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Review on Fish Diseases

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Abstract

The need for safe, secure, and sustainable protein production is crucial as the world's population continues to rise and industrialize. The production of seafood is one industry that is of particular relevance because the catch fishery and aquaculture sectors supply 15–20% of the world's protein needs. Unfortunately, illnesses have a significant impact on fish output. Importantly, one of the most dangerous viral infections of fishes in the world may be viral hemorrhagic septicemia, which is brought on by the viral hemorrhagic septicemia virus (VHSv; Rhabdoviridae) To find vulnerable disease-free areas, we investigated the ecology and epidemiology of VHSv using an ecological niche modeling approach. Due to environmental (water quality and hypoxia) and physiological factors, fish are more stressed when raised in intense circumstances (parasites and infectious diseases.) All of these elements have a detrimental effect on fish health and performance generally, resulting in financial losses. Although good management techniques help to lessen the effects of stressors, congested environments always increase stress susceptibility. When it comes to immunological defense in fish, innate characteristics are at the forefront and play a critical role in disease resistance. Although the fish's adaptive response is frequently delayed, it is crucial for long-lasting immunity and a crucial component of successful vaccination. The primary fish diseases are described, the pathogenicity and host defense are reviewed, and several internal and environmental elements that can influence a fish's immune system are covered. The key preventative methods, such as immunization, probiotics, and immunostimulation, are discussed.

Keywords: Fish, Aquatic Environment, Viral disease, Bacterial Disease, Fungal Disease

1 Introduction

Many ecto- and endoparasite sites can be found in fish. Every ecosystem contains these parasites, which often have little impact on the fitness of healthy fish. But when fish are raised in captivity,

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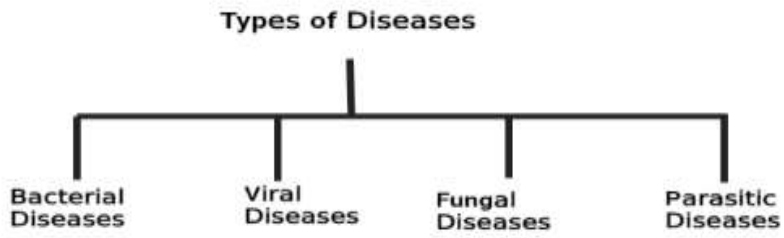
stress can happen, which might lead to a parasite issue (e.g., public aquariums, the ornamental fish trade, and aquaculture). The loss of output in aquaculture can be linked to infections up to 50% of the time. Up to 50% of output loss in aquaculture can be attributed to diseases. (Assefa & Abunna 2008).

Poor water quality and high stocking numbers create ideal circumstances for parasite infection and reproduction, which soon rises to pathogenic levels. Furthermore, the inescapable transportation of fish and equipment contributes to the spread of harmful infections. (Sandeep et al. 2016).

Regular biological functions of fish are incredibly dependent on their aquatic environment and are therefore susceptible to unfavorable changes in water quality. Fish immune alterations and the incidence of infectious diseases have been connected to heavy metals and other aquatic pollutants. Even extremely low sublethal doses of particular heavy metals can have significant negative effects on the structure and/or function of the immune system during a disease epidemic that may be nearly as harmful as direct toxic dosages. Heavy metal chromium is widely found in the effluents of many industries, especially the chrome tanning industry, which is a major source of surface and groundwater contamination. (Lee, 1994).

Fish from contaminated places could be harmful to human health because they are a crucial part of human nutrition. Metals can linger in water and sediments and accumulate in aquatic species like fish. Fish are the straightforward and trustworthy biomarkers of water body contamination. Fish tend to absorb metals from their immediate environment when they are exposed to high metal levels in a contaminated aquatic ecosystem. (Alfred et al., 2020) Fish from contaminated places could be harmful to human health because they are a crucial part of human nutrition. Metals can linger in water and sediments and accumulate in aquatic species like fish. Fish are the straightforward and trustworthy biomarkers of water body contamination. Fish tend to absorb metals from their immediate environment when they are exposed to high metal levels in a contaminated aquatic ecosystem. (Lee and Reasner, 2000 Harvel et al., 1999).



