Cystic Liver Disease Caused By Myxobolus Sp. in Goldfish (Carassius auratus)*

Mehmet Cemal ÖGUZ
Fish Disease Laboratory, Fisheries Faculty, Ege University, 35100, Bornova, İzmir-TURKEY

Received: 03.03.1997

Abstract: 23 fish with suspected abdominal dropsy were chosen and 13 were observed to be infected with a cyst in the liver. It was detected that the Myxobolus sp. caused the infection. The livers with cysts was excised, crushed in a homogenizer, then suspensions were prepared in water, later centrifuged and finally the spores were counted with the help of a hemocytometer. Among the 13 fish examined, the number of spores in 0.01 gr were determined to be $1.1 \times 10^5$ and $1.5 \times 10^6$.

Key Words: Liver disease, goldfish (Carassius auratus), Myxobolus sp.

Introduction
Myxobolus sp. infections cause serious problems by killing especially cultured fish. Even though there have been studies on this subject (1-13) it appears that none have been carried out in Turkey.

This study was carried out during my research at the Department of Fisheries, Faculty of Agriculture, The University of Tokyo (Japan) and the objective was to determine the destruction of goldfish (Carassius auratus) which is not well understood.

Materials and Method
Upon the questionable deaths of goldfish in the Tokyo Metropolitan Fish Experimental Station, where the discussed fish were bred, the Department of Fisheries, Faculty of Agriculture,

*This paper presented at the 8th International Conference of Parasitology, 10-16 October, 1994, Izmir.
The University of Tokyo was informed of the examination. Then the fish with swollen abdomens or those which exhibited swimming problems were kept in a separate tank for subsequent transportation to the university.

25 fish from this station were put into plastic bags filled with air and taken to the Agriculture Faculty of Tokyo University, where they were put into aquaria. Two fish died on their way to the university.

First the length and masses of fish were measured. Later the fish were cut from the anus to the anterior region and the reason for the swelling was examined. During the examination it was observed that the livers of the infected fish were white and in some they were contracted (Figure 1).

Later, to find the reason for the white colour, a small part from each liver was cut, crushed between a slide and coverslip and then examined under a light microscope.

During this examination, it was discovered that the livers were infected with spores of *Myxobolus* sp. a species of the group Myxosporidia. The infected livers were removed with a pair of thin scissors and the mass measured (Figure 2). The livers were crushed in homogenizers and then placed in 10 cc capacity plastic tubes. These tubes were filled with distilled water to a certain level which were then placed in a centrifuge, (Kubota K.S. 5000), for 5 minutes at 3000 rpm.

At the end of this period the supernatant of the suspension was removed from the tubes.
with a thin pipette. Then more distilled water was added to the tubes and to homogenize the suspension, the tubes were kept in a mixer for 1 minute. At the end of 1 minute without waiting for the spores to settle, a drop of the suspension was taken from the centre of tube placed in a Thoma hemocytometer to count the number of spores per volume. Later the number of spores in the tube was calculated. Each count was repeated 3 times to minimize error. Measurement were made using an ocular micrometer and the spores which were counted were stabilized in a 10% formaldehyde solution for transportation to Turkey.

Results

The spores had a length of 16.9 (16.0-18.4) µm, a width of 9.8 (8.8-11) µm and thickness of 8.0 (6.4-11.4) µm and contained two polar capsules of different dimensions. The small capsule was 6.9 (6.4-8.8) µm by 8.1 (7.2-9.6) µm.

The total weights of the cysts and the fish were also measured and the number of spores in 0.01 gr cyst was determined (Table 1).

Conclusion

We measured the weight of cyst as a function of infected fish and counted the number of spores in 0.01 gr. cyst and total number of spores.
In a different study, plasmodia were found namely Chloromyxum cyprini in the liver parenchyma of crap and grass carp fingerlings. Some plasmodia were sharply outlined and scattered in the parenchyma, the others at the cell surface (3).

As shown in Figure 3, the weight of cysts increased regularly as a function of fish. This regular trend could be observed if we plot the weight of fish as a function of the weight of cyst too. Only the weight of fish at the 0.32 gr weight of cyst deviated from this regular trend.

