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Freshwater and marine water fish diseases: A review

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Abstract
Pathogenic microorganisms may induce infection by numerous stress factors, such as insufficient physicochemical and microbial content of culture water, poor nutritional status and high stocking density. Acute levels of contaminants and suspended solids in seed fish and adults can directly cause anomalies and mortality. In terms of elevated morbidity and mortality, decreased development and expanded spending on the use of chemicals as prevention and control steps, multiple opportunistic bacterial pathogens and parasites cause catastrophic losses in the fish industry. Fish disease prevention is as is known, of paramount importance in terms of sustainable aquaculture development.

Keywords: Pathogenic microorganisms, anomalies and mortality

Introduction
Particularly among developing and underdeveloped countries, there is a global need for food and nutritional protection [1]. India's fishing industry is a gradually increasing sector with a range of capital. More than 14.50 million individuals at the primary level are projected to be directly or indirectly dependent on this sector for their livelihood survival. The sector has shown substantial growth from conventional farming techniques to commercial cultivation methods, increasing fish production from just 7.5 lakh tonnes in 1950-51 to 107.95 lakh tonnes in 2015-2016, while Rupees obtained 33,441 crore in 2014-15 (US $ 5.51 billion) by fish exports to various countries [2-4].
A significant average annual growth rate of around 4 percent was reached by the fisheries and aquaculture sector during the 11th. Duration of Five Year Strategy. As such, fisheries and aquaculture contributed roughly 0.91% to the national gross domestic output (GDP) and 5.23% to the agricultural GDP (2014-2015), which is a very important contribution. India actually accounts for about 6.30 percent of the world's fish baskets and 5 percent of the world's fish trade [5]. India is the second largest production country for fish and the world's second largest producing nation for aquaculture [2]. Though Asia accounts for more than 90% of the world's aquaculture output, India now ranks second only after China in terms of annual fisheries and aquaculture production [6]. According to FAO statistics, aquaculture has been the world's fastest growing food-producing industry, with an annual average growth rate of 8.9% since 1970, compared to just 1.2% for capture fisheries and 2.8% for terrestrial meat processing systems over the same time [7]. Progress in aquaculture, though has resulted in some unjustified practises for both animals and the ecosystem. Around the same time, over-exploitation of fisheries and anthropogenic stress on marine environments have placed wild fish stocks under threat. The effect has been the advent and dissemination of a growing number of new changes in diseases. As has been observed in other food-producing industries, aquaculture has been adversely affected primarily by intense culture activities for greater economic benefit owing to the regular incidence of disease outbreaks [8].

Disease and disease control in aquaculture
Production intensification of both land-based livestock farming and aquaculture is characterised by the containment of vast numbers of animals in confined spaces. While hygienic steps and stress reduction are part of modern aquaculture's regular routines, large numbers of fish can impede the daily tracking, care and recovery of dead fish. Therefore this scenario will establish optimum conditions for the transmission of disease within the cage population [9].

In addition, the selection of disease tolerance characteristics has now been one of the priorities of the fish breeding objectives [10] that can help to mitigate the problems of both proven (Atlantic salmon and rainbow trout) and newly introduced fish species, including Atlantic cod, in intensive farming. However, breeding for disease resistance is difficult and resistance to one infection in general does not generally mean improved defence from pathogens [11]. With the establishment of new fish varieties, there is reasonable reason to expect that bacterial diseases could greatly hinder the early growth of those crops. During the early stages of the salmon farming industry, bacterial agents caused huge losses. In initial cod farming, this pattern was already confirmed, mainly with heavy losses linked to francisellosis, vibriosis and atypical furunculosis. It is therefore important to undertake intensive research to overcome the threats facing bacterial pathogens at an early stage of this vulnerable new industry's growth. In addition to the production of fast and accurate diagnostic methods, the possibility of bacterial diseases spreading from one fish species to another and from farmed to wild stocks should be thoroughly evaluated and vice versa.

Fish Diseases may be subdivided into:

Infectious diseases, caused by pathogenic organisms present in the environment. They are mostly contagious and treatment may be necessary to control the disease outbreak.

Non-infectious diseases, caused by environmental problems, nutritional deficiencies, or genetic anomalies. These are not contagious, usually cannot be cured by medications but rarely happen and are best prevented and controlled by provision of good water quality and good management.

More widespread and broadly classified as bacterial are infectious diseases, High mortality and morbidity rates are generally associated with bacterial, fungal or viral diseases and have a large negative effect on farmers, consumers and the environment.

Source and mode of infection

There are variable causes and modes of infection among fish, as fish disease is seldom a clear interaction between a pathogen, a host fish and an environmental issue. Such stressors also lead to the spread of disease and the difficulty of the problem, such as low water quality. Many bacteria in or on fish are either natural residents or saprophytes in soil or water or hosts of invertebrates, such as snails or crustaceans. Most diseases are linked to stress. The transmission of infection to fish occurs through direct and indirect exposure of cultured fish to pathogens, which is facilitated by poor fish health management. The mechanisms by which fish diseases are transmitted generally including a mixture of the following: contaminated water supply, infected eggs or fish stocks and/or contaminated culture facilities, together with environmental conditions associated with the fish culture practice (air, ponds, soil, equipments, feed, pollutants, etc.).

