

Influence on Enrichment Pasta with Fish Protein Concentrated (FPC) for Silver Carp (*Hypophthalmichthys Molitrix*) Minced Meat Industrial Product

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Abstract

Fish protein concentrated of Silver carp minced, was obtained in three steps using solvent (Isopropanol), drying and pressing using dry temperature (60 °C), and this concentrate had 93% protein, which according to Aquatic protein sources have a high nutritional value and are used to enrich other food products. In this research, given that the current macaroni production is from the source of carbohydrates, it is deficient in the lysine and threonine amino acids. This gives the opportunity to be used to enrich and enhance its nutritional quality. The ratios of 3 treatments, 1(control), 2(5) and 3(15) percent of fish protein concentrate were used for enrichment of pasta, and samples were prepared in three replicates and stored at ambient temperature for 3 months and tested for nutritional value, , corruption microbial, sensory and amino acids, and with The control sample without of the concentrate was compared. According to the results of experiments of food, chemical, sensory, microbial and amino acid profile, and after performing the statistical tests, the data were determined, although in terms of nutritional value, the protein percentage, Fat, and amino acid profiles. The fish protein concentrate enrichment treatments were better, but were considered to be tasty and the shelf-life of the enriched treatment with 5% fish protein concentrate was better and, given that the taste is in the priority of the evaluation, In the overall assessment of fish protein concentrate enriched with 5% better than other samples and has a significant difference ($P < 0.05$).

Keywords: Fish Protein Concentrate; Cultured Silver Carp; Enriched Pasta

Introduction

Fish is high nutritional value because it is in the highest level in terms of protein and good source of vitamins (B, A, D) and rich in essential amino acids, is also minerals including magnesium, phosphorus, iron, and even iodine [1]. Considering the growing need for human societies for protein and, on the other hand, limiting the resources to meet the needs. The authorities have urged countries to use and exploit as much as possible the vast resources of waters and seas. On average, the individual's needed for a protein product per year, based on age and weight about 15.5 kg. All in all, millions of tons of pure protein will be needed by the community .The importance of aquaculture as a nutritious food source and valuable animal protein has been proven, so that about 20% of the animal protein in modern societies comes from this way. They have a very good position and compete with other protein sources [2].

Developing countries have been able to help eliminate protein poverty and increase per capita consumption of aquatic resources through efforts to exploit water resources and expand aquaculture, as well as studying, researching and investing in the processing of aquatic species. As of today, more than 150 types of products from various types of fish such as sausages, surimi, and salami ... have been produced. Consumption of cereal products is very common among today's societies due to its high taste and taste. Various types of pasta ingredients, the shape and the things that can be used to make it a popular product among people. In the macaroni industry, many of the additives used for enrichment have been misused due to lack of sufficient information to put human health at risk. Therefore, it is necessary to make the necessary studies to make sure that the ingredients are used to. Due to the differing consumer tastes and different baking practices, as well as the high demand for this product, food has been increasing in the world. So with regard to the prevalence of ill-caused ill-health, we are now pushing for the production of products that guarantee the health of consumers [3].

Noodle is one of the products of cereals that is very important in feeding the modern societies. This product is simply produced and consumed, and also due to its high baking quality and long shelf life has made it a good consumer choice. So the need for research to improve the quality of cereal products is increasing. The noodle is a source of carbohydrates, containing 11-15% of protein. While lysine and threonine amino acids are deficient in terms of amino acids. Fish protein concentrate contains essential amino acids. Usually in advanced countries, food products are mainly used for increasing the nutritional value of carbohydrates, from dried, salted and fermented fish products.

One of the products used to make macaroni enrichment is the protein in the fish. Milk protein powder concentrate is grayish milky which has a high nutritional value and is produced in most countries under strictly hygienic conditions for edible fish. FPC has a very high nutritional value used in many countries for human consumption. We can use any type of fish to produce protein concentrate. The quality of raw material for producing FPC affects its quality accordingly, if corrosive substances are used, the amount of histamine, trimethylamine and dimethylamine in the final product will increase [4].

