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SOME INSIGHT INTO FISH ZOONOTIC DISEASES AND IT'S CLINICAL SIGN

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ABSTRACT

Zoonotic diseases are a public health and social concern that causes mortality and significant sickness in humans and animals around the world. Because of growing international markets, improved transportation systems, and demographic changes such as population movements, zoonosis have been limited for the most part to populations living in low and middle-income countries. However, the geographical limits and populations at risk are expanding. A variety of bacterial zoonotic diseases can be spread by human interaction with and ingestion of fish. The most common disease is Aeromonas hydrophila, Edwardsiella tarda, Erysipelothrix rhusiopathiae, Mycobacterium marinum, Streptococcus iniae, Vibrio vulnificus and Vibrio damsel. Although numerous bacterial diseases have been classified as fish-borne zoonosis based on epidemiological and phenotypic evidence, genetic identity between fish and human isolates is rarely investigated or does not support transmission between these hosts.

Keywords: Bacterial Transmission, Preventive Measures, and Zoonotic Disease.

INTRODUCTION

Occurrence of several diseases is still a serious limitation to aquaculture productivity around the world as revealed by Adams et al., 2005. The risk of new diseases arising and established diseases spreading to different geographical places is a reality as the sector expands and diversifies. The exchange of eggs and fry between fish farms creates ideal conditions for viruses to adapt to their hosts and surroundings. Bacterial control is difficult, requiring a combination of bacterial detection, disease diagnosis, treatment, prevention, and general health management. The importance of these zoonoses in terms of public health, their links to poverty and cultural traditions, agricultural intensification, environmental degradation, and a lack of management mechanisms are becoming more widely recognised (World Health Organization, 1995, 2004). This is due in part to the competitive process by which national public health priorities are formed, in which the case for paying more attention and resources to fish-borne zoonoses is frequently hampered by a lack of reliable evidence on health and economic implications. Rapid disease identification and immunization play a crucial role in this, and both have made tremendous progress since the 1980s. Since 2000, the rate has accelerated even faster as clinical and veterinary care methods have been rapidly adopted and optimized for use in aquaculture. Novel diagnostic procedures are frequently published, and vaccination is effective in lowering antibiotic use, at least in some countries. Alternative approaches for controlling fish infections are also being investigated and implemented.

ZOONOTIC TRANSMISSION

There are many modes of transmission and the fact that many zoonotic infections do not produce disease in aquatic organisms, bacterial interactions between humans and aquatic species are complicated. As a result, outwardly healthy fish can transfer infections to people as unaffected carriers. It's also feasible for commensal microbes that normally cause little trouble for aquatic creatures to become a human zoonotic disease similar kind of transmission study done by Lowry and Smith, 2007. Furthermore, many clinical symptoms of sickness in aquatic species have little relevance to the clinical signs that arise in infected humans, which is a problem linked with pathogen detection in fish.

The most common zoonotic disease in fish *Aeromonas hydrophila, Edwardsiella tarda, Erysipelothrix rhusiopathiae, Mycobacterium marinum, Streptococcus iniae, Vibrio vulnificus and Vibrio damsel* are the most common infections acquired topically from fish. *M. marinum* frequently infects home aquarium enthusiasts, while S. iniae has lately emerged as a public health issue related with aquaculture similar kind of disease was also studied by Lehane and Rawlin, 2000. Medical practitioners might anticipate seeing more infections of this type as aquaculture and recreational fishing become more prevalent in Australia. Diagnosis and treatment may be difficult, particularly given the rise in antibiotic resistance among fish infections.

1. ***Edwardsiella tarda***: According to Reddacliff et al. (1996), E. tarda is a dangerous disease that affects a wide range of fish species and has been linked to mortality in food fish in Australia. It is a rare human pathogen that causes gastroenteritis, as well as wound infections, septicaemia, meningitis, cholecystitis, and osteomyelitis. The infection of a wound can range from moderate cellulitis to necrosis. *E. tarda* appears to have a preference for producing significant infections in people who have a pre-existing condition, such as hepatic cirrhosis, or in people who have increased iron availability (Janda et al., 1993).

Clinical sign in Fishes: Small cutaneous lesions, muscle abscesses, loss of pigmentation, enlarged abdomen filled with ascitic fluid, protruded bleeding anus, and opaqueness of the eyes are all symptoms of ascitic fluid. Small white nodules can be found in the gills, kidney, liver, and spleen, as well as the gut on occasion. Bacteria abound in these nodules.

