
Mycobacteriosis in Fish

Mycobacteriosis in fish is a disease caused by certain bacterial species within the genus *Mycobacterium*. There are many different species of *Mycobacterium* that cause diseases in animals. Some of these cause important diseases in humans. However, those species that cause Mycobacteriosis in fish are referred to as non-tuberculous mycobacteria and do not cause major disease in normal, healthy people.

Non-tuberculous mycobacteria are relatively common environmental bacteria. This means that they can live in the aquatic environment and do not require the presence of fish or fish tissue to survive. They have been isolated from drinking water supplies, swimming pools, coastal waters, and aquaculture facilities.

Mycobacteriosis is a disease of concern in fish for several reasons. First, it causes a chronic wasting condition with continuous low, to moderate, level mortality within the affected population, and can result in significant financial loss to fish culturists. Secondly, the disease is considered non-treatable once established in the fish host. Finally, *Mycobacterium*-infected fish do have the potential to cause disease in humans.

The genus *Mycobacterium* contains many species of bacteria that cause disease in mammals, birds and reptiles, as well as fish. Three species believed to account for most incidences of mycobacterial disease in fish are *M. marinum*, *M. fortuitum*, and *M. chelonae*. Of these, *M. marinum* has been reported in fish from both freshwater and marine tropical waters, and *M. fortuitum* in fish from tropical or temperate waters. *M. chelonae* has been associated with disease in hatchery-reared Pacific salmon.

Definition "Chronic progressive disease of freshwater, brackish and marine fishes as well as aquarium ones characterized by emaciation, unilateral or bilateral exophthalmia together with stunting of growth rate".

Mycobacterium marinum (in marine fishes) & Mycobacterium fortuitum and M. chelonae (in fresh and brackish water)

Etiology Gram positive straight long rods, non motile, non-spore forming, acid fast, non capsulated and doesn't produce pigment unless grow on special medium.

The organism is strictly aerobic. It grows on only a few media Dorset's medium, glycerol agar, Lowenstein's medium, Loeffler's medium and CGY medium (casein glucose yeast extract). Grow well at 25° C and the growth start to appear at least after 5 days (may take a few weeks).

Susceptibility All fish species are susceptible and involved in the maintenance and transmission of the disease.

Freshwater fishes (e. g. Salmonids, eels, tilapia, carp,barbs). Brakish water such as mullet and rook fish. Marine fish such as sea bream, yellowtail, amberjack and flounder.

Mycobacteria cause disease in fish were reported as an important zoonotic organism as it cause a skin infection in people that is referred to as:

"fish handler's disease" or "fish tank granuloma."



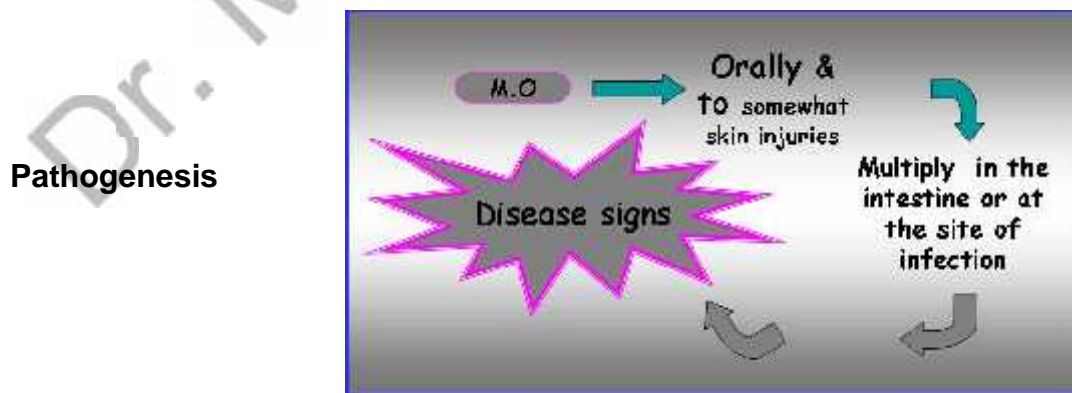
Predisposing Causes

- Increase of temperature above 30 ° C.
- Overcrowding.
- Low dissolved oxygen.
- Presence of large amount of organic matter.

- (stressors)**
- Nutritional deficiencies.
 - Injuries of the skin or gill either by trauma or ectoparasites.
 - Presence of carries and/or infected aquatic animals.
 - Rough handling especially during transportation.
- Mode of infection** Not defined but mainly through ingestion and injuries of skin and /or gills.

Transmission Epidemiology, which is the study of the prevalence and spread of the disease in a population, is poorly understood for mycobacteriosis in fish. The most common method of transmission is assumed to be ingestion of infected material. This can occur if fish are fed fish products that have not been thoroughly cooked, or if an infected fish dies and is consumed by other fish in the population. Fish may also contract the infection through open wounds in their skin if the number of bacteria in the environment is high enough or if the fish has a poorly operating immune system. It is suspected that vertical transmission (transmission from parent to offspring) may occur through egg or sperm products. If this is the case, maintenance of mycobacteria-infected broodstock would be totally unacceptable for fish culturists.

