

Changes observed in the kidney of biofloc grown rohu infected with pathogen *Aeromonas hydrophila*

Anand Prasad Paturi
Assistant Professor and head
Department of Aquaculture
College of fishery Science, Muthukur
SPSR Nellore District -524344
Ph; 9949097882

Citation: Paturi A.P. (2022) Changes observed in the kidney of biofloc grown rohu infected with pathogen *Aeromonas hydrophila*, *International Journal of Fisheries and Aquaculture Research*, Vol.8, No.1, pp.63-68,

ABSTRACT: *Kidneys are the major parts of excretion in the body of fish (animals). Some pathogens like Aeromonas hydrophila affect kidney and destroy the cells of kidney and the normal colour of the kidney. Rohu fish grown in biofloc for 120 days were dissected to observe the changes in the kidneys, after infecting with Aeromonas hydrophila. The dissected kidneys were collected observed for abnormalities in the affected kidneys of rohu. Void spaces, atrophy, inflammation, tubular infection, glomerular abnormality and heavy infiltration of bacteria of have been observed. Higher concentration of bacteria shown more infection and death of rohu fish.*

KEYWORDS: Rohu, pathogen, *Aeromonas hydrophila*, kidney cells, infiltration, bacteria

INTRODUCTION

Rohu is one of the largest cultured freshwater fish and stocking density is also more compared to all other freshwater fishes in any type of culture ponds. Growth rate is also high in rohu and takes the place after catla in Indian major carps. Rohu is more prone to any type of freshwater diseases due to its high stocking density. *Aeromonas hydrophila* is a gram negative, facultative and rod shaped bacteria. Mesophilic *Aeromonads* have vast distribution and can be isolated from aquatic environments also. This is one of the dangerous bacteria for cultured species of fish, causes severe abnormalities and even kills if the infection is more in rohu. *Aeromonas* sp. cause septicemia, eye disease, dropsy in rohu. By maintaining good water quality and better feed management methods this bacterium can be avoided in culture ponds.

Materials and methods

A. hydrophila can be separated from the culture ponds and that is difficult to get pure strain of *Aeromonas hydrophila*. That is why to get specific strain *A. hydrophila* bought from commercial laboratory and cultured in our lab by using *Aeromonas* agar in broth. After 18 hours the *A. hydrophila* bacteria development was observed and it was infected to

biofloc grown fishes. The kidney from the infected fishes control and biofloc fishes were dissected and collected and fixed for observation under microscope. To observe the abnormal characters in the kidney of rohu infected with *Aeromonas hydrophila*, the following steps have been followed *ie.*, Fixation, Dehydration, Clearing, Embedding, Sectioning, Staining have been done to observe the drastic changes happened in the affected kidney. CIFE standardised methods were followed for the histological procedures.

RESULTS

Control fishes all have died within 16 hours of infection and biofloc fishes survived after one week also with 76% survival. The kidney of *A. hydrophila* infected fishes have shown more abnormalities compare to control kidney. *Aeromonas hydrophila*, travelled through the bloodstream to the first available organ when enters the body of its host. Aerolysin Cytotoxic Enterotoxin (ACT) is produced there, which can cause tissue damage. All the changes have been shown in the figure 1 to figure 8.

DISCUSSION

Every organism has it's own defense system to fight against pathogens which enters to it's body called innate immunity. *Aeromonas hydrophila*, travelled through the bloodstream to the first available organ when enters the body of its host. Aerolysin Cytotoxic Enterotoxin (ACT) is produced there, which can cause tissue damage. Motile Aeromonad septicemia is a systemic disease caused by members of genus *Aeromonas sp.* resulting in swelling of the body cavity and haemorrhages in the organs and cells. This disease is frequently reported in carps, catfishes, milkfish, tilapia, murrels and seabass. (Joseph and Carnaham,1994).

The knowledge of the effect of *Aeromonas hydrophila* infection on non specific immunity is of potential importance for the immunological control of disease in the *M. amblycephala* farms, Hu *et al.* (2017) determined the effect of *Aeromonas hydrophila* infection on the non-specific immunity of blunt snout bream. According to Sahoo *et al.* 1999 rohu fishes have specific genes to tolerate and fight against pathogens. Mononuclear cells along with abnormal bowman's capsule can be observed in Fig. 1 & Fig 7

Motile Aeromonad septicemia is a systemic disease caused by members of genus *Aeromonas sp.* resulting in swelling of the body cavity and haemorrhages in the organs and cells. This disease is frequently reported in carps, catfishes, milkfish, tilapia, murrels and seabass. (Joseph and Carnaham,1994).

