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Health Benefits from Functional Protein Hydrolysates of Marine Resources

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ABSTRACT

Marine ecosystem has abundance of living organisms and plays a vital role in our ecosystem and food-chain. Some food from marine source was consumed due to its nutritional benefits. In fish and seafood processing, the by-products which include heads, frames, fins, skin, shells and viscera were discarded. Selected by-products were used as fish meal and animal feed, while others treated as wastes resulting in environmental pollutions. These by-products and wastes however have potentials to be converted into beneficial functional food ingredients. In addition, functional food ingredients can produce value added food products as well as for human health benefits. Innovations such as the advancement of biotechnology and food processing methods are useful, whereby the by-products inherited with significant amount of protein-containing sequences of amino acids can be converted into functional bioactive protein hydrolysates for the health and food industries.

Keywords: Protein hydrolysate, Marine, Food waste, Bioactive component

INTRODUCTION

Protein hydrolysates are usually prepared using enzyme reaction according to specific proteases at controlled pH and temperature. The important bioactivities of potential peptides produced and contribution of essential amino acids have been scientifically proven. Additionally, marine biodiversity can be useful to provide nutritional benefits and functional ingredients for food industries [1].

From the total global fisheries (wild capture fish and aquaculture), usually only 50-60% of total marine landing is used for direct human consumption and a vast proportion of discard was used for the production of high protein animal feed, fish meal and fertilizer [2]. Fish protein hydrolysates (FPH) are prepared by digestion of fish meat with proteolytic enzymes and have been considered as an alternative approach for converting underutilized fish biomass into edible protein products [3].

Malaysia is well known in Asia Pacific as a producer of premium value-added seafood products, such as Abalones, Sea Cucumbers and Lobsters, for domestic and overseas market; exporting to East Asia, Australia, New Zealand, North America and Europe. In recent years, due to high demand of such seafood products worldwide, local resources have become scarce, and many of these items had to be outsourced from other countries in the Asia Pacific and others. Among the seafood items, Sea Cucumbers are one of those popular seafood products in the Chinese community, fetching with reasonable high pricing.

A current major issue with sea cucumber is the waste generated in the process, resulting up to 30-40% waste in the form of visceral organs, which might pose as environmental issue to the community, such as causing pollution and contamination, if not managed properly. Sea Cucumber internal Organs (SCiO) and washed water, containing soluble components usually were discarded as wastes in the industry; the wastes have considerable amount of nutritional components.

FUNCTIONAL COMPOUND FROM MARINE RESOURCES

Protein hydrolysate can have good functional properties and contribute to water holding, texture, gelling, whipping and emulsification properties when added to food. In addition to nutritional composition and depending on the amino acid sequence, they may be involved in various biological functions such as antioxidant, anti-hypertension, immunomodulatory, anti-thrombotic, anti-diabetic, anti-cancer and antimicrobial activities [4].

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In example, *Cucumaria frondosa*, also known as orange-footed sea cucumber, which belonged to the class of Holothuroidea, is rich in bioactive compounds, including saponin, phenolics, condroitin sulphate, collagen, amino acid, vitamins and minerals. These bioactive compounds exhibit numerous medicinal benefits and health functions, making the sea cucumber one of the important components in marine ecosystem [5].

Proximate analysis showed that sea cucumber internal organ (SCiO) consists of 81.5% moisture followed by protein (9.3%), fat (4.1%), ash (2.8%) and carbohydrate (2.3%) with no cholesterol detected. Dried SCiO showed high crude protein (50.27%) and fat (22.16%) contents. Utilization of sea cucumber by-product is beneficial not only to the environment but also can be profitable to the industry as it can be applied as a food ingredient, animal nutrition, nutraceutical or in cosmetic product and further benefits for health and well-being.

HEALTH BENEFITS FROM FUNCTIONAL PROTEIN HYDROLYSATE

Oxidative stress, on the other hand, occurs when there's an imbalance between free radical activity and antioxidant activity. When there are more free radicals present than can be kept in balance by antioxidants, the free radicals can cause damage to cells and tissues in the body and can further lead to a vast number of diseases over time [6]. Evidences show that oxidative stress can be responsible in the onset and/or progression of several diseases (i.e., cancer, diabetes, metabolic disorders, atherosclerosis and cardiovascular diseases) [7].