- Source of infection**
- Shaded microorganisms from infected fishes and/or other infected aquatic animals.



- Disease signs**
- Fish become listless and lethargic.
 - Suspend their head down and maintain in this position

for long time.

- Emaciation and inflammation of the skin.



- Unilateral or bilateral exophthalmia "pop-eye"



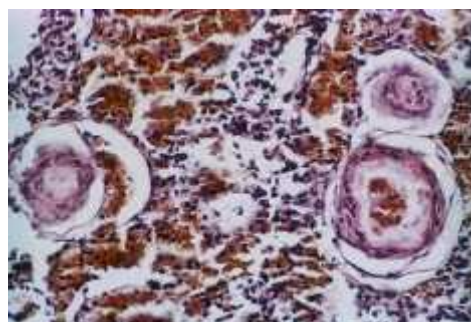
- Open lesions, or ulceration

Postmortem Findings

- Internally, there were gray-white granulomas (nodules) develop in the liver, kidney, spleen, heart, and muscles.
- Enlarged spleen and kidney.



Microscopic Pathology



- Sever edema, infiltration of lymphocytes and

macrophages in the periorbital tissue together with necrosis of the center of the lesion.

- There may be caseation in the center surrounded with inflammatory cells and fibrous Tissue.

Diagnosis

I. Case history revealed that:

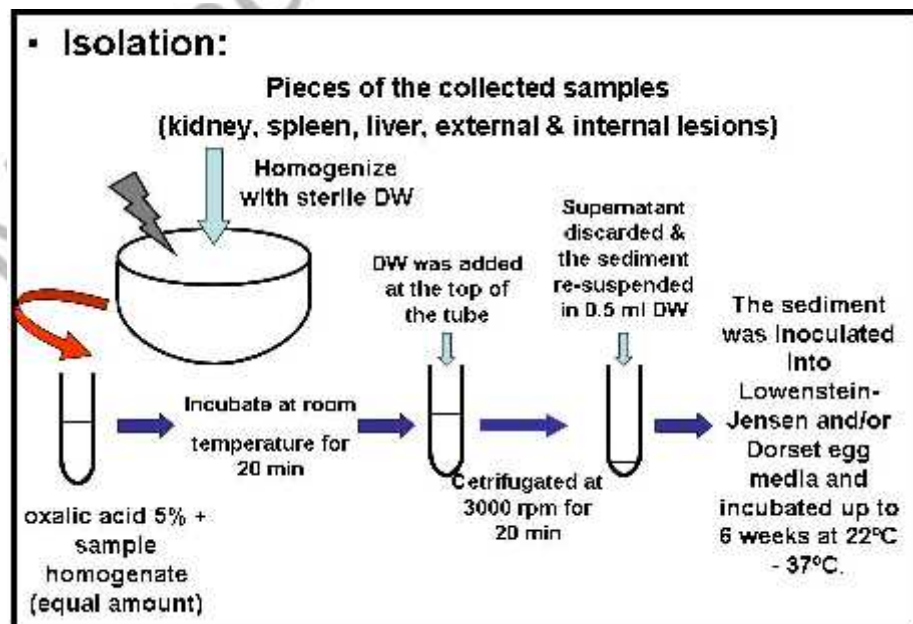
- Loss of appetite or may the fishes refuse food.
- Sluggish swimming and the fish seek the sides of the holding facilities.
- Presence of mortalities.

II. The disease signs (as mentioned above).

III. P. M. findings.

IV. Laboratory diagnosis:

- Samples: kidney, liver, spleen, , muscles especially the lesions (nodules)
- Squash smear from the organs stained with **Zeihl – Neelsen stain**
- Histopathological findings (as mentioned above).
- Isolation and identification:



Identification of mycobacteria		
Ziehl – Neelsen stain and Pigment production	Morphological Characteristics & Rate of growth	Growth at different temperature degrees
Niacine & Nitrate reduction Tests	Aryle sulfatase & Urease Tests	Hydrolysis of tween 80 & Iron uptake
Growth on MacConkey agar	5 % sodium chloride tolerance & Sensitivity to Thiophene-2 carboxylic acid hydrazide	

Mycobacterial infections of fish should be considered non-treatable. Therefore, it is best to destroy infected stocks and thoroughly disinfect facilities before restocking.

Following depopulation, the entire system, especially the filter bed, must be thoroughly disinfected with a mycobactericidal product.

Chlorine at the rate of 10,000 ppm has been reported necessary to kill mycobacteria. Mycobacteria are sensitive to 60-85% alcohol.

Control

Good hygiene and removal of all stressors is the proper way for disease control this can be achieved through:

- Avoid overcrowding.
- Proper disposal of dead and dying fishes either by burning or burying.
- Control of aquatic animals such as reptiles and amphibians.
- Proper disposal of infected fish if in small number.
- Proper drainage, drying, and disinfectant of the pond (quick lime 4 tone/acre).
- Vaccination, formalized whole cultured or DNA vaccine.

Therapy
&
Control