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Full Length Research paper

Features of experimental, commercial and sun dried fin fish, *(Scomberoides tol)*

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Seafood is a popular food item and has been preserved by several ways. Curing is one of the simplest methods to preserve fish to meet out the need of the people. In India, fishes are washed, gutted and sun dried on the ground, surface of rocks, wooden platforms, palm leaves and also on sandy beaches. The export of Indian cured fishery products are reduced because of their poor quality. The nutritive quality of one of the commercially sun dried fish, *Somberoides tol* was assessed. The same species was sun dried hygienically by keeping on fish drying rack under direct sun light and moving air and their qualities were assessed. The present study reveals that the fish was dried experimentally on fish drying rack that had good nutritional qualities and hygienic compared to the commercially sun dried fish from the same species.

Key words: Fin fish, *Scomberoides tol,* commercially and experimentally sun dried, nutritive quality, microbial quality.

INTRODUCTION

Salting and drying is an ancient and simplest method to preserve fish. In India about 17% of the total catch is being used for salting and drying (Anon, 2001). The fish must be dried quickly and cleaned through sunlight and moving air. This protects the fish from microbes, insects and dirt. Salting and sun drying of fish is a traditional method of seafood preservation employed in many countries. On the global basis, 14% of the marine landings are processed by curing (Sanjeev and Surendran, 1996). Curing is the simplest method to preserve fish. In India, utilization of dried fish comes next to fresh fish about 8 million tons of fish (25-30%) of the world catch are being used for human consumption as dried, salted, smoked or treated by some combination of these processes (Kamruzzaman, 1992) . Curing is a simple and cheapest method of processing requiring least technical expertise, but it has great significance and relevance in the socio-economic system of small-scale fisher folk. In India, most of the marine landings are being processed into cured products. This is still applied to a larger extent to preserve fish and squid (Sikorski et al., 1995). Fishes are washed, gutted and sun dried on ground, rocks, wooden platforms, palm leaves and also on the sandy beaches. The possibility of contamination is obvious in sun dried fishes using these traditional methods and sun drying on these substrates. The fishes dried slowly and unhygienically in direct sunlight in the absence of moving air.

The cured fishery products have good potential for internal market and exported to various South and South East Asian countries such as Sri Lanka, Hong Kong and Singapore. During the past few years there has been a decline in the exports of Indian cured fishery products (Sugumar et al., 1995). The nutritional qualities of the dried fishes are the major attribute for these decline. Only few studies on the biochemical and nutritional changes are available on biochemical and nutritional changes occurred during dehydration (Raghunath et al., 2000).

During the past few years, there has been a decline in the export of Indian cured fishery products (Sugumar et al., 1995) mainly because of their poor quality. This causes considerable loss to the fish curing industry in India. Sugumar et al., 1995 suggest that the quality of dry fish available in the country requires much improvement.

Fungal contaminations are a common problem and it adversely affects the quality of cured fishes. The presence of these fungi in salted and sun dried fishes are acquiring importance in view of the safety and quality of the seafood. Valsan et al. (1985) reported on the quality

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Table1. Percentage of nutritive values of raw and sun dried fin fish.

Species	Protein (%)	Carbohydrates (%)	Lipids (%)	Free fatty acids (%)
Sample A (Fresh fish)	26	32.096	1.6	0.008
Sample B (Experimentally sun dried fish)	17	15.98	1.2	0.011
Sample C (Commercially sun dried fish)	8	13.872	1.4	0.014

of cured fishes in different parts of the country. Chakrabarti and Varma (1999) reported the quality of cured fishes of Vishapatinam Coast of India.

In the fish curing yards of Tuticorin coast, different varieties of fishes are washed in seawater and are immersed in 20% of brine for 16- 24 h and sun dried for 2-3 days (Sugumar et al., 1995) and the same method is being followed till date with little modification. Even though preservation of fishes by salt curing has long been practiced in Tuticorin as a traditional technique, the ratios of salt-to-fish are too low to ensure adequate preservation (Shanthini and Patterson, 2002).

Microbiological and biochemical quality assessments are necessary to ensure the food safety of any processed products. Therefore, in the present study, the biochemical and microbiological analysis were carried out to assess the qualities of commercially and experimentally sun dried fin fish*, Somberoides tol*

MATERIALS AND METHODS

The commercially valued fin fish *S. tol* was selected for the present study. Fresh raw fish piece was bought from local market and brought to laboratory in a plastic bag. A small piece was cut from the raw fish and dried in a mechanical drier for biochemical and microbial analysis of the raw fish.

Fish drying rack was designed based on King and Johnson, 1987. Fish drying rack was made using wooden poles and nets. 4 wooden poles were taken and their one end is buried in sand and a square shape was formed. Then polythene net was thoroughly washed, sun dried and tied on the top and the square area was covered. Now the fish drying rack is ready for sun drying the fish.

Then a large piece of what was salted and sun dried experimentally (sample B) by keeping on fish drying rack. The commercially sun dried fish (sample C) piece was brought from local market. All the sun dried fish samples were powdered separately and packed in polythene bags and stored at 4°C for microbiological and biochemical analyses.

Estimation of biochemical composition

Biochemical parameters like proteins, lipids, carbohydrates and free fatty acids were estimated by following standard methods. The amount of proteins in the sample was estimated by Biuret Method (Raymont et al., 1964), carbohydrate content was estimated by the phenol sulphuric acid method (Dubois et al., 1956), lipid was estimated according to the method of Bligh and Dyer (1959) and the free fatty acid, which is an indication of the quality of fat, was estimated by the method of Ke et al. (1976).