Materials and Methods

To produce fish protein concentrate is a combination of physical and chemical processes [4]. At first, silver carp with a mean weight of 800-900 grams, approximately 11 kg and 12 pieces in spring were prepared live fish ponds in Guilan province. After catching Silver carp, ice-cold kept in a refrigerator car to the location of the National Research Center for Aquaculture and after weighing until the start of operation at a low temperature (4 °C). After the head, the fish's viscera are drained. Filled fish are washed with clean water, livers, and blood and fish saltines by brushing. The digestive system of fish, kidneys and liver contains proteolytic enzymes. Therefore, if these organs are not completely eliminated, the quality of the fish undergoes undesirable changes. After complete washing, the fillets are placed inside the bone stack. The base of this machine is based on a rotating grille, a fish fillet is pressed between it and a thick rubber belt, and the meat is removed from the skin and bone. The perforations of the cylindrical lattice are 4-8 mm in diameter. Then, the pure meat weighing 5.5 kg was placed in isopropanol (two parts of alcohol and one part of meat) for 50 minutes at ambient temperature (25.8 Co) for 50 minutes, after the time. The first press was carried out; where the initial press cake was transferred to the second phase of the production of concentrate. In the second stage of extraction, the press cake prepared from the previous step was placed in 2: 1 in isopropanol and placed in Ben Mary for 90 minutes at a temperature of 75 °C. After the time was elapsed, the product was pressed and immediately after weighing, the dryer was transferred to a temperature of 125 °C for 3 hours, the product was manufactured by the mill and passed through a 100 micron screen [5]. Ratios of 2 to 1 Production ratio according to the initial weight of the minced fish after the drying process, drying and grinding, it was 12.5% fish protein concentration (FPC) finally than the production fish protein concentrate enrichment steps with 3 treatments. Perform and after packaging kept at normal temperature and quality control of products Contains Chemical (Protein, fat, moisture and ash), sensory evaluation, microbial and amino acid profiles [6,7].

The Method of Supplement Enriched Pasta with FPC

The main raw materials used for the preparation of fish protein concentrate-enriched pasta in three treatments, 1(control), 5 and 15% are Fish Protein Concentrate (FPC), semolina flour, dry gluten and water for a period at least 3 minutes into the mixer Pilot Plant, the Italian compound was mixed, then the water was added to the formulation for 20% of the weight of the flour and continued to be used for 10 minutes to form the gluten network, Finally, the mixture was extracted under a temperature of 45 °C with Isopropanol and pressed 0.6 mm Hg. During the outlet process, the temperature of the dough was removed from the mold under a temperature of 20 °C, so that the macaroni from the mold did not stick together and did not lose its shape. Peculiar macaroni extracted from the mold was first poured onto plastic trays and the fan under the tray was constantly on to prevent the sticking of pasta during the process. The macaroni is then placed on a wooden tray with a plastic net to transfer to the dryer, and the dryer automatically dry. The macaroni drying process was carried out in two steps, the initial drying step was carried out at a low temperature (about 50 °C) and a high humidity (55%) for 2 hours, to avoid the rapid drying of the surface and In the second stage, drying is used at high temperatures (75 °C) and low humidity (20 to 30%). At the end of the drying process, 10% moisture content was obtained, which was then spent for 3 hours. Dried pasta was stored after cooling in a normal packing and under ambient temperature (25 °C) [5].

Results

For the purpose of this research, freshly-caught fresh-fished meat was used in FPC production and compared with 5 and 15% FPC ratios for enriching pasta with control sample (T1). Qualitative evaluation of the final product (chemical, microbial, acid profiles Amino and sensory) are maintained at ambient temperature and the results are as follows:

The average of the approximate combinations of protein percentage measurements in the fish protein concentrate is very high and after enrichment in the treatment, 15% higher than the control treatment and 5%, and this data is significant ($P < 0.05$).

