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Nutrient quality of 22 important coldwater fish species and their potential contribution to human nutrition

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Nutrient quality of 22 important coldwater fishes preferred by the people of upland region in their diet was analyzed and their potential contribution to human nutrition was evaluated. *Tor putitora, N. hexagonolepis, O. mykiss, S. richardsonii* and *C. carpio* were examined for muscle fatty acid and amino acid composition. All the fish species recorded excellent amounts of n-3 fatty acids (8.69–21.48%) and the n-3/n-6 ratio ranged from 0.7 to 4.98. The amino acid score calculated based on the WHO protein standard indicated good quality proteins. Limiting amino acids such as lysine, methionine and cysteine occurred at levels higher than or marginally lower than the recommended amino acid level. Six small indigenous fish species namely *M. aral, Setipinna phasa, C. garua, A. morar, B. bendelisis* and *S. semiplotus* were subjected to muscle nutrient quality. Protein and lipid in all six fishes were found ranging from 15.65 (*S.phasa*) to 20.88% (*C. garua*) and 2.91 (*C. garua*) to 13.23% (*S.phasa*) respectively. Among the fatty acids, sum of n-3 PUFAs was high in *S. semiplotus, S. phasa* and *B. bendelisis*, and lower in *C. garua* and so was in n-3/n-6 ratio. In most of these fishes, with slight exception, the profiles of macro minerals reveals the abundance trend, as potassium>calcium> sodium, while the trend for micro minerals was iron>zinc> manganese. In terms of dietary mineral contribution, *M. aral* and *B. bendalisis* showed best dietary potential for Ca and S. phasa and *M. aral* contributed for Fe. Also while analyzing the muscle composition of *L. dero, L. dyocheilus, S. sanguina, B. bendelisis, G. mullya, L. pangusia*, the important food fishes in Himalaya recorded crude protein levels ranged from 16-20%, crude fat 9.60-1.54%, moisture content 71-78% and ash 3.5-0.99%. Maximum concentration of potassium was found in *L. dero* followed by *L. pangusia*. Selenium was abundant in all the experimental fishes. Proximate composition, total fat, cholesterol, triglyceride, mineral and fatty acids profile of the flesh of five snow trout (*S. niger, S. progastus, S. plagiostomus, S. curvifrons* and *S. esocinus*) were also analyzed in the present study. SFA, MUFA, PUFA content were ranging from 57.47-66.06%, 19.44-31.66% and 10.54-14.51%. In SFA, palmitic acid (C16:0) is predominant followed by myristic acid (C14:0). Oleic acid (C18:1n9) was higher in *S. plagiostomus* (16.93%) and *S. esocinus* (13.61%) while palmitoleic acid (C16:1n7) was principal MUFA in *S. niger* (16.49%) *S. progastus* (13.66%), and *S. curvifrons* (14.34%). The dominant n-6 PUFA were linolenic acid (C18:3n6), linoleic acid (C18: 2n6) and arachidonic acid (C20:4n6). The DHA values are higher than EPA. The n-6/n-3 ratio ranged from 2.135-4.167. Phosphorus was maximum (5800-8300 mg/kg) followed by potassium (4500-7000 mg/kg), calcium (3500-4300 mg/kg), sodium (700-1800 mg/kg) and magnesium (700-1500 mg/kg). Trace mineral contents (mg/kg muscle) were observed 114.48-125.97 (Fe), 26.38-64.5 (Zn), 4.34-16.19 (Mn) and 7.16-18.11 (Cu). The above results infer that all the studied fishes are having excellent nutrient qualities in terms of protein, PUFA and selected micro and macro minerals which are beneficial to human health.

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