
FISH MEAT – A POTENTIAL DANGER FOR CONSUMERS' HEALTH

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Abstract

Fish is an excellent source of Omega 3 protein and fatty acids, which have the property of reducing cholesterol, maintaining a healthy heart, and even helping to prevent depression. Also, meat fish is a lean meat with low calorie but delicious assortment of meat, and is recommended in the consumer's diet. The fish content vitamins (A, D, E, B12), minerals (phosphorus, iodine, potassium) and healthy fats that can not be synthesized in the human body and must be fed through food. How healthy the fish meat is, the more dangerous it can be in terms of its safety for the consumer, and more precisely the presence of parasitic hazards. The main objectives of this paper are to describe the parasitic hazards of fish meat to indicate the proper preparation of fish meat and to increase consumer awareness of the risks associated with the consumption of this type of meat, threats of parasitic nature. Avoiding the consumption of untreated or poorly treated fish meat is one of the preventive measures that need to be taken to avoid fish parasites.

Keywords: fish, parasites, public health

Introduction

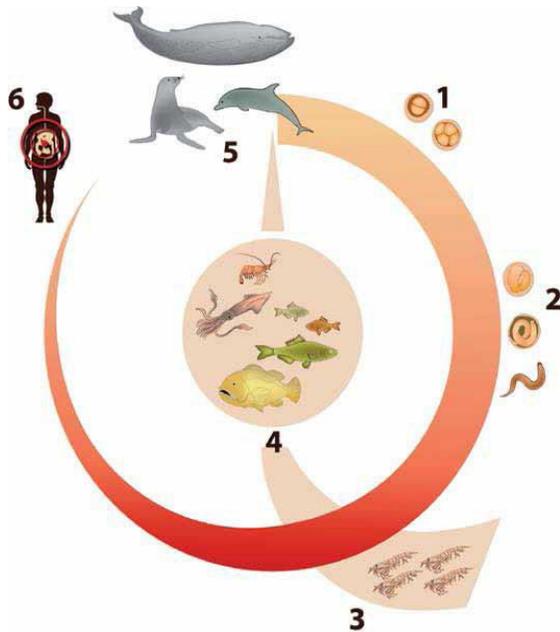
Aquaculture is one of the fastest growing sectors of the economy in the field of production where fish or fish demand is constantly increasing. It looks like fish is imported from different countries, either from fish farms or captured. Fish is a valuable source of protein, minerals, vitamins, especially essential fatty acids and fatty acids that are present in optimal quantities for the human needs. On the other hand, a great emphasis is placed on the consumption of raw fish, which represents a great danger to the consumer safety, the main dangers being those of parasitic and bacterial nature.

This paper describes the most important parasitic hazards from fish, indicating the need for an adequate preparation of fish meat, in order to reduce the risk of parasitic zoonoses transmission in humans and to increase consumer awareness of these risks.

Parasites

Fish is a food recommended and consumed by many people, but not many people are aware that in addition to its benefits, fish can also be dangerous to human health due to the presence of dangerous parasitic worms. Parasites of the nematode and trematode class can affect a large number of fish species, especially in countries where fish are fed with animal and human waste and they are not subject to thermal treatments. Among the parasites that can be transmitted to humans, the most common one is *Anisakis simplex*, a white worm in the form of a spring that is the stage larvae of some nematodes (cylindrical worms). These can be found in some saltwater fish, especially in herring and mackerel, in viscera or in the flesh. The most common biological cycle is the one of the species *Anisakis simplex*. The adult worms parasitize the marine mammal's digestive tract, which is the definitive host. Females lay the eggs that grow in the seawater, in the natural environment, along with the feces. Larvae hatch from eggs and if they are ingested by crustaceans, their development continues. These larvae reach the digestive tract of marine fish and cephalopods, they become free and cross the wall of the digestive tract, they reach the serous membrane of the abdominal cavity and the viscera or occasionally, they penetrate into the wall of the viscera or muscles and encapsulate. When infected fish, crustaceans or cephalopods are ingested by marine mammals, larvae develop into adults, ending the biological cycle of parasites (*Figure 1*).

Figure 1. Life cycle of *Anisakis simplex*



1. eggs laid in the natural environment along with the feces of the marine mammals
2. stages of larvae development (L1-L3), afterwards the worm is released in the aquatic environment
3. L1-L3 larvae ingestion by the planktonic crustaceans
4. L3 larvae are ingested by fish, crustaceans and cephalopods
5. the moment the fish, crustaceans and cephalopods are ingested by marine mammals, larvae develop into adults
6. in case of accidental parasitic infestation in humans after the consumption of infested fish/crustaceans, one or more larvae can determine clinical disorders or allergic reactions

Identifying risk factors on the food chain with parasites such as *Anisakis simplex* is one of the most important stages, taking into account the increased consumption of fish meat. All capture fish from seawater or freshwater should be considered as bearing the risk of containing live parasites with implications for public health if these products are to be consumed as such (raw or almost raw). Human can get infested by eating raw or insufficiently thermal cooked, infested fish and cephalopods. Once they reached the stomach, they do not develop into adults because the biological cycle of parasites in the human body is interrupted. The increase in the number of human infections in the recent years is due to several factors, including: improvement of diagnostic techniques and the increase in the consumption of raw or insufficiently heat-treated fish;

