

Pathomorphology of argulosis in fresh water carps in Thanjavur region of Tamil Nadu

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Abstract

*In a private fresh water pond Argulosis was recorded in one acre size, 4500 numbers of carps consisting of Catla (*Catla catla*), Rohu (*Labeo rohita*), Grass carps (*Ctenopharyngodon idella*), Mrigal (*Cirrhinus mrigala*) and Common carp (*Cyprinus carpio*) were cultured. Clinically, 100% morbidity, 3.5% mortality, repeated rubbing of fins, lethargic, anorexia, reduction in body weight, hyperactiveness and restlessness, open wound with or without haemorrhages on the surface of the body, reduced pigmentation and drooping of fins etc. were recorded. On external examination, a heavy infestation of parasitic load on body surfaces in all carps was observed and characterised by a translucent parasite. Based on morphological characteristic feature, the parasite was identified as *Argulus* sp. Gross and histopathological changes were recorded in skin, fins, lungs, liver, kidneys, heart. To control the ectoparasite, an alternate bath in salt solution followed by formalin to treat the affected fishes and to treat the tank with *Curcuma longa* and *Azadirachta indica* powder. However, the hygienic maintenance of the tank by stocking fishes with optional density and periodical flushing of the organic waste from the bottom is recommended to control the incidence of the ectoparasitic infestation, argulosis in fresh water carp farming.*

Key words: Argulosis, Pathomorphology, Fresh water fish

Introduction

Argulosis is one of the economically important parasitic disease causing heavy mortality in Indian major carps (Rahman, 1968). It is caused by members of the Branchiura belong to the genus *Argulus*, so called fish lice. Many of the species are parasitic on marine fishes, and about 15 spp. are found on freshwater fishes (Bykhovskaya-Pavlovskaya *et al.*, 1964). Heavy mortality due to Argulosis has been reported to infect cultured fishes. These parasites inhabits the skin, fins and gills of the host and cause extensive pathological lesions in the skin, kidneys, liver, gills (Dey, 1989). Azadirachtin was used to eliminate *Argulus* and protect the host from ectoparasites but it is also reported to be a strong natural insecticide (Schlüter, 1987). Applications of malathion, potassium permanganate is more helpful in the eradication of *Argulus* species in fishes (Kumar *et al.*, 1987). The present paper describes about pathomorphology of argulosis in fresh water carps and ethnoveterinary herbal intervention at Thanjavur region.

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Materials and methods

A private fresh water pond farmer from Vaduvur, Thanjavur approached Veterinary University Training and Research centre and he had fish pond of one acre size, 4500 numbers of carps consisting of Catla (*Catla catla*), Rohu (*Labeo rohita*), Grass carps (*Ctenopharyngodon idella*), Mrigal (*Cirrhinus mrigala*) and Common carp (*Cyprinus carpio*) were cultured. He reported that about 158 fishes died. The disease outbreak in the farm was investigated in detail. The fishes in the pond were observed keenly. The clinical signs were recorded. The fishes in the pond were taken and examined. Necropsy was conducted. The external parasite was collected. A piece of skin, liver, kidneys, heart, skeletal muscle were collected in 10 % formalin and sent to central University laboratory, TANUVAS, Chennai for further investigation. Based on necropsy, the farmer was advised as follows. To control the ectoparasite, it was recommended to have an alternate bath in 5% salt solution followed by 1:5000 formalin to treat the affected fishes and to treat the tank with 2% *Curcuma longa* and 1% *Azadirachta indica* powder. However, the hygienic maintenance of the tank by stocking fishes with optional density and periodical flushing of the organic waste from the bottom was recommended to control the incidence of the ectoparasitic infestation, in fresh water carp farming.

Results

Clinically, repeated rubbing of fins, lethargic, anorexia, reduction in body

weight, hyperactiveness and restlessness, nervous manifestation with easily detached scales and abraded areas, 100% morbidity, 3.51% mortality were recorded. Among carps, Rohu (*Labeo rohita*), Mrigal (*Cirrhinus mrigala*) were severely affected.

