



Traditional and Highly Popular Semi-Fermented Fish Products of North-East India: A Review

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Abstract

In North Eastern states of India, the solid semi-fermented fish products are hugely in demand by the consumers at large. Mostly the tribal and the Bengali population of the zone are fond of this product because of its characteristics taste and flavor. The present review widely portrays the quality aspects and point popular characteristics of the processed semi-fermented fish product which directs to its huge popularity among the fish consuming population there.

Keywords: Consumers, Fish, Semi-fermented, Taste and flavor

1. Introduction

In South East Asia, traditional processing of fish such as fermentation, salting, drying and smoking are the principal methods of fish preservation[1]. In North East India, fermentation is one of the oldest and most economical methods for producing and preserving food. The fermentation process causes enrichment and improvement of food through flavor, aroma and change in texture, preservation by producing organic acids, nutritional enrichment, reduction of endogenous toxins and reduction in the duration of cooking and thereby fuel requirement. In some cases, the pharmacological and nutritional value of the product is enhanced including the digestibility[2]. Depending on the product and consumer preferences, its appearance and flavor may be enhanced. Fermentation may make the product more enjoyable and safer. Probiotics or “good bacteria” are also formed through the process of fermentation.

Fish sauce, Jeotgal, Shrimp paste, Shidal, Hentak and Ngari are the popular indigenous fermented fish products worth mentioning. *Ngari*, a traditional fermented fish product prepared from sundried *Puntius* sp. were fermented in different temperature and its biochemical and microbiological qualities were analyzed. Changes in the different proximate and nutritional parameters were observed. *Vibrio parahaemolyticus* and Pathogenic bacteria such as

Salmonella and *E.coli* were not detected during the course of study. *Aspergillus* spp. and *Penicillium* spp. were the dominant fungal species during the period of fermentation. The results shows that several microflora with varying percentage were found to be associated with the fermentation of sundried *P. sophore* and they might play an important role during fermentation [3].

Reported results on nutritional, biochemical and microbiological analyses:

Sarojnalini and Vishwanath⁴ studied the chemical composition, total bacterial counts and digestibility of *Hentak* and *Ngari*, the two fermented fish foods consumed in Manipur. They have analyzed and found that the compositions of *Hentak* and *Ngari* were respectively, cholesterol, 2.67 and 8.37 mg/g; Ca, 12.60 and 6.88 mg/g; Fe, 1.29 and 0.51 mg/g; and total viable bacterial counts, 4.8×10^8 and 5.0×10^7 cells/g. According to them, *Hentak* appears to be a better food in view of its higher Ca, Fe, essential amino acids, lipids and low cholesterol content. Vishwanath and Sarojnalini⁵ studied *Hentak*, a fermented paste product of Manipur, prepared from *Esomus danricus* and showed the changing profile of total oxalate content during fermentation.

Sarojnalini and Vishwanath⁶ also studied the biochemical composition and nutritive value of sun dried *Puntius sophore*, which was used in the preparation of *Ngari*, a fermented product of Manipur. According to their analysis, it contains 18.1% moisture, 45.0% protein, 18.5% lipids and 11.0% ash. The in vitro digestibility of protein was found to be 44.1% in 2 hours by pepsin and 55.7% by pepsin + trypsin in 24 hours. The α -amino nitrogen was 32.6 mg/g of total nitrogen. The total volatile base nitrogen (TVBN, 4.6 mg/g) value, thiobarbituric acid number (TBA, 0.507 mg/1000g) and peroxide value (4.2 mmol/g) were within the acceptable limits.

Khanum *et al.*⁷ studied the nutritional characteristics of a semi-fermented fish product, commonly known as *chepa shutki* in Bangladesh. They have analyzed the product and found that the crude protein, crude fat, and crude ash contents were 33.2, 17.0 and 12.2%, respectively. The calcium, phosphorus, magnesium and iron contents of *chepa shutki* were higher than those of similar kinds of Japanese processed fish. The amino acid score of the protein was found to be 100, based on the provisional amino acid scoring pattern⁸. Based on their findings, they have ultimately concluded that *chepa shutki* can be considered a high-quality protein food.

