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A STUDY OF VARIOUS SYMPTOMS SHOWED BY FISH INFECTED WITH BACTERIA *AEROMONAS HYDROPHILA*

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ABSTRACT
Among the Indian major carps, Rohu is one of the most preferred species in the country and commands a higher price in the market. *Aeromonas hydrophila* bacterium causes disease in fresh water fishes and responcible for economic loss of the country. In present study the fishes were infected with bacterium *Aeromonas hydrophila* and various behavioural changes were observed. We found that the symptoms range from sudden death in otherwise healthy fish to lack of appetite, swimming abnormalities, pale gills, bloated appearance, and skin ulcerations. The skin ulcers may occur at any site on the fish and often are surrounded by a bright rim of red tissue. Aeromonas hydrophila causes disease in fish known as "Motile Aeromonas Septicemia" (MAS), "Hemorrhagic Septicemia," "Ulcer Disease," or "Red-Sore Disease."

KEYWORDS: *Aeromonas hydrophila* , *Labio rohita*, Motile Aeromonas Septicemia.

INTRODUCTION

In India fisheries sector accounts for 4.4% of global fish production. The aquaculture systems in India and its neighbouring countries such as Bangladesh, Nepal and Pakistan, mainly constitute Indian major carps viz. Catla (*Catla catla*, Hamilton), Rohu (*Labeo rohita*, Hamilton), Mrigal (*Cirrhinus mrigala*, Hamilton) and sometimes Kalbasu (*Labeo calbasu*, Hamilton).

Among the Indian major carps, Rohu is one of the most preferred species in the country and commands a higher price in the market. Andhra Pradesh, West Bengal, Assam and Odisha are the most important states for aquaculture production and Rohu is the most preferred species in these states and also in other states of the country.

The economic loss due to the diseases outbreak in the aquaculture sector can be considerable. The best way to overcome the disease problems in a system is through effective management practices, i.e. management of stock, water, nutrition and environment. As proper management is not always delivered, pathogens become established in animals and produce disease.

Aeromonas hydrophila is a Gram-negative, rod-shaped bacterium mainly found in areas with a warm climate. This bacterium can be found in fresh or brackish water. It is resistant to most common antibiotics and cold temperatures. Diseases caused by *Aeromonas hydrophila* are some of the most widespread in freshwater fish culture. Septicaemia caused by motile *Aeromonads* is a ubiquitous problem that affects fishes found in warm, cool, and cold fresh water around the world. The bacterium, *A. hydrophila* has been associated with disease in carp, eels, milkfish, channel catfish, and tilapia and can also be an opportunist in stress-related diseases in salmonids (Rahman et al., 1997; Plumb, 1999).

Fish infected with Aeromonas hydrophila may have many different symptoms. Fish shows changes in normal behaviour of fish.

Accordingly in present study we focus on various behavioural changes and the survival rate of *Labio rohita* infected with bacteria *Aeromonas hydrophila*.

MATERIALS AND METHODS

A total number of 60 apparently healthy *Labeo rohita*, (Hamilton) fish with an average body weight of 25 ± 5 gm were collected from lake at Thane and used in this study. The diet was daily provided at 3% of body weight as described by Eurell et al (1979). No drugs or vaccines were given to the fish along the course of the experiment.

Glass aquaria measuring 90 × 60 × 50 cm were used for grouping and holding the fish during the experiment. The tanks were disinfected by filling dilute Potassium permagnate. They were again washed thoroughly and filled with Methylene blue water (10mg/litre) which was as fungicide. Therefore the chances of growing fungus or bacteria in the tanks were reduced. The aquarium was

filled with chlorine free tape water with continuous aeration. Aeration helps in homogenous distribution of food and maintenance of the thermal equilibrium.

Water of aquarium was changed daily. During the experimental period the water quality variables: temperature (28±1oC), pH (7.2±0.2), and salinity (0.12±0.02ppt) were maintained.

Fishes were divided into two groups experimental group (group I) and control group (group II).

Bacterial Infection

Fishes of groups I were infected with bacteria *Aeromonas hydrophila*.