External examination of Mrigal (*Cirrhinus mrigala*) and Rohu (*Labeo rohita*), revealed severe infestation of *Argulus species* external lice in all over the body with heavy infestation in head, body and tail. (Fig. 1 & 2). In Rohu, body showed severe infestation of lice and ulceration on the surface of the skin (Fig.3).



Fig. 1: Mrigal: Infestation of *Argulus species* in head region of Mrigal fish



Fig. 2: Heavy infestation of *Argulus species* in body region of Mrigal fish



Fig. 3: Rohu fish showed *Argulus spp* infestation and ulceration of skin

Grossly, all the affected fishes showed open wound with or without haemorrhages on the surface of the body, reduced pigmentation and drooping of fins etc. The surface of the skin excess mucus secretion was observed. Eyes revealed mild congestion. Liver, kidney, gills, heart revealed diffuse mild to moderated pale (Fig.4). On thorough external examination, a heavy infestation of lice on body surfaces in all carps was observed and characterised by a translucent parasite with dorso-ventrally flattened body covered by a large chitinous carapace. The body was divided into cephalothorax, thorax and abdomen. This parasite had the large ventral suckers. Various other spines and hooked/clawed appendages in the parasites attached on the epidermis of the skin Based on morphological characteristic feature, the parasite was identified as *Argulus sp.*



Fig. 4: Gills, liver and muscle revealed pale discoloration

Histopathology

Skin revealed diffuse mild to moderated ulceration with mild haemorrhages, diffuse hyperplasia of the epidermis at the margins of the wound, diffuse moderated epithelial degeneration, diffuse severe oedema and multifocal mild hyperplasia of dense connective tissue in sub cutaneous areas, focal loss of mucous

and club cells in the epidermis, hyperplasia of mucous secreting cells around the wound margins with excess mucous exudate. Kidney showed diffuse moderated tubular degeneration and necrosis. In the interstitial are diffuse mild to moderated reactive hyperplasia of erythropoietic and granulopoietic cells. Liver revealed diffuse severe sinusoidal congestion, multifocal mild vacuolation of hepatocytes (Fig.5) and multifocal mild necrosis of hepatocytes. Heart revealed diffuse mild degeneration of myofibril. Gill lamellae showed hypertrophy and hyperplasia in many areas resulting in the fusion of secondary lamellae (Fig. 6).

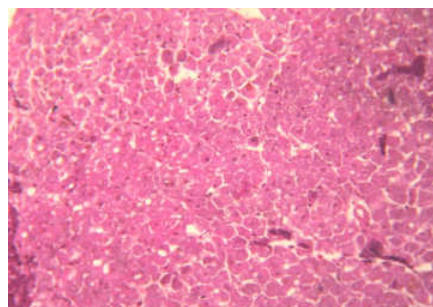


Fig. 5: Liver revealed mild vacuolation of hepatocytes H&E 400x

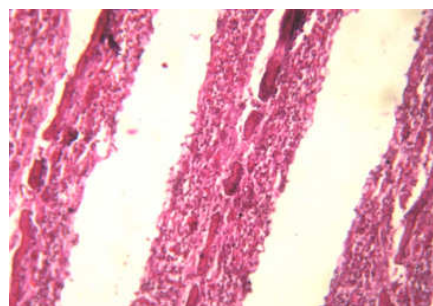


Fig. 6: Gills. Lamellae showed congestion and fusion of secondary lamellae H&E 400x

To control the ectoparasite, it was recommended to have an alternate bath in 5% salt solution followed by 1:5000 formalin to treat the affected fishes and to

treat the tank with 2% *Curcuma longa* and 1% *Azadirachta indica* powder. All the treated fishes were transferred to fresh ponds. However, the hygienic maintenance of the tank by stocking fishes with optimal density and periodical flushing of the organic waste from the bottom is recommended to control the incidence of the ectoparasitic infestation, argulosis in fresh water carp farming.