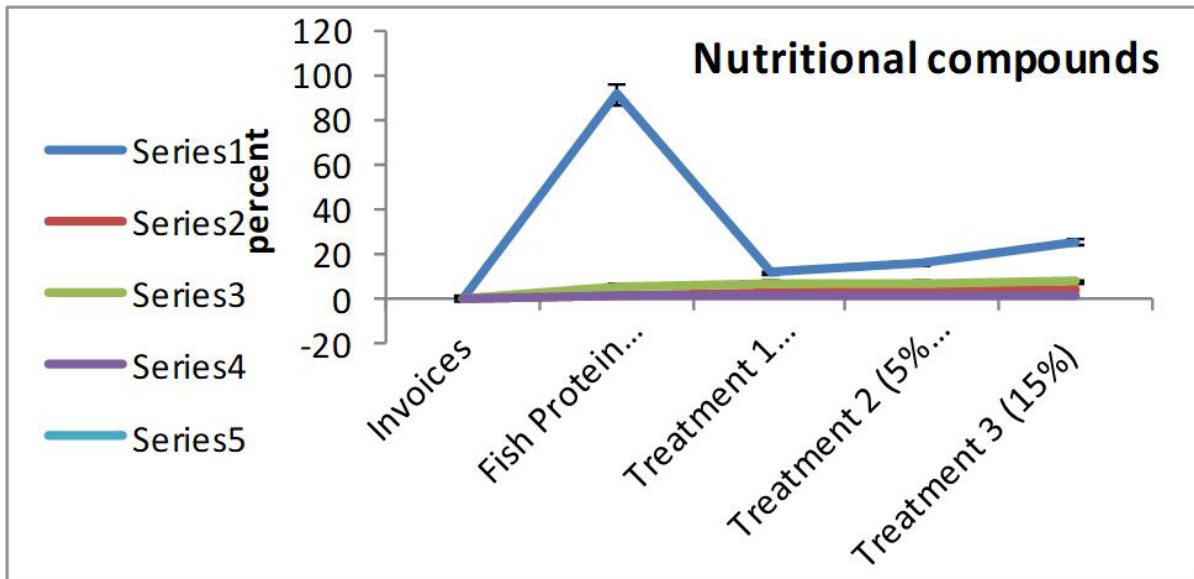


Figure 1: Relationship between FPC and nutritional compounds

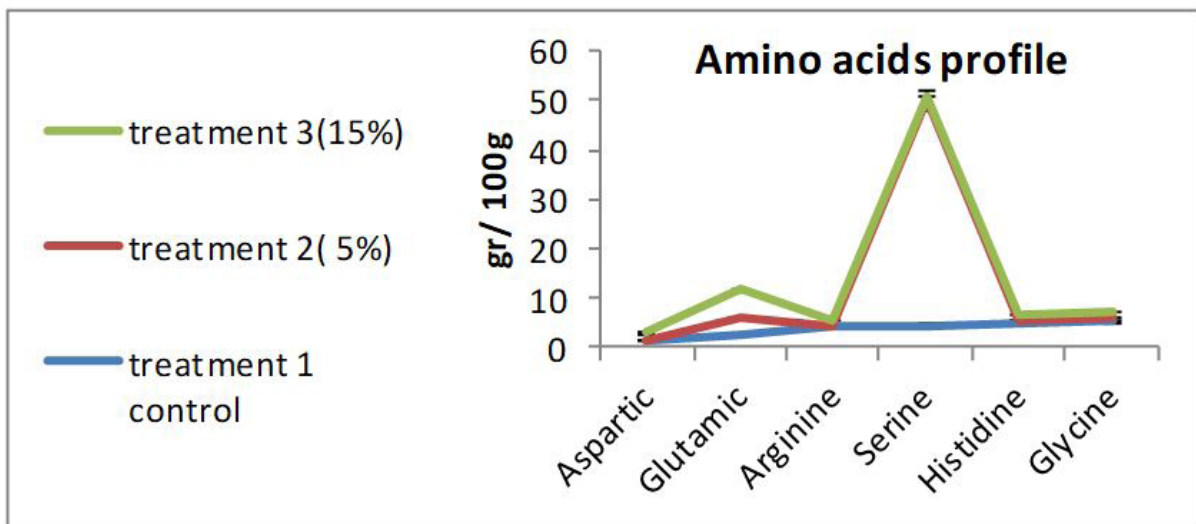


Figure 2: Relationship between FPC and 6 Amino acids profile

The average of approximate compounds of amino acid profiles in treatment 3 with 15% enrichment for 6 amino acids aspartic, glutamic, arginine, serine, hysteine and glycine was higher than other treatments and 5% treatment was carried out at the next stage and the results of the data Are significant ($P < 0.05$).

