Study on Biochemical and Microbiological Assessment of Traditionally Processed Fish Species of India

Dr. P. Viswanathan*

Assistant Professor, Department of Biotechnology, Dhanalakshmi Srinivasan College of Arts and Science for Women, Perambalur, Tamil Nadu

research@dscollege.ac.in

ABSTRACT

For almost all ethnic communities in NE India, dried fish is an integral part of food, and because of its ubiquity, ethnic individuals dry fish by various methods and protect it for longer periods of time. As the educational level of the general population in rural areas rises, consumers are currently more concerned about the health benefits of nutritious products. Quality management of such an essential food is therefore compulsory, triggering the justification for the investigation. The important type of food product is known to be dried fish, an exceptional wellspring of animal protein. Safeguarding and handling of dried fish is highly important due to its extremely perishable nature. Smoking or sun-drying fish are ancient survival methods. Due to spoilage, invasion of flies or other form of bacterial contamination of the protected fish causes health hazards. As different microorganisms contaminate the dried fish right from catching to selling the items, microbiological analysis is also a very important aspect of the research. Thus, 16s r-RNA area amplification and detection is now gaining momentum days after isolation of bacteria from various dried fish samples.

Keywords – *Biochemical, Microbiological, Fish*

INTRODUCTION

In India, and more specifically in North East India, dry and other processed fish products are common and popular food items. In Assam and other states of North East India, fish are found in large quantities during the rainy months. Usually fishes are eaten fresh after capture and the excess catches are dried using various traditional procedures by different groups. Dried fish has a decent amount of protein in it. In this part of India, the drying of fish is a common activity among various racial groups of people. For a longer period of time, dried fish items may be packed away. Dried fish and fish products can be used throughout the year, as and when necessary. It should be noted that consumers are currently more concerned about the health benefits of nutritional products such as dried and fermented fish, with the increasing education level of the general population in villages and suburban areas. Compared to other protein-rich food products such as red meat and white meat, dried fish has a stronger nutritional composition. Fish is an exceptional low-fat protein. Fish protein is tastier and readily digestible relative to

many other protein foods. Fish is also high in phosphorus and calcium. Fish is a source of iron, zinc, iodine, magnesium, and potassium minerals. With almost every meal in North East India (NEI), most of the tribal population use dried fish as a side dish. For all ethnic groups, it is a popular delicacy.

Fishes are dried using their own and special age-old methods by various indigenous and tribal groups and, as a result, wholesomeness often differs in different products. In general, fish are dried out by exposing them to sunlight and long hours of smoke. The consistency of dry fish varies according to the drying methods. Scientific study of the nutritional parameters of dried and processed fish products has been carried out worldwide of late, due to the high demand. The market (bazaar) for dried and processed fish products in Northeast India is very big. Assam is home to one of the largest dry fish markets in Jagiroad (Marigoan district), which is considered to be Asia's largest dry fish market. This market supplies all of the NEI states as well as many Southeast Asian countries such as Bhutan, Singapore and some others with large shipments of dried fish of various forms. It should be remembered that several variables, such as autolysis, bacteria and fat chemical oxidation, increase fish spoilage due to rancidity. The method of fishing also influences the consistency of the fish to a greater degree. The fish are killed by mechanical damage during fishing. Physiological and microbial degradation of fish happens after death. So, methods of preservatives or refining are really helpful. In the humid environment of NE India, if not processed immediately after catching, bacterial or enzymatic activities cause degradation of the fish. The fish are washed or directly dried by the local people with different traditional techniques after the catch. The effect of these procedures on the wholesomeness of the dried fish product is clear. For different reasons, the ruining of dry fish products takes place during the drying process and thus quality control of the products is important. Due to various factors, some literature on the quality degradation of food products has been available. In general, conventional drying is primitive and proper hygienic conditions are normally uncared for, as a result of which the food commodity is losing its wholesomeness. As a result of complex biochemical, chemical and enzymatic changes, spoilage occurs with bacterial activity in fish that begins immediately after the capture, suggesting that the fish is sagging and unsuitable for human consumption. Many microbial activities are responsible for spoiling fish or fish products. The indication of fish spoilage is an unpleasant foul odour along with tissue softening and slime production.

