MedCrave
Step into the World of Research

Journal of Aquaculture & Marine Biology

Mini Review

Open Access

CrossMark

A review of Saprolegniosis

Abstract

The most common infection in freshwater fish is a fungal infection, and they occur when the fish's immune system is weakened. *Saprolegnia* are fungi found in freshwater ecosystems around the world, and some species may be found in brackish to estuarine waters. These fungi need water to grow and hexose, which is why they are called water molds. Most transmission is by zoospores, which are produced by vegetative hyphae. Fish infections are usually caused by non-living sources, i.e. the fungus hexes on non-living organic matter and then attacks the fish.

Keywords: fungus, fish diseases, spore

Volume 11 Issue 1 - 2022

Mohammad Forouhar Vajargah,[1] Nava Majidiyan[2]

[1]Department of Fisheries, Faculty of Natural Resources, University of Guilan, Iran

[2]Department of Veterinary Medicine, Faculty of Veterinary Medicine, Islamic Azad University, Urmia, Iran

Correspondence: Mohammad Forouhar Vajargah, Department of Fisheries, Faculty of Natural Resources, University of Guilan, Iran, Email mohammad.forouhar@yahoo.com

Received: March 30, 2022 | **Published:** April 25, 2022

Introduction

Freshwater fish, like ornamental fish, are the most common fungal infections. Of course, there are also increasing reports of estuarine fish. They are distributed all over the world. An important category is the oomycete category. *Saprolegnia* is a foreign parasite of eggs and larger fish. It grows like cotton threads on fish bodies or their eggs. It is noteworthy that the spores of this fungus are present everywhere and until a very small scratch is created on the surface of the egg or on the body surface of the fish, its egg or spore cannot grow on the healthy surface of the egg or the body of the fish.

It has four orders, three of which are for fish:

a. Saprolegnial

b. Saprolegniacea (which is the major cause of fish diseases in this order).

c. Leptomital

d. Pronospral.

The genus *Saprolegnia* belongs to the order Saprolegniacea, and *parasitica S* and *S. diclina* are two prominent species of the genus Saprolegnia. They are considered classic opportunistic factors and feed on organic factors in a rotten manner. When the fish's immune system is weakened, they can cause an infection. They also occur after a drop in temperature or when the temperature reaches its lowest physiological level for a particular species. Skin injuries, whether due to disease or wear and tear, are one of the ways in which they occur. Other omomycetes include *Achlia hoferi*, *dictyochus*, and the most important in the pathogenicity of Parasitica *S. Pythium* and leptomitus are weakly pathogenic.

Geographical distribution of Saprolegnia

Saprolegnias are fungi found in freshwater ecosystems around the world, and some species may be found in brackish water up to estuarine. However, salinity above 2.8 parts per thousand limits the release of these fungi. Due to the fact that the spores of these fungi can be transmitted by birds, animal hair, water, etc. Therefore, the possibility of the presence of fungi in freshwater ecosystems such as farms, aquariums, etc. is not far from expectation. Therefore, Saprolegnia is one of the most widespread fungal and pathogenic causes of freshwater fish and their eggs (Figure 1).[1–3]

Figure 1 Goldfish with Saprolegnia disease.

Predisposing factors

Numerous factors underlie the primary and secondary cause and persistence of fish Saprolegniosis, including displacement, density, poor nutrition, which are aggravating factors, the presence of toxic substances in the water, damage to the skin, fins and gills due to external parasites. Physical wounds are physical stresses such as decreasing temperature, increasing or decreasing pH and increasing water salinity.[4,5]

Way of transmission

Water molds are rotten edibles that are found everywhere in soil and fresh water. They need water to grow and hatch, which is why they are called water molds. Most transmission is by zoospores, which are produced by vegetative hyphae. Fish infections are usually caused by non-living sources. This means that the fungus hexagons on inanimate organic matter and then attacks the fish.

Pathogenicity

They are usually seen as relatively superficial hairs growing on the skin or gills. They start as small local infections and then spread widely throughout the body, and can even cause large injuries within 24hours.

They work in such a way that these spores first find a suitable area on the surface of the body of sensitive fish, such as wounds, and

then germinate and produce vegetative hyphae. Mycelium begins to grow in the damaged tissue and covers it. They then develop into surrounding healthy tissues. The fungus destroys the surrounding tissue through enzymatic digestion, paving the way for it to invade dying or dead cells. It then sends filaments into the surrounding water, which show the same cotton-shaped mass that, if damaged, could kill the gills.

The color of these is usually seen in white, but if it wants to be algae and mud in the middle of these strings, they are seen in red or brown or even green.[6]

If we separate the infected fish from the water, the strands lie on top of each other and form a glistening or carpet-like mass on the surface of the body. It is rare for these lesions to penetrate the superficial layers and penetrate. But they can also cause electrolyte loss, osmotic and ionic imbalance, and serum proteins that cause death. The higher the surface area of the affected skin, the greater the loss. In the acute case, the fish may die within a few days or take several weeks to heal.

Oomycetes are also important pathogens in fish eggs. Infection usually begins with unfertilized and dead eggs that act as a culture medium for them. They form mycelial filaments that surround healthy eggs and prevent oxygen from reaching healthy eggs. Rarely, it also affects the gastrointestinal tract of young infants.

Symptoms of Saprolegniosis

The growth of white or gray-brown cotton wool on the skin or gills and fins or on fish eggs can warn us of this disease. When a blow is inflicted on the body of the fish, it is possible for the fungus to grow in the bruised area.