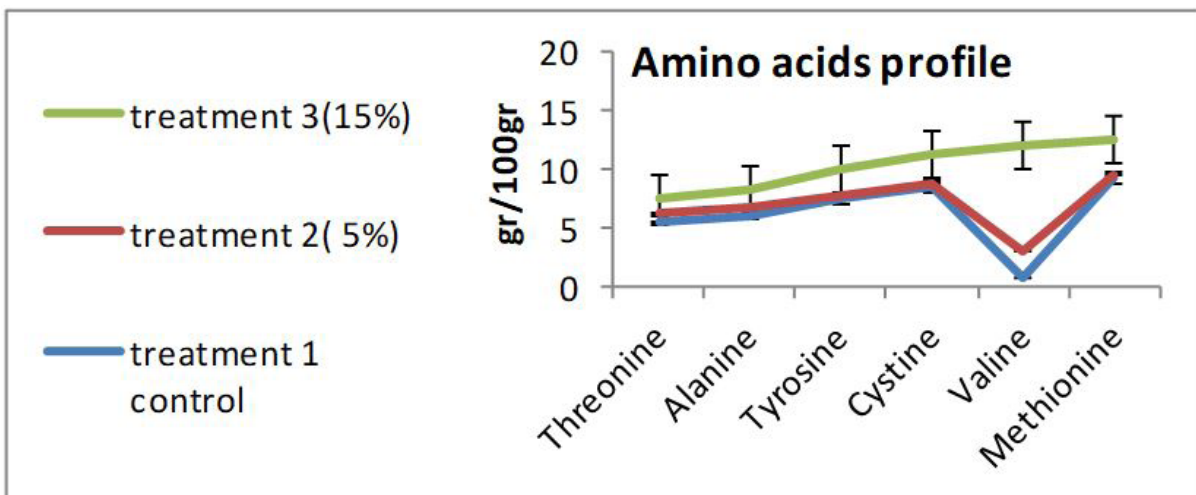


Figure 3: Relationship between FPC and another 6 Amino acids profile

The average of approximate compounds of amino acid profiles in treatment 3 with 15% enrichment for 6 amino acids of trionine, alanine, tyrosine, cysteine, valine and mitoinin are higher than other treatments and 5% treatment is in the next stage and the results of the data Are significant ($P < 0.05$).

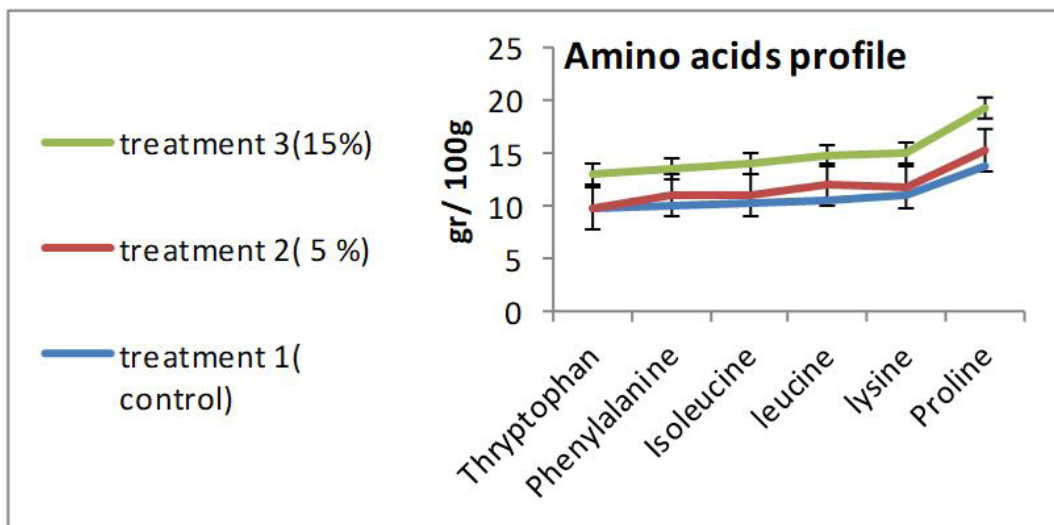


Figure 4: Relationship between FPC and last 6 Amino acids profile

The average of the approximate compounds of amino acid profiles in treatment 3 with 15% enrichment for 6 amino acids tryptophan, phenylalanine, isulosin, leucine, lysine and proline is higher than other treatments and 5% treatment is in the next stage and the results Data are significant ($P < 0.05$).

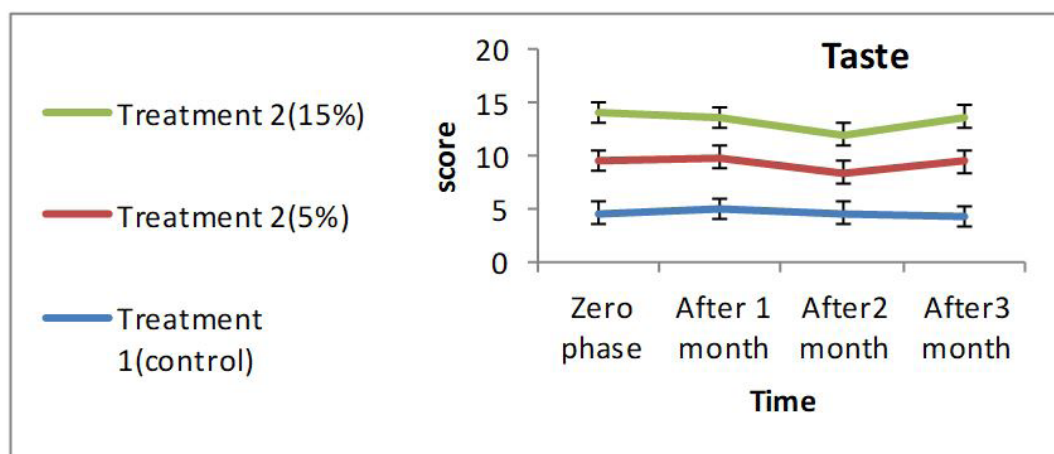


Figure 5: Relationship between Taste assessment and organoleptic score at 4 phases time

In terms of taste assessment, 5% and then 15% and control treatments are in the next stages, and these values are statistically significant ($P < 0.05$).

