BEVERAGE PREPARATION FROM FISH HYDROLYSATES

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A method for the preparation of energy food incorporating fish hydrolysates, sugar, cocoa, malt extract etc. is described. The product has good consumer appeal. The preparation does not impart any bitter taste of the hydrolysate to the final product irrespective of the type of fish used for preparing the hydrolysate. It freely mixes with hot or cold milk and the resulting drink is adjudged to be very palatable.

INTRODUCTION

Several therapeutic preparations containing easily digestible protein hydrolysates are available in the market for the treatment of gastro intestinal disorders and pernicious anaemia. Animal protein and protein hydrolysates are highly valuable in human and animal nutrition. Preparation of protein and protein hydrolysates from elasmobranches like shark and rays have been reported by Mohanty and Roy (1955) and also by Ambe and Sahani (1957). Shurpulikar (1962) studied the various aspects of supplementary foods containing fish flour. Products of protein hydrolysates from fish form the subject of study by Sen, *et al.* (1961). The use of raw fish as a substrate for proteolytic enzyme hydrolysis was studied by Sripathy, *et al.* (1964).

The problem of 'protein malnutrition' as experienced by the world has attracted the attention of nutritionist and others and much work has been done in this line. This is evident from the numerous publications and the interest shown by such world organisations like F. A. O. and W. H. O. Being abundant in supply, fish is a relatively inexpensive source of high quality protein and is considered to be the ultimate answer to eradicate this burning problem of protein malnutrition to a great extent. The present study attempts to prepare enzymatic hydrolysates from different species of fish and convert the same to a palatable product.

MATERIALS AND METHODS

Different species of fish purchased from the local market were brought to the laboratory and washed thoroughly in potable water. 500g. of each variety was used for preparing the hydrolysate. The enzyme papain is used for hydrolysis because of its favourable properties of pH and temperature optima for activity (Hoover

TABLE I

ANALYTICAL VALUES OF FISH HYDROLYSATE

Sl. No	Type of fish: Local name	Type of fish: Scientific name	Hydrolysate: TN.	Hydrolysate: α-NH_2N as % of TN.
1.	Mackerel	*Rastrelliger kanagurta*	5.267	34.18
2.	Jew fish	*Otolithus argentius*	6.637	27.52
3.	Sole	*Brochiras albomaculate*	7.459	26.53
4.	Silver bellies	*Leiognathus bindus*	6.006	33.30
5.	Prawn (Naran)	*Penaeus indicus*	5.352	26.79
6.	Orathal	*Platycephelus indicus*	8.159	30.55
7.	Arana	*Saurida tumbil*	9.607	31.64
8.	Ribbon fish	*Trichurus savala*	7.307	36.19

et al. 1947). Papain is also shown to have outstanding value for liberating several of the B-vitamins from their bound forms (Cheldelin, *et al.* 1942). The essential steps in the preparation of hydrolysates are (1) mincing the whole fish in a meat mincer (2) boiling with equal quantity of water (3) bringing down the temperature to 45-50°C (4) addition of 0.2% papain on the basis of substrate by making it into a slurry with water after adjusting the pH to 5 to 7 and hydrolysing for 4 hours (5) boiling to deactivate the enzyme and filtering.

The filtrate was neutralised with dilute sodium hydroxide initially and with baking soda towards the last stage. To the hydrolysate the following ingredients were added so as to obtain a final composition as under.

Hydrolysate	40%	on dry weight basis
sugar	40%	
Malt extract	10%	
Vegetable fat	5%	
Cocoa	5%	

After mixing the ingredients thoroughly, it was evaporated on a water bath to a pasty consistancy and dried in a vacuum drier. The product was powdered and packed in air tight polythene bags or glass bottles.

The hydrolysate obtained from each species of fish was analysed for total nitrogen by the micro-kjeldahl method. α-amino nitrogen was determined by the method of Pope and Stevens, (1939) and the amino acid content by standard microbiological assay method (Kavanagh, 1963). The final product was analysed for moisture and protein contents (A. O. A. C. 1960). The product was tested for its bacteriological quality as well.

