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"STUDY OF VIRAL DISEASES IN FISHES : A REVIEW"

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ABSTRACT:

The review article "Study of Viral Diseases in Fishes: A Review" aims to provide an overview of the various viral diseases that affect fishes. Fishes are an important source of protein and are widely consumed around the world. However, viral diseases in fishes can cause significant economic losses to the aquaculture industry and threaten food security. The article starts by discussing the general characteristics of viruses, their classification, and replication cycle. It then goes on to describe the various viral diseases that affect fishes, including the causative agents, mode of transmission, clinical signs, and diagnosis. Some of the viral diseases discussed in the article include Infectious Hematopoietic Necrosis (IHN), Viral Hemorrhagic Septicemia (VHS), and Infectious Pancreatic Necrosis (IPN). The article also discusses the various preventive and control measures that can be employed to prevent viral diseases in fishes. These include good management practices, biosecurity measures, vaccination, and the use of antiviral drugs.

KEYWORDS: *Fish, Viral Diseases, Preventive and Control measures.*

INTRODUCTION:

Fish viral diseases account for a large scale mortality in farmed fish and are very difficult to treat directly. Avoidance has been suggested as one of the best control measures of viral infections. Usually, viruses can be easily transmitted from one culture system to another through handling or improper management and hence require easy and early diagnostic methods to detect infections. Viruses are unique, they are exceedingly small, often made up of a nucleic acid molecule within a protein shell and when they are entering a cell, they parasitize the cellular machinery to produce thousands of progeny. The objective of research in virology is to understand how viruses enter individual cells, replicate and assemble as a new infectious particle. There are a number of viral diseases that attack fishes attack cultured fishes. Seed production of ornamental fishes, similar to many other fishes has been extremely vulnerable by mass mortality due to viral infections. Viral diseases are sometimes hard to diagnose properly. Viral studies are usually carried out with cell cultures rather than with animals because cell culture provides a much simpler and more homogenous experimental system. Fish cell lines are important tools for studying viruses in fishes (Hightower LH and Renfro JL., 1988**)** and are also essential for isolating and identifying fish viruses.

Fish are an essential source of protein for human consumption and play a significant role in the economy of many countries. However, viral diseases are a major threat to the health and productivity of fish farms, causing significant economic losses and threatening food security. Viral diseases in fishes can affect various organs and systems, leading to mortality, reduced growth, and increased susceptibility to

secondary infections. The transmission of viral diseases can occur through various routes, including direct contact between infected and healthy fish, contaminated water, and infected feed.

The study of viral diseases in fishes is important to understand the causative agents, mode of transmission, clinical signs, and diagnosis of these diseases. This knowledge is essential in developing effective preventive and control measures, such as vaccination and biosecurity protocols, to minimize the impact of viral diseases in fish farms. The purpose of this review article is to provide an overview of the viral diseases that affect fishes, including their causative agents, mode of transmission, clinical signs, diagnosis, and preventive and control measures. The article aims to be a useful resource for researchers, students, and practitioners in the field of aquaculture and fisheries.

The ideal way to control infectious fish diseases is to prevent exposure to pathogenic agents whenever possible, thus avoiding most devastating health problems through biosecurity (Plumb and Hanson, 2011). However, when dealing with the aquatic environment, it is virtually impossible to define all disease-causing agents and keep them isolated from the fish host. Water provides an excellent medium for transfer of many communicable agents from fish to fish or from locality to locality. Moreover, many disease-causing organisms are endemic to the aquatic environment and are opportunistic, facultative pathogens that remain viable under various conditions (Plumb and Hanson, 2011). Aquaculture is a vital source of food and still the fastest growing animal food producing sector. As a result of intensive fish farming and stressful conditions, infectious diseases, especially bacterial and viral origins, became one of the most important limiting factor in aquaculture facilities. Some diseases do not always reveal themselves in a clinical form. These types of diseases, e.g. BKD, furunculosis and ERM pose real risk of transferring the pathogen with fish movements (Hirvela et al., 2006).

DISCUSSION:

In their natural environments, fishes suffer from a variety of diseases. In India, very little consideration and less attention have been devoted on research to the possibility that man and fish may share disease· producing organ isms in common or serve as vectors of each other's diseases. The need for much more research on fish as possible vectors of human infectious diseases is stressed here because of the increasing use of fish as human food, increasing contamination of the aquatic environment with human wastes and increasing.

The causative agent is Infectious pancreatic necrosis virus (IPNV) which belongs to Birnaviridae group. It is icosahedral in shape, unenveloped and has a double stranded RNA genome. IPN is an infectious systemic disease that has been recognized to have worldwide distribution in a wide range of fish. It causes high mortalities especially in fry and fingerling salmonids. The virus can be vertically and horizontally transmitted. Thus, the only way to get rid of the virus is the destruction of the stock (Olson and Thomas, 1994). Wood et al. (1955) was first described the IPNV.

