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Fish powder in instant fish soup mix

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Abstract

This study was conducted with the development of instant fish soup mix and finding out the effect of fish powder on it. Ingredients of soup mix were cooked and dried up to desired moisture content. The drying or dehydration was done by using a mechanical dryer (Cabinet dryer) at constant air flow rate and constant temperature with varying thicknesses. After drying the dried products were ground to make powder. These were then mixed with desired composition. Here fish powder was varied in composition in different samples and it was 5%, 10% and 15% in Mix-1, Mix-2 and Mix-3 respectively. For preparing soup mix was reconstituted with boiled water. The result of organoleptic test was determined by ANOVA and DMRT analysis to find out the best sample. (Mix-2) was adjudged to be the best by the panelists using 1-9 hedonic scale and ranked as “like very much” securing score 8.0 which containing 10% fish power.

Keywords: Fish powder, Vegetable powder, Soup mix, Sensory evaluation

Introduction

Soup is the very fast form of cookery. Soup is probably one of man's oldest foods, since it must have developed about the time that boiling was found to be a way of cooking food. Soup is a food that is made by combining ingredients such as meat, vegetables in stock or hot/boiling water, until the flavor is extracted, forming a broth. Dry soup mixes are now an established food item in the world food markets. Instant Soup Mixes are preferred more as dry soup mixes by consumers. As a dry product instant fish soup mix can be stored for a longer period. Now-a-days Bangladesh is faced with serious protein energy malnutrition problem. Millions of people suffer from serious nutritional problem due to acute shortage of animal protein and vegetables in the diet. This protein deficiency can be minimized by supplying sufficient amount of fish instead of meat. Instant fish soup mix can provide a certain amount protein in the diet. The muscle of silver carp (*Hypophthalmichthys molitru*) possess all the useful qualities to be used for the production of various value added products (Nowsad *et.al.* 1999). Among the value added fish products instant fish soup mix may become good and tasty food item to new generation depending on fast food. Silver carp fish was used in this study. The study was carried out with the objectives of formulate soup mix as a complete instant food, examine the effect of fish powder in soup mix, evaluate the nutrient specification and content of soup mix side by side drying characteristics of ingredients.

Materials and Methods

Fish, tomato and cauliflower, sugar, salt, spices were collected from local market. H₂SO₄, Digestion mixture, desiccator, cabinet dryer, Soxhlet apparatus, Kjeldahl flask were used in the study.

Preparation of dehydrated fish, cauliflower and tomato powder

Fishes were tested organoleptically. Meat of the fish was found translucent. Fishes were beheaded by knife then washed with 1% brine solution and cooked at 100°C for 10 min with 2% vinegar solution. After separation of all bones, moisture content was reduced to 6% using a cabinet dryer (Gallenkamp model OV-165) for 4 hrs at 55°C. For drying it was spread on flat tray at a thickness of thin layer. A fan passed over a heater and trays containing the sample to be dried blew air. The velocity of air was 0.6 m/sec. The dried fish was ground, packed & stored.

Tomato slices cooked and pulps were dried in a cabinet drier for 4 hrs at 60°C. Dried pulp was ground, packed and stored.

Fresh cauliflower was sliced and blanched for 7 min at 95°C. Blanched cauliflower was treated with Potassium metabisulphite (KMS) (@750 ppm) and size was reduced with hand. The slices of treated cauliflower were placed in a cabinet dryer for 4 hrs at 60°C. The moisture content was reduced to 9.43%. The dried samples were ground and packed.

Preparation of spices powder

Spices (cardamom, cinnamon, black pepper, cloves) were dried and ground.

Drying method

Dehydration of the major ingredients was conducted as per the following method.