RESULT AND DISCUSSION

Table I represents the total nitrogen and α-NH_2N values of the hydrolysates prepared with different varieties of fish. The pattern of amino acid distribution in the different species of fish is shown in Table II.

TABLE II

Amino acid composition of different species of fish hydrolysates in g. per 16 cm. of Nitrogen.

Sl. No.	Amino acid	Mackerel	Jew fish	Sole fish	Silver bellies	Praws spp.	Orathal	Arana	Ribbon fish
1.	Alanine	4.3	5.9	5.7	4.7	4.2	5.1	4.1	5.3
2.	Arginine	4.9	5.1	6.1	8.4	9.3	8.8	5.1	8.3
3.	Aspartic acid	8.7	7.9	9.3	8.2	8.7	9.2	10.1	11.3
4.	Cystine	1.1	0.9	2.1	0.8	1.3	2.1	1.1	1.3
5.	Glutamic acid	12.1	13.8	12.9	11.8	12.9	11.9	13.3	12.8
6.	Glycine	4.3	5.1	4.5	8.4	8.3	8.1	7.1	8.1
7.	Histidine	1.9	1.4	2.2	1.7	1.3	2.9	1.9	1.7
8.	Isoleucine	3.9	5.4	5.6	3.9	4.3	3.8	4.2	4.7
9.	Leucine	7.4	8.6	7.7	6.8	6.5	6.1	7.3	7.8
10.	Lysine	9.2	8.1	9.4	7.3	9.1	7.4	8.9	7.3
11.	Methionine	2.8	2.1	2.9	1.9	2.4	2.2	3.1	2.8
12.	Phenylalanine	2.9	3.1	3.7	2.8	3.2	2.9	2.4	3.1
13.	Proline	3.8	3.2	4.1	3.3	4.6	4.3	3.9	4.1
14.	Serine	3.4	3.7	4.3	3.5	4.8	4.1	4.3	4.7
15.	Threonine	3.9	3.2	3.9	3.4	3.4	2.9	3.1	2.9
16.	Tyrosine	3.4	3.2	3.1	2.9	3.9	3.7	3.4	3.1
17.	Tryptophane	0.7	0.8	0.6	0.7	0.7	0.6	0.5	0.5
18.	Valine	5.2	5.7	5.4	5.9	4.1	5.4	5.3	4.9

The product is found to contain 25 to 30% hydrolysed protein and a moisture content of 8 to 10%. The product is bacteriologically safe and also free from the bitter taste of the hydrolysate. This is effectively attained by the addition of 5% vegetable fat to the hydrolysate in preparing the final product. Earlier work carried out (Anon 1966) showed that treatment with 0.5, 1.0 and 1.5 N.acid and heating for 15 to 20 minutes could not reduce the bitter taste of the hydrolysate. So also addition of citric acid and salt failed to prevent the bitterness of the hydrolysate.

From Table II, it is evident that aspartic acid, glutamic acid, arginine and lysine account for considerable portions of the total amino acid in the hydrolysates. It is interesting to note that the distribution of these amino acids do not appreciably vary with different species of fish that are used for the study. The levels of lysine content are somewhat lower in silver bellies, ribbon fish, jew fish and orathal but they are rich in glycine and arginine. Tryptophan content is comparatively low in all the hydrolysates. The levels of various other amino acids viz. alanine, histidine, leucine, isoleucine, methionine, proline, threonine and valine are found to have no appreciable difference among the hydrolysates prepared from different species of fish.

Energy content of the product can be influenced by the protein utilization. The nitrogen balance in the food is disturbed when the withdrawal of energy is in the form of fat or carbohydrate. Munro (1951) also found that addition of fat or carbohydrate to an already adequate diet can improve the nitrogen balance of that diet.

The final product is almost alike in all respects irrespective of the type of fish used for preparing the hydrolysate. Consumer preference studies showed that the product is quite acceptable, when served in milk.

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