Atrophy in the glomeruli cells have been observed (as shown in Fig.1) glomeruli is the one of the important excretory part in kidney whose failure creates the accumulation of the wastes in

kidney. Heavy infiltration of bacteria is seen in all the figures but in Fig.2 & Fig.8. Inflammation and desquammed glomeruli is observed in the fig. 3 which will decrease the efficiency of the glomeruli. Tubular fibrosis will be an obstruction of blood and nutrient supply to the kidneys as shown in the fig. 6. as the reports of Gobinath *et al.* 2014. Some of the figures are showing over staining by which clear demarcation difficult to identify. In fig. 5 Bowman's capsule has lost its normal shape. Tiwari and Pandey (2014) indicated that *Flexibacter columnare* infection in rohu was primarily associated with skin and finuleers and gill necrosis was rarely observed. Large number of *Flexibacter columnare* were observed in the skin ulcers and attached to the exposed layers of dermis. In fig.4 it is clearly the diffused tubular necrosis with cystic spaces.

CONCLUSION

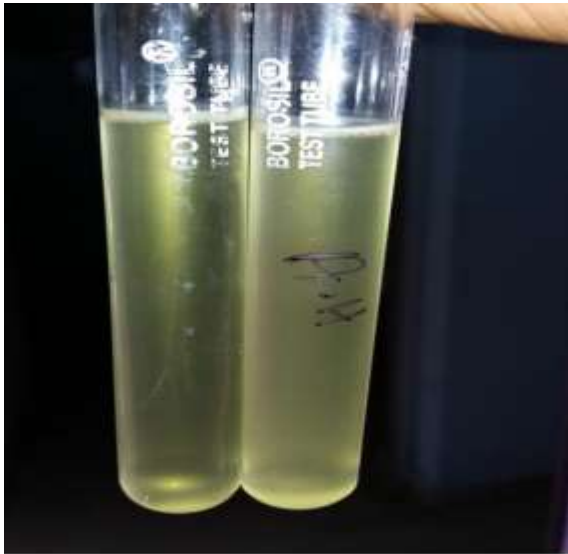
The biofloc grown fish which were survived, shown mild kidney infection, but dead fishes have shown shruken kidneys, enlargement of cells with heavy infiltration of bacteria. This proves that biofloc method is useful to withstand against *Aeromonas hydrophila* to the possible extent.

Acknowledgements

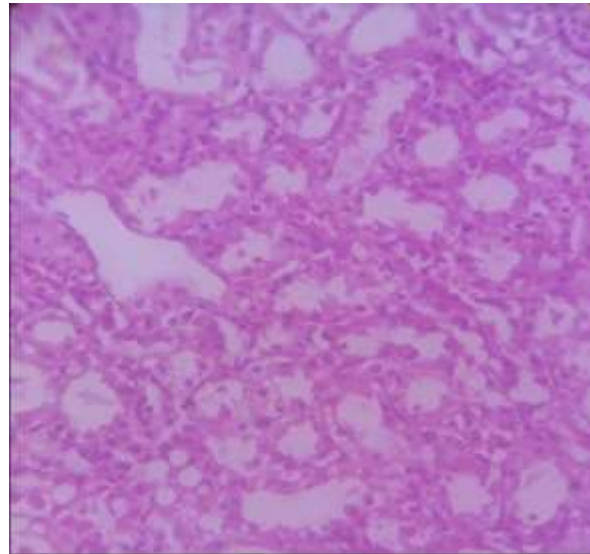
I am grateful to College of Fishery Science, Muthukur, Sri Venkateswara Veterinary University and supporting staff for making it possible to finish the experiment without much difficulty.