The cases of allergies caused by *Anisakis simplex* are reported mainly in Spain, where 12.4% of the Madrid population has IgE specific to *A. simplex*, due to the consumption of fresh anchovies in vinegar. In the EFSA document following the request from the European Commission to formulate a scientific opinion on food safety associated with parasites present in fishery products, it is specified that food poisonings due to the consumption of fishery products occur either as a result of the ingestion of live parasites, either as an allergic reaction (hypersensitivity reaction) against parasite antigens, the only parasite of fishery products involved in the occurrence of allergic reactions is *A. simplex* nematode and the primary initiation of various forms of allergies occurs through live larvae infection. Once the body sensitivity occurs, the reaction to allergens can be extremely aggressive and can cause severe forms of allergies. In general, the consumption of fish products containing live larvae of *Anisakis simplex* presents a higher risk of allergies than with the consumption of fish products containing non-viable larvae. Consequently, preventing the human body sensitivity to *Anisakis simplex* should focus on preventing infections. Human anisakiasis is characterized by allergic, cutaneous or articular (invasive), pseudo-ulcer (acute phase) or subocclusive pain or syndromes (subacute phase). It has a worldwide distribution, focusing on Asia and Western Europe, with 90% of cases being reported in Japan, followed by Germany, the Netherlands, Spain and France. Most cases were associated with the consumption of traditional products from raw fish, insufficiently heat-treated or marinated products containing

infesting larvae (e.g. sushi and sashimi - Japan, salted and smoked herring - the Netherlands, dried matured and brined salmon - Scandinavia, pickled anchovies - Spain, raw salmon - Hawaii). The marine products most commonly involved in the occurrence of human anisakiasis are: the mackerel and the octopus in Japan, the herring in Europe.

Evaluation of risk factors at European and national level

EC-Regulation nr. 853/2004 provides in point *D.1 of chapter III, section VIII, addendum III* that certain marine products must be frozen at a temperature not higher than -20°C at all points of the product for at least 24 hours. At the same time, the freezing requirement for marinated or salted products is also provided if the processing was insufficient to ensure the destruction of nematode larvae. General risk factors for serious or fatal reactions due to food allergens include: young age, multiple sensitivity of the body, uncontrolled asthma, severe previous reactions to food, food consumption outside the house (in public places).

At European level, *A. simplex* is considered to be the major factor in the occurrence of angioedema and urticaria in adults due to fish and shellfish consumption and is responsible in 8% of the cases of acute urticaria and angioedema. Moreover, in 27% of the cases, an anaphylactic shock may occur. They constitute a similar prevalence toward other sources of allergens. On the other hand, allergy cases caused by *A. simplex* have been described over time particularly in Spain, with signs of varying severity but requiring emergency treatment in 50% of cases. As awareness has been raised about *A. simplex*'s food allergy potential, sporadic cases have also been reported in France, Italy, Portugal and other regions of Spain, Bulgaria and Serbia. The reported cases in Italy and Portugal were similar to those in Spain-Basque Country as they involved specific allergic reactions due to consumption of cooked fish, while reports from other parts of Spain (Madrid and surrounding provinces) described cases of allergic gastroenteritis caused by the consumption of raw or insufficiently heat-treated fish.

Conclusions and recommendations

Freezing or heat treatment remain the most effective methods of destroying parasitic larvae. Many of the traditional brining or cold smoking techniques are not enough to ensure the destruction of *A. simplex* larvae. These treatments must be applied to raw or finished products. *A. simplex* larvae are saline-resistant: the immersion in a saline solution of 80‰, 21% salt for 10 days, allows the destruction of all larvae, but in low salinity solutions, they can survive for a long time. *Anisakis* is also resistant to brining and cold smoking.

The allergens produced by *A. simplex* are very resistant to heat treatment and freezing, that is why treatments that destroy Anisakidae from marine products do not implicitly lead to consumer protection against allergy risks due to consumption.

There are no alternative treatments to freezing of marine products, there is no sufficient information to show whether these treatments - high hydrostatic pressure, irradiation, dehydration, low-voltage current - are effective for destroying larvae of *Anisakidae*.

So far, no specific treatment capable of destroying viable parasites in vivo has been identified and prevention remains the most effective treatment. No fishing area, as defined in EC Regulation No. 2406/1996, with its subsequent amendments, cannot be considered free of *A. simplex* larvae. Only in the case of farmed Atlantic salmon grown in floating cages or in tanks on shore, on which the controlled feeding with complex feed has been performed, the associated risk of *Anisakis* infection is negligible, provided that no changes occur in the growth practices. Except this, there is insufficient data regarding other species of farmed fish which ensure the identification of those species that do not pose a public health risk with regard to the presence of

parasites when marine products are to be consumed raw or almost raw. No risk has been identified in fish oil intended for human consumption.

The Food Safety Supervision and Control Program (Order of the National Authority for Sanitary Veterinary Care and Food Safety no.29 / 2014) provides for the obligation to subject each batch of fish or roes, to a randomized visual inspection before their processing or marketing, in order to detect and remove parasites visible to the naked eye as well as the obligation to collect representative samples from each batch of fish or roes.

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