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Evaluation of Functional Properties of Protein Hydrolysate from the Fresh Water Mussel Lamellidens marginalis for Nutraceutical Therapy

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Abstract : High incidences of Protein Energy Malnutrition as a consequence of low protein intake are quite prevalent among the children in developing countries. Thus prevention of under-nutrition has emerged as a critical challenge to India's developmental Planners in recent times. Increase in population over the last decade has led to greater pressure on the existing animal protein sources. But these resources are currently declining due to persistent drought, diseases, natural disasters, high-cost of feed, and low productivity of local breeds and this decline in productivity is most evident in some developing countries. So the need of the hour is to search for efficient utilization of unconventional low-cost animal protein resources. Molluscs, as a group is regarded as under-exploited source of health-benefit molecules. Bivalve is the second largest class of phylum Mollusca. Annual harvests of bivalves for human consumption represent about 5% by weight of the total world harvest of aquatic resources. The freshwater mussel Lamellidens marginalis is widely distributed in ponds and large bodies of perennial waters in the Indian sub-continent and well accepted as food all over India. Moreover, ethno-medicinal uses of the flesh of Lamellidens among the rural people to treat hypertension have been documented. Present investigation thus attempts to evaluate the potential of Lamellidens marginalis as functional food. Mussels were collected from freshwater ponds and brought to the laboratory two days before experimentation for acclimatization in laboratory conditions. Shells were removed and fleshes were preserved at- 20oC until analysis. Tissue homogenate was prepared for proximate studies. Fatty acids and amino acids composition were analyzed. Vitamins, Minerals and Heavy metal contents were also studied. Mussel Protein hydrolysate was prepared using Alcalase 2.4 L and degree of hydrolysis was evaluated to analyze its Functional properties. Ferric Reducing Antioxidant Power (FRAP) and DPPH Antioxidant assays were performed. Anti-hypertensive property was evaluated by measuring Angiotensin Converting Enzyme (ACE) inhibition assay. Proximate analysis indicates that mussel meat contains moderate amount of protein (8.30±0.67%), carbohydrate (8.01±0.38%) and reducing sugar (4.75±0.07%), but less amount of fat (1.02±0.20%). Moisture content is quite high but ash content is very low. Phospholipid content is significantly high (19.43 %). Lipid constitutes, substantial amount of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) which have proven prophylactic values. Trace elements are found present in substantial amount. Comparative study of proximate nutrients between Labeo rohita, Lamellidens and cow's milk indicates that mussel meat can be used as complementary food source. Functionality analyses of protein hydrolysate show increase in Fat absorption, Emulsification, Foaming capacity and Protein solubility. Progressive anti-oxidant and anti-hypertensive properties have also been documented. Lamellidens marginalis can thus be regarded as a functional food source as this may combine effectively with other food components for providing essential elements to the body. Moreover, mussel protein hydrolysate provides opportunities for utilizing it in various food formulations and pharmaceuticals. The observations presented herein should be viewed as a prelude to what future holds.

Keywords : functional food, functional properties, Lamellidens marginalis, protein hydrolysate
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