Therefore, proper drying should be done for improved fish quality. With adequate drying, the moisture content of the fish becomes poor. To prevent the growth of bacteria, proper drying is important. In order to avoid the chemical deterioration of fish, the moisture content should be decreased by careful drying, so that the bacteria are unable to expand by using water. Accessible studies have indicated that the drying of fish should be possible with a moisture content of 45% to 10% or less. It was also recorded that in market shops with insufficient storage facilities, smoked fish can only be kept for 2 to 4 weeks. Due to nutritional degradation, the spread of flies or some kind of bacterial contamination of the fish poses health risks. Therefore, to enhance food quality and food safety, it is mainly important to prevent food spoilage. In order to ensure an appropriate sterile routine with regard to fish preservation, there must be a few procedures directly from the capture to the processing of fish. Owing to its unhygienic practise, preservation is vulnerable to tainting, the commonly used method for sun drying. Despite the fact that fish treated with turmeric and salt or salt alone ruin the production of microorganisms to a certain degree, numerous flies, insects and rodents plague the fish along these lines, crumbling the

consistency during sun drying due to the introduction of the fish to the open. Due to dissipation, the fish are exposed to higher concentrations of moisture and salts in traditional strategies for air drying at high temperature, resulting in changes in pH and salt concentrations that affect solvency and water binding properties, contributing to the deterioration of the fish object.

Via its oxidative effects and antibacterial properties, smoking also plays a crucial role in the resilience of fish products, as well as accelerating the drying process and serving as an adversary of spoilage factors. Many microbes are present on the surface of the fish and the growth of the harmful microbes stops after heat application, and chemicals from the smoke deprive the microbes of their essential growth factors. Unclean activity during the processing of the product, insufficient smoking or salting, unhygienic drying practises and lack of storage facilities for the end products are other factors responsible for poor dried fish quality. Various ethnic groups of people have also preserved fish as a fermented food. A special fermented fish prepared by the Rabha tribe of Assam, 'Hukoti' is prepared with washed and dressed fish soil to paste with siju leaves and colossi stems. The effectiveness of the fermentation process depends on the quantity of salt used, the cleaning of the fish, either by removing the gut or by removing it moderately, or by not removing at all, the fat content of the fish, the types of additives used and the temperature of the fermentation process. During fermentation, biochemically converted ingredients that are locally available and upgraded to edible products by adding value to the starter culture containing beneficial microbes. There are about 2508 fish types in India, of which 856 fish species are found in freshwater. As for the decent diversity of freshwater fish, the ninth position is occupied by Indian freshwater fish, creating about 8.9 percent of the world's recognised fish species. Many water bodies accommodating about 267 fish species are considered to be presented with NEI. Numerous components emerging due to the lack of analysis, unnoticeable contrast between identical species and idea in ordered keys affect the obstacle to correctly distinguishing the true number of fish species representing numerous mysterious or latent species. The records posting the fish from NE India were entirely based on customary scientific classification denoting an inq The dry fish section comprises about 20% of India's total fish production. As indicated by a fisheries investigation carried out by the Association of the Chamber of Commerce and Industry of India (Assocham), fish generation in the nation is expected to cross the 13 million tonnes mark by 2016 from the current level of more than 9 million tonnes. The latest packaging innovation called Changed Atmosphere Packaging (MAP) may increase the time span of usability of packaged dry packaging It is a method of evacuating air around a food object, including the mixture of different amounts of three essential gases that are visible all around, i.e. nitrogen, oxygen and carbon dioxide, and then fixing the plastic pockets to make it waterproof. As the fish is dried from sunlight-based boards in UV shielded dry and hot air, there is less loss of supplements as well as a shift in colour and texture for dry fish. In a sterilised and standardised setting, the entire procedure is carried out.

OBJECTIVES

1. Collection and enumeration of selected dried fish species traditionally processed by various ethnic communities of North East India.

