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Short Communication

Storage stability of Pangasius cutlet under refrigerated conditions

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ABSTRACT

In the present study, quality changes of the fish cutlets prepared from the mince of pangasius *(Pangasianodon hypophthalmus*) using sensory and biochemical methods during refrigerated storage were investigated. A storage study was conducted to find out the shelf-life of the product under refrigerated conditions for 12 days. The initial values of moisture, crude protein, fat and ash content of the prepared cutlet were found as 54.50, 18.27, 15.40 and 4.35 percent respectively. At the end of the 12th day of storage moisture, crude protein, fat and ash content were found 50.20, 19.90, 15.60 and 4.90 per cent respectively. NPN content increased from 1.06 to 3.20 during the study. The total volatile base nitrogen contents (TVBN) increased from 5.0 to 18.60 (mg %) on the 12th day of study. Peroxide value also showed an increasing trend and was found as 11.88 (meqO_2/kg) on the 12th day of the study. Similarly, the pH value increased from 6.58 to 7.20 during the study. The product was rejected by the taste panel on the 12th day of the study.

Key words: Fish cutlet, pangasius, sensory evaluation, storage study

Fish is a highly perishable commodity, compared to land animals so it must be properly handled and preserved before it is disposed of. Lipid oxidation and microbial growth are the major factors responsible for the perishable nature of the fish which influence its colour, texture, flavour, nutritional value and safety. Consumer acceptability of fish is affected by the undesirable reactions associated with lipids and proteins leading to detrimental changes in nutritional and sensory properties. Therefore, it is necessary to produce good quality and safe fish to satisfy consumer demand. Consumption of fish and fishery products has increased in recent times, as fish is considered a healthy source of protein. India's total fish production has raised to 11.16MMT in the year 2019-20 and exports touched an all-time high of 46662.85 crores (MPEDA, 2020). Post-harvest losses in the production of marine and inland fisheries account for an annual loss of 61000 cr. (Kumar and Narayan, 2020). Fish production is a seasonal activity and for round-the-year availability processing and product development are imperative. Aquaculture has shown a growth of 6-7% per annum in the recent past and is one of the fastest-growing sectors mainly due to species diversification and new culture systems (Ayyappan, 2012). The Pangasius (*Pangasianodon hypophthalmus*) has a poor demand in the international market due to varied reasons and is mainly consumed by the low-income group. Pangasius production has increased in India but fish farmers practising aquaculture express that the cost of feed, seed, fertilizers and lease rent has gone up considerably and profitability has gone down. Pangasius fetches a low price compared to the Indian major carps and other culture species. This makes it one of the viable candidates for value addition, so that profitability is increased. People prefer ready-to-cook and ready-to-eat products as the purchasing power has increased with the working nature of both male and female family members besides the scantiness of time to prepare the food. The development of ready-to-cook and ready-to-serve products helps in increasing the demand and also creates new employment opportunities. The present study was carried out to prepare the fish cutlet from the Pangasius and study the storage stability.

MATERIALS AND METHODS

Fish collection and preparation: Pangasius fish (*P. hypothalamus*) was purchased from the local market of district Srinagar Jammu and Kashmir and transferred to the fish processing laboratory of Division of Post-Harvest Technology, Faculty of Fisheries Rangil, Ganderbal under proper iced condition. Upon reaching the laboratory, the fish was thoroughly washed with potable water, beheaded, gutted, washed again and filleted. The mince was prepared using the meat mincer. The mince was salted at the rate of 5% and kept in the refrigerator for future use.

Preparation of fish cutlet: A Standardised recipe (Rathod *et al*., 2012), with slight modifications in ingredient composition and methodology, was followed for the preparation of fish cutlets. Potato content was reduced to fifty per cent and replaced by Bengal gram (Table 1). Likewise, raw fish mince was mixed with the other cooked ingredients and formed into an oval shape of 40g weight, the cutlet prepared was fried in vegetable oil till brown and stored under refrigerated conditions for further studies.

Table 1: Ingredients used for the fish cutlet

S. No.	Ingredient	Quantity (g)	g/1000
1.	Fish	375	650.35
2.	Potato	56	97.12
3.	Onion	56.25	97.55
4.	Green Chillies	3.75	6.50
5.	Turmeric powder	0.75	1.30
6.	Red Chilli Powder	5.62	9.75
7.	Black Pepper	0.75	1.30
8.	Ginger paste	5.62	9.75
9.	Salt	11.25	19.51
10.	Garlic	5.62	9.75
11.	Dal	56	97.1

Chemical analysis

Determination of Moisture, crude protein, Fat, NPN, and peroxide value: The moisture, crude protein, fat, NPN, and peroxide value of cutlet was carried out using the standard methods (AOAC, 2010).

Determination of pH: For estimation of pH, 5 g cutlet sample was blended in 45 ml distilled water using tissue homogeniser and then the pH was measured using digital pH meter. Before measuring the pH of the slurry, pH meter was calibrated with standard buffer solutions of pH 4.0, 7.0 and 9.0.

Determination of TVBN (Total volatile base-Nitrogen): The total volatile base nitrogen (TVB-N) was determined based on an adaptation of the current official European steam-distillation method (Official Journal, 1995).

Sensory evaluation: The sensory evaluation of the cutlet stored under refrigerated conditions was performed by 10 trained panellists. Samples were evaluated for colour, appearance, hardness succulence and overall acceptability on 10-point scale (IS: 6273 [II], 1971).

Statistical Analysis: Means and standard errors were calculated for different parameters. The data analyses were performed using SPSS software.