Bacterial Diseases

As with viral diseases, the presence of specific bacterial agents is necessary to cause an infection. Many of these agents can survive naturally in the environment (e.g. Aeromonas punctata, Aeromonas salmonicida) and/or in the digestive tract of clinically healthy fish; with an increase in their virulence and/or a weakening of the host organism (e.g. due to a polluted aquatic environment) these agents can act as causative factors in the outbreak of a bacterial disease. Organic pollution of water, followed by a decreased content of dissolved oxygen, creates a favourable environment for the growth of bacteria. A direct relationship between the organic pollution of surface waters and outbreaks of furunculosis is well established, so that this disease may at times serve as a positive indicator of poor water quality; the causative agent, Aeromonas salmonicida, can survive for a maximum of one week in tap water, 12 weeks in stream water and as long as 6 months in organically polluted mud. Organic pollution of the aquatic environment is also an important factor in columnaris infection. Vibriosis occurs most frequently in brackish water, although in inland waters it can be found in localities receiving inputs of salt. Organic and even physical (e.g. inert suspended solids) pollution of water can be important factors in inducing flexibacteriosis in the gills of salmonids, by damaging the delicate gill respiratory epithelium.

Table 1: Common bacterial infections among freshwater fish

Year of record	Bacterial pathogen	Fish species affected
2000	*Aeromonos hydrophila, Flavobacterium columnare, Vibro anguillarum*	Nile tilapia, mullet sp., *Carlos* catfish
2001	*F. columnare, Pseudomonas fluorescens, Yersinio ruckeri*	Nile tilapia, *Clarias* catfish, carp, goldfish *(C. auratus)* and common carp
2002	*Pseudomonas fluorescens, Streptococcus iniae*	*Oreochromis niloticus*
2003	*Klebsiella pneumonia, Enterococcus faecalis*	Nile tilapia
2004	*Pseudomonas fluorescens, P. oureginoso, P. anguilliseptico, P. pseudoalkaligenes*	Nile tilapia, African catfish, silver carp and grey mullet
2005	*Yersinio ruckeri*	Nile tilapia, common carp and monosex tilapia
2006	*Edwordsiella tarda, E. Ictaluri, Streptococcus faecelis, A. hydrophila* and *P. fluorescens*	Nile tilapia, common carp, African catfish, and grey mullet
2008	*F. columnare*	Nile tilapia
2009	*Enterococcus faecalis, Streptococcus iniae*	Nile tilapia

Fungal Diseases

A direct relationship between branchiomycosis and organic pollution of water is well known in fish culture practice. Usually, the disease is endemic in ponds and reservoirs; cyprinid fish species, whitefish, pike, but also wels and rainbow trout can be affected. The outbreak and duration of the disease depend on ambient environmental factors, the most important of which is water temperature. The disease occurs most frequently when the water temperature is above 20 °C (with an optimum of 26 °C) and is accompanied by organic pollution and associated fluctuations in the dissolved oxygen concentrations. Mechanical (i.e. physical) and/or chemical damage of the protective mucus layer of the skin, fins and gills are prerequisites for the disease outbreak. Such damage is also a precondition for the secondary development of saprolegnia; fungal spores develop to form greyish-whitish woolly growths on the damaged surfaces, particularly in weakened fish.

Fish parasites

The degree of pathogenic activity exerted by ecto-and endoparasites living on the body surface and/or in internal organs of fish, can be influenced by water pollution (KHAN and THULIN, 1991). Contaminating substances such as pesticides may have a harmful effect on the parasites but fish weakened by parasite infestation may be more sensitive to the toxic effects of substances in the water. For a number of fish protozooses there is a conditional dependence on organic and other pollution of the aquatic environment; for example, such a reduction in water quality can be followed by a gill invasion with Cryptobia branchialis. Reduced pH values of the water (e.g. to 5–6), together with unsuitable breeding conditions, can contribute to an outbreak of ichthyobodosis. Poor hygienic conditions in ponds and reservoirs carry a potential danger for myxosporeoses outbreaks; low dissolved oxygen concentrations associated with low light conditions are favourable for chilodonellosis. Thermal pollution can lead to lethal outbreaks of ichthyophthiriosis. Domestic sewage discharged into surface waters can be a source of high populations of trichodines. Phenol and polychloropinen can cause fish to become more sensitive to Ichthyophthirius multifiliis; an increased sensitivity of carp to this parasite has also been found in connection with sublethal concentrations of cadmium. As for the commonly found helminthoses, the relationship between a low oxygen concentration in water and the complicated course of dactylogyroses is well known. The oxygen content of the water is also an important factor affecting the growth and abundance of Gyrodactylus sp. populations; for example, a decrease in oxygen concentration of 50% caused a three to four-fold increase in their reproduction rate. This effect is probably caused by the weakening of the host organisms under these conditions rather than the direct effect of an oxygen deficiency on the parasites. Several authors have found a high prevalence of monogenea, particularly the species *Dactylogyrus similis*, *D. fallax*, *Gyrodactylus gasterostei*, *G. carasii and G. vimbi*, in fish from lakes polluted by papermill effluents. However, this type of pollution also caused a decreased infestation of gill parasites in the fish [12, 13].