The bacteria *Aeromonas hydrophila* was obtained from National Collection of Industrial Microorganisms (NCIM), National Chemical Laboratory, Pune. Bacteria were cultured in nutrient agar for 24 hr at 37^0C and the culture were adjusted to 1.0×10^7cfu /ml by McFarland Nephelometer Barium Sulphate Standard Method. Each fish of experimental group was subjected to infection by immersion in 1.0×10^7cfu /ml of *Aeromonas hydrophila* for 30 minute in separated aquaria of 30 liters chlorine free tap water at 24°C. After infection fishs were observed for 5 days.

RESULT

The behavioural and the swimming patterns of the fish were normal in case of control group and there was no mortality. After the exposure of fishes to Bacteria *Aeromonas hydrophila* various behavioural changes were observed.

First day: both Infected and controlled fishes shows normal swimming.

Second day: both Infected and controlled fishes shows normal swimming.

Third day: from third day visible external symptoms and behavioural changes were observed by infected fishes. reddening of the skin, and accumulation of fluid in the scale pockets were observed.

Fourth day

Symptoms range from sudden death in otherwise healthy fish to lack of appetite, swimming abnormalities, pale gills, bloated appearance, and skin ulcerations. The skin ulcers may occur at any site on the fish and often are surrounded by a bright rim of red tissue.

The abdomen may become distended and scales may bristle out from the skin.

Fifth day

The schooling of fishes starts disrupting and then abnormal swimming behavior increases. The fishes were observed to hit the aquarium walls. The opercular movement initially increases and then decreases. Vertical and downward swimming patterns were observed. Loss of balance increased and the color of the fish were observed to get lighter with an increased secretion of mucus. Defecation was increased and more fecal matter was found at the bottom of the aquarium than control. Finally due to complete loss of balance, fishes sank to bottom with their ventral side facing upwards.

DISCUSSION

The symptoms vary since they are dependent upon a number of factors including the virulence of the organism, the resistance of the fish to infection, the presence or absence of bacteremia or septicemia, and stress factors associated with the fish.

Abnormal swimming and loss of balance was caused by the deficiency in nervous and muscular coordination which may be due accumulation of acetylcholine in synaptic and neuromuscular junctions (Rao *et al*., 2005).

Lallier et al. (1981) performed additional studies on rainbcw trout (Salmo gairdneri) to compare the relative virulence of the two species (A. hydrophila and A. sobria).

Their results indicated that strains of A. hydrophila isolated from either healthy or diseased fish were more virulent than strains of A. sobria. Additionally, A. sobria was not isolated from fish with clinical signs of motile aeromonad septicemia (Boulanger et al. 1977).

Among Aeromonas spp. A. hydrophila is an important bacterial pathogen as it infects both fish and humans (Janda et al., 1996).This bacterium in fishes has been reported to occur from time to time in Asian countries including China, Phillipines, Thailand and India (Ebanks et al., 2004), and in fish culture results in decrease in production and economic losses. This species has been incriminated as the etiological agent in diseases of fish where it cause haemorhagic septicemia, and often aquatic and terrestrial animals (Asha et al., 2004).Several studies have described a wide variation in the pathogenicity of A. hydrophila in different fish species. This is mainly due to the heterogenicity of strains and differences in the adhesive and enterotoxic mechanisms responsible for causing infection in fish (Fang et al., 2004).

Ye et al (2013) isolates A. Hydrophila from sixty diseased freshwater fish and concluded that A. hydrophila is a foodborne pathogen causing zoonotic diseases spreading from animals to humans.

A. hydrophila is one of the major sources of disease complications for farmed fishes (Bauer AW et al 1966, and Guz L et al 2004). Another study by Daskalov H (2006) also showed A. hydrophila as being widely distributed in food, drinking water and environment, and as an important pathogen causing freshwater fish

hemorrhagic diseases, zoonotic diseases, and food borne infections.

CONCLUSION

Aeromonas hydrophila causes disease in fish known as "Motile Aeromonas Septicemia" (MAS), "Hemorrhagic Septicemia," "Ulcer Disease," or "Red-Sore Disease."

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