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Value added products from red snapper fish

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Abstract

Fishes are consumed as food in fresh condition. Some of them are also utilized after the preservation. Red snapper is found in the Atlantic Ocean. It is usually from 1.5-2 feet in length. Red snapper fish is a popular game fish that has flaky skin and is mildly sweet with a pink colour. It is very healthy and full of nutritional elements. It contains high levels of omega - 3 fatty acids, selenium, magnesium, vitamin D and E. It is found in 170 kilo calories and 35 grams of protein. It aids in weight control and lowers heart disease risk, support thyroid health and increase white blood cells in the body, to lower the risk of megaloblastic anaemia due to high selenium content. It prevents Osteoporosis and strengthens bone mineral density and strokes and bring blood pressure down due to high levels of Omega 3 fatty acids. It helps in weight management because of protein density and high potassium levels. It improves cognitive function and boosts nervous system health due to high levels of vitamin A. It is safe to eat occasionally, about 1-3 times a week, though with restraint because there is some concern regarding mercury levels in the fish. The red snapper fish is moist with a firm texture and holds up against strong flavours. It can be versatile cooked whether it is steamed, grilled, broiled, sautéed, baked or poached. Fish cutlet, fish finger, fish pickle, fish wafers, fish balls, fish sausage, fish burger, fish momo, fish nuggets, fish rolls, fish soup, fish noodles, fish biryani, fish kabab, fish samosa and dry salted fish were prepared from red snapper fish.

Keywords: Red snapper fish, protein, omega 3 fatty acid, vitamin A, mercury, products

Introduction

Fish are aquatic vertebrates that inhabit both freshwater and marine environments and play an important role in human nutrition and global food security. Fish are characterized by the presence of gills for respiration, fins for locomotion and a streamlined body that enables efficient movement in water. They represent one of the most diverse groups of vertebrates and are widely distributed across oceans, rivers, lakes and ponds. According to Food and Agriculture Organization (2018), fish and fishery products are among the most traded food commodities in the world and provide an important source of animal protein for millions of people.

Fish are considered an excellent source of high-quality protein, essential amino acids, omega-3 fatty acids (EPA and DHA), vitamins and minerals. Regular consumption of fish is associated with several health benefits such as improved cardiovascular health, better brain development and reduced risk of chronic diseases. Gopakumar K (1997) reported that fish protein is highly digestible and contains essential nutrients necessary for human growth and maintenance. In addition, fish are rich in vitamins such as vitamin A, vitamin D and B-complex vitamins, along with important minerals like calcium, phosphorus, iodine and selenium.

India is one of the leading fish-producing countries in the world and plays a significant role in global fisheries and aquaculture. The fisheries sector is an important component of the Indian economy as it contributes to food security, employment generation and export earnings. According to the Food and Agriculture Organization (2022), India ranks second in global fish production, contributing nearly 8% of the total global fish production. The rapid growth in the fisheries sector is mainly due to the expansion of aquaculture, improved fishing technologies and supportive government policies.

Fish production in India has shown remarkable growth over the past few decades. According to the Department of Fisheries (2023), the total fish production in the country increased from 95.79 lakh tonnes in 2013-14 to about 175-180 lakh tonnes in recent years, reflecting the

continuous development of the fisheries sector. Inland fisheries and aquaculture contribute the largest share, accounting for nearly 70-75% of the total fish production, while marine fisheries contribute around 25-30%.

Inland fisheries include fish farming in ponds, tanks, reservoirs, rivers and canals, and they have become the major driver of fish production in India. Marine fisheries are also important due to India's long coastline of about 8,118 km, which supports diverse marine resources and provides livelihood to millions of coastal fishermen. Ayyappan S (2011) reported that the rapid expansion of aquaculture, particularly freshwater aquaculture, has significantly contributed to the growth of fish production in India.

Red Snapper fish (*Lutjanus* sp.) is one of the most important marine food fishes due to its high nutritional value, excellent taste and economic significance. It is widely distributed in tropical and subtropical marine waters and is highly preferred by consumers because of its firm texture, mild flavor and attractive appearance. According to Venugopal V (2006), marine fishes such as red snapper are valuable sources of high-quality protein, essential fatty acids, vitamins and minerals that contribute significantly to human nutrition.

Red snapper fish is considered an excellent source of easily digestible protein containing all essential amino acids required for human growth and maintenance. It also contains significant amounts of omega-3 fatty acids such as EPA and DHA, which are known to promote cardiovascular health and reduce the risk of heart diseases. Gopakumar K (1997) reported that fish proteins have high biological value and play an important role in maintaining proper body functions and overall health.

In addition to its nutritional importance, red snapper also has considerable economic value in the fisheries sector. It is widely utilized in both fresh and processed forms and is suitable for the preparation of various value-added fish products such as fillets, fish cutlets, fish fingers, fish patties and fish nuggets. According to the Food and Agriculture Organization (2020), the utilization of marine fishes for value-added products helps improve product quality, increase market demand and reduce post-harvest losses.