The etiological agent of the disease is an iridovirus, named as erythrocytic necrosis virus (ENV). It was first reported in 1969 and identified as piscine erythrocytic necrosis (Laird and Bullock, 1969). Since its initial recognition, the virus has been recovered as a pathogen from a wide variety of fish species from different countries, for instance, sea bass in Spain (Pinto et al., 1989), coho salmon in Japan (Takahashi et al., 1982), pacific herring in Alaska (Meyers et al., 1986), coho salmon in Chile (Reyes and Campalans, 1987) and eel in Taiwan (Chen et al., 1985). Unlike VHSV and IPNV, VEN has not been recognized as a severe disease, it causes nominal mortalities in regard to other viral infections.

Viral Diseases-

There are six types of viral diseases present in fish body. They are-

a) Spring viremia- It is a viral disease, the causal agent of this disease are *Rhabdovirus Carpio*. Generally host species of this disease are common carp. Other infected species are silver carp, grass carp, koi carp, and crucian carp. The clinical signs of this disease are nonspecific, but some symptoms shows in generally. Abdominal distension, exophthalmia and petechial hemorrhages of the skin, gills and eyes, swim and breathe more slowly than normal. This virus is shed in the feces and urine, as well

as the gill and skin mucus of infected fish. It is also found in the exudate of skin blisters and edematous scale pockets. The virus enters most often through the gills and direct contact, through the water.

b) Carp Pox- Carp pox is a viral disease which is caused by the *Herpes virus Infection*. This disease usually affects carp and koi.it is also called koi herpes virus disease. The gills of the infected fish show serious tissue damage. Due to the death of gill tissue, the fish are unable to breathe. Mucus secretion can be seen on gills and skin of the infected fish, initially stage carp pox shows up as milky skin lesions.

It is also known as a fish pox or epithelioma papillosum, caused by a herpes virus. Like lymphocystis, it is one of oldest known fish disease. The virus was first recorded in 15th century (Hedrick and Sano, 1989). It was mainly reported from carp producer countries such as European countries, United States and Far East countries. Sano et al. (1985) was reported that, the most susceptible hosts of the virus are common carp and koi carp.

c) Lymphocystis- Lymphocystis disease is a common viral infection of fish, it is caused by *Lymphocystis Virus (Irido Virus)*.It affects the skin and fins growth of fresh water fish's. Generally this viral infection does not pose any health problem to the fish.

Lymphocystis is caused by a lymphocystis virus. It has been reported from wide variety of both freshwater and marine fish species from all over the world. It is one of the oldest and the best known fish virus. It has been known as a causative agent of a disease since 1874 (Plumb and Hanson, 2011). It was reported from ornamental fish in USA (Niggrelli and Ruggieri, 1965), Red Sea, Bering Sea, Mediterranean Sea (Anders, 1989) and Korea (Hossain et al., 2007).

d) Viral Nervous Necrosis (VNN) - It is caused by Betanodavirus. Betanodavirus can infect tropical, sub-tropical or cold temperature fishes. Betanodavirus more commonly cause disease and morality in larval stages. Abnormal swimming behavior, muscle tremors, hyperinflation of the swim bladder symptoms shows generally because Betanodavirus attack on nervous system.

e) Infectious Hematopoietic Necrosis (IHN) – It is a viral disease caused by **IHNV**. It is a bullet shaped novirhabdo virus. The clinical signs of these disease are abdominal swelling, anemia, darkened body coloration, exophthalmia, stomach and intestine filled with milky fluid, pale liver and petechial hemorrhaging of mesenteries or visceral tissues. This disease transmission through the water via sex product. Virus occurs commonly in ovarian fluids and on the surface of eggs.

f) Viral Hemorrhagic septicemia (VHS) – It is caused by viral Hemorrhagic septicemia virus. This virus found in generally European country but this virus found in north Bengal areas river water. Most of fingerlings effect on this disease. The clinical symptoms are small hemorrhages are common in the musculature, gills, visceral organ. Middle stages internal organs become very pale.in late stages kidney become swollen and discoloured.

PREVENTIVE AND CONTROL MEASURES:

There are six types of viral diseases show on freshwater fishes. In carp pox disease there are no treatments for carp pox infection. But only way to prevent the viral infection from spreading is to destroy the infected fish and its environment. For lymphocystis only disease has been diagnosed, the veterinarian may recommend to not treat the fish. Because the infection is not terminal. Preventive and control measures are essential in minimizing the occurrence and spread of viral diseases in fishes. Here are some of the measures that can be employed:

Good management practices: Proper management practices such as maintaining water quality, proper feeding, and avoiding overcrowding can help reduce stress and enhance the immune system of fishes. This, in turn, can reduce the likelihood of viral infections.

Biosecurity measures: Effective biosecurity measures can prevent the introduction and spread of viral diseases in fish farms. This can include measures such as strict quarantine protocols for incoming fish, limiting access to the farm to authorized personnel, and disinfecting equipment and vehicles that come in contact with fish.