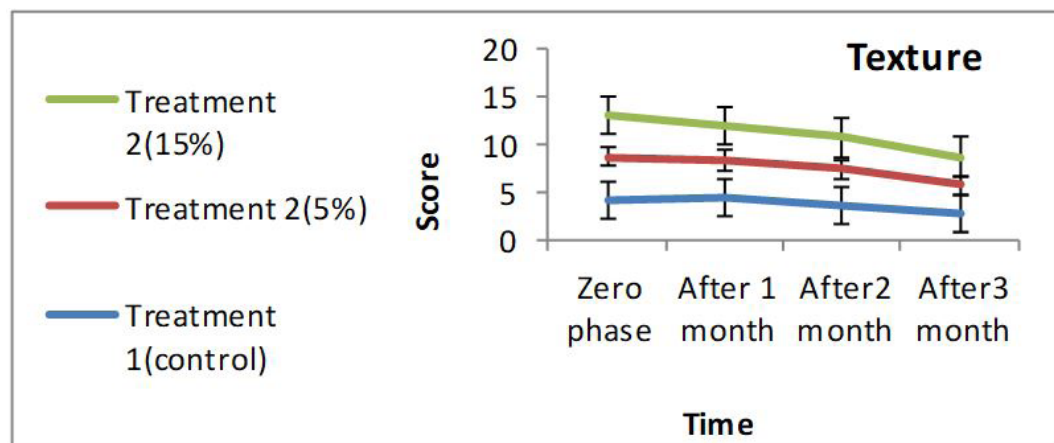


Figure 6: Relationship between Texture and enriched pasta score at 4 phases time

In terms of measuring the score, the texture of the treatment was 5% and 15% at one level and the control treatment was in the next stages and these values were statistically significant ($P < 0.05$).

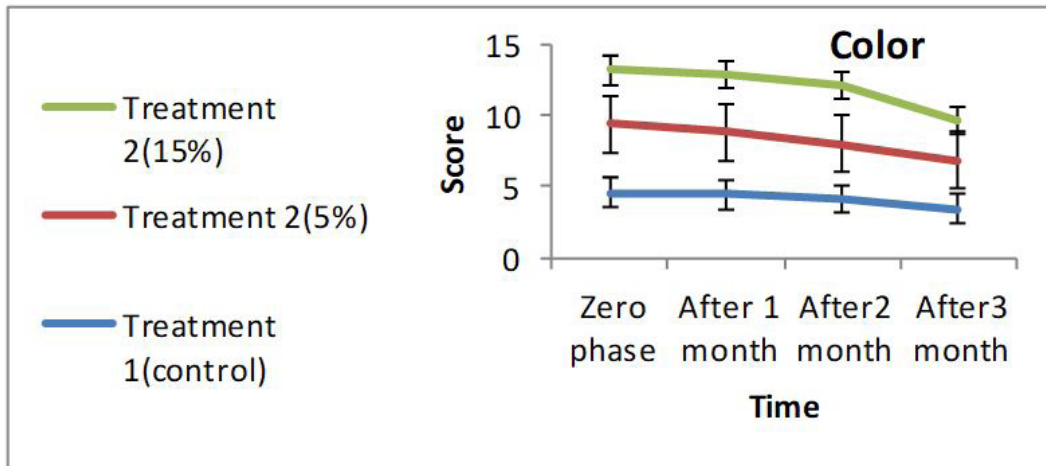


Figure 7: Relationship between Color and enriched pasta score at 4 phases time

In terms of measuring the color of the treatment, the control treatment was better 5% and then 15% at the next stage and these values were statistically significant ($P < 0.05$).