Mechanical drying

After preparation the wet products were placed in a thin layer of different pre-weighed trays and weighed the tray with samples of known moisture content. The trays were placed in the cabinet dryer at constant temperature. Fish was dried at constant temperature 50°C, tomato and cauliflower were dried at 60°C till desired moisture removed. After the end of each definite time interval the trays were weighed. Since initial moisture content was determined previously, weight loss was used as the extent of drying. Fish mash and vegetables were dried different thickness (5mm and 10mm)

Mixing method of the dehydrated powder of the ingredients

To study the effect of fish powder on instant fish soup mix, three different composition of fish powder were used in the mix with all the dried powdered ingredients (Table 1).

Table 1. Ingredients for different composition of fish powder with all the ingredients

Ingredients	Mix-1	Mix-2	Mix-3
Fish powder	5g	10g	15g
Corn flour	39g	34g	29g
Tomato powder	17.5g	17.5g	17.5g
Cauliflower powder	17.5g	17.5g	17.5g
Salt	10g	10g	10g
Sugar	5g	5g	5g
Spices powder	5g	5g	5g
Testing salt(MSG)	1g	1g	1g
Total	100g	100g	100g

In formulation 1, 2 and 3, fish powder were taken as respectively 05g, 10g and 15g. Composition of corn flour was changed respectively to retain the composition of other ingredients at constant.

Fish powder, vegetable (tomato & cauliflower) power, corn flour, spices, salt, sugar, testing salt were grinding and mixing then packaging and storage.

Chemical analysis of the soup mix

The mixes of dehydrated fish powder, cauliflower and tomato powder, corn flour, sugar, salt and spices were analyzed for their chemical composition. Moisture, protein, fat and ash contents were measured using AOAC method (1984). Total carbohydrate content was determined by subtracting the measured protein, fat, ash and moisture from 100 (Pearson, 1976). The results were expressed as the mean of three independent values.

Reconstitution of the mix before consumption

In reconstitution water was added to the product which was restored to a condition similar to that when it was fresh. To make broth from soup mix 300ml boiled water was added with 40g soup mix.

Subjective (sensory) evaluation of Fish soup mix

For statistical analysis of sensory data, soup mixes of three deferent composition were evaluated for color, flavor, texture and overall acceptability by a panel of 07 trained panel members. Three reconstituted samples were presented to 07 panelists and randomly coded sample. The test panelists were asked to rate the different composition presented to them on a 9 point hedonic scale with the ratings of: 9 = Like extremely; 8 = Like very much; 7 = Like moderately; 6 = Like slightly; 5 = Neither like nor dislike; 4 = Dislike slightly; 3 = Dislike moderately; 2 = Dislike very much; and 1 = Dislike extremely.

The results were evaluated by Analysis of Variance (ANOVA) and Duncan's Multiple Range Test (DMRT) procedures of the Statistical Analysis System (SAS, 1985).

Results and Discussion

Composition of fresh fish and dried fish powder

The moisture content in fresh silver carp fish, mechanical dried fish powder was 77.8% and 7.89% respectively. The ash content in fresh fish 1.85% and that was in mechanical dried fish was 12.97%. The fat content in fresh fish was 2.07% and that was in mechanical dried fish 13.87%. The protein in fresh fish was 18.37% and that was in mechanical dried fish 64.9%. Protein, fat, ash of dried sample were increased but moisture content of dried samples were decreased. The higher concentration of nutrients in the dried product is due to lower moisture content. The chemical composition of fresh fish & dried fish are given in the following Table 2.

Table 2. Composition of fresh and dried fish powder

Parameters	Fresh fish	Dried fish
Moisture %	77.8	7.89
Ash %	1.85	12.97
Lipid (fat)%	2.07	13.87
Protein %	18.37	64.98

Composition of Instant Fish Soup Mix

Among the three formulations Formulation No-2 (mix 2) was taken for analysis for its moisture, protein, fat, ash contents. The results are presented in Table 3. The moisture content in instant fish soup mix was 9.4%. The ash, fat and protein content was found to be 14%, 1.47% and 9.5%, respectively. The higher concentration of nutrients in the dried product was due to lower moisture content.

