Enzymatic Hydrolysis of Ovotransferrin and the Functional Properties of Its Hydrolysates

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With the increase of human health concerns, egg white protein-derived bioactive peptides have great potential applications as nutraceuticals and pharmaceuticals. Ovotransferrin (OT) is a major egg white protein, which can be used to produce bioactive peptides. The objectives of this research were to produce functional peptides from OT using single enzyme treatments and to analyse the antioxidant and antimicrobial properties of the hydrolysates produced. Lyophilized OT was dissolved in distilled water at 20 mg mL^{-1} concentration, treated with protease, elastase, papain, trypsin, or α-chymotrypsin separately at 1% level and incubated for 0-24 hr with the optimal temperature and pH of each enzyme. The 15% SDS-PAGE images indicated that OT was completely hydrolyzed with protease, papain, trypsin, and α-chymotrypsin after 3 hrs, whereas elastase produced partially hydrolyzed products even after 24 hrs of incubation. Thus, hydrolysates obtained by incubating OT + protease (OTPro), OT + papain (OTPap), OT + trypsin (OTTrp) and OT + α-chymotrypsin (OTChy) for 3 hrs and OT + elastase (OTEla) for 24 hrs were selected as the best to analyse the functional properties. None of the OT hydrolysates exhibited antioxidant properties in oil emulsion. However, OTChy and OTEla had higher Fe^{3+}-chelating activities (1.06±0.88%, 1.25±0.24%, respectively) than the native OT (0.46±0.60%), but no significant difference was observed among the treatments. Although OT was reported to possess a strong antimicrobial property, the hydrolyzed products did not show any clear inhibition against bacteria at 20 mg mL^{-1} concentration. Therefore, overall results indicated that the investigated single-enzyme treatments were not effective to produce peptides with antioxidant and antibacterial activities from OT. Hence, further research is needed to produce peptides with different functions from OT using single enzymes or their combinations.

Keywords: Antioxidant, Bioactive peptides, Fe^{3+}-chelating activity, Lyophilization, Protease