Discussion

Heavy mortality due to Argulosis or fish lice infestation has been reported in Indian major carps. Several species of *Argulus* have been reported to infect cultured fishes. In the present study, parasitic infestation could possibly be due to overdensity. In general about 1500 adult fishes shall be reared in 1 acre pond under hygienic condition. But, in the present investigation, the farmer reared about 4500 fishes which lead to unhygienic condition of the pond, competition for food, excess excretion in the environment. Rohu has been observed to be the most susceptible species among the Indian carps (Dey, 1989). Moreover, Rohu (*Labeo rohita*), Mrigal (*Cirrhinus mrigala*) affected much could possibly be due to excess contamination bottom soil and lack of oxygen reduce the body immunity.

The clinical signs of natural infested carps with argulosis were revealed the presence of erratic movements, abnormal swimming, rubbing themselves against the sides of the pond loss of fins and anorexia. At the site of parasitic infestation, excess secretion of mucous exudate and haemorrhages causing

erosions of the injured areas were observed on the skin and fin. However, some infested fishes showed nervous manifestation with easily detached scales and abraded areas. These findings could possibly be due to severe irritation caused by *Argulus species* at the site of infestation. *Argulus species*, an ectoparasite which feeds on blood and other bodily fluids and causes further harm to the fish by injecting digestive enzymes that can lead to systemic. These results are in agreement with the results that revealed by (Roberts, 2001; Eissa, 2002; Noga, 2010). The haematological examination of highly infested carps with Argulosis showed anaemia with a significant reduction in total erythrocytic count, haemoglobin and packed cell volume. The biochemical examination of the serum showed hypoproteinaemia and hypoalbuminaemia when compared with normal healthy carps of corresponding species (unpublished data). Gross and histopathological alterations of infested fish species with argulosis. Skeletal muscles showed edema and hyalinization affecting some skeletal bundles. However, degenerative and necrotic changes in the epithelial cell with hyperplasia of fin filaments associated with chronic inflammatory cells infiltration these results are in agreement with the results recorded by (AL-Darwesh *et al.*, 2014). *Argulus species* cause a reactive hyperplasia of the epithelium and increased mucus production. Hyperplasia appears as a cloudiness to the skin and leads to hypoxia if occur on the gills. It will insert its needle-shaped mouth into the tissue. This parasite causes patches of

swollen and bleeding skin and can affect the entire body, including fins and gills. It feeds on blood and other bodily fluids, and causes further harm to the fish by injecting digestive enzymes that can lead to systemic illness. The parasites pierce the host tissue with the pre-oral stylet, inject a cytolytic toxin, and feed on the blood released by the resultant wound. The surface of the host at the point of stylet entry can become erythemic and hemorrhagic. A hemorrhagic factor is produced by some species. Several parasites feeding in close proximity may cause edema and localized swelling of tissues (Taylor *et al.*, 2005) In all fish, mucous and club cells will be absent from the epidermal tissue within the crater but mucous cells are often abundant in the tissue observed around the wounds margins. These parasites inhabit the skin, fins and gills of the host and cause extensive pathological lesions in the skin showing circular haemorrhagic patches which become ulcerated. Mucous cells proliferate and copious mucous is produced. Similar finding was reported in Indian carps by Dey (1989). In the present investigation, anaemia and hypoproteinaemia could possibly be due to excess feeding of blood and body fluid by the parasite and its toxin lead to damage liver and kidney. The pathological changes in gills could possibly be due to hypoxia lead to hyperplastic activity in secondary lamellae.

The treatments of *Argulus* infestations include the use of common chemicals such as salt (NaCl) (Wolfe *et al.*, 2001). Other common chemicals used

in experimentation include formaldehyde (Rydlo, 1989), potassium permanganate (2-5 mg/l bath) (Oge, 2002), and formalin (Rezeka, 1998). Kumar *et al.*, (1987 b) reported weekly applications of malathion @ 0.25 ppm for three consecutive doses. They also reported that bath in potassium permanganate @ 500 ppm/minute once a week with the combination of malathion treatment is more helpful in the eradication of *Argulus species*. In the present investigation, an alternate bath in 5% salt solution followed by 1:5000 formalin to treat the affected fishes and to treat the tank with 2% *Curcuma longa* and % of *Azadirachta indica* powder which gave 100% effectiveness in control of disease in fresh water fishes.