Clinical sign in Human: Soft tissue infections, Arthritis, Septicaemia.

2. Aeromonas hydrophila: This complex group of numerous, ubiquitous bacteria affects both freshwater and marine fish, but farmed freshwater fish suffer from the most serious diseases. The pathogenicity of isolates varies widely (Aoki, 1999). In immune-compromised patients, *P. Aeromonas* infection in a wound can cause cellulitis, muscular necrosis, or septicemia, although it can also happen in immune-competent people. Cellulitis is the most common type of infection. Muscle necrosis is an uncommon but devastating condition that frequently necessitates amputation. It has a quick start and is accompanied by severe localised oedema, spreading serosanguinous bullae, and occasionally gas in the muscle fascial planes. Septicaemia is a rare disease that is typically lethal. Janda and Duffey (1998), found it to be related to ecthyma-like lesions with erythematous borders and necrotic centres.

Clinical sign in Fishes: In fish, symptoms include haemorrhagic septicaemia, tail/fin rot, surface lesions, scale sloughing, exophthalmia, and stomach distension.

Clinical sign in Human: Serious infections are infrequent, except in immunocompromised people. Septicaemia, cellulitis, or muscular necrosis.

3. Erysipelothrix rhusiopathiae: The aetiological agent of swine erysipelas, this pathogen infects a wide range of mammals and other animals. It has been isolated from numerous species of fish 24 and grows in fish slime, even though it has not been recognised as a fish pathogen (Reboli and Farrar, 1989). According to Haebler and Moeller (1993), it causes septicaemia and persistent skin disease in dolphins. It can be passed from person to person through skin damage. The infection can take three forms: erysipeloid or "fish rose," a localised cutaneous form that affects the fingers or hands; a diffuse cutaneous form; and an uncommon septicaemic form that is often associated with endocarditis.

Clinical sign in Fishes: At this time, descriptions of *E. rhusiopathiae* causing mortality in fish are limited to a limited publication. Chong et al. (2015) reported haemorrhagic septicaemia in Australian short-fin Anguilla australis and long-fin Anguilla reinhardtii eels, resulting in 5% and 20% mortality, respectively.

Clinical sign in Human: Erysipelothrix rhusiopathiae is a pleomorphic, non-sporulating gram-positive bacillus. In humans, it causes erysipeloid illness (localised cutaneous infection), diffuse cutaneous infection, and systemic or invasive infection (bacteremia with or without endocarditis or vocal organ or deep tissue infection).

4. Streptococcus iniae: Streptococcus iniae infection in fish was first recognised in 1958, and there have been numerous outbreaks in fish in saline, brackish, and freshwater settings since then (Kusuda and Salati, 1999), the majority of which have been linked to aquaculture, according to Durborow, 1999. The bacterium is widespread and cannot be eradicated from fish or the environment, but only a few clones are harmful to humans. Bromage (1999) discovered S. iniae as a severe infection of farmed barramundi in Australia.

Clinical sign in Fishes: Septicaemia, meningitis, discolouration, loss of orientation, bilateral exophthalmia, corneal opacity, and eye bleeding are all symptoms of septicaemia.

Clinical sign in Human: Tropical sores, cellulitis, local lymphadenitis, septicaemia, endocarditis, and arthritis are all symptoms of persistent suppurating ulcers.

5. Mycobacterium marinum: This bacterium is a significant zoonotic organism transmitted by fish that causes sporadic fatalities of farmed rainbow trout in Australia during the summer. M. marinum was linked to outbreaks of granulomatous lesions in swimmers in public pools in the 1950s and 1960s before swimming pools were properly chlorinated. The majority of M. marinum infections are now linked to home aquariums or water-related activities including swimming, fishing, and boating (Durborow, 1999; Iredell et al., 1992).

Clinical sign in Fishes: Dermal lesions, pigmentary abnormalities, emaciation, stunted growth, exophthalmia, and sluggish swimming are some of the symptoms. Granulomatous nodules that range in colour from grey to white, most commonly found in the spleen, liver, and head kidney.

Clinical sign in Human: Skin, sub-cutaneous tissues, and tendon sheaths with single nodular or sporotrichoid granulomas. In immunocompromised people, septic arthritis and osteomyelitis can arise.

