

Zoonotic Disease in Fishes

Rekha Moun*, **Rajender kumar Gupta**, **Priya**, **Monika Jangra**, **Renu Yadav**

Department of Zoology and Aquaculture, Chaudhary Charan Singh Haryana Agricultural University, Hisar-125004 (Haryana) India



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*Corresponding Author
Rekha Moun*

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INTRODUCTION

A zoonotic disease is a disease or infection that can be transmitted naturally from vertebrate animals to humans or from humans to vertebrate animals. This involves a wide variety of bacteria, viruses, fungi, protozoa, parasites and other pathogens. Factors such as climate change, urbanization, animal migration and trade, travel and tourism, vector biology, anthropogenic factors like consumption of animals, and natural factors have greatly influenced the emergence, re-emergence, distribution, and patterns of zoonoses. As time passes, there are more emerging and re-emerging zoonotic diseases and at a fast scale. In this article we want to describe the zoonotic major as major concern their impact on human health and control measures for better management.

Sources and factors affecting the zoonotic disease

- Evolution towards person-to-person and animal to human transmission depends on the biological features of the pathogen. but may well be triggered or facilitated by external factors such as changes in human exposure. Disease emergence may thus be deciphered as an evolutionary response to changes in the environment including anthropogenic factors as main reason due to new agricultural practices, urbanisation, globalisation which are causing climate change rapidly. This is clear that changes in pathogen and host ecology are primarily responsible for the majority of emerging diseases.
- Ecological changes' embrace a number of very different processes under the same umbrella for instance changes in agricultural practices, urbanisation, globalisation or climate change again.

The latter is a factor of emerging concern as it may affect the areas where primary agricultural production takes place, alter vector distribution and abundance, change the migration patterns of birds and other wildlife, and affect the survival time of pathogens outside the host. A common feature of all these processes is that they are largely a consequence of human activity.

- Human hunger is another crucial factor which is responsible for consumption of diverse animals even like bats

Zoonotic disease and their pathogen in fishes

Human contact with the fishes and their consumption is responsible for hazards from a range of bacterial zoonotic infections. Many bacterial pathogens have been presented as fish-borne zoonoses. Some bacteria generally described as fish-borne zoonoses are *Mycobacterium* spp., *Streptococcus iniae*, *Clostridium botulinum*, and *Vibrio vulnificus* appear to be well-described as zoonoses in the strict sense. *Erysipelothrix rhusiopathiae* can transfer from fishes to humans but does not cause disease in fishes and is therefore excluded from the list of zoonotic pathogens. Some epidemiological or molecular linkages have been described between bacteria infecting both fishes and humans. Instead of this more work is needed to decipher routes of transmission and the identity of these pathogens in their respective hosts at the genomic level. Many bacteria like *Clostridium botulinum*, *Erysipelothrix rhusiopathiae* (does not cause disease but remain as commensal in skin), *Lactococcus garvieae* (*Enterococcus seriolicida*), *Staphylococcus* spp. (molecular and epidemiological evidence are not discovered yet), *Streptococcus agalactiae* (Molecular evidence support the transmission), *Streptococcus iniae* (both molecular and epidemiological evidence support the zoonosis), *Mycobacterium* spp. (both

molecular and epidemiological evidence support the zoonosis), *Nocardia* spp. (molecular and epidemiologically not proved yet), *Vibrio damsela*, *Aeromonas* spp., *Edwardsiella tarda*, *Leptospira* spp., *Plesiomonas shigelloides* and *Yersinia ruckeri* (for all the six transmission has been proved epidemiologically). Some common pathogen and their disease are briefly described here.

Clostridium botulinum

Clostridium botulinum lives commensally in the intestines of freshwater fish and marine species in the whole world fishes. There are seven type of recognized botulinum toxin types (A–G). Out of these type E is responsible for most cases of human disease caused by fish consumption. Although types A and B are occasionally implicated. Disease in fishes due to *C. botulinum* is not common if occurs, when fishes feed on decaying carcasses that have become anaerobic and thus support growth of the bacterium. Well known disease is ‘bankruptcy disease’ in earthen pond culture of salmonids and which has also been documented as ‘visceral toxicosis’ of catfishes in south eastern USA. Human botulism has been associated with consumption of contaminated fish products, notably smoked fish in Arctic and northern temperate regions.

Lactococcus garvieae

It is ‘group D streptococci’. *Lactococcus garvieae* is the noteworthy fish pathogen and has been described as a human pathogen. It cause cholecystitis, endocarditis, and diskospondylitis. *L. garvieae* usually causes serious disease in cultured warm water fishes with high stocking density. Mainly cause acute haemorrhagic septicaemia with mortality and reduced growth. Human infection with *L. garvieae* has been associated with ingestion of raw seafood (fishes mollusc etc.). There are seasonal peaks in *L. garvieae* infection in cultured fishes and occupational person with fishery exposure.

***Streptococcus* spp.**

Streptococcus spp. infection in fishes typically involves Lancefield group B organisms e.g

Streptococcus agalactiae or *Streptococcus iniae* which has peculiarity that these do not express Lancefield antigens. *S. agalactiae* is an agent of infection neonatal sepsis in human mastitis in cows. Infection with group B *Streptococcus* spp. has been reported from a broad range of temperate and warm water fishes having haemorrhagic septicaemia and neurological signs. Scientists have reported that there is genetic similarity in isolates of *S. agalactiae* isolated from human neonatal, piscine and dolphin. *Streptococcus iniae* was first isolated from the Amazon river dolphin i.e. *Inia geofrensis* and at present it has been reported in a variety of piscine hosts. Scientist identified zoonotic infection with *S. iniae* in a disease outbreak in Toronto, Canada, involving nine humans possessing cellulitis related to handling raw fish like tilapia and other fishes. Some of the infected persons also had endocarditis, meningitis and arthritis.

***Mycobacterim* sp.**

Mycobacteria are the well known zoonotic fish-borne bacterial pathogens which cause granulomatous inflammation of the skin. Generally affects deeper tissues in human. This is also known as ‘fisherman's finger’, ‘fish tank granuloma’, ‘fish-fancier's finger’

etc. These symptoms were firstly described by Nordén and Linell in 1951. Disease from fish and water-borne mycobacterial infection in humans generally takes the form of superficial granulomatous inflammation which affect extremities and may involve deeper tissues, resulting in bursitis, tenosynovitis, osteomyelitis and arthritis.

Prevention and precautions

- Foodborne zoonoses can often be interrupted by using good sanitation and hygiene during food preparation, eliminating cross-contamination of foods, cooking all foods of animal origin
- Avoid feeding raw meat
- Break the chain of transmission which was also the theme for Zoonosis day in 2020
- Regular and thorough cleaning of ponds and cages prevents the accumulation of debris that can shelter microorganisms.
- Common antibiotics and vaccination should be used
- Awareness program should be organized.