2. Biochemical analysis of the dried and other processed fish products.

Quality characters of dry fish products

Dry and other processed fish products are common and popular food items in India and, more specifically, in North East India. During the rainy months, fish are found in great quantities in Assam and other states of North East India. Typically, fish are consumed fresh after capture and the excess catches are dried by different groups using different conventional methods. Dried fish contains a good amount of protein. Fish drying is a common activity among different racial groups of individuals in this part of India. Dry fish products can be packed away for a longer period of time. Dried fish and fish products can be used, as and when appropriate, throughout the year. It should be noted that consumers are currently more concerned about the health benefits of nutritional items, such as dried and fermented fish, as the general population of villages and suburban areas is becoming more educated. Dry fish has a better nutritional composition compared to other protein-rich food items, such as red meat and white meat. Fish is an excellent protein with a low fat content. Similar to many other protein foods, fish protein is tastier and readily digestible. The fish is also rich in calcium and phosphorus. Fish is a source of minerals including iron, zinc, iodine, magnesium, and potassium. With almost every meal in North East India (NEI), dried fish is used as a side dish by most of the tribal population. It is a common delicacy for all ethnic groups.

Fishes are dried by different indigenous and tribal communities using their own and unique age-old methods and, as a result, wholesomeness frequently differs in various items. Fish are usually dried out by exposing them to sunshine and smoke for long hours. According to drying techniques, the quality of dried fish varies. Due to the high demand, scientific studies of the nutritional parameters of dried and processed fish products have been carried out at a late stage worldwide. The market (bazaar) in Northeast India for dried and processed fish products is very high. Assam is home to one of Jagiroad (Marigoan districtlargest)'s dry fish markets, which is considered to be Asia's largest dry fish market. This market supplies large shipments of dried fish of various types to all NEI states as well as several Southeast Asian countries, such as Bhutan, Singapore and some others. It should be recalled that because of rancidity, many causes, such as autolysis, bacteria and fat chemical oxidation, increase fish spoilage. The method of fishing also affects to a greater extent the quality of the fish. Mechanical damage during fishing kills the fish. After death, physiological and microbial deterioration of fish occurs. So, preservative or grinding techniques are very useful. In the humid environment of NE India, bacterial or enzymatic activities cause degradation of the fish if not processed immediately after capturing. After the catch, the fish are washed or directly dried by the local people with various traditional techniques. There is a strong influence of these procedures on the wholesomeness of the dried fish product. During the drying process, the ruining of dry fish products takes place for various reasons and quality control of the products is therefore important. Some literature on the quality deterioration of food products has been made available due to different factors. In general, traditional drying is primitive, and proper hygienic conditions are typically not taken care of, resulting in a loss of wholesomeness of the food product. As a result of complex changes in biochemistry, chemistry and enzymes, bacterial activity in fish starts to spoil immediately after capture, meaning that the fish is sagging and unfit for human consumption. The spoiling of fish or fish products is responsible for many microbial activities. An unpleasant foul odour along with tissue softening and slime production is an indicator of fish spoilage.

Proper drying should also be performed to improve the condition of the fish. The moisture content of the fish becomes low with proper drying. Proper drying is important for preventing the growth of bacteria. The moisture content should be minimised by careful drying, so that the bacteria are unable to spread by using water, in order to prevent the chemical degradation of the fish. Open studies have shown that drying of fish with a moisture content of 45 percent to 10 percent or less should be possible. It has also been reported that smoked fish can only be kept for 2 to 4 weeks in market shops with inadequate storage facilities. The spread of flies or any form of bacterial contamination of the fish presents health risks because of nutritional deterioration. Therefore, in order to improve food quality and food safety, preventing food spoilage is primarily important. In order to ensure an acceptable sterile regimen with regard to the protection of fish, a range of procedures must be carried out immediately from the catch to the processing of fish. Preservation is prone to tainting, the widely used procedure for sun drying, due to its unhygienic practise. Despite the fact that fish treated with turmeric and salt or salt alone ruin the development of microorganisms to a certain degree, the fish along these lines are plagued by numerous flies, insects and rodents, the consistency of which crumbles during sun drying due to the opening of the fish. In conventional techniques for air drying at high temperatures, fish are subjected to higher concentrations of moisture and salt due to dissipation, resulting in changes in pH and salt concentrations affecting solvency and water binding properties, leading to the degradation of the object of the fish.

