Nutritional labelling of some commercially important fishes and shrimps from the retail markets of Cochin

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Fishery resources have been considered as an excellent source of dietary protein, minerals and vitamins. Fats and oils from fish is widely recognized as better dietary sources of long chain polyunsaturated fatty acids *viz.*, EPA and DHA which are not contained in the fats of terrestrial animals or in vegetable oils. Several reports confirmed that fish oil supplementation is beneficial for the healthy functioning of the heart, brain and nervous system. Many organizations like the health authorities in Canada (Scientific Review Committee, 1990) and the United Kingdom (The British Nutrition Foundation, 1992) have recommended higher proportion of n-3 fatty acid consumption as prophylactic and therapeutic aid for many cardiovascular ailments. Moreover, daily intakes of about 200–400 mg of long chain n-3 PUFA has been recommended in Europe and the US (de Deckere *et al.*, 1998; Simopoulos *et al.*, 2000). Apart from this, fish is considered as an affordable food source for about 400 million poor people in small island states (FAO, 2007).

Food composition data are needed to estimate the actual contribution of a particular food to the recommended dietary nutrient intakes of individuals or populations. Such data is also important for the development of food-based dietary guidelines and for labelling purposes. However, in many food composition tables, fish is included to a limited extent only. Considering this need, recently the FAO International Network of Food Data Systems (INFOODS) endeavored into developing a user databases for fish and shellfish (uFiSh). In the present study, nutritional labelling

of some commercially important fishes and shell-fishes collected from retail markets of Cochin were carried out and the results are given in Table 1 and 2.

A total of four fishes collected during the months of October-November *viz*; Indian Mackerel (*Rastrelliger kanagurta)*, Threadfin bream (*Nemipterus japonicus)*, Six-barred Reef Cod (*Epinephelus diacanthus*), Indian anchovy (*Stolephorus indicus)*, and two shrimps, Flower shrimp, *Penaeus semisulcatus* and Giant tiger prawn *(Penaeus monodon)* were biochemically analyzed in the present study. The protein content of these species varied from 18.22 to 23.46%. Among the samples analyzed, *Nemipterus japonicus* showed a higher protein content of about 23.46%, followed by *Rastrelliger kanagurta* (22.99%) and a comparatively lower protein content of about 18.02% was observed in Flower shrimp, *Penaeus semisulcatus*. Likewise, fat analysis showed that *Epinephelus diacanthus* was having higher fat content of about 4.03% followed by Indian mackerel (1.62%). Based on the RDI level given by National Institute of Nutrition (NIS), Hyderabad, the daily dietary percentage contribution towards protein and fat from these samples were calculated. It was observed that about 32–41% of the daily requirement of the protein can be met by the consumption of 100 g of these species, where higher protein contribution was recorded from threadfin bream (41.89%) followed by Indian mackerel (41.06%). Similarly, about 1.76–6.20% of the daily dietary requirement of fat can be obtained by the consumption of these species, with *E. diacanthus* contributing the higher proportion. Apart from this, combined caloric content of protein and fat was also estimated. About 88-127 calories per 100 g can be obtained from the consumption of these species with the highest caloric contribution from *E. diacanthus* followed by *R. kanagurta* and *N. japonicus*.

Table 1. Proximate composition of the species analyzed

Name of sample	Moisture (g/100 g)	Protein (g/100 g)	Fat (g/100 g)	Ash (g/ 100 g)	Total calories (Protein+ Fat)	Calories from fat (per 100 g)
Rastrelliger kanagurta	75.39	22.99	1.62	0.47	111	14.6
Nemipterus japonicus	75.51	23.46	1.03	3.16	108	9.3
Epinephelus diacanthus	72.45	21.60	4.03	1.92	127	36.3
Stolephorus indicus	71.86	22.16	1.15	4.83	103	10.3
Penaeus monodon	76.02	22.02	1.30	0.66	104	11.7
Penaeus semisulcatus	76.85	18.02	1.40	3.73	88	12.6

Table 2. Fatty acid, cholesterol and fat soluble vitamins content in the species analyzed

Name of sample	SFA	MUFA	PUFA	Cholest-erol	Vit.A	Vit.D	Vit.E	Vit.K
Rastrelliger kanagurta	253.47	100.17	462.17	78	16.13	17.13	241	7.57
Nemipterus japonicus	67.92	31.21	101.90	65.24	12.90	42.76	341	8.27
Epinephelus diacanthus	869.22	612.46	502.92	119.29	33.30	5.54	193	ND
Stolephorus indicus	217.90	64.90	513.28	104.97	24.37	23.87	508	ND
Penaeus monodon	101.06	70.30	201.12	155.19	31.71	20.28	871	12.73
Penaeus semisulcatus	73.03	46.29	85.29	153.58	41.94	77.86	1402	34.03