Thapa *et al.*⁹ studied about microbial diversity in *Ngari*, *Hentak* and *Tungtap* of North East India by collecting six samples of each from Manipur and Meghalaya fish market. They reported that, the LAB, endospore forming rod, yeast and aerobic mesophilic counts ranged from 4.0 to 7.2, 3.3-4.6, <1-3.5 and 4.3-7.3 log cfu/gm respectively. Sarojnalini and Suchitra[10]. Isolated and identified bacteria from *Ngari* (a fermented fish product of Manipur), prepared in large-scale industries. The starter culture isolated from 'Ngari', consisting of 3 species of *Bacillus* and 3 species of *Micrococcus* which served as inoculums for the initiation of fermentation at 30°C in laboratory conditions. Proper fermentation was noticed in 40 days in starter culture inoculated fish whereas in naturally fermented fish, fermentation was noticed after 5 to 6 months. Their results confirmed that bacteria are responsible in the ripening process of 'Ngari'. They also observed total bacterial count 10^6 and 10^8 cfu g⁻¹ in naturally fermented and inoculated samples of *Ngari* in Manipur respectively.

Nutritional composition, yield and consumers' acceptability of a ground semi-fermented fish product prepared from the underutilized fish species of the Bay of Bengal have been studied by Mansur *et al.*¹¹. They prepared the product by a traditional semi-fermentation method, identical for the preparation of *Sheedal shutki*, and was subsequently dried in oven, ground, packed in polyethylene bags and stored in ambient condition. Quality in terms of nutritional composition was found comparable to other fish products of Bangladesh. They could be able to show that the new product is equally acceptable.

Nayeem *et al.*¹² studied traditional semi-fermented fishery product (*Chepa shutki*) of Bangladesh collected from the value chain and assessed the quality of it. They analyzed the proximate composition of *Chepa shutki* obtained from producer, wholesaler and retailer and found that protein and lipid contents were highest in case of *Chepa shutki* obtained from producers and lowest from wholesalers. On the other hand, moisture and TVBN content was lowest in producer's sample and highest in *Chepa shutki* collected from wholesaler. According to them, the moisture content varied from 39.62 to 46.89% with the highest value recorded in product obtained from retailer and lowest from the producer.

Storage studies as conducted by investigators with quality evaluation studies:

The storage stability of a Bangladeshi traditional semi-fermented fish product, *chepa shutki*, was evaluated by Khanum *et al.*¹³. They have stored the product for 3 months at 20°C and 35°C under 40% and 80% relative humidity, which were apparently similar atmospheric conditions to those of the winter and summer in Bangladesh, respectively. The fatty acid composition did not change markedly during storage. They found that the initial carbonyl value (COV) and thiobarbituric acid reactive substances (TBARS) value of the sample were 28.4 meq/kg

and 36.1 mg malondialdehyde (MDA)/kg of oil, respectively. These values only slightly changed during 3 months of storage regardless of the storage conditions. The COV and TBARS values were in the range of 19.8-22.0 meq/kg and 31.4-36.4 mg MDA/kg of oil, respectively. Their results indicated that the lipids of *chepa shutki* were essentially not susceptible to oxidative deterioration.

A study on *Chepa Shutki* of Bangladesh has been carried out by Khanum *et al.*¹³. They analyzed the volatile compounds in *Chepa Shutki*, which is responsible for its strong smell using Gas chromatography-mass spectrometry (GC-MS) and compared with those in *izushi* (Japanese processed-fermented fish product) and *iwashi no nama boshi* (Japanese processed but non-fermented fish product). A total of 21, 10 and 11 compounds were identified, respectively, in *Chepa Shutki*, *izushi* and *iwashi no nama boshi*. *Chepa Shutki* contains 4 acids, 7 alcohols, 6-aldehydes, 3 ketones and 1 furan. Among the identified compounds ethanol, hexanal, propanal and 1-pentan-3-ol were found common in all the fish products. Except these, *Chepa Shutki* contained acetic acid, butanoic acid, 1-butanol, 3-methyl-1-butanol, 3-methylbutanol and pentanal. Although majority of the lipid derived compounds were aldehydes, alcohols and ketones, *Chepa Shutki* contained more acid as acetic acid and butanoic acid than the other two. Sour flavor of *Chepa Shutki* may be derived from these acid compounds.

2. Conclusion

It is concluded that the poor economic condition, high transportation cost and less availability of fresh fish are the main reason for the acceptance of this product though it has off smell.

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