Disease Infection by *Enterobacteriaceae* Family in Fishes: A Review

**Abstract**

*Enterobacteriaceae* family microorganisms are the major cause of infection in humans. Usually, they are commonly found in normal microbiota from fish. The incorrect handling of professionals that work with fish farm, and the indiscriminate use of antibiotics in the pisciculture can lead to the onset of diseases in fishes transmissible to human consumer.

**Keywords:** *Enterobacteriaceae*; Fish Infection; Pisciculture

**Introduction**

Fish farming has increased in the last decades, in order to the growth of animal protein consumption. The food safe handling is a topic widely discussed in various studies that discussed the migration of microorganisms exclusive from fish to human feed. *Enterobacteriaceae* family is one group, which includes the most species related with infection in humans. Microorganisms of *Enterobacteriaceae* family are Gram-negatives, positives for catalase, facultative aerobics and non-glucose fermenters [1]. These microorganisms are usually found in gastrointestinal tract from fish, but a study performed by [2] showed that microorganisms like *Escherichia coli*, *Enterobacter* spp. and *Klebsiella pneumoniae* [3-5], are frequently isolated from fish in pisciculture.

The presence of *Enterobacteriaceae* bacteria in fish farming lead to a serious health public risk. Despite in most cases these microorganisms are part of normal microbiota from fish, when colonizing human sites, they can cause some diseases, like urinary tract infection [6]. For preventing infection on fish and economic loss [7], the use of antibiotics in aquaculture has been widely used [6,8], but the indiscriminate use of these drugs has led to the emergence of resistant strains, a very dangerous situation for the consumers [9]. Isolation of *Enterobacteriaceae* species has been the focus of researches, especially in fish farming, due to the transmission of resistant bacteria to humans [10].

In a research performed by Peixoto et al. [4], *Pseudomonas aeruginosa* and *Enterobacter cloacae* were isolated from curimba, *Prochilodus lineatus* (Valenciennes, 1837) in a closed system. The fish exhibited the following descriptions: adult member with 42.69 mm total length and 31.96 mm length pattern. The fish had the following infectious processes: bleeding in the pectoral fin, ulceration head above the eyes. Oliveira et al [3], isolated strains of *Klebsiella pneumoniae* from a nishikigoi carp, *Cyprinus carpio* Linnaeus, 1758, in a closed system vivarium. In this case report, the authors observed lesion of necrosis, but no systemic infection was observed. *Escherichia coli* are the most frequent microorganism isolated in fish meal and water in fish farming. Ristori et al. [11], investigated the presence of *E. coli* O157:H7 in fish meal, in order to prevent the transmission to the consumers.

Conceição et al. [12] investigate the presence of microorganism in fish farming at Conceição das Alagoas, Minas Gerais - Brazil, and *Enterobacteriaceae* the most isolated species were from *Enterobacteriaceae* family. Yagoub [2] isolated *Enteriobacteriaceae* Family and *Pseudomonas* spp. from fresh fish bought in supermarket (*Tilapia nilotica* Linn). Among the bacteria from *Enterobacteriaceae* family, 23.2% of the strains isolated were identified as *E. coli*. The authors point out the need that the experimental and theoretical methods must be done like described in Nascimento et al. [13].

Since several of these microorganisms are transmitted by fecal-oral route as observed with contaminated fruits or vegetables, the risk to human health may be during handling, processing or, where it is difficult to determine the source of the microbes. When it occurs during handling, a hypothesis that could be raised could probably be the reflection of the use of bovine manure to stimulate the production of plankton in nursery. The authors point out the need of eliminates the use of manure in all systems, especially when in direct contact with fish or fish farmers.