- Fatty acid and cholesterol content are expressed in mg/100g and vitamins in µg/100g of sample
- ND – Not Detectable

The important macro-elements like calcium, sodium and potassium content was also analyzed and it was found that calcium content was higher in all these species followed by potassium and sodium. The highest calcium content was found in *S. indicus* (754 mg/100 g) followed by *P. monodon* (633 mg/100 g) and *P. semisulcatus* (561 mg/100 g). The potassium level was higher in *S. indicus* (377 mg/100 g) followed by *R. kanagurta* (361 mg/100 g) and *N. japonicus* (347 mg/100 g). The lowest potassium content was noted in *P. monodon* (227 mg/100 g). The sodium content was found to be higher in *S. indicus* (323 mg/100 g) and lowest in *E. diacanthus* (37 mg/100 g). As per the RDI level given by National Institute of Nutrition (NIS), Hyderabad, it was found that about 2-13%, 5-9% and 54-75% of the daily dietary requirements of sodium, potassium and calcium, respectively can be obtained by the consumption of these fishes and shrimps. The fatty acid composition, fat soluble vitamins and cholesterol content in all these species were also analyzed and given in Table 2.

As expected, the polyunsaturated fatty acid content was more than monounsaturated and saturated fatty acid content in almost all samples except in *E. diacanthus* where a higher content of saturated fatty acids was observed. The highest monounsaturated fatty acid content was reported in *E. diacanthus* (612.46 mg/100 g) followed by *R. kanagurta* (100.17 mg/100 g) and the least was observed in *N. japonicus*. The polyunsaturated fatty acid content was found to be higher in *S. indicus* (513.28 mg/100 g) followed by *E. diacanthus* and *R. kanagurta*. As per the dietary recommendation given by NIS, Hyderabad, the daily dietary contribution towards fatty acids that can be obtained from the consumption of these species was calculated. It was found that 7.11-16.76% and 8.49-42.77% of the daily requirement of PUFAs can be met by the consumption of fishes and shrimps, respectively. The highest contribution of PUFA was from *S. indicus* (42.77%), followed by *E. diacanthus* (41.91%) and *R. kanagurta* (38.51%) and the least was from *P. semisulcatus* (7.11%). The highest cholesterol content was reported from shrimps in general than fishes (155.19 mg/100 g). About 51% of the daily requirement of cholesterol can be met by the consumption of shrimps. Likewise, the consumption of fishes can help in meeting 11.30- 39.76% of the daily cholesterol requirement. Among the fish samples analyzed, the highest cholesterol content was reported in *E. diacanthus* (119.29 mg/100 g).

Among the fat soluble vitamins, higher vitamin A content was reported in *P. semisulcatus* (41.94 µg/100 g) followed by *E. diacanthus* (33.30 µg/100 g) and *P. monodon* (31.71 µg/100 g) and the lowest content was reported in *N. japonicus* (12.90 µg/100 g). Vitamin D content was higher in *P. semisulcatus* (77.86 µg/100 g) and lowest in *E. diacanthus* (5.54 µg/100 g). Coming to the vitamin E content, the highest amount was reported from *P. semisulcatus* (1402 µg/100 g) followed by *P. monodon* (871 µg/100 g) and *S. indicus* (508 µg/100 g) and lowest content in *E. diacanthus* (36.93 µg/100 g). The vitamin K content was highest in *P. semisulcatus* (34.03 µg/100 g) followed by *P. monodon* (12.73µg/100 g). But in case of fishes like *S. indicus* and *E. diacanthus*, the vitamin K content was found to be below the detectable limits. In general, the vitamin analysis showed that *P. semisulcatus* was having higher amount of all the fat soluble vitamins than all the other samples analyzed. As per the RDI level given by NIS, Hyderabad, it was found that the consumption of these species can contribute as high as 4.66%, 519.06%, 9% and 28.36% of the daily requirements of vitamin A, D, E and K, respectively.

Conclusion

The nutritional composition of selected commercially important fishes and shrimps showed that the daily dietary requirement of 32–41% of protein, 1.76–6.20% of fat, 2-13% of sodium, 5-9% of potassium, 54-75% of calcium and 7.11-42.77% of PUFAs can be met by consuming 100 g of fish meat. Moreover, considerable amount of fat soluble vitamins and cholesterol can also be obtained from these species. Hence, these seafood sources can be considered as a better dietary source in terms of both nutrient availability and affordability.

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