RESULTS AND DISCUSSION

Proximate analysis of Pangasius fish cutlet: The moisture, crude protein, fat and ash contents in freshly prepared fish cutlet were 54.50, 18.27, 15.40 and 4.35 respectively (Table-2). The moisture content showed a decreasing trend during the storage period and it reached to value of 50.20 percent on the final day of the study. An increasing trend was observed in the total protein, fat and ash content also increased slightly during the study. Rathod and Pagarkar (2013) reported decrease in the protein content and increase in the fat content of the Pangasius cutlet during the refrigerated storage. Decrease in the moisture content and increase in the fat content in the tilapia cutlet has been attributed to the deep frying (Ninan *et al.*, 2010)

Table 2: Changes in the % Proximate Composition of the fish cutlet

Day	Moisture Content	Protein content	Crude Fat	Ash Content
0	54.50±0.63	18.27±0.17	15.40±0.15	4.35±0.04
2	53.57±0.65	18.66±0.16	15.45±0.16	4.61±0.05
4	53.16±0.64	18.72±0.18	15.49±0.15	4.75±0.04
6	51.52±0.64	18.78±0.21	15.50±0.13	4.76±0.06
8	50.97±0.61	19.74±0.13	15.52±0.14	4.78±0.05
10	50.92±0.70	19.80±0.18	15.55±0.14	4.78±0.06
12	50.20±0.78	19.90±0.19	15.60±0.18	4.90±0.03

Data (n=3) are presented as means ± SD,

Changes in pH: The change in pH of fish muscle is a good index for quality assessment. The pH of the cutlet increased from 6.58 to 7.20 from the initial day of preparation to the final day of storage (Fig.1.) Similar trend has been observed by Coban (2013) in fish fingers and Dhanpal *et al.* (2012) associated this increased pH to the breakage of hydrogen bond and electrostatic interactions.

Changes in Non-protein nitrogen: The data pertaining to the NPN is presented in the Figure 1. NPN changed from an initial value of 1.06 mg/100g to a final value of 3.20 mg/100g on the last day. Increase in NPN content has been attributed to hydrolysis of protein and other nitrogenous compounds by autolytic enzyme together with bacterial action (Yeasmin *et al*., 2010)

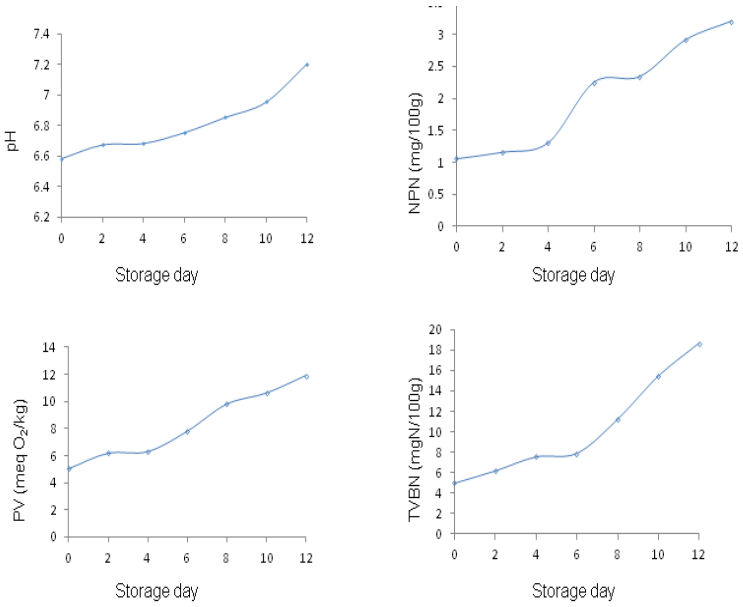

Fig. 1: Changes in pH, NPN, Peroxide value and TVBN of pangasius cutlet during refrigerated storage

Changes in TVBN (Total volatile base-Nitrogen): TVBN is a commonly used chemical method to determine spoilage of fish. The TVBN in freshwater fish and their products comes from ammonia (Tokur *et al*., 2004). TVBN data is presented in the Figure 1. TVBN showed an increasing trend during the study and increased from 5.0 mg/ 100g on the initial day of the study to18.60 on the final day of the study. Similar trend has been observed by Reddy and Bhandary (2015) and Rathod and Pagarkor (2013)

Changes in Peroxide value: The PV is a measure of first stage of rancidity (Gopakumar, 2002). Peroxide value of fish cutlet increased from 5.06 to 11.88 meqO_2/kg of fat during storage study. Ninan *et al.* (2008) reported increased trend in the peroxide value of fish cutlet prepared from tilapia up to 12-15 weeks of frozen storage.

Changes in Sensory data: Sensory evaluation of the data is presented in the Table 3.The overall acceptability score of the cutlet decreased from 8 to 5, indicating that the product accessibility decreased with the storage time. The sensory score corroborated with the changes in the TVBN value and peroxide value of the product.

Table-3: Changes in the Sensory data of fish cutlet

Day	Colour	Appearance	Hardness	Succulence	Overall acceptability
0	8±0.15	9±0.23	9±0.18	8±0.20	8±0.32
2	8±0.05	8±0.25	9±0.16	8±0.19	8±0.21
4	7±0.02	8±0.21	8±0.18	8±0.23	7±0.22
6	7±0.21	8±0.21	8±0.19	7±0.21	7±0.25
8	7±0.23	7±0.25	7±0.21	6±0.21	7±0.23
10	6±0.12	7±0.24	7±0.21	6±0.32	6±0.24
12	5±0.16	6±0.16	5±0.23	5±0.12	5±0.21

Data (n=3) are presented as means ± SD

CONCLUSION

An attempt has been made to reduce the carbohydrate content in the Pangasius cutlet and study the quality changes in the product up to 12 days under refrigerated conditions. It has been observed that the potato content in the Pangasius cutlet can be reduced up to fifty percent of the content as used by the previous researchers. The product had a shelf life of 11 days under refrigerated condition.

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