Type I collagen from the skin of barracuda (sphyraena sp.) prepared with different organic acids: biochemical, microstructural and functional properties

ABSTRACT

This study was carried out to compare the extractability and characteristics of barracuda (Sphyraena sp.) skin collagen using various organic acids. Acetic-solubilized collagen (ASBS), lacticsolubilized collagen (LSBS) and citric-solubilized collagen (CSBS) yielded 6.77 g/100 g, 10.06 g/100 g and 8.35 g/100 g, respectively, and those yields were significantly different ($p < 0.05$). All acid solubilized collagens were considered as type I because of their two alpha chains (α1 and α2) detected in acrylamide gel after electrophoresis. Ultraviolet–visible (UV–vis) analysis confirmed that ASBS, LSBS and CSBS had similar absorption peaks (230.5 nm) and the results were in accordance with other fish collagens. Under infrared (IR) and X-ray diffraction (XRD) analysis, the triple helical structure of type I collagens extracted from barracuda skin was maintained. From a thermostability study, all type I collagens showed a higher maximum transition temperature (Tmax = 40.16 to 41.29 ◦C) compared to other fish skin collagens. In addition, the functional properties of the extracted collagens revealed the ASBS had higher water and oil absorption capacities than the CSBS and LSBS samples. The highest level of the emulsion ability index (EAI) (>200 m2/g) was detected under acidic conditions (pH 4), while lower EAIs were recorded under the alkaline (pH 10) and neutral treatments (pH 7). All type I collagens had a higher relative solubility (>60%) at a low pH test but the solubility level sharply decreased at a neutral pH. In addition to this, a lower concentration of NaCl (0–20 g/L) showed the higher percentage of solubility (>60%) while adding over 30 g/L of NaCl decreased solubility (>40%). From a microstructural test, all type I samples had an irregular and dense flake structure with random coiled filaments. Overall, collagen extracted from the barracuda skin may be applied as an alternative collagen from an industry perspective.