In numerical analysis it was determined that the total number of spores exhibit an irregular change when plotted as a function of the weight of cyst (Figure 4). The number of spores were lowest in fish in the range 0.36-0.38 gr. The reason for these low levels of spores could be the

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N.F</td>
<td>W.C</td>
<td>W.F</td>
<td>Tot N.S.</td>
<td>W.C/W.F.(%)</td>
</tr>
<tr>
<td>----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>----------</td>
<td>--------------</td>
</tr>
<tr>
<td>1</td>
<td>0.14</td>
<td>1.07</td>
<td>20,800,000</td>
<td>13.1</td>
<td>1,485,714</td>
</tr>
<tr>
<td>2</td>
<td>0.26</td>
<td>1.53</td>
<td>18,600,000</td>
<td>17.1</td>
<td>715,384 (Ex.d)</td>
</tr>
<tr>
<td>3</td>
<td>0.30</td>
<td>1.46</td>
<td>13,600,000</td>
<td>20.5</td>
<td>453,333</td>
</tr>
<tr>
<td>4</td>
<td>0.32</td>
<td>2.90</td>
<td>18,300,000</td>
<td>11.0</td>
<td>571,253</td>
</tr>
<tr>
<td>5</td>
<td>0.36</td>
<td>1.85</td>
<td>4,750,000</td>
<td>19.4</td>
<td>131,944</td>
</tr>
<tr>
<td>6</td>
<td>0.38</td>
<td>1.74</td>
<td>4,300,000</td>
<td>21.1</td>
<td>113,157</td>
</tr>
<tr>
<td>7</td>
<td>0.46</td>
<td>2.41</td>
<td>25,000,000</td>
<td>19.1</td>
<td>543,378</td>
</tr>
<tr>
<td>8</td>
<td>0.55</td>
<td>2.04</td>
<td>31,350,000</td>
<td>26.1</td>
<td>570,000</td>
</tr>
<tr>
<td>9</td>
<td>0.59</td>
<td>2.08</td>
<td>34,600,000</td>
<td>28.0</td>
<td>586,000</td>
</tr>
<tr>
<td>10</td>
<td>0.63</td>
<td>2.70</td>
<td>32,300,000</td>
<td>23.0</td>
<td>512,000</td>
</tr>
<tr>
<td>11</td>
<td>0.71</td>
<td>2.44</td>
<td>14,000,000</td>
<td>23.1</td>
<td>197,138</td>
</tr>
<tr>
<td>12</td>
<td>0.95</td>
<td>3.85</td>
<td>19,000,000</td>
<td>24.0</td>
<td>200,000</td>
</tr>
<tr>
<td>13</td>
<td>1.23</td>
<td>5.55</td>
<td>40,000,000</td>
<td>22.0</td>
<td>325,203</td>
</tr>
</tbody>
</table>

Ex.D. : Examined after death  
N.F. : The number of fish  
W.C. : Weight of cyst  
W.F. : Weight of fish  
Tot.N.S. : Total number of spores  
N.S. : Number of spores in 0.01 gr of cyst  

In a different study, plasmodia were found namely Chloromyxum cyprini in the liver parenchyma of crap and grass carp fingerlings. Some plasmodia were sharply outlined and scattered in the parenchyma, the others at the cell surface (3).

As shown in Figure 3, the weight of cysts increased regularly as a function of fish. This regular trend could be observed if we plot the weight of fish as a function of the weight of cyst too. Only the weight of fish at the 0.32 gr weight of cyst deviated from this regular trend.

In numerical analysis it was determined that the total number of spores exhibit an irregular change when plotted as a function of the weight of cyst (Figure 4). The number of spores were lowest in fish in the range 0.36-0.38 gr. The reason for these low levels of spores could be the
replacement of the liver by spores but not occupying the liver completely or the fish being infected very recently.

In Figure 4 there is an inverse relation between total number of spores in of cyst and weight of total cyst. In addition to this, it is seen that weight and density of spores are not greater than the organic structure of liver tissue occupied by spores.
A similar exceptional irregular trend could be seen for the 5th and 6th fish in Figure 5. These two fish had the lowest total number of spores and total number of spores in 0.01 gr. of cyst. There is a high probability that these two fish had been infected by the spores recently and their livers could be occupied by the spores completely.

As it is seen in Table 1., the 1st and 2nd fishes were examined after death. The number of spores in 0.01 gr. cyst in both fish were determined to be between 715,384 and 1,485,714. In this study by counting the spores in the liver it was revealed that the number of spores in that range could be lethal for the liver as it cannot function because of being covered and destroyed by millions of spores.

References


