Global Veterinaria 4 (5): 515-518, 2010
ISSN 1992-6197

Survey on *Dactylogyrosis* in Caspian Frisian Roach *(Rutilus frisii kutum)* Caused by *Dactylogyrus frisii*

[1]*Mohammad Rahanandeh,* [2]*Issa Sharifpour,* [3]*Behyar Jalali,*
[4]*Rezvanolah Kazemi,* [1]*Bagher Aminian Fatideh and* [5]*Saeed Shafiei Sabet*

[1]Mirza Koochak khan Higher Fisheries Education Center,
Km. 5. Rasht Industrial Town, Rasht, Guilan, Iran
[2]Iranian Fisheries Research Organization, Tehran, Iran
[3]Department of Aquatic Disease Division, Islamic Azad University, Tehran, Iran
[4]Sturgeon Research Institute Rasht, Guilan, Iran
[5]Fisheries Department, Fisheries Faculty,
University of Agricultural Science and Natural Resources, Gorgan, Golestan, Iran

Abstract: During late March to August (2009) a total of 100 specimens of kutum fish fries were collected from pond fishes in Shahid Ansari Fish Culture Center (Rasht, Guilan). The fries in aquaria were treated by Organophosphate (Mazoten) as long duration bath at a concentration of 0/25-0/5ppm. Such treatments were repeated during different seasonal periods. For infection to take place in kutum fish fries, the collected *Dactylogyrus frisii* by pipette were exposed to the gill of the fries with 10-20 Parasites each species. After ensuring that infection has success fully been taken place (After 2 weeks) the gills of experimentally infected fries were survey and the gill filaments were fixed in 10% formalin solution. Histological studies were performed only on changes on the gill of kutum fish fries caused by *Dactylogyrus frisii*. The results obtained in this study indicated that the *D. Frisii* caused various abnormalities in copious mucus including congestion, hemorrhages, necrosis and destruction of secondary gill lamella, hyperplasia and fusion in gill lamella. Consequently, damages specific to *D. Frisii*, such as adhesion of the base of gill lamella, displacement in lamella, swelling and oedema of primary and secondary gill lamella.

Key words: Pathology · *Rutilus frisii* kutum, monogen · *Dactylogyrus frisii* · Gill · Caspian Frisian roach

INTRODUCTION

Parallel to the fast developing of pond fish culture in Iran special attention were paid to Caspian roach *(Rutilus frisii kutum)* as this fish is highly appreciated by Iranian consumers and is antifacially propagated in large number in Iran. Produced fingerlings of this fish are cultured under the same condition as other pond fishes but in higher density, therefore the chance of gill diseases caused by *Dactylogyrus sp* and its severity is higher than in carp fingerlings Culture. Species of *Dactylogyrus* are primordially parasites of the gill of cyprinid fishes, [1], the family which are the main freshwater fishes in Iran. According to Jalali *et al.* [2] more than 80 species of this genus have been reported in Iranian cyprinid fishes. According to investigation carry out by Jalali *et al.* [2] Caspian roach was infected by 6 species of the genus *Dactylogyrus.* Fingerling cultured in fish pond receives an infection by the five Dactylogyrus species *(D. frisii, D. haplogonus, D. rarissimus, D. suecicus and D. turaliensis*). Presumably *D. frisii* is the only Dactylogyrus species which is able to infect both fingerlings in fresh water and adults in Caspian Sea. Despite frequent infection with monogeneas, no pathological changes were observed on natural water body fishes [3,4].The slightest injury to gills particularly among fingerling fish kept at high density level under captivity condition cause a variety of complications such as stress, respiratory problems, loss of osmotic equilibrium, decreased growth and mortality [5]. However in cultured fish first of all fingerlings often showed disease symptoms and alterations in gill filaments.

Corresponding Author: Mohammad Rahanandeh, Mirza Koochakkhan Higher Fisheries Education Center, Km. 5. Rasht Industrial Town, Rasht, Guilan Iran, E-mail: rahanandeh@yahoo.com.

Among them diseases of common carp caused by *D. extensus* [6], *D. Vastator* [7] similarly, alteration caused by *D. lamellatus* on the gill of the *grass carp* had no difference from the ones detailed by Molnar [8]. However there is No information regarding the most prevalent Dactylogyrosis caused by *D. frisii* is available. Therefore the aim of the present investigation is to survey the pathogenic caused by *D. frisii* in *R. frisii kutum*.