Smoking also plays a vital role in the resilience of fish products through its oxidative effects and antibacterial properties, as well as speeding the drying process and acting as an opponent to spoilage factors. Many microbes are present on the surface of the fish and after heat application, the growth of the harmful microbes stops and chemicals from the smoke deprive the microbes of their vital growth factors. Other factors responsible for low dried fish quality are unclean operation during the processing of the product, inadequate smoking or salting, unhygienic drying practises and the lack of storage facilities for the final items. Fish has also been preserved as a fermented food by various ethnic groups of people. 'Hukoti' is a special fermented fish prepared by the Rabha tribe of Assam, prepared for pasting with siju leaves and colossi stems with washed and dressed fish soil.

The efficacy of the fermentation process depends on the amount of salt used, the cleaning of the fish, either by extracting or moderately removing the intestine, or by not removing the fat content of the fish, the types of additives used and the temperature of the fermentation process at all. Ingredients that are locally available and upgraded to edible products are biochemically transformed during fermentation by adding value to the starter culture containing beneficial microbes. In India, there are around 2508 types of fish, of which 856 species are present in freshwater.

As for the decent diversity of freshwater fish, Indian freshwater fish hold the ninth spot, generating about 8.9 percent of the world's recognized fish species. NEI is known to be presented with several water bodies accommodating about 267 fish species. Due to the lack of research, various components appearing, unnoticeable comparison between similar species and idea in ordered keys affect the obstacle to properly distinguishing the true number of fish species representing numerous mysterious or latent species. Records of fish from NE India is entirely based on the usual scientific classification denoting an inq The dry fish segment accounts for approximately 20% of the total fish production of India. As indicated by a fisheries investigation

conducted by the Association of the Chamber of Commerce and Industry of India (Assocham), by 2016, fish production in the country is projected to reach the mark of 13 million tonnes from the current level of over 9 million tonnes. Modified Atmosphere Packaging (MAP) is the latest packaging invention that can increase the time span of the usefulness of packed dry packaging. It is a method of evacuating air around a food item, including the mixture of three essential gases that are visible all around, i.e. nitrogen, oxygen and carbon dioxide, and then repairing the plastic pockets to make them waterproof. There is less loss of supplements as well as a change in colour and texture for dry fish as the fish is dried from sunlight-based boards in UV-shielded dry and hot air. The entire procedure is carried out in a sterilized and standardized environment.

Preservation of dried fish

The drying of fish involves the use of safeguarding techniques to preserve consistency and increase the timeframe for functional usability. There are different techniques that are related to fish conservation. In addition to techniques such as drying, salting, smoking, and freeze-drying, which speeds up water movement control, most of the procedures are based on temperature control, using ice, refrigeration or freezing. For the most part, fish protection is obtained by conventional drying with exposure to sun and wind, which is also related to an immense degree of protection for fish and squid. The least costly and clearest approach for fish protection is by curing, which includes all of the fish protection techniques such as sun-drying, salting, pickling, smoking, artificial hydration, and so on. Normal air drying at high temperatures can damage the fish muscle on the ground that diffuses to the surface due to evaporation, moisture and salts, which expands the salt fixation and changes the pH that affects the properties of dissolvability and water binding. Salted fish products are considered healthy for use because they decrease the behaviour of water, move salt into food structures and are represented by various physical and synthetic influences, such as diffusion, osmosis and the progression of other confounded compounds and biochemical processes.

As the ambient temperature is high in tropical areas, it causes quick waste of the fish, so it is important to experience quick cooling or salting of the catch. A lot of fish are accessible during the angling season which cannot be sent to the market available for purchase due to the absence of expedient transport offices and are thus sold at a shabby rate or squandered by the anglers due to the lack of sufficient handling and storage facilities. In any event, if these masses could be planned and safeguarded and cleanly put away for a current moment or long haul time, the need would have been brought together to a notable degree during the offseason. Conservation should start from the moment it is harvested before it reaches the customer's table.