Flow Chart

The flowchart shows the Types of Fish diseases these are following

1.1 Bacterial Diseases

Bacterial infections are the main cause of infectious diseases and fatalities in wild fish populations and fish farmed in crowded conditions. Disease-related problems are the main cause of financial losses in aquaculture. (F. P. Meyer. 1991).

Together with the rapid expansion and development of aquaculture, increased use of water bodies, pollution, globalization, and transboundary movement of aquatic fauna, the number of novel pathogenic bacterial species found in fish has been steadily rising. (C. D. Harvell et al., 1999).

1.2 Viral Diseases

The ability to isolate and grow fish viruses in vitro has made virus isolation the "gold standard" for detecting viruses in key aquaculture species like carp, rainbow trout, and Atlantic salmon in addition to aiding research on viral diseases(Oliva-Teles, 2012). In the molecular era of today, virus isolation is still a critical diagnostic and research procedure. As a result, over the past ten years, the use of cell culture and molecular techniques has greatly increased our understanding of the biology of fish viruses. (Austin et al., 2006).

1.3 Fungal Diseases

Like other vertebrates, aquatic animals are vulnerable to a variety of harmful diseases, such as fungi. A fish was the first vertebrate to be clinically reported to have a fungal infection(Paperna, 1991). (Ainsworth,1976) . Eggs, fry, fingerlings, and adult fishes can all contract illnesses from aquatic fungi. The majority of aquatic fungi are saprophytes, meaning they feed on decaying organic waste. (Mishra, 2017)They are typically thought of as secondary invaders and are well recognised for attacking the host when it sustains an injury from mechanical trauma or an infection other than a fungal one. (Francis et al., 1991).

1.4 Parasitic Diseases

Under favourable circumstances, fish parasites proliferate quickly, affecting fish health and frequently resulting in high mortality. In addition to compromising the host's ability to eat, parasites also disturb the digestive system's secretary functions and harm the nervous system. (Sandeep P et al., 2016).

2 The Significance of Fish Diseases to Aquaculture

The aquaculture business is extremely important to many nations, especially emerging nations. For aquaculturists, (Mougin & Joyce, 2023) fish illness is a significant cause of financial loss. Fish illness outbreaks raise production costs due to the investment lost in dead fish, the expense of treatment, and the reduced development during convalescence. (Francis, 2005).

Fish disease obstructs social and economic development in a number of ways, including directly through output losses and increased operating costs and indirectly through costs to society (social, welfare, and environmental), (Waiho et al., 2021) changes in market shares, and price rises due to a decrease in supply. Fish diseases have an adverse effect on fish development and survival rates, resulting in low yields (both in quality and quantity ,the livelihood of those involved in fisheries, and the culture production and the community in which it takes place. (Valladão et al., 2015)Food availability is decreased, lost income/employment, lost leisure time, mistrust in a healthy environment, and consumption and handling of diseased fish are all negatively impacted. Significant socioeconomic losses are continuously incurred by consumers and fish farmers. (Francis, 2005; Aseefa et al., 2008).

3 Conclusion

Public aquariums, fans of aquatic ornaments, and aquaculture businesses all suffer major financial losses as a result of diseases (Sustainable et al., 2020).There aren't many research investigating the benefits of environmentally friendly therapeutics on diseases like velvet disease, (Aly, n.d.) maybe because the disease is less contagious at low temperatures.Hobbyist aquarists (Jørgensen, 2020)frequently utilise commonplace cures like saline baths, however these are inappropriate for use in commercial settings. (Magnadottir, 2010) Commercially accessible therapeutics can lower

health conditions, increase stress levels, (Altinok & Kurt, 2003)and even result in fish mortality when used on non-target animals(Nasr-Eldahan et al., 2021). These medicinal medications' leftovers could affect the environment and result in the development of microbial resistance, which could then pose a risk to human safety (Yılmaz et al., 2022). This could harm the environment and raise concerns about the security of people as a result. (Bliznakov et al., 1972).

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