Table 3. The chemical composition of Instant Fish Soup Mix are given in the following

Parameters	Soup mix formulation no 2 (mix 2) (10% fish powder)
Moisture %	9.4%
Ash %	14%
Lipid (fat)%	1.47%
Protein %	9.5%
Total carbohydrate	65.7%

Sensory evaluation of instant fish soup mix

The mean scores for color, texture, flavor and overall acceptability of three deferent amount of fish powder in Instant Fish Soup Mix are presented in Table 4.

Table 4. Means of sensory evaluation of instant fish soup mixes

Sample No.	Sensory attribute			
	Color	Flavor	Texture	Overall acceptability
1	7.57 ^b	6.71 ^b	7.86 ^b	6.71 ^b
2	7.71 ^a	7.86 ^a	8.43 ^a	8.00 ^a
3	7.43 ^b	6.29 ^b	7.43 ^b	6.57 ^b

The means with the same superscripts within a column are not significantly different at $p < 0.05$

Mix- 1: use 05% fish powder & 39% corn flour.

Mix- 2: use 10% fish powder & 34% corn flour.

Mix- 3: use 15% fish powder & 29% corn flour.

A two-way analysis of variance (ANOVA) was carried out for color preference and results revealed that there was no significant differences in color (Table 4). The calculated F-value (0.1765) was lower than the tabulated F-value (3.89). This indicates the color of the samples of instant fish soup mixes were equally accepted and the numerical score varied from 7.43 to 7.71

Incase of texture preference among the samples (ANOVA) the results showed that there was significant ($P < 0.05$) difference in texture (Table 4). The calculated F-value (6.7273) was greater than tabulated F-value (3.89). This indicates the texture of the samples of instant fish soup mixes were not equally accepted and the numerical score varied from 7.43 to 8.43.

A two-way analysis of variance (ANOVA) was carried out for flavor preference and results revealed that there was significant ($P < 0.05$) difference in flavor acceptability among the soups. The calculated F-value (8.1972) was greater than tabulated F-value (3.89). This indicates that the flavor of different samples of soup mixes were not equally acceptable (Table 4). As shown in Table 4 the flavor of Mix-2 (10% fish powder) was the most acceptable among the samples and was followed by sample-1 (mix-1) (5% fish powder), while the lowest score was given by sample-3 (mix-3) (15% fish powder).

It was apparent from the results of the ANOVA that there was significant ($P < 0.01$) difference in overall acceptability of the samples tested as the calculated F-value (6.5455) was greater than tabulated F-value (3.89). As shown in Table 4 the results showed that sample-2 (mix-2) has highest overall acceptability score among the samples tested and was followed by sample -1 (mix-1), while sample-3 (mix-3) secured the lowest score. Sample-3 (mix-3) had the highest proportion of (15% fish powder) fish powder. Sample-2 (mix-2) and sample-1 (mix-1) contained 10% and 5% fish respectively.

From the results it is found that in all respects sample-2 with 10% fish secured the highest scores and can be ranked as "like very much". Sample with 5% fish powder secured the second highest score for all quality factors and can be ranked as 'like moderately'. Sample-3 with 15% fish powder secured the lowest score among the samples for all quality factors and can be ranked as 'like moderately'.

All the products were equally acceptable with respect to color but were found different from one another with respect to flavor and texture. Thus flavor and texture were overriding factors influencing overall acceptability.

Studies on organoleptic taste test, showed that soup sample with 10% fish powder secured the highest score in all respect and could be ranked as 'like very much'. The soup with 5% fish powder secured the second highest score for all quality attributes and was classified as 'like moderately' while the soup with 15% fish powder secured lowest score and was ranked as 'like moderately'. The study clearly shows that fish flavor and texture were overriding factors influencing overall acceptability of soup from fish.

It may be concluded that the product of instant fish which has higher nutrient value, can help to reduce nutritional deficiency and can appropriately utilize the surplus of fish and vegetables production. This mix also replaces animal protein by fish.

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