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Commentary

Various Types of Bacterial Pathogens in Aquaculture

Louis Samuael*

Department of Fisheries, University of British Columbia, Vancouver, Canada

ABOUT THE STUDY

The Indian fisheries and aquaculture industry is a key source of food production, contributing to agricultural exports, ensuring the nutritional security of the food basket, and employing around 14 million people participating in various events. Due to its extensive aquatic resources, the country has steadily improved its fish production since becoming independent. The sector contributes 1.1% to GDP and 5.15% to agricultural GDP while producing around 6.3 % of the world's seafood. Currently, the inland sector produces 10.07 million metric tons of fish, or around 65%, with cultural fisheries producing almost the same amount. Fish illnesses have grown to be a significant barrier to the long-term production and trade of aquaculture products, endangering the livelihoods of Indian fishermen. Poor nutritional status, excessive stocking densities, and low physicochemical and microbiological quality of culture water are a few factors that may contribute to opportunistic infections. Adult and seed fish might have abnormalities and pass away as a result of a brief exposure to pollution and suspended particles. The fish industry suffers enormous losses as a result of several opportunistic bacterial diseases and parasites because of their high death and morbidity rates, lower growth, and higher costs for chemical control and prevention [1,2].

A salmonicida, *Vibrio* species, *Edwardsiella ictaluri*, *E tarda*, *Aeromonas hydrophila*, and Streptococcus species are some of the most frequent bacterial illnesses in aquaculture and other comparable gram-positive cocci can also infect species used in aquaculture. Yersiniosis (enteric redmouth disease) is an acute or chronic bacterial illness that can be fatal in highly bred salmonids. Yersinia ruckeri is the responsible agent. Darkening and bleeding of the skin, anus, and fins are among the symptoms. Chronic symptoms include exophthalmos, inappetence, edoema, and internal organ degeneration. The death rate varies, but other things like poor water quality make it higher [3]. Pure cultures of the organism are isolated and recognized for diagnosis from the diseased fish's internal organs. The most prevalent infectious illness affecting the channel catfish, ice fish business is enteric septicemia, which is brought on by *Edwardsiella ictaluri*.

Infection occurs in spring and fall when water temperatures range from 22°C to 28°C. Meningeal and enteric meningitis are the two varieties (or intestinal). Infected fish may develop skin lesions with significant petechial bleeding around the mouth, operculum, and eyes or, in the intestinal version, measles-like red punctate lesions along the body wall. The gut may be hemorrhagic and packed with fluid or gas, and there is hemorrhagic enteritis. Liver lesions are common and can present as bleeding and widespread necrosis. Columnaris disease, which mostly affects warm-water fish species, is caused by the bacteria *Flavobacterium columnare*. On wet mounts of damaged skin or gill tissue, specific organisms can be identified to make a preliminary diagnosis. Isolating the organism on Ordal's or another cytophaga media allows for the diagnosis of disease. Sensitivity testing is challenging to do since *F columnare* does not grow on muller-hinton media. Early diagnosis of the illness is crucial for the efficacy of hydrogen peroxide or potassium permanganate treatment. If the condition progresses to chronicity, oxytetracycline or florfenicol treatment is advised [4,5].

A bacterium called *F branchiophilum* is the source of the bacterial gill illness that affects juvenile farmed salmonids and fish kept in environments with high organic loading. It can be caused by overcrowding, poor water quality, high ammonia levels, especially from heavy organic loads and detritus. Direct gill smears can confirm the appearance of inflated, mottled, and patchy bacterial growth on the gills under a microscope. The gill lamellae exhibit abnormalities, adhesions, and hyperplasia. In young icefish, the illness results in significant death and long-term morbidity. Two preventative techniques include enhancing water quality and avoiding overstocking. Although sanitation is necessary for long-term resolution, a single potassium permanganate treatment followed by the addition of salt to the system may assist reduce losses [6].

Disease severely hampers aquaculture in India, as it does in many other nations throughout the world, and limits socioeconomic and economic development. Some illnesses have hurt the future growth of the sector as well as the livelihoods of fish farmers. Many of the illnesses that affect modern aquaculture are caused by increased growth tactics used without a

Correspondence to: Louis Samuael, Department of Fisheries, University of British Columbia, Vancouver, Canada, E-mail: samuaellousis5877@gmail.com

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fundamental understanding of the delicate balance between host, pathogen, and environment [7,8].

Disease outbreaks are frequently linked to environmental degradation, which causes stress in domesticated animals. The risk of infection by opportunistic pathogens may rise as a result of many stress factors in the aquatic environment, such as poor water quality, increased microbial load, poor nutritional condition, and excessive stocking density. Most bacterial, parasitic, and fungal diseases are only parasitic in appearance. These illnesses are very tolerant to environmental changes.

When conditions are unsuitable for parasitism, saprophytic partnerships develop. Stress factors in the environment might lead to fungus infections.

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