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Potential Development of Value-Added Fishery Products in Underutilized and Commercial Fish Species: Comparative Study of Lipid Quality Indicators

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Abstract In this study, proximate and fatty acid composition in the edible flesh of eight underutilized and five commercial freshwater fish species were compared in order to evaluate the potential of these fish for development of functional value-added fishery products. The lipid content (% dry weight basis) of investigated fish species ranged from 3.44 to 9.25 in underutilized and 3.73–7.68 in commercial species. In comparison with underutilized fish species, commercial species had higher levels of protein ($P < 0.05$). The high proportion of EPA+DHA was found with Goldfish (524 mg/100 g flesh), Wels (422 mg/100 g flesh), and Crucian carp (354 mg/100 g flesh), all of which belonged to underutilized group. All studied fish (save Lenkoran) showed values higher than the minimum recommended DHA/EPA value (0.45). The ratios of n-6/n-3 found in this study were much lower (save Goatfish) than those cited as a harmful value (4.0 as the maximum value). The PUFA/SFA value of the present fish samples was higher at 1.57 for Goatfish, 1.02 for Lenkoran, 0.68 for Wels, all of these fish belonging to the underutilized group. The highest atherogenic and thrombogenicity index values were generally obtained for commercial species. It seems in respect of comparability of these lipid quality indicators, the underutilized fish species could be highly recommended as an important source of polyunsaturated fatty acids and Max-EPA products for humans consumption.

Keywords Fish species · Lipid quality · Fatty acid composition · Underutilized fish · Commercial fish

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Introduction

Fish has turned into a favorite foodstuff due to having high-quality proteins, nutritional vitamins, and essential ω3 polyunsaturated fatty acids (PUFA) [1, 2]. Epidemiological, clinical and nutritional studies have demonstrated that consumption of foods rich in PUFA has beneficial effects in the alleviation of various clinical disorders including cardiovascular disease, diabetes, obesity, arthritis, asthma, depression, hyperactivity and some types of cancer [2–4]. Taking these facts into account, all attempts to reduce the risk of the above-mentioned diseases, especially cardiovascular diseases, emphasize the importance of an increased consumption of fish or fish products, which are rich in PUFA of the ω3 family and poor in PUFA of the ω6 family [5, 6].

The rapid growth of the world's population and the improvement in people's living standards have placed a greater demand on the supply of fish as food [7–9]. Furthermore, the overexploitation or depletion of the world's most valuable fish stocks and diminishing catch of preferred species have contributed to an imbalance in supply and demand of fishery products in several countries [9]. Although, fish farming is being considered as the best option to make preferred fish species available to the consumers, aquaculture has failed to meet the rising demand for fish [8, 9]. With consideration of these facts, although, the supply of several commercially important fish species is dwindling, significant numbers of available fish species remain underutilized in human food [10]. Some of these species, still being underused, hold the potential of being human food and may also be exploited as representing a major source of lipids and fatty acids [10].

The global trend in underutilized fish and the need for their better utilization for human consumption have

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