References

- AL-Darwesh, A.A., Al-Shabbani, M.A.A. and Faris, B.H. (2014). Diagnostic and pathological study of *Argulus japonicas* in goldfish (*Carassius auratus*). *Global Journal of Bioscience and Biotechnology*. 3 (4): 384-387.
- Bauer, R. (1991). *Erkrankungender Aquarien fische*. Verlag Paul Parey. Berlin und Hamburg.
- Bykhovskaya-Pavlovskaya, I.E., Gusev, A.V., Dubinina, M.N., Izyumova, N.A., Smirnova, T.S., Okolovskaya, I.L., Shtein, G.A., Shulman, S.S. and Epstein, V.M. (1964). *Key to Parasites of Freshwater Fish of the U.S.S.R.* Leningrad

- Chandra, K.J. (2006). Fish parasitological studies in Bangladesh: A review. *Journal of Agriculture and Rural Development*, 4(1&2), 9-18.
- Chandra, K.J., Das, A.K., Alim, M.A. and Barai, A.K. (2004). Lice (*Argulus foliaceus*) on carp of Bangladesh Agricultural University experimental pond. *Bangladesh Veterinarian* 21.
- Dey, R.K. (1989). Histopathology of Argulosis in the Indian major carp, *Labeo rohita* (Hamilton). Proc. Natl. Sem. On "Forty Years of Aquaculture' in India: 7-9 SVP/6.
- Eissa, I.A.M. (2002). Parasitic fish diseases in Egypt. El- Nahda El-Arabia Publisher, 32 Abd El-Khalek Tharwat street, Cairo, Egypt.
- Kumar, S., Raman, R.P, Kumar, K., Pandey, P.K., Kumar, J., Mallesh, B., Mohanty, S. and Abhay Kumar, A. (2012). Effect of azadirachtin on haematological and biochemical parameters of *Argulus*-infested goldfish *Carassius auratus* (Linn. 1758) *Fish Physiol Biochem* DOI 10.1007/s10695-012-9736-8.
- Kumar, D., Dey, R.K., Mishra, B.K. and Kumar, K. (1987). Observations on the efficacy of malathion and potassium permanganate combination treatment in combating acute argulosis. Abstract. *Publ. Proc. of Nat. Seminar on Fish Aqua*. In India, held at Nagarjuna University (A.P.), 27-30.
- Noga, E.J. (2010). Fish disease diagnosis and treatment. 2nd ed., Mosby-yearbook, Inc. watsworth publishing Co., USA. pp.366.
- Oge, S. (2002). Chemotherapy for parasites of freshwater fish. *Turk Parazitol Derg.* 26:113-118.
- Rahman, A.K.A. (1968). A note on *Argulus* species which caused mortality in carps in the experimental cistern of the Freshwater research Station, Chandpur, East Pakistan. *Pakistan J Sci Indust Res* 11, 115-118.
- Rezeka, S. Trials for treatment and control of ectoparasites infesting commercial penaeid shrimps "*Penaeus vannamei*". 8th Scientific Congress Faculty of Veterinary Medicine, Assiut University, Egypt, 15-17 November. 1998; 844-855.
- Richards, R. (1977). Diseases of aquarium fish- 2.Skin diseases. *Vet Rec.* 101:132-135.
- Roberts, R.J. (2001). Fish Pathology 3rd ed., W.B. Saunders, An imprint of Harcourt Publishers.

Rydlo, M. (1989). Comparative experiments on the control of some fish ectoparasitoses. Current trends in fish therapy. Proceedings of a joint WAVSFD and DVG meeting held in Munich on 25-26 April, 76-90.

Schlüter, U. (1987). In Schmutterer H, Ascher KRS (eds) Natural pesticides from the neem tree and other tropical plants. GTZ Press, Eschborn, pp 331-348.

Taylor, N.G.H., Sommerville, C. and Wootten, R. (2005). A review of *Argulus spp.* occurring in UK freshwaters. *Journal of Fish Biology*, 11: 349.

Wolfe, BA, Harms, CA, Groves, JD. and Loomis, MR. (2001). Treatment of *Argulus sp.* Infestations of river frogs. *Contemp Top Lab Anim Sci.* 40(6): 35-36.