



THE ART OF TURNING SEAFOOD INTO SUPERFOOD

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Abstract

Fermented fish products are an intriguing and essential component of the culinary scene because of their distinctive flavour combination and fish preservation through fermentation. These products are not only delicious food items but also symbols of cultural variety and customs. One of the traditional and inexpensive methods of curing fish is fermentation. It has a wide range of advantages, such as high quality, low cost, and low toxicity. This review focuses on the importance of fermented fish products, their health benefit and cultural significance.

Key words: fish, fermentation, cultural significance, fermented food

Introduction

Around the world, several nations include fermented fish items in their diets. Their taste, texture, and high nutritional value are all part of what makes them so popular, but so is how simple the creation process is. Fish viscera from both marine and freshwater species, as well as whole and comminuted fish, are used as raw materials. There are numerous varieties of fermented fish items available in different regions of the world, including Southeast Asian, Northern European, and West African nations. Fermentation is one of the ancient and economical curing techniques used to preserve fish. When canning, refrigeration, freezing, drying and other modern approaches to food preservation were non-existent, fermentation played a major role in food preservation. Some of the popular fermented fish products from Southeast Asian countries are Pedah, Makassar, Trasi and Bekasam in Indonesia, Budu, Nam-pla, Pla-ra and Plaa-som in Thailand, Belacan, Budu and Pekasam in Malaysia, Bagoong-patis, Balao-

balao and Buro in Philippines, phu quoc, shiokara and narezushi in Japan, ngapi in Myanmar.

Ngari and hentak from Manipur, tungtap from Meghalaya, puthi shidal, lona ilish and phasa shidal from Tripura, nghaum, nghathu and dang pui thu from Mizoram, ngyii papi from Arunachal Pradesh, seedal from Assam etc., are some of the major fermented fish items from India.

Why to ferment fish?

Fish quickly deteriorates because of its rich nutrient composition. Thus, it is necessary to use preservation technique to delay their degradation. Fermentation is used to generate product variety, distinct taste, flavour development, nutrient enhancement, value addition, handle surplus fish, overcome off-season fishing and avoid spoiling.

Production Method

There are few steps involved in the production of fermented fish products.

1. **Selection of fish:** Freshness, flavour and texture are the three main factors considered while selecting premium fish. Commonly used fish are herring, mackerel, anchovies and small fish.
2. **Cleaning and Gutting:** Depending on the product, the fish are cleaned, gutted, and sometimes filtered.
3. **Salting:** An essential component of the fermentation process is salt. It not only enhances flavour but also helps preserve the fish by inhibiting the growth of harmful bacteria.
4. **Fermentation:** Fermentation is started by microorganisms like lactic acid bacteria and enzymes that are either

added to the fish during the process or are naturally present in it. The fish goes through biochemical changes, which might take weeks to months, improving its texture and flavour.

- 5. Maturation:** After the fermentation process, the fish product is left to mature, which enhances the development of flavours. There is deference in the maturation times of items; some can be consumed immediately while others benefit from a longer time period.

Types of fermented fish products

A) Products retaining original shape:

Examples: Pedah siam (Thailand), makassar (Indonesia), Burong Isda (Philippines), shidal (India), Perkasam (Malaysia), Surstromming (Sweden)

B) Products in the form of paste:

Examples: Ngapi (Myanmar), mams (Vietnam), prahoc (Kampuchea), belachan (Malaysia), trassi (Indonesia), bagoong (Philippines).

C) Products in liquid form:

Examples: Budu (Malaysia), patis (Philippines), nuoc-mam (Vietnam), nam-pla, pla-ra (Thailand)

Table 1. Countries producing fermented fish product

Countries	Sauce	Paste	Original form
Japan	Phu Quoc	Nukazuke, shiokara	Narezushi, Funazushi
Thailand	Nam-pla, pla-ra		Plasom, som-fug
Indonesia	Makassar	Trassi	
Malaysia	Budu, Pekasam, belacan		
Philippines	Patis, buro	Baggoong	
Vietnam	Nuoc-mam	Mams-ca	
Myanmar	Ngapi	Ngapi	

India			Seedhal, ngari, hentak, lona ilis
Bangladesh			Shutki, lona ilish
Sweden			Surstromming
Iceland			Hakarl

How does fermentation preserve fish?