Antioxidants can reduce the ROS species by donating a hydrogen atom or electrons to radicals formed and reduce radical intermediates from the medium. The antioxidant-pro-oxidant balance in human body can change due to factors, such as fatigue, environmental pollutants, excessive caloric intake, and high fat diets and with the progression of age. In a long term progression, synthetic antioxidant may lead to toxicity in the body. Hence, protein hydrolysates with proven and promising antioxidant properties can be a replacement to the synthetic antioxidant to control various oxidative processes in the human [3,8].

Besides that, fermented food also had known for having several health benefits. Fermented foods have been generally consumed among the Asian people, especially Southeast Asian. During food fermentation, bioactive peptides can increase and enhances the biological properties of the food products [9,10]. Studies by Je et al. [11] have showed that fermented blue mussel sauce contained angiotensin converting-enzyme (ACE) inhibitory bioactive peptides. In another study, antioxidant activity of fermented fish products has been investigated for various products such as blue mussel sauce [12], fermented fish muscle sauce [13], hydrolyzed and fermented minced mackerel [14]. These studies demonstrated that the functional protein hydrolysates can be used to promote health benefits while exploring the diversity of marine resources and reduce food waste while promoting clean environment that is free from waste pollution [15].

REFERENCES

1. Vijaykrishnaraj M, Prabhasankar P (2015) Marine protein hydrolysates: Their present and future perspectives in food chemistry - A review. RSC Adv 5: 34864-34877.
2. Norris R, Harnedy PA, FitzGerald RJ (2013) Antihypertensive peptides from marine sources. Bioactive compounds from marine foods: Plant and animal sources, pp: 27-56.
3. Najafian L, Babji AS (2012) A review of fish-derived antioxidant and antimicrobial peptides: Their production, assessment and applications. Peptides 33: 178-185.
4. Shahidi F, Ambigaipalan P (2015) Novel functional food ingredients from marine sources. Curr Opin Food Sci 2: 123-129.
5. Mamelona J, Saint-Louis R, Pelletier É (2010) Nutritional composition and antioxidant properties of protein hydrolysates prepared from echinoderm by-products. Int J Food Sci Technol 45: 147-154.
6. Pizzino G, Irrera N, Cucinotta M, Pallio G, Mannino F, et al. (2017) Oxidative stress: Harms and benefits for human health. Oxid Med Cell Longev.
7. Roberts CK, Sindhu KK (2009) Oxidative stress and metabolic syndrome. Life Sci 84: 705-712.
8. Daud NA, Babji AS, Yusop SM (2015) Effects of enzymatic hydrolysis on the anti-oxidative and anti-hypertensive activities from red tilapia fish protein. J Nutr Food Sci 5.
9. Najafian L, Babji AS (2018) Fractionation and identification of novel antioxidant peptides from fermented fish (pekasam). J Food Measurement Characterization 12: 2174-2183.
10. Najafian L, Babji AS (2019) Purification and identification of antioxidant peptides from fermented fish sauce (Budu). J Aquatic Food Product Technol 28: 14-24.
11. Je JY, Park PJ, Byun HG, Jung WK, Kim SK (2005). Angiotensin I converting enzyme (ACE) inhibitory peptide derived from the sauce of fermented blue mussel, *Mytilus edulis*. Bioresour Technol 96: 1624-1629.
12. Jung WK, Rajapakse N, Kim SK (2005). Anti-oxidative activity of a low molecular weight peptide derived from

the sauce of fermented blue mussel, *Mytilus edulis*. Eur Food Res Technol 220: 535-539.

13. Rajapakse N, Mendis E, Byun HG, Kim SK (2005) Purification and *in vitro* anti-oxidative effects of giant squid muscle peptides on free radical-mediated oxidative systems. J Nutr Biochem 16: 562-569.
14. Yin LJ, Lu MC, Pan CL, Jiang STS (2005) Effect of Monascus fermentation on the characteristics of mackerel mince. J Food Sci 70: S66-S72.
15. Elmadfa I, Meyer AL (2008). Body composition, changing physiological functions and nutrient requirements of the elderly. Ann Nutr Metab 52: 2-5.