In the tropical nations, a portion of the management methods used include chilling, solidifying, drying, salting and smoking to drag out the timeframe of practical usefulness of fish. A few scientists have seriously focused on fish smoking and its consequences.

The smoked fish industry is conducting a few salting strategies in different countries (59,60). Before smoke-drying the fish, hardly any researchers worked using salt and turmeric that are efficiently accessible and less costly savvy. Since days ago, salt has been used as an additive to ensure nourishment against microscopic organisms, mould and any kind of decay as it works by drying the sustenance, absorbing water from it and making the sustenance earth too dry to even think about helping any hurtful mould or microorganisms and salt is also an extraordinarily

normal additive as it is non-lethal, inexpensive. Turmeric, then again, is one of the most experienced recognised enemies of bacterial fixings used to cure various diseases through antiquated human advances. It is used in subsistence and curcuminoids present in turmeric have broad pharmacological exercises as a colouring and enhancing operator.

Microbiological

During food processing, microorganisms play a vital part. In order to guarantee protection and determine the consistency and freshness of dried fish, microbiological quality assessment is very important. The presence of microbes can be linked to the major cause of dried fish spoilage. In addition, in dried fish products, food-borne pathogenic bacteria can develop as a result of food-borne infections and intoxications. For the food processing industry and related food authorities, the detection of foodborne pathogens and the identification of microbial spoiling populations is very important. As standard methods, traditional microbiological methods are still well thought-out and rely on the use of appropriate cultural media for microorganism enrichment, detection, and enumeration. The native micro biota of aquatic products consists of bacteria that, though some are human pathogens, may cause spoilage. During the collection, contamination with non-indigenous microorganisms occurs. It is also possible to move microorganisms from the atmosphere to food through various means. Human beings are known to bear numerous forms of bacteria. The presence of food-borne pathogens such as Staphylococcus aurus may be present.

Enterobacteriaceae are widely found in any setting, although in poor hygienic conditions, infection with enteric pathogens may also occur. It is possible to bind Listeria monocytogenes to food contact surfaces that form biofilms and contaminate food items. Extrinsic factors such as temperature and environment have the most effect on microbiological growth for fresh or lightly preserved dried fish products, while altering intrinsic properties such as pH, water activity, etc. often contribute to the growth of dominant micro biota for preserved dried fish products. The key spoilage mechanism is the development and metabolic activity of different bacterial species in fresh or lightly preserved dried fish products, resulting in the production of different metabolites that affect the organoleptic properties of the dried fish product. Specific spoilage species are bacteria that create flavours for fish products and thus contribute to the product being rejected. The environmental conditions and microbial content of the water have been reported to affect the microbial community of fresh water fish products. Some microorganisms are thought to be toxic to the chloride ions in salt . The growth of fungi in dried fish has also been found to adversely affect the consistency of dried fish products . Outbreaks were recorded from different countries from the ingestion of dried fish products which is mainly due to the presence of bacteria including C.botulinum, E.coli, Salmonella, Staphylococcus, Vibrio species and Bacillus cereus.

CONCLUSION

North East India is rich in water assets that provide an exceptional outlet for freshwater fisheries. The numerous ethnic groups living in the NEI use fish and fish products as an inevitable part of their eating routine. Fish is a good source of protein and is also a good business source for many individuals who are concerned with its processing, handling and appropriation. However, because it falls apart after being caught, fish is a very perishable food product. Deterioration sets in a few hours after the fish is caught as a progression of complex changes in enzymes, bacteria and substances that make the fish unfit for human use. The fish are dried or aged in order to

avoid post-harvest loss of fish and to meet the needs of dry fish customers. Drying fish from shouldering wood by salting or smoking is a well-established method. Individuals from days of yore have used various techniques to protect fish in either a dried or matured state. The most prominent and realistic relief technique in NEI is the fermentation and drying of fish that blesses ethnic individuals with the flavours at whatever point they like. As a large scale of the population devour fish in crisp or restored ways alongside rice, which is their staple nourishment, fish and fish products have enhanced the financial life of the general population from the North East.

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