COMPARATIVE EVALUATION OF FISH PROTEIN CONCENTRATE AND FUNCTIONAL FISH PROTEIN CONCENTRATE FROM CAT FISH

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Fish protein concentrate and functional fish protein concentrate samples were prepared from eviscerated meat of cat fish (*Tachysurus jella* Day). Functional fish protein concentrate is found to be lighter, less gritty and rehydrates more rapidly than fish protein concentrate. Functional FPC is seen to have higher PER and biscuits containing it at levels of 5 and 7 percent are less hard compared to FPC.

INTRODUCTION

A number of workers in India have reported various methods of production of fiish protein concentrate (Bhatia *et al.* 1955; Pillai, 1956, 1957; Moorjani *et al.* 1962; Revankar, Khabade and Rao, 1965 and Ismail, Madhavan and Pillai, 1968). Although the methods of production of FPC have been fully developed it has not yet been possible to market it successfully in India. A number of characteristics of FPC like grittiness, lack of functional properties, together with high cost of production and lack of popular acceptability compared to vegetable proteins, can be attributed to this. Recently the prices of commercially important species of fish has become so high that the production of FPC has become commercially non-viable. Attempts have also been made to prepare FPC from trash fish (by catch from shrimp trawlers) and studies on its utilization were reported (Gopakumar, 1973). FPC having high PER was also prepared from the picked meat of trash fish and its analytical characteristics reported (Vasanth Shenoy, Kutty Ayyappan and Gopakumar, 1976). A method to prepare FPC having less grittiness and more functional properties, following the method of Bligh *et al.* (1973) is described. Cat fish (*Tachysurus Jella* Day), a fatty fish, abundantly available throughout India and usually obtained as a by catch from shrimp trawlers, is selected for this study. A comparative evaluation was carried out between FPC and functional FPC.

MATERIALS AND METHODS

Cat fish meat separated by a mech-

TABLE I

CHEMICAL COMPOSITION OF FUNCTIONAL FPC AND FPC FROM CAT FISH

		FPC	Functional FPC
Protein	%	91.3	90.5
Moisture	,,	7.7	7.7
Ash	,,	0.9	1.2
Fat	,,	0.2	0.35
Potassium	mg.%	65.52	26.38
Sodium	,,	132.9	182.5
Calcium	,,	326.0	361.0
Phosphorus	,,	203.0	229.9
Available lysine		6.8	6.85

anised flesh separater was utilised for the study. FPC and functional FPC were prepared with the same sample of cat fish meat as described below.

Preparation of FPC

The meat was cooked for 10 minutes in water (1 : 1 W/V) containing 0.5% acetic acid. Cooked fish cake was pressed in canvas bag and defatted with an azeotropic solvent system of hexane and alcohol (33.2 mo/percent of alcohol, B.P. 58.69°C) following the method of Ismail, Madhavan and Pillai, (1968). The defatted cake was pressed in a screw press and again extracted with ethyl alcohol to remove the residual hexane, if any, left behind in the cake. The cake was then dried in a vacuum drier until free from the last traces of the solvent, alcohol. The dried fish meat is powdered, sieved and packed in air tight containers.

Preparation of functional FPC

The fish meat was suspended in ice water (0°C) for 2-3 hours. The pH of the medium was brought to 6 by addition of hydrochloric acid and kept for another hour at the same temperature. The pH was then brought to 8 by addition of sodium hydroxide and the meat was kept at 0°C for an additional 2 hours. The pH was then brought to the acidic range (pH5) and immediately heated to 65-70°C and maintained at this temperature for 10 minutes. The whole swollen mass of proteins coagulates and gets precipitated. After neutralisation to pH 7, the protein was filtered, washed with cold water and pressed free of water. The resultant

TABLE II

PROTEIN EFFICIENCY RATIO OF FPC AND FUNCTIONAL FPC

Male altrino weanling rats (21-25 days old) Wistar Strains, were fed ad libitum with diets containing 10% protein. Reference standard was casein. Daily food intake was measured and the animals were weighed weekly for four weeks.

Diet	Initial body weight g.	Body weight after 4 weeks g.	Increase in body weight g.	Food intake for 4 weeks g.	Protein intake g.	PER
Casein	41.17	12.08	84.91	344.58	34.46	2.46
FPC	38.92	152.08	113.16	366.15	36.62	3.09
Functional FPC	38.42	153.58	115.16	370.5	37.05	3.11

TABLE III

AMINO ACID COMPOSITION OF FPC AND FUNCTIONAL FPC

		FPC	Functional FPC
1)	Arginine	5.4	5.1
2)	Aspartic acid	7.6	7.9
3)	Cystine	1.8	1.6
4)	Glutamic acid	8.4	8.5
5)	Glycine	4.5	3.5
6)	Histidine	4.1	3.1
7)	Isoleucine	3.9	4.3
8)	Leucine	6.5	6.5
9)	Lysine	7.1	7.0
10)	Methionine	3.9	5.5
11)	Phenyl alanine	6.1	5.5
12)	Proline	4.4	4.9
13)	Serine	3.6	4.0
14)	Threonine	5.9	5.8
15)	Tryptophane	0.6	0.7
16)	Tyrosine	4.5	4.3
17)	Valine	4.2	4.8

material, which is crystalline, is defatted with hexane-alcohol mixture followed by extraction with alcohol, as described above.

Both the samples were analysed for their proximate composition, Protein, ash and moisture were estimated by the standard procedures (AOAC, 1960). Lipids were extracted by the method of Bligh and Dyer (1959). Phosphorus was estimated by colorimetry (Fiske and Subba Rao, 1925) and calcium, sodium and potassium by flame photometry. Available lysene content was determined by the modified method of Booth (1971) and amino acid composition by microbiological assay (Kavanagh, 1963).

Results And Discussion

Results of the chemical analysis and amino acid composition of both FPC and functional FPC are presented in Table I and II while the protein efficiency ratios are presented in Table III.

Results of the chemical analysis show that there is very little difference in the chemical composition and amino acid built up between the two samples. However, PER evaluation shows that functional FPC has a higher PER than FPC. This evidently shows that functional FPC is having higher nutritional qualities than FPC.

Studies conducted by incorporating both the FPC samples in biscuits at 5 and 7 percent levels showed that the FPC incorporated biscuits were harder than the ones incorporated with functional FPC.

It is seen that the major difference between the two types of FPC is in their physical properties such as grittiness, texture and property of rehydration. The functional FPC is found to be lighter in weight and soft in texture compared to FPC. It absorbs water more rapidly than FPC and is less gritty.

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