According to FAO (2010), red snapper contains approximately 18-22 percent protein, low fat content and essential minerals such as phosphorus, potassium and magnesium. Due to its nutritional composition and good taste, red snapper is widely consumed in many parts of the world.

Materials and Methods

The study was conducted on Department of Nutrition and Dietetics, EGS Pillai Arts and Science College, Nagapattinam. Fresh red snapper fish was procured from

local fish market at Nagapattinam. Other ingredients such as corn flour, onion powder, garlic powder, ginger powder, pepper powder, turmeric powder and salt were purchased from the local market and stored in cleaned airtight containers until use.

Preparation of red snapper fish powder

Pre-processing of red snapper fish: Selected fresh red snapper fish was washed thoroughly under running potable water to remove dirt, slime and other adhering impurities. The scales were removed using a fish scaler and the fish was washed again with clean water. The head, fins and internal organs were removed carefully using a stainless-steel knife. The cleaned fish was filleted, and the flesh was separated from the bones. The boneless fish was washed again to remove traces of blood and unwanted materials. The cleaned fish was cut into small pieces.

Cooking and drying of red snapper fish powder

The fish pieces were cooked by steaming for about 15-20 minutes until the flesh became soft and completely cooked. After steaming, the cooked fish was allowed to cool at room temperature. The cooled fish was shredded manually and spread evenly on stainless steel trays. The shredded fish was dried in a hot air oven at 60°C for about 6-8 hours until the moisture content was considerably reduced.

Preparation of fish powder

The dried fish meat was ground using an electric grinder to obtain fine fish powder. The ground powder was sieved through a fine mesh sieve to obtain uniform particle size. The prepared fish powder was stored in airtight containers until further use.

Preparation of red snapper fish soup mix

Fish soup powder is a convenient dehydrated mix used to prepare nutritious fish soup quickly. It is especially useful for value-added fish products and can be developed for commercial or research purposes.

Table 1: Formula for red snapper fish soup mix

Raw ingredients	Quantity
Fish powder (from dried Red Snapper fish)	40 gm
Corn flour (For thickening agent)	10 gm
Onion flakes (dried)	10 gm
Garlic flakes (dried)	10 gm
Black pepper powder	10 gm
Ginger flakes (dried)	8 gm
Salt, Coriander leaves	5 gm each
Turmeric powder	2 gm

Preparation of red snapper fish powder and soup



Method

- Red snapper fish powder was mixed with corn flour, onion powder, garlic powder, ginger powder, pepper powder, turmeric powder and salt in predetermined proportions.
- All the ingredients were blended thoroughly using a mixer to obtain a uniform soup powder mixture.
- The prepared soup powder was packed in airtight containers.
- Take 50 gm of soup mix and add 250ml of water.
- Boil it for 5-10 minutes.
- Add coriander leaves and serve it.
- This soup has high protein, rich in mega 3 fatty acid and good source of calcium and phosphorus. Boost immunity and supports bone health.

Preparation of red snapper fish powder muffin

Muffin is an individual-sized, chemically leavened quick bread, typically characterized by a moist, cake-like texture, a rounded top, and a cup-shaped base. Originating as a denser, yeast-based street food in 11th-century Wales, modern American muffins evolved into sweet or savory cakes, commonly baked in tins for breakfast, snacks, or dessert.

Table 2: Formula for red snapper fish powder muffin

Raw ingredients	Quantity
Fish powder (from dried Red Snapper fish)	25 gm
Wheat flour	50 gm
Sugar powder	20 gm
Baking powder	3 gm
Salt	2 gm
Egg	1 No
Milk	20 ml
Butter	30 ml
Vanilla essence	1 ml

Preparation of red snapper fish powder muffin



Method

- Wheat flour and red snapper fish powder blends were sieved in a BS 60 mesh sieve,
- Add sugar powder, salt, baking powder, egg, milk, butter and vanilla essence.
- Make it in batter form.
- The batter was mixed thoroughly and poured into muffin moulds.
- The muffins were baked in a baking oven at 180°C for about 20-25 minutes until properly cooked and golden brown in colour.

Preparation of red snapper fish curry masala

Fish curry masala powder is a nutritious, protein-rich powder made by blending red snapper fish powder with roasted spices. It is similar to traditional idli podi but enhanced with fish flavor and nutrients. It is a fragrant South Indian spice blend featuring coriander seeds, red chillies, black pepper, fenugreek, cumin, and turmeric. Dry-roasted and ground, it creates a robust, tangy, and spicy curry base.

Table 3: Formula for red snapper fish curry masala

Raw ingredients	Quantity
Fish powder (from dried Red Snapper fish)	50 gm
Coriander seed powder	15 gm
Dried red chillies powder	10 gm
Black pepper powder	10 gm
Cumin seed powder	4 gm
Fennel seed powder	2 gm
Fenugreek seed powder	2 gm
Mustard seed powder	2 gm
Curry leaves (dried) powder	3 gm
Turmeric powder	2 gm

Preparation of red snapper fish curry masala



Method

- Red snapper fish powder was blended with spice powders such as turmeric powder, chilli powder, coriander powder, cumin powder, pepper powder and salt.
- The ingredients were mixed thoroughly to obtain a uniform curry masala mixture.
- The prepared masala was packed in airtight pouches.