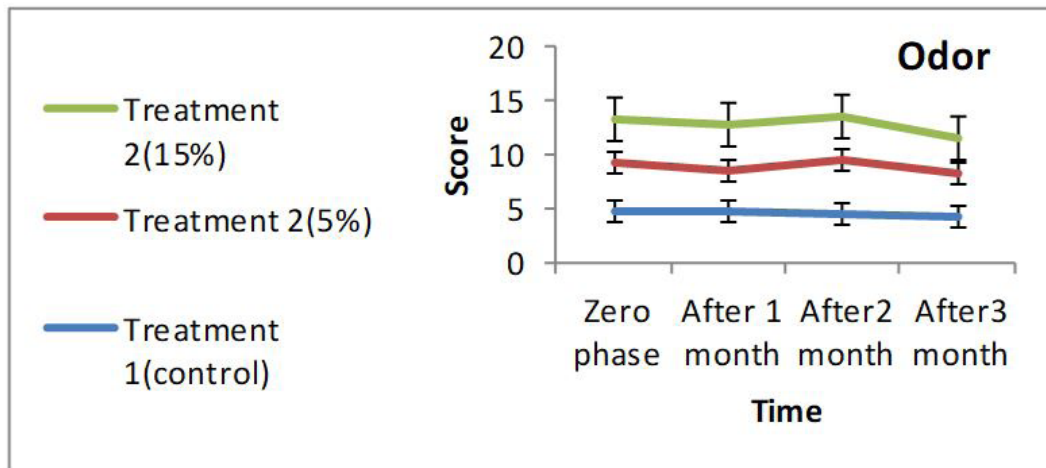


Figure 8: Relationship between Odor and enriched pasta score at 4 phases time

In terms of measuring the scores of 5% and 5% of the control, they were better at one level, 5% and then 15% at the next stage, and these values were statistically significant ($P < 0.05$).

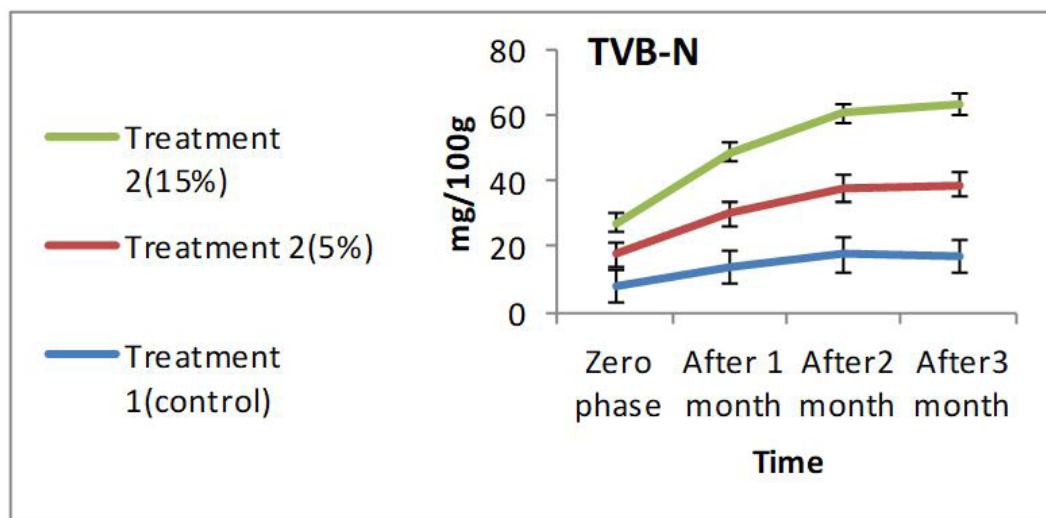


Figure 9: Comparison of TVB-N pasta fillet amount at 4 phases time

In terms of measuring the amount of volatile nitrogen in mg / 100 g and the best quality of survival for control treatment and 5%, followed by 15% treatments at a later stage and these data are significant ($P < 0.05$).

