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Ichthyophthirius Multifiliis (Fouget, 1878) Infection in Koi (Cyprinus carpio, Linnaeus, 1758) Culture

Cafer Erkin Koyuncu*¹ 

¹Mersin University, Faculty of Fisheries, Mersin, Türkiye

Keywords

Koi,
Ichthyophthirius multifiliis,
Symptoms,
Mortality.

ABSTRACT

This study was carried out to determine the cause of unexpected deaths in Koi fish (*Cyprinus carpio*) cultivated in a private aquarium farm in Mersin, Turkey between June and July 2021. In the samples taken from the skin and fin tissues of fish, it was determined that the cause of these sudden deaths was the parasite *Ichthyophthirius multifiliis* (Ciliophora: Ichthyophthiriidae). In addition, the morphological features of the parasite and its symptoms in fish were determined.

1. INTRODUCTION

Mersin province is one of the leading places in our country in aquarium fish production. In particular, there has been a rapid increase in the number of aquarium fish farms established in recent years, and aquaculture has become a sector that is gradually advancing towards being organized. The development of aquaculture and aquarium fishery also causes some problems. One of the most important factors in carp farming is diseases caused by parasites. It increases the transportation of fish to various geographical areas. Among the parasitic diseases of aquarium fish, one of the important parasites is also known as 'White spot disease' or 'Ich disease', it is also called scabies. It is seen in cultured fish, aquarium fish and wild fish. Ich infection can occur at any growth stage of fish, from fry, finger, table size to hatchling fish. (Nigrelli, et al. 1976:607 -613) The causative agent of the disease is *Ichthyophthirius multifiliis*, a parasite with

protozoan cilia. Ichthyophthiriasis is seen in all continents of the world in the water temperature range of 10-27 °C. Ich is spherical and the eyelashes are evenly distributed over the entire surface. The characteristic feature of the parasite is its horseshoe-shaped nucleus and rotational motion. It is an obligate pathogen and has a unique direct life cycle that allows the infection to intensify rapidly. Its life cycle consists of an infective theront, a parasitic trophont, and a reproductive tomont. Infective theronts actively swim in the water host. After entering the fish epithelium, theronts become trophont and feed on host tissue until maturation. (Bauer, 1959:3-215).

The parasite invades the epithelial tissue of the gills, skin, or fins, resulting in a small sore and visible white spot or nodule where each parasite joins. Infected fish are extremely lethargic and covered with visible white spots. Mortality can be rapid and catastrophic. Severe infection by Ich damages fish skin and gills, causes loss of

* Corresponding Author

^{*}(ekoyuncu@mersin.edu.tr) ORCID ID 0000-0002-5264-7055

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respiratory, excretory and osmoregulation functions, and can serve as an entryway for secondary invaders and eventually lead to fish death. (Matthews 1994: 17-42)

This study was carried out to determine the cause of death in Koi fish (*Cyprinus carpio*). It has been determined that the main factor is *Ichthyophthirius multifiliis* parasite. Also parasite the symptoms caused by infestation are discussed.

2. METHOD

There are 10 pools in total at the facility. Oxygen content (mg/L), temperature (°C) and pH values of pool waters meter was made with. Then, a total of 100 Koi fish, 10 from each of the 10 ponds in the enterprise, were taken into the tanks. Then the fish and their size were measured. The samples determined by scraping from the skin and fin tissues of the fish were examined under the microscope and permanent preparations were made. Afterwards, the permanent preparations brought to the Mersin University Faculty of Fisheries Department of Diseases were examined under the phase contrast microscope measurements and photographs were made. Diagnostic key and publications were used in the detection of parasites.