***6. Vibrio vulnificus* and *Vibrio damsel*:**

Vibriosis is very common in fish. According to Actis et al., 1999, recent information reveals that Vibrio vulnijicus bio group 1, the most common human vibrio infection derived from the marine environment, is not a fish pathogen. Actis et al., 1999, and Dryden et al., 1989 discovered Vibrio (Photobacterium) damsela, a fish and human pathogen. Aquatic vibrios are halophiles (salt-lovers) who thrive in selected media with added salt rather than media with merely 0.5 per cent sodium chloride (Ghosh and Bowen, 1980).

According to Morris 1988, V. vulnijicus lives in estuary environments and causes a variety of human diseases that can lead to serious, often deadly infections in susceptible people. Wound infections can be moderate and self-limiting, or they can proceed to severe cellulitis and myositis, which can mirror the quickness and destructiveness of gas gangrene. Septicaemia, which is most commonly caused by eating contaminated raw or undercooked seafood, especially oysters, can occur after wound contamination. Wound infections account for about a third of all instances of septicaemia, but only 8% of deaths. Morris, 1988 found a clear link between primary septicaemia and a variety of chronic underlying diseases, including haemochromatosis, hepatic cirrhosis, haematological and other immunosuppressive disorders, renal failure, and diabetes.

Infections produced by *V. damsela* are typically localised. Dryden, 1989 discovered three of these diseases near Sydney. *V. damsela*, on the other hand, can cause rapid death in people who have no predisposing factors. Two haemolytic phenotypes of *V. damsela* were associated with a fatal infection of a puncture wound caused by a catfish spine in a 60-year-old man with a history of alcoholism, pancreatitis and insulin-requiring, adult-onset diabetes. Necrosis spread from the fingers to the arm, shoulder and chest, and death with disseminated intravascular coagulation ensued nine days after the injury (Clarridge and Zighelboim-Daum, 1985).

Clinical sign in Fishes: External haemorrhagic condition, body redness, ulcers, and bleeding gills, gut, and liver.

Clinical sign in Human: With necrotizing fasciitis, myositis, septicaemia, and metastatic skin lesions, lesions can be modest and self-limiting or invasive. Individuals with chronic underlying diseases are at risk of dying.

BACTERIA TRANSMISSION FROM FISH

Human diseases caused by bacteria transmitted from fish or the aquatic ecosystem are common which depends on the climate or season, patient's interaction with the fish, eating habits and person immune system. These are optionally harmful bacterial species for fish and humans that can be eliminated from fish without causing disease. Infection can be spread by fish bred for food or as a hobby said by Acha and Szyfres (2003). For the correct diagnosis, a thorough history and microbiological analysis are required.

PREVENTATIVE ACTION

Preventing zoonotic diseases is significantly more efficient and successful than responding to current infections in aquatic medicine, as it is in other field of veterinary practices. Thus, discussing biosecurity concepts with clients and putting in place an adequate biosecurity plan for aquaculture facilities are critical for reducing the introduction and spread of pathogens in animal populations (Lowry and Smith, 2007). Veterinarians can advise customers on a variety of precautions to take to reduce the potential of zoonotic bacterial introduction into established aquatic animal populations. One option is to create a quarantine room or tanks separate from existing populations where new fish can be housed. This helps to keep zoonotic diseases and other disease agents (such as viral, parasitic, and fungal) out of the clients' fish populations. New fish should be quarantined for 30 to 45 days to observe behaviour, feeding response, and the development of any clinical indications. To prevent contamination of current fish populations, the quarantine area or facility should be treated as a separate location and provided with nets, feed, water supply, and tank-cleaning supplies that are only used in that region.

CONCLUSION

Disease-control methodologies are evolving at a breakneck speed. Selecting which approaches to advance and employ in aquaculture requires critical insight. Vaccines must be both affordable and safe, and pathogen detection systems must be both reliable and sensitive. Several cutting-edge technologies could meet these requirements and produce novel vaccinations and diagnostic tools for preventing zoonotic diseases. Further, new technologies do not supplant them simply because they are fresh ways. For the applicability of such technologies in aquaculture, they must have clear advantages over existing approaches.

Nanotechnology is being investigated for pathogen detection in food (Kim et al., 2007) as well as clinical and veterinary diagnostics, and it could be particularly valuable for aquatic animal diagnostics.

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