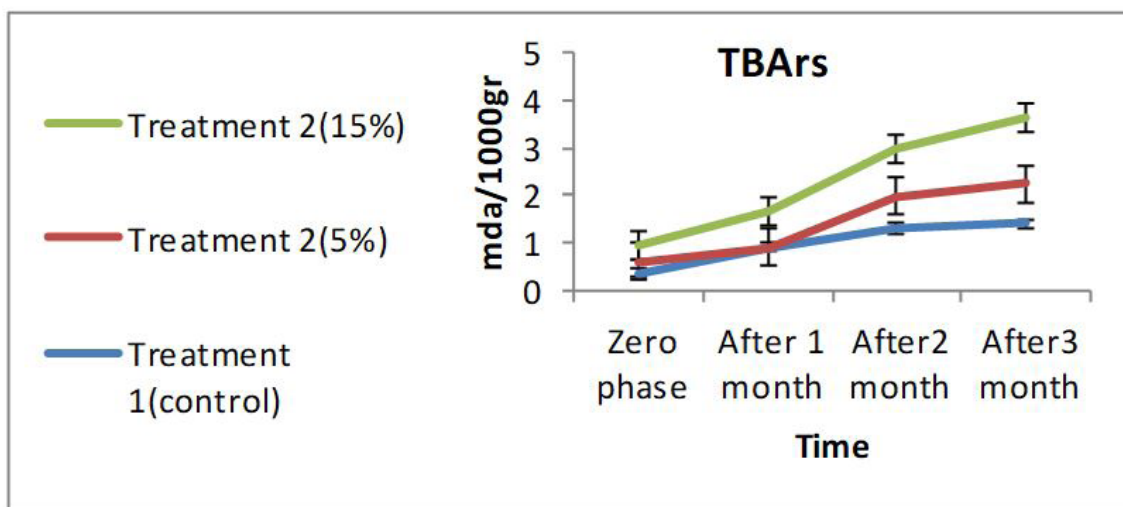


Figure 10: Comparison of TBARS enriched pasta amount at 4 phases time

Measurement of secondary oxidation by malondialdehyde (1000 g) and the best quality of survival (5% and control) are in the same level and the treatment is 15% and the difference is significant ($P < 0.05$).

Discussion

The research on the production of pasta enriched using fish protein concentrate from a variety of fish such as silver carp and its use in human diets, especially children, as a valuable protein supplement, plays an important role in providing nutritional needs and increasing the nutritional value of pasta. And will eliminate the protein deficiencies of the community. US Food and Drug Administration (FDA) controlled use of fish protein concentrate as a valuable protein supplement in the diet of humans has been confirmed (FDA, 2001). According to the Food and Drug Administration (FDA), FPC can be used as a diet supplement in addition to having a good health, its protein content is less than 75% and its fat content is less than 0.5%. Of course, in terms of fat content, The FAO considers a maximum of 0.75% acceptable. In the present study, Protein Concentrate produced from silver carp with a protein content of 91.4% and a fatty acid of 0.63% FPC type A, based on the US Food and Drug Administration (FDA) and FAO, can be used as a source of human nutrition Rich in animal protein. In the current study, in terms of dietary measurements, the percentage of protein and fat in the treatment was 15% higher than treatment 5% and control. In relation to wheat flour enrichment with three sources of vegetable protein, soy protein and fish protein concentrate with ratios of 5 and 10% in bread. The results showed that breads enriched with fish protein concentrates were 10% higher than other treatments which are consistent with the results of this research [8,9].

Regarding qualitative changes (chemical and sensory evaluation and amino acid profiles) in spaghetti enrichment using protein sources with 100% wheat flour, 25% soy flour + 75% wheat flour, 25% soy flour + 70% flour Wheat, 5% corn flour, 35% soy flour + 65% wheat flour, 50% wheat flour + 50% soy flour, showed that the highest percentage of protein was related to treatment 6 (50% wheat flour + 50% soy flour). Which is consistent with the results of this research? [10]. In the metabolism and physiological activity of the body, amino acid compounds play different tasks [11].

The decreasing or incremental changes in the amino acid profile observed in this study are due to the stability of the structure of the amino acids in terms of their circular chain count. In this study, 18 types of amino acids were measured from the group of essential amino acids (arginine, lysine, tert ounine, methionine, valine, phenylalanine, leucine, tryptophan, isoleucine, histidine) and also from the group of unnecessary amino acids (glycine, alanine, serine, cysteine, aspartic acid, proline, tyrosine and glutamate) Enriched pasta with fish protein concentrate contains a high percentage of protein and amino acids, especially amino acids, especially amino acids. As seen in Figures 2, 3, and 4 most of the amino acids measured in the enriched pasta in treatment 2 (15%), compared to 1 (5%) and the control treatment during 3 months of storage in the temperature of the environment increased significantly with time ($p < 0.05$). investigated thalassemia protein concentrate (FPC) enrichment in terms of nutritional value and sensory evaluation. In this study, Tilapia protein concentrate was added to pasta with percentages of 0, 10, 20 and 30% The results of the experiments showed that, by increasing the percentages of concentrate, the amount of amino and protein profiles, total fat, ash, carbohydrate and energy content in pasta was increased, sensory analysis, tissue assay, and the overall acceptance of different percentages of thylaphia concentrate in comparison No significant difference was observed with pasta without the addition of Tilapia protein concentrate [12]. Finally, in terms of total acceptance of 20% treatment, the treatment was selected. In the research, chemical analysis (amino acids and nutritional value) and sensory evaluation of FPC enriched flour in 5% and 10% percent were studied. The protein content obtained from FPC was 84.46 and its fat content was 0.23, which was 5% enriched with FPC, its