References

- Hu Xia, Ying Tang, Fenghui Lu, Yushuang Luo, Pinhong Yang, Wenbin Wang, Jigang Jiang, Na Li, Qing Han, Fei Liu, And Lianggvo Liu, 2017. "The effect of *Aeromonas hydrophila* infection on the non-specific immunity of blunt snout bream (*Megalobrama amblycephala*)" *Cent Eur J Immunol.* 2017; 42(3): 239–243
- Joseph, s. W. and arnaham, A., 1994. "The isolation, identification, and systematics of the motile *Aeromonas* species". *Annu. Rev. Fish Dis.*, 4: 315-343
- Gobinath, J., & Ramanibai, R. (2014). Histopathological Studies in the Gill, Liver and Kidney of the Freshwater Fish *Labeo rohita* Fingerlings. *International Journal of Innovative Researcin Science, Engineering and Technology*, 3 (3), 10296
- Sahoo, P.K., Mukherjee, S.C., 1999. Influence of the immunostimulant chitosan on immune response of healthy and cortisol-treated rohu, *labeorohita*. *J. Aquac. Trop.*, **14**: 209–215.
- Tiwari, C.B., and Vijay Shanker Pandey., 2014. " Studies of hematology and histology in *labeo rohita* infected with cutaneous columnaris disease" *rec. Zool. Surv. India*: 114(part-i): 151-157



