
Database on nutritional composition of food fishes from India

Food is an important component of public health as the quality and quantity of food components greatly influence the health status of the consumers¹. Therefore, for developing and implementing effective dietary interventions to improve nutrition at the community and population level, it is important to know the nutritional situation of the target group², which requires the evaluation of quality and quantity of the food items consumed through food composition analysis.

The food composition analysis data are the basis of food-based dietary guidelines for healthy nutrition². The importance of such information has been understood worldwide and bulk amount of food composition data have been compiled in the form of on-line databases. Some of the important interna-

tional databases include International Network of Food Data Systems (INFOODS; <http://www.fao.org/infoods/infoods/en/>), European Food Information Resource (EuroFIR; <http://www.eurofir.org/>), Nutrient Database for Standard Reference-US Department of Agriculture (<http://ndb.nal.usda.gov/>), Nutrition Coordinating Center University of Minnesota, USA (<http://www.ncc.umn.edu/>), etc. While INFOODS is a worldwide network of food composition experts aiming to improve the quality, availability, reliability and use of food composition data, EuroFIR AISBL draws together the best available food information globally from 26 compiler organizations in Europe, Australia, USA and Canada (FoodEXplorer) as well as validated information about bioactive

compounds. Such databases provide information on nutrient composition of food components to dieticians and clinicians for their inclusion in clinical nutrition. These databases are also helpful in creating awareness among the consumers and increase the economic importance of food components and provide standardized calculation procedures that are required for international studies on nutrition and disease to calculate nutrient intake across countries.

Fish is an important component of human diet and is a rich source of quality animal proteins that are readily digestible and contain the dietary essential amino acids in quantities that correspond to human requirements^{3,4}. Fish is one of the cheap sources of quality animal proteins and availability and affordability is better

Nutrient Profiling And Evaluation Of Fish As A Dietary Component
Outreach Activity Consortium # 3
Fisheries Science Division
Indian Council Of Agricultural Research

Welcome

About Outreach Activities
 The 'Outreach Activities' are research initiatives which were taken up by the Indian Council of Agricultural Research (ICAR) under the XI Five Years Plan. These projects were meant for focusing attention in certain key areas of research that cut across the mandates of more than one institute. These 'Outreach Activities' functioned in a Consortium mode, led by a 'Lead Institute' in active partnership with other 'Participating Institutes'. Three 'Outreach Activities (Consortium Projects)' were initiated by the Fisheries Division of ICAR. These are different from other projects; these are technically independent and spread over the participating institutes in consortium mode and are monitored by the Fisheries Division, ICAR. There is a Coordinator and Co-Coordinator to coordinate, implement, monitor and report the project activities.

Outreach activity # 1
Fish Feeds
 (Lead Institute CIFA, Bhubaneswar)

Outreach activity # 2
Fish Genetic Stocks
 (Lead Institute NBFGR, Lucknow)

Outreach activity # 3
Nutrient Profiling and Evaluation of Fish as a Dietary Component
 (Lead Institute CIFRI, Barrackpore)

Background of Outreach Activity #3
 Fish is one of the cheapest sources of animal protein and is widely recognized as a health-food owing to its richness in essential amino acids, minerals and trace elements. Marine fishes are rich in fats and oil (PUFAs, polyunsaturated fatty acids) PUFAs, especially the omega-3 PUFAs, EPA and DHA, consumption has various health benefits. It helps in preventing cardio-vascular diseases (CVD) in adults, age-related macular degeneration (AMD), dementia and mood disorders in elderly population and attention-deficit hyperactivity disorder (ADHD) and childhood asthma in pediatric population. Small indigenous fishes (SIFs) are nutrient dense and help in preventing micronutrient deficiency. Low birth weight (LBW) and stunted growth are anthropological and social problems in the South-East Asian countries. Marine fish consumption has been reported to prevent the low birth weight problem. India has vast marine, brackish and fresh water resources and has a rich fish biodiversity. Nutrient compositions of fish vary with species, size and season as well as habitat and production systems. However, the nutrient compositions with respect to such variables have not been properly recorded. Hence, there is the need to document the nutrient profiles in terms of proximate composition, amino acids and fatty acids profiles, mineral and vitamin profiles for the common edible species available in the country. This would enable us in appreciating the true health value of fish and help in designing fish-based 'dietary guidelines' to combat preventable human diseases. Therefore, a nation-wide survey is envisaged to find out the fish availability, fish consumption rate and pattern in different sections of the society, especially in fisherman communities and coastal population to correlate the fish intake and low birth weight. A database will be generated with such information that would help the scientists, dieticians, food manufacturing companies, policy makers to take decision on profile. Therefore, a nation-wide survey is envisaged to find out the fish availability, fish consumption rate and pattern in different sections of the society, especially in fisherman communities and coastal population to correlate the fish intake and low birth weight. A database can also be generated with such information that would help the scientists, dieticians, food manufacturing companies, policy makers to take decision on manufacturing and valuation of fish food products and also for consumer guidance. This will also help in prioritization of species for commercial exploitation.

