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An Investigation on *Diplostomum spathaceum* metacercariae in *Oncorhynchus mykiss* Fish in Nagadeh, Oshnavieh and Piranshahr Fish Farms

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Abstract: The aim of this study is to determine the outbreak of *Oncorhynchus mykiss* fish to *Diplostomum spathaceum* metacercariae in Nagadeh, Oshnavieh and Piranshahr fish farms. This study was done in three seasons of summer, fall and winter in the year 2006. 275 fish with different ages and weights were sampled from 21 fish farms. The outbreak of infection in Nagadeh, Oshnavieh and Piranshar fish farms were 4.5, 3.38 and 2.32%, respectively. The maximum and minimum of metacercariae in infected cases are 5 and 1, respectively. In the case of severe infection, *Diplostomum spathaceum* metacercariae causes the rupture of lens and exophtalmia but in this study such kinds of infection were not observed in the infected fish and only a case of blindness due to cataract was seen in only one case.

Key words: *Oncorhynchus mykiss* · *Diplostomum spathaceum* · West Azerbaijan · Iran

INTRODUCTION

Oncorhynchus mykiss is a fish native to the Pacific Coast and North America that has been brought to Europe in 1880. *Oncorhynchus mykiss* is the continental form of this fish that will not migrate to the sea. *Diplostomum Metacercaria* is a common parasite of freshwater fish resting in the eye of which the common species is *Diplostomum Spathaceum* Metacercaria which has been separated and eliminated from over 100 species of freshwater fish from around the world [1,2]. However, only two species of fish *Diplostomum* parasite in Canada have been isolated and removed [3, 4]. *Diplostomum spathaceum* metacercaria is considered the cause of blindness in farmed fish in Iran. The Parasites resides itself around the infected fish eyes lenses which causes lesions and cataracts in the eye and causes blindness in severe cases.

Most freshwater fish in different parts of Iran, such as Hamoon wetland, Gilan and Mozandaran intakes, Central and West Lakes of Azarbaijan and Khuzestan have reported this parasite infection [5, 6].

West Azerbaijan has ranked to be the second province after Khuzestan province, which is rich in terms of water resources and has a temperate climate of the mountain areas which is appropriately suited for farming the cold-water fish.

MATERIALS AND METHODS

Sampling Locations: Locations under study comprised the cold-water fish farms of Nagadeh, Oshnavieh and Piranshahr in late summer, autumn, winter and samples taken from various fish farms. The selection of the stations were based on geographical location, sanitation condition, farming management, water supply resources, adjacency to the rivers, proximity to labor hostels and different farming methods. 275 random samples were taken regardless of their age and sex from 21 fish farms. The geographical location, sanitation condition, farming management, water supply resources, adjacency to the rivers, proximity to labor hostels and different farming methods were tested in each selected fish farm.

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Sample Collection and Preparation Methods: The sample preparation was conducted and purchasing the infected samples to be taken to the Parasitological Laboratory for being examined. The owners of the fish farms made fishing and the workers using fishing nets (Sachuk) accidentally caught the fish.

Explanation of the Methods: In order to examine the *Diplostomum spathaceum* metacercaria, the wet smear method was used. Each fish was caught by hand, analyzed and tested on their apparent skin and gills condition, wing molder, fungal diseases, the color and they were weighted and their length and standard length were measured and recorded. Then the fish were placed in the dissection tray and by using a clip the mouth-like edges of the eyeball were removed and the eyeball is removed from eyehole by using a scissor or surgery blade. Then the eyeball is placed inside a glass and the pupil is pressed to be squashed and then it is spread on the smear and the core is removed by adding a drop of physiological solution. Immediately, it will be examined and analyzed under a microscope with a magnification of 3.2. Similarly, this process will be repeated for other eye and the lenses of both left and right eye will be separately evaluated. Wet smear will be prepared from the vitreous fluid to observe the parasites Metacercaria.

RESULTS AND DISCUSSIONS

In this study, the farmed *Oncorhynchus mykiss* fish from different fish farms of Nagadeh, Oshnavieh and Piranshahr were tested for the eyes Metacercaria infection.

In this study, 275 random samples were taken to be analyzed and examined from 21 fish farms. In the present study, the highest percentage of infection was observed in the city of Piranshahr with 5.81% disease (the number of samples taken was 86 of which 5 were positive) and the lowest percentage of disease was seen in the city of Nagadeh with 4.62% infection (the number of samples taken was 108 and 5 of them were positive) and the disease value for the farmed *Oncorhynchus mykiss* fish in Oshnavieh was about 5% (the number of samples taken was 80 of which 4 were positive).

In this study, the fish-eye lenses disease to *Diplostomum spathaceum* parasites Metacercaria were observed in a sample of fish whose observed Metacercaria ranged from 1-5 and none of the cases showed the cornea rupture, exophthalmia and corneal infection, but in a sample, the corneal opacity (cataract) caused from the *Diplostomum spathaceum* parasite agglomeration was observed. Regarding the fact that the study was conducted in summer, autumn and winter, no logical relationship between the frequency of contamination and the related seasons was identified.

Modern and intensive fish farms are established to increase production of fish for human consumption. However, any way the increasing number of such fish farms has attracted different kinds of parasites, which threaten the life and existence of fishes, which is confirmed in this study that there is a direct relationship between the frequency of parasites and fish population. In another study, the same cases of the parasites have been reported in the neighboring Azerbaijan country [7].

Suckers at 7 °C will be infectious for 4-5 seconds later than 15 °C and the settlement of the suckers entered the fish body toward the lens of the eye is affected by temperature so that the disease of fish in the 7 °C takes 26 h to amalgamate 50% of larvae in the eye lens. However, at 15 °C, it takes 15 hours to accumulate the same amount of larvae in the eye lens [8]. The higher sucker transfer rate is more affected by fish density (population) and their number does not affect the fish size or water quantity [9]. In the present study, it was observed that in the farms which were more populated and dense, the percentage of disease was higher than others were.

These parasites Metacercaria are known as eye worms, which cause eye abnormalities, impaired blood circulation and large longitudinal axis of the eye [10]. The most common symptom is cataract and blindness, which are seen, in the infected fish [8]. In this study, one case of blindness caused by parasites in the eye was observed. It should be noted that the *Oncorhynchus Mykiss* and carp fish are the most sensitive species to *Diplostomum spathaceum* [11].

The results of the researches indicated that the contamination with *Diplostomum spathaceum* metacercaria is likely to increase with age and height increase [9]. In this study, the relationship between age and infection was also confirmed. The outbreak of the disease depends on the number of the host interface snails. In order to fight the host interface snails, the combination of the copper sulfate with the 3.5 ppm dose can eradicate the snails and is effective in preventing disease. In the present study, it becomes clear that the fish farms which used chemical materials such as copper sulfate for spraying and fighting the snails and weeds were to some extent successful in preventing such

a problem. Preliminary experiments have shown that the *Diplostomum spathaceum metacercaria* parasites in *Oncorhynchus mykiss* were somehow eliminated by feeding the infected fish [12, 13].

In general, the contamination rate in the given areas was low due to relatively few past records, but because of the abundant resources of the water and the recent investments, the idea of establishing standard fish farms seems to be a significant issue for future projects.

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