MATERIAL AND METHODS

During late March to August 2009, a total of 100 specimens of kutum fish fries were collected by Cast net from 10 pond culture sites in the Shahid Ansari Fisheries and reproduction Center (Rasht, Guilan province). The fish were collected and immediately sent live to the fish health Higher Fisheries Education Center laboratory in Mirza kochak khan Higher Fisheries Education Center and stored in aquaria until used for detailed investigation. Water temperatures were kept between 24-28°C. For production of ectoparasites free specimens, fingerling aquaria were treated by Organophosphate (Mazoten) as long duration bath at a concentration of 0/25-0/5 ppm. Such treatments were repeated for two times with 72 hours interval. For infected specimens to take place in kutum fish fries, collected *Dactylogyrus frisii* by pipette were exposed to the gill of the fries with 10-20 parasites in each species. After ensuring that infection successfully has been taken place (After 2 weeks) gills of experimentally infected fries were survey and gill filaments were fixed in 10% formalin solution. Histological studies were performed only on changes on the gill of kutum fish fries caused by *D. frisii*. The fixing Solution was diluted to 4% after 4-24 hours, washed for 24 hours and dehydrated in graded ethanol and then samples were embedded in paraffin [9,10]. The sections were stained with H and E technique. Most sections were cut longitudinally so that the branchial lamellae were sectioned parallel to then longitudinal amiss [9, 11].

RESULTS

Gross examination of kutum fish fries gills was associated with mucus secretions, adhesion and congestion of gill arch. General lesion caused by *D. frisii*, in the sectional tissues gill of fries under light Microscopic examination revealed degeneration, damaged tissues, haemorrhages, necrosis, atrophy, congestion and hyperplasia. More specific *D. frisii* induced lesion on the gill lamella of kutum fish fries appeared in the form of

Fig. 1: parasite attachment to primary gill lamella (1). (2). Imitation of hyperplasia. (H and E, X_{100}).

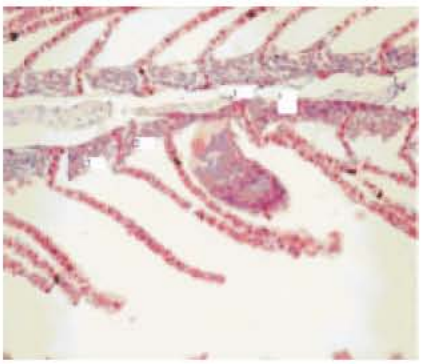

Fig. 2: Oedema (1), hyperplasia in primary gill lamella (2) (H and E, X_{100}).

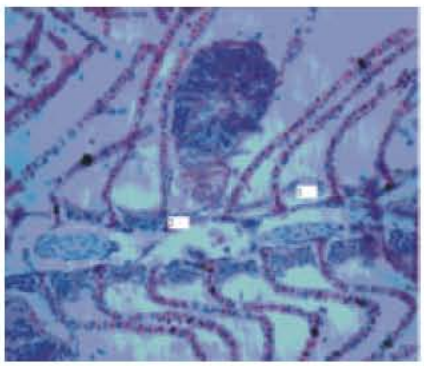

Fig. 3: Oedema and detachment of primary gill lamella (1), Attachment of parasite to the secondary lamella (2) (H and E, X_{100})

perichondrium hyperplasia of secondary gill lamella, the severe damages of secondary gill lamella, displacement of secondary gill lamella which was caused by adhesion and parasitic load, swelling and oedema of primary and secondary gill lamella. The histological lesions caused by *D. frisii* both *Rutilus frisii kutum* and kutum fish fries were equal with no major differences. Figures (1-4) in

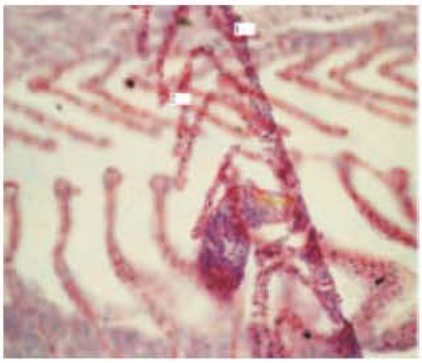

Fig. 4: Congestion (1), destruction and fusion of primary and secondary lamella (2). (H and E, X_{100})