3. RESULTS

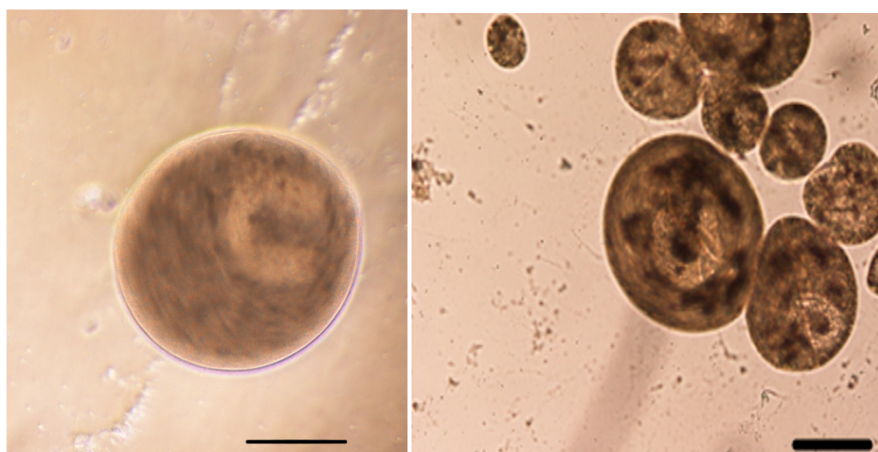


Figure 1. Wet mount of the koi skin during infection with *Ichthyophthirius multifiliis* (Note the C-shape nucleus)(original)(Scale bar=0,5mm).

4. DISCUSSION

The ICH ectoparasite, which is found in freshwater and aquarium fish, has been reported by various researchers from different geographical regions. In the current study, it was reported for the first time as ICH (*Ichthyophthirius multifiliis*) isolated from koi fish grown in Mersin.

It is known that ICH infestations cause significant damage in fish farming areas (Bauer, 1959, Ogut vd..2005: 23-27, Öztürk vd.2010: 209-215). The parasite feeds on the fish's mucus and skin tissue. Among the symptoms of infestation, melting of the fins, skin hyperemia, petechial hemorrhages and wounds draw attention.

It can cause significant losses in aquaculture as it is a porter for secondary bacterial and fungal infestations. In the current study, anorexia, swimming disorders, pale

It has been determined that the dissolved oxygen amount of the water measured in the pools of the enterprise varies between 4.5-4.9 mg/L, the water temperature varies between 25-27.5 °C and the pH varies between 7-7.9 during the months when the disease is most intense in fish.

In the clinical examination of the sick fish, it was observed that the fish move slowly in the corners of the pond and especially rub against the sides of the pond.

In addition, it was observed that redness and hemorrhagic areas were formed in the skin area of the fish and accordingly wounds were formed. It has been determined that the fish do not regularly eat the feed given every day in the enterprise and deaths occur especially in juvenile and weak fish. In the morphological examination of the fins and body surface of the sick fish brought to the laboratory from the farm alive to determine the disease, white and gray spots and an increase in the number of mucus were observed, especially on the skin of the fish. Horseshoe-shaped macronucleated trophont and oval pear-shaped tomites were seen under the microscope in smear preparations prepared from the white-spotted areas of the skin of the fish, and it was determined that the cause of the disease was white-spotted ICH. In addition, in the measurements made under the microscope, the average of adult individuals was 0.8- 1 mm.

color of the fins, melting, skin redness and hemorrhage were recorded as clinical symptoms. With extensive infestation, death has been reported in the later stages of the disease. In many studies, it has been reported that many ectoparasites such as skin and gills of fish were found together with ICH infestations. (Ogut vd..2005: 23-27).The presence of another parasitic agent was not found in the parasitic examination performed in the current study. It is known that water temperature is a limiting factor in ICH infestation, especially in the transition from spring to summer, infestation rates increase. In the current study, it was determined that the parasite causes mortality during high temperature periods. Under adverse environmental conditions Ich infections grown in intensity and weak fish in fish appear to be rising too much (Kabata 1985: 1-318). *I. multifiliis* is endemic in the region. Many factors may be

responsible for this endemism. These are improper water circulation, insufficient water supply, insufficient tank cleaning and disinfection regimes or, in some cases, reuse water without purification. Controlling water quality, optimum feeding, maintaining ponds and removing waste reduce the risk of ICH infestation. (Woo, 1995: 200-202).

In this study, ICH type ectoparasite was identified as the main factor causing sudden death in koi fish in a commercial aquarium fish farm in Mersin. It is thought that the current study findings will be useful in terms of taking the necessary precautions against ICH infestations of the aquarium fish farming sector and preventing economic losses.

Author contributions

The authors contributed equally to the article.

Conflicts of interest

The authors declare that they have no conflict of interest.

Statement of Research and Publication Ethics

For this type of study formal consent is not required.

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