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Entitled

MULTIFUNCTIONAL BIOACTIVE PROPERTIES OF PLANT-BASED PROTEIN HYDROLYSATES DERIVED FROM CITRULLUS COLOCYNTHIS (BITTER APPLE) AND PENNISETUM GLAUCUM (PEARL MILLET) SEEDS

by

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Abstract

Protein hydrolysates (PH) from plant-based proteins (PBP) are gaining importance due to the availability, sustainable and economical production when compared to their animal origin counterpart. Therefore, this study explored under-utilized PBP hydrolysates derived from Bitter apple (BA) and Pearl millet (PM) and determined their bioactive properties. Enzymatic hydrolysis (EH) of BA and PM proteins was carried out by enzymes such as alcalase (A), bromelain (B), and chymotrypsin (C) for 3, 6, and 9 h to produce PH possessing high bioactive properties. Highest degree of hydrolysis (DH) was reported in BAPH generated with C9 (87.8 %) whereas for PMPH highest DH was found in hydrolysate generated by B9 (92.4%). In terms of antioxidant activities of BAPH, the highest 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging activity (65.7mmol TE/g), ferric-reducing antioxidant power (FRAP) (192.5 mmol TE/g), and 2, 2'-Azino-bis (3-ethylbenzothiazoline-6-sulfonic acid) (ABTS) radical scavenging activity (525.2 mmol TE/g) values were recorded by C6, A3, and C6 derived BAPH, respectively. Whereas for PMPH, C9, B9, and A9 reported to have the highest DPPH (222.3 mmol TE/g), FRAP (585.7 mmol TE/g), and ABTS (976.0 mmol TE/g) activities, respectively. The BAPH-B6 and BAPH-A3 samples have exhibited the highest α -Glucosidase (GLU) and dipeptidyl-peptidase-IV (DPP-IV) inhibitory activities with IC_{50} values of around 13.27 μ g/ml and 38.57 μ g/ml, respectively, while for α -amylase (AMY) inhibition, BAPH-A6 demonstrated IC_{50} of 17.0 μ g/ml. For PMPH, B9 and A9 derived hydrolysates showed GLU, DPP-IV, and AMY IC_{50} inhibitory values of 6.71, 3.44, and 5.06 μ g/ml, respectively. *In-vitro* anti-obesity activities of BAPH and PMPH were evaluated using the pancreatic lipase (LIP) and cholesteryl esterase (CE) inhibitory assays. C6 derived BAPH showed the highest activities with IC_{50} values of 14.12 and 13.68 μ g/ml for LIP and CE inhibition, respectively. Moreover, for PMPH, A9 has reported the highest LIP and CE inhibitory activities with IC_{50} values of 3.46 and 3.61 μ g/ml, respectively. In conclusion, significant increase in the bioactive properties of BA and PM proteins upon EH has been observed in comparison to unhydrolyzed proteins which indicates the enhanced bioactive properties of PH derived from BA and PM proteins.

Keywords: Protein hydrolysates; plant-based proteins; bioactive properties; DPP-IV, antioxidant activities; pearl millet; bitter apple.