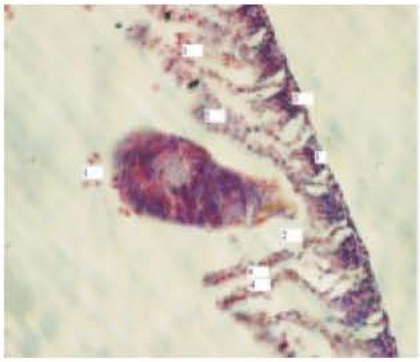

Fig. 5: Hemorrahge (1) and dislocation of secondary lamella (2), Hyperplasia (3), Congestion (4). (H and E, X_{100})

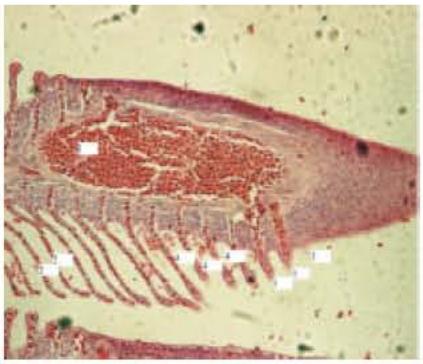

Fig. 6: Sever congestion of primary lamella (1), Congestion of secondary lamella (2), shortening of size secondary lamella (3), hemorrhge (4). (H and E, X_{100})

kutum fish fries and (5-6) in Caspian Frisian roach and the light microscopic pictures of *D. frisii*.

DISCUSSION

The gross and Microscopical lesion caused by *Dactylogyrus. frisii* resemble was done by *Dactylogyrus. lamellatus* [8] and *Dactylogyrus. Sahuensis* [12] but significant differences were found as well. Among the monogeneans the most important group from a pathological point of view are the gyrodactylids and Dactylogyrus. The disease caused by various species of *Dactylogyrus* and *Gyrodactylus* infecting the wild fish skin and gills may occure during any life stage of the fish. They are also regarded as the main causes of injuries or mortalities among juvenile fish and in cases even to farmed fishes cultured in ponds [13]. Gills are the most delicate organs in the bony fishes which are extremely liable to damages since they are exterior to body and thus are highly vulnerable. In the case of infection by *Dactylogyrus* serious damages are often infected to fish gills which may cause varying degrees of damages based on the fish species, size and health status as well as the water temperature [7]. *Dactylogyrus extensus*, *Dactylogyrus anchoratus* create spot ulcers within carp gills causing greater injuries than extensive hyperplasia [13]. According to Paperna, [7], the first local change caused by *Dactylogyrus.vastator* noted is hyperplasia of the branchial epithelial which shows a number of mitoses in the vicinity, but not adjacent to the point of attachment. The pathological changes on the margin of the gill extend along the gill filament toward the base and as a result the delicate respiratory mechanism is damaged. Molnar, [8] described that establishment of *Dactylugyrus lamellatus* on the gill lamellae of grass carp gives rise to local and general lesion. The local lesion comprise erosion endothelial impairment and minor areas of cell degeneration around the site of attachment of the parasites the general gills lesion include, degeneration, tissue damage haemorrhages, necrosis, atrophy and cell proliferation. Infections caused by *D. sahuensis* [12] in carp are often associated with degeneration of epithelial cell in gills, haemorrhages and lamella cell proliferation. The infection by this Dactylogyrusis is characterized by lamellae viscousity of gills involving 2, 3 or even 6 lamellae together which was also noticed in the present study. The infection in carp fries by *D. vastator* is often followed by sever hyperplasia of epithelial cells, degeneration of veins in blood recirculation system as well as acute deformities of gill filaments. Careful pathological examinations should show the deep penetration of parasites hooks inside the fish gills along with hyperplastic changes [7]. Kutum fish fries harbour a variety of external parasitic infections affecting the skin and gills during farming cycle in fresh water. The infective load of *D. frisii* in this study was 10 specimens per each fish gill which although results in lower mortalities, it may be lead to hampered growth, anemia and extensive lesions to gill tissues. In the pathological analysis of Dactylogyrusis symptoms such as anemia within gill area,