Microbial analyses

The total plate count and fungal count were enumerated using the standard methods (APHA, 1992) . *Escherichia coli was* enumerated using the standard method of Most Probable Number (MPN) technique (APHA, 1992) and *Salmonella* sp. was enumerated by the pour plate method recommended by the US Food Drug Administration (1998).

RESULTS

The biochemical parameters like proteins, lipids, carbohydrates and free fatty acids content of raw fin fish *S. tol*, commercially and experimentally sun dried samples were estimated and the results are presented in Table 1.

The nutritive value of raw fish, *S. tol* (Sample A) was found to be good. It had 26% of protein, 32.096 % of carbohydrate, 1.6% of lipid and 0.008% of FFA. The protein, carbohydrate and lipid quantity is reduced in sun dried fishes. The nutritive value of experimentally sun dried fish (sample B) was found to be 17% protein, 15.98% carbohydrate, 1.2% lipid and 0.011% FFA, while low nutritive value was observed in commercially sun dried fish (sample C) such as 8% protein, 13.872% carbohydrate, 1.4% lipid and 0.014% FFA.

Among the commercially and experimentally sun dried fish samples, the protein, lipid and carbohydrate contents were high in experimentally sun dried fish sample whereas the free fatty acid content was found to be high in commercially sun dried fish followed by experimentally sun dried fish. The low nutritive value in commercially sun dried fish sample is mainly due to improper handling, inadequate preservation and unhygienic mode of drying the fish samples.

The microbiological analyses also showed variations among the samples. The changes in enumeration of total viable bacteria (Total Plate Count, TPC), Total fungal count (TFC), *E. coli* and pathogenic bacteria, *Salmonella sp.* were assessed and the results are given in Table 2. The pathogenic bacterial colonies were tested using the methods of APHA (1992) and Kiss (1984).

Total plate count was observed in all the 3 samples. It was higher in commercially sun dried fish sample

Table 2. Microbiological Analysis of sun dried samples.

Species	TPC (CFU/ml)	TFC (CFU/ml)	*E. coli* (MPN) value	*Salmonella*
Sample A (Fresh fish)	4×10^{-4}	1×10^{-2}	2.9	Absent
Sample B (Experimentally sun dried fish)	28×10^{-4}	-	0.27	Absent
Sample C (Commercially sun dried fish	60×10^{-4}	1×10^{-2}	0.26	Absent

(sample C) than the fresh fish (sample A) and experimentally sun dried fish sample (Sample B) . Total fungal count was observed in samples A and C and it was count was observed in samples A and C and it was absent in the experimentally sun dried fish samples. *E. coli* count was found to be high in commercially sun dried fish sample (sample C) than the other samples. (*E. coli* was found to be more in experimentally sun dried than commercially sun dried). *Salmonella* sp. was not detected in all the three fish samples. The highest count of TPC and *E. coli* in commercially sun dried fish sample revealed the unhygienic condition prevailed during the drying process.

DISCUSSION

Fish acts as protein supplement for the people living in 63% of countries (Bangladesh DOF, 2001). The protein content was found to be high in experimentally sun dried fish (Sample B) than the commercially sun dried fish (Sample) . The increase in drying time and loss of moisture content leads to protein denaturation. The protein content was higher in raw fish than the sun dried fish and it is mainly due to protein denaturation of reducing moisture level ref.

The free fatty acid levels (1% Oleic acid) of all the sun dried fish samples were higher than the raw fish. In the present study, high amount of free fatty acid content was observed in commercially sun-dried fish (sample C) than the experimentally sun dried fish sample (sample B). The increase amount of FFA is directly related to the degree of spoilage (ref). In the present study, commercially sun dried sample (sample C) shows high FFA content due to long storage period. The lower FFA in raw fish (sample A) was due to the less degree of oxidation.

The protein, lipid and carbohydrate contents were high in fresh fish samples (sample A) than the experimentally and commercially sun dried samples (sample B and C) due to the prevalence of unhygienic conditions, improper handling and inadequate preservation of the fishes (the statement is vague and should be supported by proper references)

The total plate count and *E. coli* counts were found to be higher in commercially sun dried fish (sample C) which is available in Tuticorin local market than the experimentally sun dried fish. High counts of TPC and *E. coli* in commercial sample was due to high content of moisture and humidity in the environment and unhygienic method of preparation. *Salmonella* was not detected in the raw and sun dried fish samples.

The total fungal count was also high in commercially sun dried fish sample (sample C) due to high moisture content and humidity. The cured fish in hot humid tropical climates are liable to deteriorate during storage due to mould growth. Visible colonies appeared on the fish samples due to high moisture content and high relative humidity in the atmosphere (ref.)

The biochemical and microbial analysis showed that the quality of experimentally sun dried fish sample was good than the commercially sun dried fish sample. Experimentally sun dried fish was properly handled and well exposed to sun light and moving air and it dried quickly and the end product was clean and hygienic.

Conclusion

The present study reveals that the fish dried on fish drying rack had good nutritional qualities and hygienic. The results were remarkable and therefore this simple but effective method of sun drying could be popularized among local coastal population to increase the effective utilization of marine resources in a better and hygienic way in order to enhance the value in local as well as export market.

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