Vaccination: Vaccination is an effective preventive measure against viral diseases in fishes. Various vaccines are available for different viral diseases in fish, and farmers can consult with their veterinarians to determine the most suitable vaccine for their fish species.

Antiviral drugs: Some antiviral drugs are effective in treating certain viral diseases in fishes. However, their use must be carefully monitored, and farmers should consult with their veterinarians before administering any medication to their fish.

Surveillance and early detection: Regular surveillance and monitoring can help detect viral diseases in their early stages. This can enable farmers to take appropriate control measures before the disease spreads.

Proper disposal of infected fish: Proper disposal of infected fish can prevent the spread of viral diseases to healthy fish. Infected fish should be immediately isolated and disposed of according to local regulations.

CONCLUSION:

In conclusion, viral diseases are a major threat to the health and productivity of fish farms. The transmission of viral diseases can occur through various routes, including direct contact, contaminated water, and infected feed. The study of viral diseases in fishes is essential in understanding the causative agents, mode of transmission, clinical signs, diagnosis, and preventive and control measures. Effective preventive and control measures such as good management practices, biosecurity protocols, vaccination, antiviral drugs, surveillance and early detection, and proper disposal of infected fish can help prevent and control the spread of viral diseases in fish farms. Continuous research and development of vaccines and antiviral drugs, as well as the implementation of effective preventive and control measures, are crucial to minimizing the impact of viral diseases on the aquaculture industry and ensuring food security.

REFERENCES:

- Anders, K. 1989. Lymphocystis disease of fishes. In: W. Ahne and E. Kurstak (Eds.), Viruses of lower vertebrates, Springer-Verlag, Berlin: 141-160.
- Chen, S.N., Kou, G.H., Hedrick, R.P. and Fryer, J.L. 1985. The occurrence of viral infections of fish in Taiwan. In: A.E. Ellis (Ed.). Fish and Shellfish Pathology. First International Conference of the European Association of Fish Pathologists, Plymouth, England: Academic Press, London, England.
- Hedrick, R.P. and Sano, T. 1989. Herpesviruses of fishes. In: W. Ahne and E. Kurstak (Eds.), Viruses of lower vertabrates. Springer-Verlag, Berlin: 161-170.
- Hightower LH, Renfro JL. Recent applications of fish cell culture to biomedical research. Journal of Experimental Zoology. 1988; 248(3):290-302.
- Hirvela, V., Pohjanvirta, T., Koski, P. and Sukura, A. 2006. Atypical growth of Renibacterium salmoninarum in subclinical infections. Journal of Fish Diseases, 29: 21-29.
- Hossain, M., Kim, S.R. and Oh, M.J. 2007. Lymphocystis disease virus persists in the epidermal tissues of olive flounder, Paralichthys olivaceus (Temminch and Schlegel), at low temperatures. University Journal of Zoology, 26: 59-62.
- Laird, M. and Bullock, W.L. 1969. Marine fish hematozoa from New Brunswick and New England. Journal of the Fisheries Research Board of Canada, 26: 1075- 1102.
- Niggrelli, R.F. and Ruggieri, G.D. 1965. Viral nervous necrosis of larval and juvenile marine fish. In: Proceedings of the international symposium on biotechnology applications in aquaculture. Asian Fisheries Society Special Publication, 10: 147-152.
- Olson, C. and Thomas, J. 1994. An outbreak of infectious hematopoietic necrosis in the baker river system affecting two year classes of sockeye Fish Health Section, American Fisheries Society Newsletter, 22: 1-3.
- Pinto, P.M., Alvarez, P., Bosch, A. and Jofre, J. 1989. Occurrence of a viral erythrocytic infection in the Mediterranean Sea bass, Dicentrarchus labrax. Journal of Fish Diseases, 12: 185-191.

- Plumb, J.A. and Hanson, L.A. 2011. Health maintance and principal microbial diseases of cultured fish. Third ed. Wiley-Blackwell, Iowa, USA. 244 pp.
- Reyes, X.P. and Campalans, M.B. 1987. Necrosis eritrocitica viral (VEN) presunta en salmon coho de la decima region, Chile. Investigaciones Marinas, Valparaiso. 15: 25-31.
- Sano, T., Fukuda, M., Furukawa, H., Hosoya, H. and Moriya, Y. 1985. A herpesvirus isolated from carp papiilloma in japan. In: A. E. Ellis (Ed.), Fish and shelfish pathology, Academic Press, Orlando, FL.
- Takahashi, K., Okamoto, N., Kumagai, A., Maita, M., Ikeda, Y. and Rohovec, J.S. 1982. Epizooticsof erythrocytic inclusion body syndrome in coho salmon cultured in seawater in Japan. Journal of Aquatic Animal Health, 4: 174-181.
- Wood, E.M., Snieszko, S.F. and Yasutake, W.T. 1955. Infectious pancreatic necrosis in Brook trout. American Medical Association Archives of Pathology, 60: 26-28.