increased mucus secretions, haemorrhages, congestion and necrosis and epithelial cell proliferation are often observed among the affected kutum fish fries. Similar findings have already been made in the present study. There has, so far, been no pathological examination of Dactylogyrusis among *Rutilus frisii* kutum. The reason may be that such a mass production or rearing of *kutum fish* fries in fresh water is mainly practiced in southern part of the Caspian Sea in Iran for restocking purposes. *Rutilus frisii* kutum is indigenous to the southern coast of the Caspian Sea in Iran. The presence of *D. frisii* in gill lamellae of the kutum fish fries and adult ones resulted in the displacement and compression of the lamella leading certain lamella to stick to each other. In certain cases, lamella tended to be completely separated from the filament. These parasites usually infest the lamella bases of the gill causing damages to the main veins of the filament. The destruction of the secondary gill lamellae, congestion, hemorrhages, perichondrium hyperplasia, displacement of secondary lamella caused by sticking and parasitic load on gill strings and shortening of the gill lamellae constitute some of problems induced by *D. frisii*. Among the monogene parasite *D. frisii* is capable of withstanding both fresh water and salty water conditions [12]. Considering the results of the present research it is logical to suggest that all the kutum fry rearing ponds should be sampled prior to the actual release of the fingerlings. In case of detecting any cases of contamination in the rearing ponds, attempts should first be made to disinfect the contaminated ponds by Mazoten toxin and kutum fingerlings should be released into rivers only after parasite elimination. Consequently, damages specific to *D. frisii* such as adhesion, displacement, oedema, lesion and necrosis appear in both primary and secondary lamella which are absent in pathological observations of other Dactylogyrus species.

ACKNOWLEDGEMENT

Hereby, the authors deem it necessary to present their deep appreciation to colleagues and fisheries experts in Shahid Ansari Fish Hatchery Complex in Guilan namely as Eng. Majid khadivinia moghadam for their valuable helps.

REFERENCES

1. Gibson, I.G., T.A. Timofeeva and P.I. Geraser, 1996. A catalogue of the nominal species of the monogenean genus *Dactylogyrus Diesing*.
2. Jalali, B., S.H. Shamsi and M. Barzagar, 2007. Monogenea: Dactylugyridae of Caspian Frisian roach (*Rutilus frisii kutum).*
3. Kabata, Z., 1985. Parasites and diseases of fish cultured in the tropic. Taylor and Francis LTD. Philadelphia. USA., pp: 16-17.
4. Jalali, B., 1995. Monogenean parasites of fresh water fish in Iran, Veterinary Medical Research institute, Hungarian Academy of Sciences, Budapest Hungary, pp: 31-32.
5. Mohajeri, D., Y. Dostar, A. Samavatian and H. Mirzaei, 2008. Histopathological comparisions of gill lesions in Rainbow trout in open system and recirculation systems. J. fisheries sciences 7th year No 2: summer Iss: pp: 134.
6. Prost, M., 1958. On the occurrence of *Dactylogyrus. extensus* Mueller et ran cleave 1932 in Poland. Bull. Acad. Polonaise Sci. Ser. Biolog., 6(4): 151-155.
7. Paperna, I., 1964b. Host reaction to infestation of carp with *Dactylogyrus. Vastator* Nybelin 1924 (Monogenea), Bamidgeh., 16(4): 141-229.
8. Molnar, K., 1972. Studies on gill parasitosis of the grass carp *(ctenopharyngodon idella)* cused by *Dactylogyrus. lamellatus* Achmerow 1952 IV: Histopatological changes. Acta. Vet. Acad. Sci. Hung., 22(1): 9-24.
9. Gussev, A.V., 1985. Monogenea. In: O.N. Baur, (Ed), key to parasites of freshwater fishes of USSR. (Ist Edn), Vol. 2, Nauka, Leningrad, USSR., pp: 424. (In Russian).
10. Shafiei Sabet, S., B. Aminian Fatideh and M. Rahanandeh, 2009. A comparative study on fish infection with *Diplostomum spathaseum* in sefid-rud River and Heshmat-rud River Guilan Province, Astaneyeh Ashrafiyeh. 1st internat. Cong. Aqua. Anim. health. Manag. diseases, pp: 133.
11. Roberts, R.J., 2001. Fish pathology. Bailliere Tindall. London, pp: 72-74.
12. Jalali, B. and M. Barzegar, 2005. Dactylogyrosis (Dactylogyride monogenea) on common carp (*Cyprinus carpio*) in fresh water of Iran, 4: 9-18.
13. Jalali, B. and P. Jafari, 1998. Parasites and the parasitic diseases of fresh water fishes. Of Iran fisheries co of Iran Aquaculture Dept publications, pp: 232-242.