

International 58th Meat Industry Conference “Meat Safety and Quality: Where it goes?”

Potential parasitic hazards for humans in fish meat

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Abstract

The image of fish as a healthy food is the main reason for increasing demand for fish meat but there are serious safety concerns related to the presence of parasitic hazards in fish meat. The main goals of this paper are to describe the most important parasitic hazards in fish meat, to indicate the need for adequate preparation of fish meat and to increase public awareness of the risks associated with consumption of fish containing viable infectious parasitic hazards. Avoiding consumption of raw or poorly cooked fish is the best preventive measure to avoid infection by fishborne parasites.

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1. Introduction

Aquaculture is one of the fastest expanding sectors of the economy in the area of food production and demand for fish meat is continuously increasing. Fish meat is a valuable source of all nutrients¹ and especially essential fatty acids which are present in optimum quantities for human needs^{2,3,4}; this is the main reason for increasing demand for

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fish meat. On the other hand, there are serious safety concerns related to the consumption of raw fish meat due to the presence of parasitic hazards. Because of all the mentioned facts, good knowledge and management of parasitic hazards associated with the consumption of fish meat is of major health and economic significance. The main goals of this paper were to describe the most important parasitic hazards present in fish meat, to indicate the need for adequate preparation of fish meat to reduce the risk of human fishborne disease, and to increase public awareness concerning the risks of consuming fish meat containing infectious parasitic hazards.

2. Parasites

Parasitic infections can affect a large number of fish species, especially in countries where untreated human and animal waste is used as fish feed in fish production. There are a moderate number of these parasites which have been reported in humans, but only a few cause serious diseases. Nematodes and trematodes are the most important while cestodes and acanthocephalans have been reported from humans on rare occasions⁵.

2.1. Nematodes

Some nematodes are zoonotic. Among these parasites, *Anisakis* spp. has the highest medical importance because of the severe allergic reactions and gastrointestinal symptoms it causes in humans after eating or handling infected fish or crustaceans⁶. These symptoms are especially prevalent in countries where it is common to eat raw or undercooked fish and anisakiasis is a serious zoonotic disease with a dramatic increase in prevalence throughout the world in the last two decades. The highest prevalence of anisakiasis is found in north Asia and western Europe (The Netherlands, Germany, France and Spain)⁷. In Serbia, *Anisakis* can be present in imported marine fish. Ćirković et al.⁸ inspected 2414 samples of imported marine fish in the period 2000-2013. *Anisakis* spp was identified in 25 (1.29%) samples of herrings (*Clupea harengus*) and mackerel (*Scomber scombrus*). *Pseudoterranova decipiens* is also frequently associated with human disease⁹. Humans are infected with larval *A. simplex* by eating raw, inadequately cooked, poorly salted or smoked salmon, herring, cod or mackerel, while *P. decipiens* is commonly present in cod, halibut or flatfish⁵. *A. simplex* larvae enter the gastric or intestinal mucosa in humans and can cause an abscess or eosinophilic granuloma¹⁰. Also, these parasites can enter the peritoneal cavity and also enter other organs, while some of the nematodes may not invade tissue but instead can pass out with faeces, vomit or pass up the oesophagus¹⁰. *P. decipiens* larvae can cause 'tickling throat syndrome' in which a tickling sensation occurs and the patient may cough up the larvae¹¹. Besides that, *Contracaecum osculatum* has been reported to cause disease in humans, but infection with larvae of *Contracaecum osculatum* is less common¹².

The most significant freshwater fish zoonotic nematodes which occur in Serbia are *Eustrongylides* spp.¹³, of which the most important species is *Eustrongylides excisus*¹⁴. In humans who have consumed raw or undercooked fish, *Eustrongylides* spp. have produced gastritis and intestinal perforation¹⁵. Human infections with *Eustrongylides* spp. occur after ingestion of raw or poorly cooked fish meat, since fishes act as intermediate and paratenic hosts in the development of their lifecycles. The pathogenicity to humans can be different to and, most times, more conspicuous than that observed in birds, the natural definitive hosts for this species¹⁶. *Eustrongylides* spp. have been reported in various freshwater fish in Japan, Iran, Papua New Guinea, Canada, Bangladesh etc⁵.

2.2. Trematodes

It has been estimated that the number of people infected with fish-borne trematodes exceeds 18 million worldwide. Moreover, the number of people at risk, including those in developed countries, is more than half a billion⁷. Notwithstanding 33 species of digenetic trematodes having been registered as transmissible to human through the consumption of fish, crustacea or molluscs, only a few represent zoonotic threats¹⁷. *Chlonorchis sinensis*, *Opisthorchis* spp., *Heterophyes* spp., *Metagonimus* spp., *Nanophyetes salminicola* and *Paragonimus* spp. are the most important among trematodes from the public health point of view⁵. The members of the *Heterophyidae* family are among the most significant and the most important are *Heterophyes heterophyes* and *Metagonimus yokogawai*¹⁷. People become infected by eating raw, marinated or improperly cooked fish. Human infections are frequently reported in the Middle East and Asia, especially the Philippines, Indonesia, Thailand, China, Japan and

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