Results and Discussion

Red snapper fish soup mix powder

Soup premix powder was prepared using fish powder along with spices and other ingredients.

Panelists	Colour and appearance	Texture	Taste	Flavour	Overall acceptability
1	8.5	8.0	8.5	8.7	8.5
2	8.8	8.2	8.6	8.5	8.6
3	8.6	8.4	8.7	8.6	8.7
4	8.7	8.3	8.8	8.7	8.6
5	8.5	8.1	8.5	8.6	8.5

The sensory evaluation conducted by the panelists showed high acceptance of the product across all sensory attributes. The scores for colour and appearance ranged from 8.5 to

8.8, indicating that the product had an appealing visual quality and was attractive to the panelists. The high ratings suggest that the product's appearance positively influenced consumer perception. The texture scores ranged between 8.0 and 8.4, which were slightly lower compared to other attributes but still indicated good acceptability. This suggests that the texture was satisfactory and acceptable to the panelists.

For taste, the scores ranged from 8.5 to 8.8, demonstrating that the product was highly palatable and well accepted. Flavour scores varied from 8.5 to 8.7, indicating a pleasant sensory experience and good overall flavour profile. The overall acceptability scores ranged between 8.5 and 8.7, reflecting a high level of consumer acceptance. The similarity in scores among panelists indicates consistency in sensory perception and suggests that the product was uniformly preferred. Overall, the results indicate that the product achieved high sensory acceptability, with average scores above 8, corresponding to "liked very much" on the 9-point hedonic scale. Among the evaluated parameters, taste and flavour contributed strongly to the overall acceptability, while texture showed slightly lower but still favourable ratings. These findings suggest that the developed product has good potential for consumer acceptance.

Red snapper fish curry dry masala

Fish curry masala was prepared by blending fish powder with traditional spices.

Panelists	Colour and appearance	Texture	Taste	Flavour	Overall acceptability
1	8.8	8.5	9.0	8.9	8.8
2	8.9	8.6	8.8	8.7	8.8
3	9.0	8.7	9.0	8.8	8.9
4	8.7	8.5	8.9	8.6	8.7
5	8.8	8.6	9.0	8.9	8.8

The sensory evaluation results indicated that the product received high acceptance from the panelists across all sensory attributes. The scores for colour and appearance ranged from 8.7 to 9.0, suggesting that the product had an attractive and appealing appearance, which positively influenced consumer preference. The texture scores ranged between 8.5 and 8.7, indicating that the texture was highly acceptable and satisfactory to the panelists. The consistent ratings show uniform perception regarding the product's physical characteristics.

For taste, the scores ranged from 8.8 to 9.0, representing one of the highest-rated attributes. This suggests that the product was highly palatable and well appreciated by the panelists. Similarly, flavour scores ranged from 8.6 to 8.9, indicating a pleasant aroma and flavour profile that contributed positively to sensory acceptance. The overall acceptability scores varied from 8.7 to 8.9, demonstrating strong consumer acceptance of the product. The minimal variation among panelists reflects consistency in evaluation and indicates reliable sensory preference. Overall, the findings show that the product achieved excellent sensory acceptability, with average scores close to 9, corresponding to "liked extremely" to "liked very much" on the 9-point hedonic scale. Among all attributes, taste and colour/appearance received the highest ratings, suggesting they were major contributors to overall acceptance. These

results indicate that the developed product has strong potential for consumer preference and market acceptance.

Red snapper fish powder muffin

Fish-based muffin was developed as a bakery product incorporating fish powder.

Panelists	Colour	Texture	Taste	Flavour	Overall
1	8.5	8.8	8.7	8.6	8.7
2	8.7	8.9	8.8	8.7	8.8
3	8.6	8.7	8.9	8.8	8.8
4	8.8	8.9	8.7	8.6	8.7
5	8.7	8.8	8.8	8.7	8.8

The sensory evaluation conducted among the panelists showed high acceptability of the product across all sensory attributes. The scores for colour ranged from 8.5 to 8.8, indicating that the product had an attractive appearance and was visually appealing to the panelists. The texture scores ranged between 8.7 and 8.9, suggesting that the product possessed a desirable consistency and mouthfeel. The high texture ratings indicate good product quality and acceptability.

For taste, the scores varied from 8.7 to 8.9, reflecting high palatability and positive consumer preference. Similarly, flavour scores ranged from 8.6 to 8.8, indicating that the product had a pleasant flavour profile and was well accepted by the panelists. The overall acceptability scores ranged from 8.7 to 8.8, demonstrating strong consumer acceptance of the product. The close similarity in ratings among panelists suggests consistency in sensory perception and reliability of the evaluation results.

Overall, the findings indicate that the product was highly acceptable, with average scores above 8.5, corresponding to "liked very much" on the 9-point hedonic scale. Among the evaluated attributes, texture and taste received slightly higher scores, suggesting that these factors contributed significantly to overall acceptability. The results indicate good potential for consumer preference and successful acceptance of the developed product.

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