**Conclusion**

Bacteria from *Enterobacteriaceae* family are present in the normal fish microbiota, but some as *E. coli*, *Klebsiella pneumoniae* and *Pseudomonas* spp. can cause human diseases. The indiscriminate use of antibiotic in fish farming has led to the emergent of resistant strains that in contact with the consumer can lead to several health problems. We already know the consequences of indiscriminate use of antibiotics can lead, but despite this, even today we are not able to deal with the...
biodiversity of natural systems. For avoiding this imbalance, we must recognize this scenery and go further than this limitation that will help to understand the natural systems, the interactions between microorganisms, with their hosts and with the environment. Thus, the balance between host, environment and the desired food security would be established.

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References

1. Kaper JB, Nataro JP, Mobley HL (2004) Pathogenic Escherichia coli. Nat Rev Microbiol 2(2): 123-140.
2. Yagoub SO (2009) Isolation of Enterobacteriaceae and Pseudomonas spp. from raw fish sold in fish market in Khartoum state. J Bacteriol Res 1(7): 85-88.
3. Oliveira RV, Peixoto PG, Ribeiro DC, Araujo MC, Santos CTB, et al. (2014) Klebsiella pneumoniae as a main cause of infection in nishikigoi Cyprinus carpio (carp) by inadequate handling. Brazilian J Vet Pathol 7(2): 86-88.
4. Peixoto PG, Oliveira RV, Silva BR, Santos CTB, Pelli A (2013) Isolamento de Pseudomonas aeruginosa e Enterobacter cloacae isolados em curimba Prochilodus lineatus em sistema fechado. Iniciação Científica Cesumar 15(2): 189-191.
5. Guzmán MC, De Los Angeles Bistoni M, Tamagnini LM, González RD (2004) Recovery of Escherichia coli in fresh water fish, Jenynsia multidentata and Bryconamericus iheringi. Water Res 38(9): 2367-2373.
6. Nagamatsu K, Hannan TJ, Guest RL, Kostaki M, Hadjifrangiskou M, et al. (2015) Dysregulation of Escherichia coli α-hemolysin expression alters the course of acute and persistent urinary tract infection. Proc Natl Acad Sci USA 112(8): E871-880.
7. Oliveira RV, Peixoto PG, Conceição N, Ribeiro DC, Oliveira AG, et al. (2014) Colimetrica de ambientes aquáticos com cultivo de jáu, Zungaro jahu em Conceição das Alagoas/Minas Gerais. J Health Sci Inst 32(1): 82-85.
8. Romero J, Feijóo CG, Navarrete P (2012) Antibiotics in Aquaculture-Use, Abuse and Alternatives. Health and Environment in Aquaculture 160-198.
9. Gastalho S, Silva GJ, Ramos F (2014) Uso de antibióticos em aquacultura e resistência bacteriana: Impacto em saúde pública. Acta Farm Port 5(1): 29-45.
10. Elsherief M, Mousa MM, ElGaliil A, ElBabhoury E (2014) Enterobacteriaceae associated with farm fish and retailed ones. Alexandria J Vet Sci 42(1): 99-104.
11. Ristori CA, Iaria ST, Gelli DS, Rivera ING (2007) Pathogenic bacteria associated with oysters (Crassostrea brasiliana) and estuarine water along the south coast of Brazil. Int J Environ Health Res 17(4): 259-269.
12. Conceição N, Oliveira AG, Oliveira RV, Junior LCF, Silva PR, et al. (2012) Variação espacial e sazonal de microorganismos associados ao cultivo do Zungaro jahu (Ihering, 1898) na Estação Ambiental de Volta Grande no Estado de Minas Gerais. (Spatial and seasonal variation of microorganisms associated with the cultivation of Zungaro jahu (Ihering, 1898) at the Volta Grande Environmental Station in the State of Minas Gerais.) J Heal Sci Inst 30(2): 186-190.
13. Nascimento LL, Conceição Natália, Silva Paulo Roberto da, Oliveira Adriana Gonçalves, França Júnior Luiz Carlos de, et al. (2012) Padronização de procedimentos para coleta e semeadura de microorganismos em ambientes aquáticos neotrópicos mesotróficos. Revista UNINGÁ Review 12(1): 54-57.

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