 50 °C for 1 h. Collagen hydrolysate showed antioxidant properties (DPPH, ABTS and FRAP). Yellowfin tuna pepsin can be applied in food supplement production as well to commercial porcine pepsin.

Keyword: Protease, Tuna pepsin, Collagen hydrolysate, Fish skin, Tilapia skin