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Figure 1. Homepage of database on 'Nutritional composition of food fishes from India' (<http://www.cifri.res.in/outreach/>).

for fish in comparison to other animal protein sources. Thus, fish can go a long way in eradicating the protein deficiency diseases prevalent among 870 million people in the world suffering from chronic protein malnutrition⁵. Fish is considered as a health food owing to its oil which is rich in polyunsaturated fatty acids (PUFAs), especially the omega-3 PUFAs eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA)^{6,7}. It is well established that these omega-3 PUFA rich fish oils have a number of therapeutic properties and they are reported to play important roles in preventing childhood asthma and attention deficit hyperactivity disorder (ADHD) in paediatric population; cardiovascular diseases (CVD), hyperlipidaemia, hypertension, atherosclerosis in adults and dementia and age-related macular degeneration (AMD) in the geriatric population. Besides being a rich source of quality protein and oil, fish especially the small indigenous ones, are micronutrient-dense

and can play a pivotal role in eradication of micronutrient deficiency-related diseases prevailing mostly in the developing and underdeveloped countries⁸. In the present-day world, more and more people are becoming health conscious and want to know about the composition of the food they consume. This is particularly important for commodities like fish, as there are large varieties of fish available from a number of ecological habitats which vary in their composition. Understanding the biochemical composition of food is important to determine its nutritive value, which in turn is needed for harnessing fish to its fullest extent to provide nutritional security. Generation of such information bears more importance in countries like India, which harbour a rich fish biodiversity and fish is an important component of the daily diet.

Complete nutritional information on different food fishes would enhance their utility in clinical nutrition and help in issuing dietary guidelines, and thus could

contribute significantly to nutritional food security. However, dedicated nutrient databases comprising nutrient composition of different fish species are scarce and such information is available for a limited number of fish species. Keeping this in the backdrop, nutrient profiles of food fishes from India, from different habitats across the country, have been extensively studied in consortium-mode by the research institutes under the Fisheries Science Division, Indian Council of Agricultural Research as an 'outreach activity'. The large nutritional data generated under this outreach programme have led to the designing and development of a database, i.e. 'Nutritional composition of food fishes from India' (<http://www.cifri.res.in/outreach/>; Figure 1). The database runs LAMP (Linux, Apache, MySQL and PHP) technology at the front end, MySQL at the back end and the PHP is used as a server script⁹.

The main feature of the database is information on food fishes in terms of proximate composition, amino acid, fatty acid, mineral and fat-soluble vitamin. The fishes included in the study belong to different habitats like freshwater, brackish water, marine and coldwater. The database has an in-built knowledge-base which provides information on the richness of different fish species in different food components which can be helpful for their inclusion in dietary counselling by physicians⁹. Besides the nutritional data, information on standard international protocols followed to generate the information and other technical aspects is also available. It archives the publications including research bulletins, monographs, folders and research articles which serve as the original sources of information.

This database is the first of its kind on fish-food data in the country and is envisaged to serve as a repository of all such nutritional information on different food-fish species. This would also serve as a knowledgebase for different clientele groups, including physicians, nutritionists, planners and consumers to increase the utility of fish as a health food and in clinical nutrition as well. The nutritional information generated could also be helpful in prioritization of fish species for aquaculture depending upon their associated nutritional values. By now nutritional information on ~50 important food fishes has been generated;

however, 100 species have been targeted to be studied by 2017 in this on-going work.

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ACKNOWLEDGEMENTS. This work was funded by the Indian Council of Agricultural Research (ICAR), New Delhi, under the Fisheries Science Division Outreach Activity on Nutrient Profiling and Evaluation Fish as a Dietary Component (ICAR-FSD-OA #3). It was presented in the 11th International Food Data Conference (IFDC 2015) jointly organized by the INFOODS, FAO and the National Institute of Nutrition – Indian Council of Medical Research at NIN, Hyderabad, India during 3–5 November 2015 (Abstract #S5-O2). We thank the Directors of the participating institutes under the Fisheries Science Division, ICAR for providing the necessary facilities and support.

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