In the early stages of the disease there are no signs of infection. The disease is characterized when fungi penetrate the skin of fish. Factors such as Flavio bacterium in the gills can be distinguished under a microscope. Wide, wall less fungal filaments with a width of 7 to 30μm can be seen under a microscope. At the same time, tissue observations can be used. This can be done by staining hematoxylin and eosin. In this case, the lesions have a limited amount of inflammation (they are more superficial) and do not extend beyond the muscle layers.

Diagnosis should be made on live fish, as dead fish are suitable for fungal growth and may cause errors. Secondarily, they can attack wounds caused by other pathogens. So when you see these fungi, you should look for the initiator of the disease. Infected fish, if kept in improper condition, the wounds on the body may be surrounded by a capsule-like cover, and the fish may survive for a long time.

Sick fish behave abnormally and are restless, as well as rubbing their bodies against existing objects. As the fungus continues to grow, unhealthy muscles rot or rot, and fish lose their appetite, swim slowly, and eventually die.

Fungus identification

Identification to the extent of the species should be aided by the genitals. But in terms of category or order, Zoosporangium is sufficient.

Prediction of the disease

Those who are affected by major areas of the body are usually lost. Sometimes it is necessary to use antibiotics to prevent secondary bacterial infections.

Treatment

Treatment is mostly difficult. In the case of edible fish that are consumed by humans, with the exception of salt, the rest have limited effectiveness. But for other fish, malachite green is more effective. An important point in controlling this disease is that 0.3% of salt in prolonged immersion can help prevent growth. It even reduces the osmotic stress that occurs in skin lesions. But long-term immersion in farmed fish is not practical. But in cold water pools, rock salt is used to rub the fish that itches on the surface of the body. However, salt immersion can be used when transferring baby fish. In this case, in addition to eliminating the mold of saprolegnia, it reduces the bacterial population and is also appetizing.[7–9]

Other mentioned methods of treatment

To treat it in fish, the infected area can be stained with a 5% solution of blue methyl and stained with an ear cleaner. Then all the aquarium water should be disinfected with one gram of potassium dichromate per 35 liters of water. After completing the treatment within a week, the entire aquarium water should be changed.

a. Use of methylene blower for 5 days

b. Keep the tank dark

c. Temperature rise 29 degrees

Separation of infected and healthy eggs

Control and prevention

a. Disinfection of pools with lime

b. Prevent waste from factors such as catching fish, transportation and storage

c. Select healthy breeders and soak them in 1% malachite green solution

d. To increase the amount of fertilizer to prevent the eggs from getting Saprolegniosis. Choose suitable days for artificial spawning and hatch the eggs under a shower in your workshop.

Disinfection of viscous eggs by immersing them in 7 ppm malachite green solution for 10 to 15 minutes for 2 consecutive days. Then spray 10 to 15 kg of malachite green solution 10 to 100 ppm on the hatching shelf until the eggs hatch, morning and evening. Apply malachite green solution every 6 to 8 hours in a circular incubation tank so that the green water color is light. Continue this process until the eggs hatch. This method reduces the fungal infection and improves the hatching ability of the eggs. Immerse the eggshell in 3 to 5% formalin for 2 to 3 minutes or in 1 to 3% saline solution for 20 minutes.

Acknowledgments

None.

Conflicts of interest

The authors declare there are no conflicts of interest.

Funding

None.

References

1. Vajargah MF, Yalsuyi AM, Hedayati A. Effects of dietary Kemin multi-enzyme on survival rate of common carp (*Cyprinus carpio*) exposed to abamectin. *Iranian Journal of Fisheries Sciences*. 2018;17(3):564–572.

2. Montajami S, Hajiahmadyan M, Forouhar Vajargah M, et al. Effect of symbiotic (*Biomin imbo*) on growth performance and survival rate of Texas cichlid (*Herichthys cyanoguttatus*) larvae. *Global Veterinaria*. 2012;9(3):358–361.

3. Vajargah MF, Hedayati A. Toxicity effects of cadmium in grass carp (*Ctenopharyngodon idella*) and Big Head Carp (*Hypophthalmichthys nobilis*). *Transylvanian review of systematical and ecological research*. 2017;19(1):43.

4. Sattari M, Bibak M, Forouhar Vajargah M. Evaluation of trace elements contaminations in muscles of *Rutilus kutum* (Pisces: *Cyprinidae*) from the Southern shores of the Caspian Sea. *Environmental Health Engineering and Management Journal*. 2020;7(2):89–96.

5. Vajargah MF, Hossaini SA, Niazie EHN, et al. Acute toxicity of two pesticides Diazinon and Deltamethrin on Tench (*Tinca tinca*) larvae and fingerling. *International Journal of Aquatic Biology*. 2013;1(3):138–142.

6. Forouhar Vajargah M, Mohamadi Yalsuyi A, Sattari M, et al. Acute toxicity effect of glyphosate on survival rate of common carp, Cyprinus carpio. *Environmental Health Engineering and Management Journal*. 2018;5(2):61–66.

7. Vajargah MF, Hedayati A. Acute toxicity of butachlor to *Rutilus rutilus caspicus* and *Sander lucioperca in vivo* condition. *Transylvanian Review of Systematical and Ecological Research*. 2017;19(3):85.

8. Hajiahmadian M, Vajargah MF, Farsani HG, et al. Effect of Spirulina platensis meal as feed additive on growth performance and survival rate in golden barb fish, *Punius gelius* (Hamilton, 1822). *Journal of Fisheries International*. 2012;7(3-6):61–64.

9. Vajargah MF, Mohsenpour R, Yalsuyi AM, et al. Evaluation of histopathological effect of roach (*Rutilus rutilus caspicus*) in exposure to sub-lethal concentrations of Abamectin. *Water, Air, & Soil Pollution*. 2021;232(5):1–8.