Table 2: Parasitic infections among freshwater fish

Type of Infection	Species affected
Encysted metacercariae	Nile tilapia
Trypanosome, Encysted metacercariae, monogenea, ectoparasites	African catfish, *Morymyrus konumme, Bagrus bajad* and Nile tilapia
Ectoparasites, metacercariae	African catfish, Nile tilapia
Ectoparasites, monogenea, helminthes	Freshwater fishes
Ectoparasites	Nile tilapia, blue tilapia, *Titopia cal,* African catfish and common carp
Metacercariae, fluke trematodes and Cestodes	African catfish
Ectoparasites	*Oreochromis* spp., *Clarks torero,* silver carp, black carp and common carp
Cleidodiscus aculeatus	Common carp
Trichadina mutabilis, Chilodonello hexasticha, Gyrodoctylus rysavyi and Hetrophyid metacercariae *Lemoea cyprinacea*	Nile tilapia Silver carp, grass carp and mirror carp
Quadriaconthus dariodis, Orientocreadium sp., *Polyanchabothrium* sp., unidentified encysted metacercariae	African catfish
Anguillicolocrassus crossus	eel *Anguilla anguillo*

Conclusion

The production of effective prevention and control measures, including treatment for fish diseases, is of vital importance for farmers to protect their crops from pathogens. In addition to the introduction of Best Management Practices (BMP), the prevention of recurrent disease occurrences and loss of productivity in aquaculture is important. Further advancement in information about the disease mechanism, host pathogens and the relationship between the ecosystem leading to the outbreak of diseases is very important for the advancement of practical methods of programming for disease control. A good understanding of disease prevalence status, indigenous technologies for disease prevention and control, development suitable economic bio security programme and implementing farm-level BMPs and husbandry measures are key components, which must be given due attention for sustainable fisheries production.

References

1. Tripathi SD. Need for diversification of species and systems as resource-based, region-specific freshwater aquaculture. In: Swain SK, Swain P, Pillai BR, Raghunath MR, Jayasankar P (eds.). Lead papers on strategies for Aquaculture Development. ICAR-Central Institute of Freshwater Aquaculture. Bhubaneswar, India 2012.
2. DADF. Guidelines-Central Sector Scheme on Blue Revolution: Integrated Development and Management of Fisheries. Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture and Farmers Welfare, Government of India, India 2016.
3. FAO. Opportunities and challenges. The State of World Fisheries and Aquaculture. Food and Agriculture Organization of the United Nations, Rome, Italy, 2014.
4. FAO. National Aquaculture Sector Overview, Fisheries and Aquaculture Department, Food and Agriculture Organization of the United Nations for a world without hunger, India, 2016.
5. Anon. Aquaculture Production in India 2017.
6. Jelte De Jong. Aquaculture in India, Rijksdienst voor Ondernemend Nederland, 2017.
7. Bondad-Reantaso MG, Subasinghe RP, Arthur JR,

Ogawa K, Chinabut S, *et al*. Disease and health management in Asian aquaculture. Vet Parasitol, 2005;132:249-272.
8. Walker PJ, Winton JR. Emerging viral diseases of fish and shrimp. Vet Res 2010;41:51.
9. Poppe TT, Bæverfjord G, Hansen T. Effects of intensive production with emphasis on on-growing production: fast growth, deformities and production-related diseases. In Aquaculture research: from cage to consumption (M. S. Thomassen, R. Gudding, B. Norberg and L Jørgensen, eds), Research Council of Norway, Oslo, Norway, 2007,120-135.
10. Moen T, Baranski M, Sonesson A, Kjoglum S. Confirmation and finemapping of a major QTL for resistance to infectious pancreatic necrosis in Atlantic salmon (Salmo salar): population-level associations between markers and trait. BMC Genomics, 2009;10:368
11. Midtlyng PJ, Storset A, Michel C, Slierendrecht WJ, Okamoto N. Breeding for disease resistance in fish. Bulletin of the European Association of Fish Pathologists 2002;22:166-172.
12. Koskivaara M, Valtonen ET, Prost M. Seasonal occurence of gyrodactylid monogeneans on the roach (Rutilus rutilus) and variations between four lakes of differing water quality in Finland. Aqua Fennica 1991;21:47-55.
13. Koskivaara M, Valtonen ET. Dactylogyrus (Monogenea) communities in three lakes in central Finland. Parasitology 1992;104:263-272.