protein was 16.7 and 10% enriched with FPC, protein up to 22.5 Increased [9]. Also, the increase of amino acid profiles was done by increasing the FPC percentage in the final product, which is consistent with the present study. Protein is an essential ingredient for the body, about 15% of which must be made from protein-rich foods such as fish, chicken and eggs [11]. The US Food and Drug Administration (FDA) have approved the use of controlled fish protein concentrate as a valuable protein supplement in a human diet (FDA, 2006). Sensory evaluation is used as a measure of quality of fish during storage. Despite the many efforts made to develop laboratory standards for fish, the best way to evaluate the degree of novelty is still organoleptic testing. Evaluation of organoleptic indices along with chemical experiments (as a complementary method) is necessary to determine the extent of corruption and shelf-life of fish and its products. Sensory evaluation is a suitable method for estimating the shelf life of fish and its products during maintenance [13]. If a product is acceptable in terms of the qualitative parameter but not sensible, it is not suitable for use [14]. Taste is a sensation of the food product and is very effective in accepting the product by the consumer. The benefits of sensory evaluation to other methods are that it does not require laboratory equipment, tests are performed quickly, and samples are evaluated at a relatively short time [15]. Regarding the Organoleptic evaluation of spaghetti enrichment using protein sources with 100% wheat flour, 25% soy flour + 75% wheat flour, 25% soy flour + 70% wheat flour, 5% corn flour, 35% flour Soybeans +65% wheat flour, 50% wheat flour + 50% soy flour were found to be in texture, in the aggregate of all treatments in a single level and in terms of chewing Grain and solubility of treatment 6 (50% wheat flour + 50% soy flour) are the best treatments. Also, the flavor of spaghetti enrichment treatment with 35.65% wheat flour and soy flour was better than other samples [10]. In a study on macaroni enrichment using fish protein concentrate of tilapia with ratios of 10, 20 and 30 percent of fish protein concentrate and its comparison with control treatment, and in measuring sensory evaluation and flavor, color, and tissue factors In terms of taste and physical changes, treatment with 20% enriched has the best evaluation and is more acceptable. According to the results of this study, the enriched pasta corresponds to 5% FPC [16].

According to Figure 9, TBA values increased with increasing the oxidation of lipids in different treatments, which was the lowest in treatment and treatment (1%) and 5% in treatment (15%), in analyzing these results It is possible to reduce the breakdown of fatty acid bands and prevent its hydrolysis. The magnitude of this index is within the permitted range of 2 milligrams of malondialdehyde per kilogram of dry matter [5]. Only 15% treatment is close to this range at the end of the period and two other treatments with a 15% difference were statistically significant and have lower values. In the study of Moeny *et al.* [17], which was used to enhance the bread's enrichment using FPC, the TBA value increased in the 10% treatment during storage and exceeded the permitted range, However, no significant changes were observed in samples containing lower FPC values In the study of Khoshkhoo *et al.*[18], the TBA content during 6 months of storage of FPC from Kalka was increased at ambient temperature significantly during storage, However, this increase was significantly lower in vacuum packed treatments [5]. The results of this study are consistent with the results of other researchers. According to Figure 10, TVB-N is generally dependent on microbial activity and microbial degeneration, such that volatile species are produced by the separation of amines from acids by microbial enzymes. TVB-N is widely used as an indicator of corrosively of the product and usually produces a surface equivalent of 35-40 mg TVB-N per 100 grams [19]. According to the present study, TVB-N values with increasing storage time were increased in all treatments, but this increase in treatment with 2% containing 15% FPC was significantly higher than that of control and treatment 1 containing 5% FPC. Similar results were seen in enriched breads with different percentages of FPC of silver carp. There was no significant difference in the trend of increasing TVN content in 0.5, 2, 5 and 7% of FPC treatments, and 10% treatment showed a significant difference with other treatments [18]. Comparing the results of this study and comparing it with other studies showed that increasing the amount of FPC with values higher than 10% in the increase of TVB-N has a clear and distinct role and in this regard, our results are consistent with other researchers' findings. However, some researchers have mentioned in their studies that this index cannot be a suitable criterion for judging the novelty of the product [20].

Conclusion

According to the results of experiments, food, chemical, sensory and amino acid profiles were determined and after statistical tests of the data were determined, However, in terms of nutritional value, the percentage of protein, fat, and amino acid profiles of the treatment with fish protein concentrate was better. However, in terms of taste and shelf-life of the treatment, 5% of the fish protein concentrate was better evaluated and, considering that the taste is at the top of the evaluation, in the overall assessment of the fish protein concentrate enriched with 5% better than the other Samples have been.

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