Developed *A. hydrophila*



Control kidney

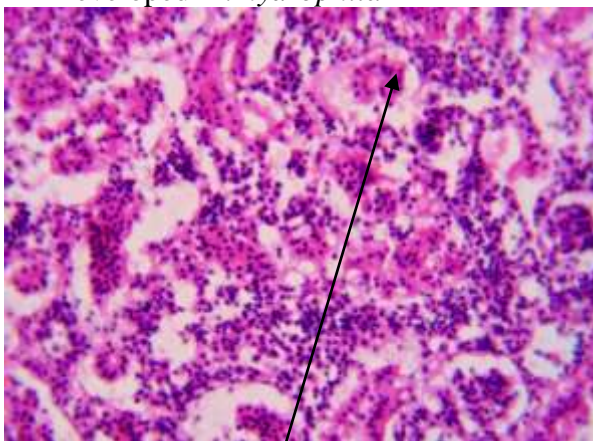


Figure. 1 Atrophy of glomerular cells with MNC and cystic spaces

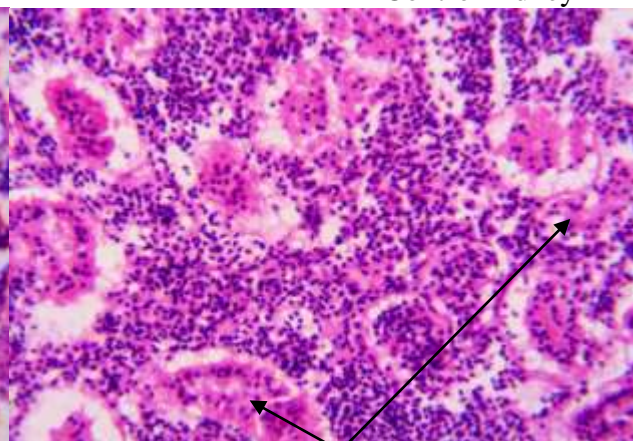


Figure.2 Heavy infection of bacteria with cystic spaces

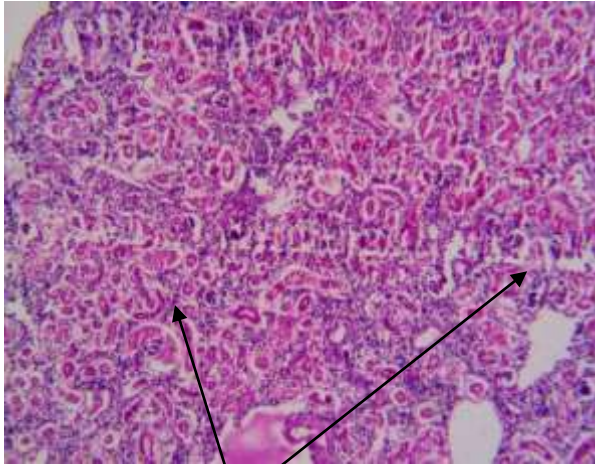


Figure.3 Inflammation with desquamated glomeruli necrosis

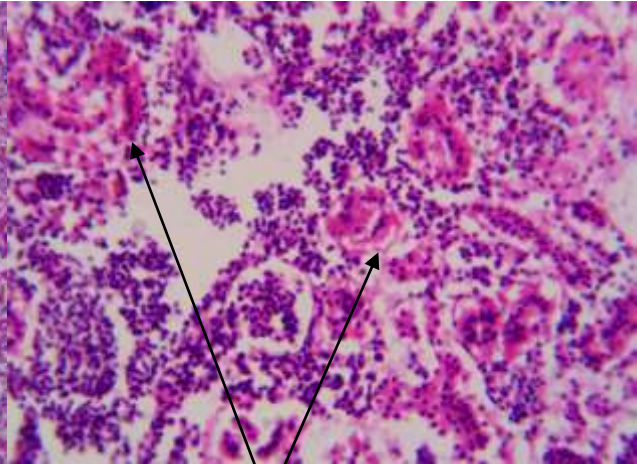


Figure.4 Kidney diffuse tubular necrosis

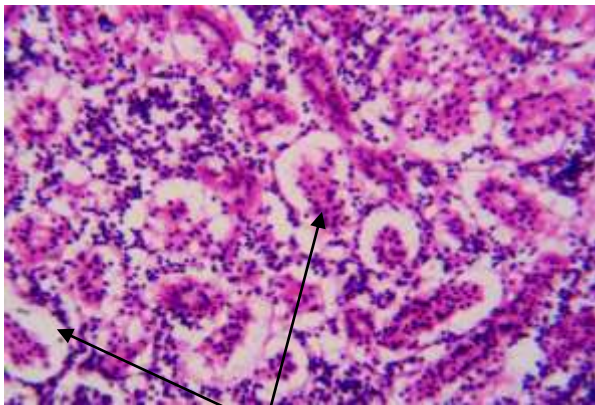


Figure 5. Severe inflammation with necrosis in tubular fibrosis

Bowman's capsule

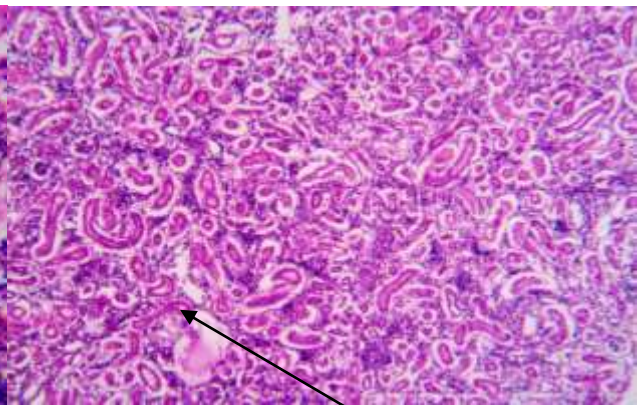


Figure.6 Severe inflammation with

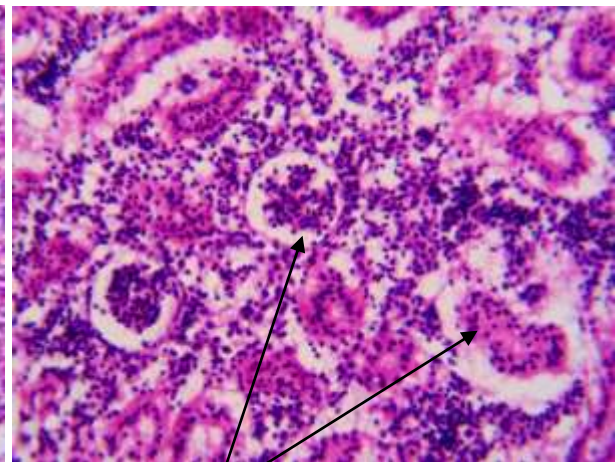
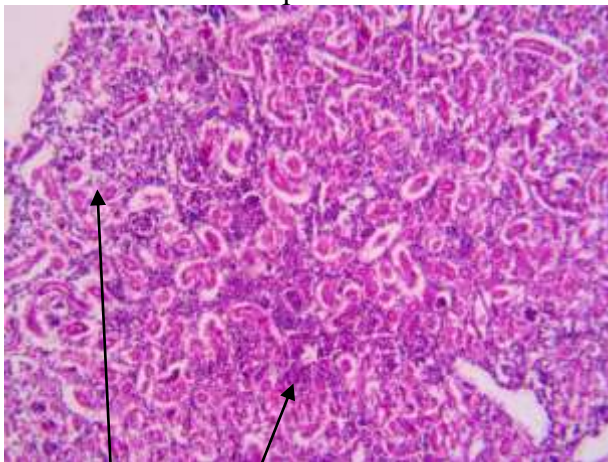


Figure 7 Moderate to severe inflammation
glomeruli cells
in glomeruli & bowman's cells

Figure 8 Atrophy and abnormality of