An excellent illustration of hurdle technology is fermentation. By reducing the substrate's pH, redox potential (Eh), and water activity (aw), it functions as a preservation method. The term "bio-preservation" refers to the addition of lactic acid bacteria (LAB) to the fish during the fermentation process in current techniques. Antimicrobials such lactic acid, acetic acid, hydrogen peroxide, antimicrobial nisin, and peptide bacteriocins are produced by LAB. These active ingredients aid in the preservation of the fish by halting the growth of harmful and spoiling germs.

Health benefits

Fermented fish products offer potential health benefits. Fermented fish contains beneficial bacteria that helps to maintain healthy gut micro-flora by competing with and eliminating all harmful bacteria. Exhibit strong antioxidant scavenging capacity against reactive oxygen species and free radicals. Rich in protein hydrolysates, it helps our body for the utilization of amino acids for tissue repair and muscular growth. The fermented fish are easier to digest, and nutrients are easily assimilated and boost your appetite. Certain nutrients bioactivity can be increased through fermentation, which also yields bioactive substances with anti-inflammatory and antioxidants qualities. Furthermore, the existence of probiotic bacteria in some fish products that have been fermented could benefit gut health.

High concentrations of EPA and DHA have been detected in fermented fish oil (FFS),

which may help reduce atopic dermatitis symptoms. In addition, it has vital minerals and naturally occurring antioxidants in the form of bioactive peptides that come from fermented FF products. Depending on their amino acid composition, these peptides may have a range of biological effects, such as anticancer, immunomodulatory, antithrombotic, antioxidant, antagonist, and antihypertensive properties. Fermented FF can yield bioactive compounds and polysaccharides that suppress the proliferation of human lymphoma cells and function as ACE inhibitors, antioxidants, and antihypertensives. But nitrogenous substances called biogenic amines, which are composed of amine groups created during decarboxylation, are dangerous. These amines may result in tachycardia, headaches, respiratory issues, nausea, and allergic responses. Fermented foods with high levels of histamine and tyramine imply that biogenic amine levels need to be closely regulated to protect human health. To guarantee safety, the quality control criteria for prahok, the country's emblematic fermented fish product, have been enforced by the Cambodian government.

Cultural Significance:

The importance of fermented food in South and Southeast Asian cultures, especially fermented fish. Fermented fish is found all throughout the world, but its strong flavour and pungent quality which sometimes offends Western palates make it less visible on the global food map. Religious beliefs, political ideologies, ethnic backgrounds, gender roles, and social classes, as well as international issues like food safety and security regulations, all have an impact on taste. Fermented foods have been shown to provide health benefits, but because of their limited production and consumption or lack of cultural significance, they have not been included in food guides in many nations. The scientific study of ethnic food and its cultural and literary integration in local communities are very different from one another. They frequently act as a means of preserving fish, which is an important source of protein and enables communities to

store and eat fish well beyond its seasonal availability. Furthermore, these goods make unique adding tastes to local cuisines, fostering a feeling of place and custom.

Risk in fermented fish

Botulism is a risk that comes with fermented fish products. Compared to other states in the US, Alaska has the highest number of botulism cases. The reason for this is the customary Eskimo practice of approving animal goods such whole fish, fish heads, and sea flippers of lions and whales, birds, etc. to ferment for a long time before being eaten. The risk arises from using a plastic container for this purpose as opposed to the more antiquated, conventional practice of lining a hole with grass because the airtight plastic container creates anaerobic conditions that are ideal for the growth of the botulinum bacterium. Because Clostridium botulinum cannot develop toxins at pH values below 4.5, the product's pH must be kept below 4.5 to prevent this risk.

Conclusion

In summary, fermented fish products are delicious food items and symbols of cultural variety and customs. These goods continue to find their way into different cuisines as people's palates grow worldwide, giving the culinary arts more nuance and complexity. These products are an intriguing and essential component of the culinary scene because of their distinctive flavour combination and fish preservation through fermentation. Traditional fermented fish products are based on enzymes, with fermentation being the most common process. Antioxidants, essential vitamins, minerals and high concentration of EPA and DHA are found in fermented fish. Fish fermentation provides bioactive peptides with anticancer, immunomodulatory, antithrombic, antihypertensive and antioxidant properties. Monitoring fermented fish quality is crucial for future research.

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