



Pathogenic Microorganisms in Fish: A Cause for Concern

Bhattacharyya S*

Associate Professor, Department of Microbiology, AIHH&PH, Kolkata, India

***Corresponding author:** Sayan Bhattacharyya, Department of Microbiology, AIHH&PH, Kolkata, India, Email: sayantheboss@yahoo.co.in

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Abstract

Pathogenic bacteria can be found in scales of fish in large amounts. They can cause foodborne gastroenteritis and also superficial infections in the handlers. These infections can be caused by a number of bacteria, viruses, parasites as well as fungi. Very few studies have been done in this aspect.

Keywords: Fish; Scales; Bacteria; Fungi; Parasites

Introduction

Fish is very popular as a part of diet in India and other countries as well [1]. Since mostly Earth has water, fishes have become part of diet of man since antiquity [1]. It is palatable and nutritious and is source of proteins, Calcium and Phosphorus and omea-3 and omega-6 fatty acids and fish preparations are proper Health foods [1].

Among fishes we eat and know, about 41% are from freshwater and 59% from seawater. Common fish eaten in India are Rohu, Catla (*Catla catla*), Tilapia, Mackerel, Pomfret and others [1]. Particularly in Eastern and Southern India, eating fish is a part of the popular culinary culture. However handling and eating raw or semi-cooked fish can be very dangerous as will be highlighted here.

Materials and Methods

Literature search was carried out. Also we added some of our own experiences after microscopy and culture.

Fishborne Zoonoses

The zoonotic infections in man reported from fish handling or eating are Mycobacterium infections, infections by *Erysipelothrix* spp. and various gut

infections by *Escherichia coli* and *Salmonella* spp [2]. *Campylobacter*, *Aeromonas*, *Vibrio*, *Edwardsiella*, *Escherichia*, *Salmonella* and *Klebsiella* are the pathogens which can be transmitted by contact with eroded skin or wounds or accidental ingestion of contaminated water, food, or other materials. *Aeromonas* is commoner in fresh water and *Vibrio* is more likely to occur in salty water [2].

Bacterial Infections

Various bacterial infections can be acquired form eating fish, like:

a) Gut infections: *Vibrio* and *Aeromonas* infections can be acquired by eating unclean or improperly cooked fish. Even *Listeria* gut infection has been reported form eating seafood. *Vibrio vulnificus* can cause gastrointestinal as well as soft tissue infection and even septicemia and can come from seafish [3]. The symptoms are similar to those of general food poisoning, like fever, vomiting, diarrhea, and abdominal pain. More serious symptoms are high fever; chills, low blood pressure, redness, swelling, and blisters on the skin [3]. Some severe cases of disseminated infections in Diabetic individuals with skin lesions have also needed amputations [4].

b) Skin infections: *Mycobacterium marinum* and *Erysipelothrix* spp. Can cause superficial infections

and ulcers in man from handling raw or live fish [2]. Fish-handler's disease occurs when cuts or scrapes in the skin get infected with the bacteria *Erysipelothrix rhusiopathiae* and others. This is an erysipeloid infection, which means it is caused by an infection that resembles erysipelas but is caused by a different organism than that which causes erysipelas. Nodular lesions on fingers may also be seen [5].

According to our experience, we found *Vibrio cholerae* and *Aeromonas* species in freshwater fish in their scales. Thus this should be of utmost concern for people consuming fish and it should be cleaned and cooked thoroughly and properly before eating.

c) Fishborne botulism: *Clostridium botulinum* can also be found in fish, especially producing the tixins E, B and F, and are mostly found in fish intestine and gills [6]. Many outbreaks of Botulism have occurred from eating hot or a smoked fish. Eating it can cause Botulism if not cooked at very high temperatures. Thus one should be very careful while eating raw or semicooked fish.

Parasites in Fish

Nematodes like *Anisakis* spp., *Gnathostoma* spp. and *Capillaria* spp. are well transmitted from raw or improperly cooked fish to man. The practice of eating pickled or semi-raw fish preparations like Sushi and "Sashimi" has led to an increase in these infections across the globe [7]. *Anisakis* larvae cause damage to gastric mucosa. Japan sees roughly 3,000 cases of *Anisakis* infection annually, according to reports [4].

Cestodes like *Diphyllobothrium latum* infection has occurred in man after eating fish soaked or prepared in lime juice [8]. They can cause loose stools and lead later to Vitamin B12 deficiency and resultant Megaloblastic anaemia. Diphyllobothriasis in man causes minimal local pathology, but can cause reduced vitamin B₁₂ absorption and changed gut mobility. The common symptoms include weakness, dizziness, salt craving, diarrhoea, and abdominal discomfort [9]. It is most prevalent in areas consuming partly cooked or raw or pickled fish, like Russia and other parts of Eastern Europe, North and South America and some Asian countries, like Japan [10].

Viruses

Viral infections like Noroviruses have been reported from eating shellfish [11]. Although shellfish are actually crustaceans, still it may be important from eating proper fish also. Noroviruses in lesser percentage has also been found in mussels and other varieties of seafood [12].

Fungal Infections from Fish

We have found *Candida* species in fish scales swab samples. They can cause yeast infections in skin and mucosa of the handler. There are reports of fungal infection of gut and colon by the fungus *Monascus ruber* in a patient with gastric Carcinoma [13]. The patient had consumed dried and salted fish which was the food responsible.

Diagnosis of Fishborne Infections

Diagnosis is both clinical and laboratory aided. Microscopy from swabs from the fish scales can be done in the form of screening for parasites. The patient's clinical findings also help to a great extent in this case. The stool of the patient may be subjected to saline and Iodine mount to find out the eggs of the helminths and cestodes. Fish scales and meat can be subjected to culture on media like TCBS agar and Blood agar to detect the various bacterial pathogens. Viruses can be detected by more sophisticated methods like Tissue culture and other methods. We ourselves did culture on CLED agar and Sabouraud's dextrose agar for finding out bacteria and fungi.

Treatment of Fishborne Infections

Bacterial infections may need antibiotics. Mycobacterium infections can be treated by antibiotics such as Rifampicin, streptomycin, sulfamethoxazole and trimethoprim, tetracyclines, and others. *D. latum* infection can be treated with drugs like Praziquantel. Disseminated or severe fungal infections need high-end drugs like Amphotericin B [13].

Discussion

Eating semi-cooked and raw fish or seafood is very dangerous and should be avoided. Various infections may arise from eating and handling raw or partly cooked fish, like gastroenteritis, dysentery, skin infections and disseminated infections. This is an important and often neglected aspect of public health. Very few studies have been done in this aspect. Author also feels that one may also carry out routine screening of fish borne bacterial pathogens including their antibiogram in order to assess the most useful antibiotics that may have to be administered. More awareness needs to be generated in fish handlers and also consumers regarding this. Laws need to be enacted in this aspect for better compliance and overall public health improvement.

Conclusion

Fish eating can be dangerous. Fish handling can also lead to many infections. More attention needs to be given to these areas of public health.

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