THE EFFECT OF *Hamatopeduncularia* sp. AND *Caligus* sp. ON SOME BLOOD PARAMETERS OF *Arius bilineatus* (Val., 1840)

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ABSTRACT

The effect of two parasites *Hamatopeduncularia* sp. and *Caligus* sp. on some blood parameters of 121 marine catfish (*Ariidae*) *Arius bilineatus* were studied. The results showed that all blood parameters were higher in healthy fishes than those of infected ones, except W.B.C. counts. In all levels of infections there were a reduction in P.C.V., Hb. and R.B.C. counts and increased in W.B.C. counts. Male fishes have higher values than females either in healthy and infected status.

INTRODUCTION

The diseases and parasites that affect fish cause high mortalities in both cultured and wild fishes and such losses are considered as one of the major barriers against the expanding of fish industry (Overstreet, 1990).

It is well known that fish parasites can cause to their hosts a numerous negative effects such as chemical and physiological effects (Williams, 1967). Also parasites affect the swimming ability of their fish host (Russel, 1980).

The blood of every organism is adjusted to its life requirements, and the changes occurring in it are signalized very early (Sopinska, 1983). In fish as in the case of higher vertebrates and in human medicine, the blood picture can be used as an effective tool for detection of stresses caused by various environmental conditions in addition to diseases (Main & Khan, 1997). Changes in blood parameters of host during or after parasitic infection have received the attention of many workers especially in man and domestic animals (Kameswari & Rao, 1987). Hawkins & Mawdesley-Thomas (1972) in their bibliography documented over 900 references concerning fish haematology, and they stated that in comparative pathology and histology of blood, little or no attention has been given to the fish. Burrows & Fletcher (1987), stated that such studies are greatly needed to understand the cellular basis of the disease process.

The aim of the present article is to study the effect of two parasites (*Hamatopeduncularia* sp. and *Caligus* sp.) on some blood parameters of the Ariid catfish *Arius bilineatus*.

**MATERIALS & METHODS**

The materials studied consisted of 121 individuals of *Arius bilineatus* with total length range from 35-40 cm. The fishes were caught during March and April 2001 from Khor Abdullah North-West Arabian Gulf. Fishes were handled gently to avoid the stress as much as possible, and immediately killed by pithing them with a fine needle. After the completion of blood withdrawl, fishes were measured (Total length), sexed and their gills were removed searching for parasites.

The fishes were categorized into four groups as follows: Healthy fishes (Table 1) represents the uninfected fishes.

Fishes infected with *Hamatopeduncularia* sp. were categorized into three groups according to the level of infection (Table 2):

- **Group A**: 1-10 specimens of parasites (light infection).
- **Group B**: 11-20 specimens of parasites (mild infection).
- **Group C**: More than 20 specimens of parasites (heavy infection).

While fishes infected with *Caligus* sp. were categorized into three groups according to the level of infection (Table 3):

- **Group A**: 1-4 specimens of parasites (light infection).
- **Group B**: 5-8 specimens of parasites (mild infection).
- **Group C**: More than 8 specimens of parasites (heavy infection).

The blood assays were as follows:

1. The haematocrit value or Packed Cell Volume (P.C.V.) was determined according to Sood (1987).
2. The haemoglobin concentration (Hb) was estimated according to Main & Khan (1997).
3. The red blood cells (R.B.C.) counts and the white blood cells (W.B.C.) counts were counted according to Lucky (1977).
two replicates for every parameter were taken in most samples. All the data were tested statistically.

The Statistical Package for Social Science (SPSS) was used to analyze the results.

RESULTS

According to the data obtained in Tables 1, 2, 3 and 4, the results can be summarized in the following points:

1- All blood parameters were higher in healthy fishes than those of infected ones, except, W.B.C. counts (Table 1). These differences were not statistically significant.

2- Male fishes have higher values than females either in healthy and infected status; also these differences were statistically not significant.

3- The effect of *Hamatopeduncularia* sp. on blood parameters was higher than those of *Caligus* sp. (Table 2). Statistical significant differences were apparent between these two infections.

4- The effect of mixed infection with the two types of parasites *Hamatopeduncularia* sp. and *Caligus* sp. is more harmful than that of separately infected fishes with one type of parasite (Table 4).

| Table 1: Means of some blood parameters of uninfected (healthy) *Arius bilineatus* (± S.E.). |
|-----------------------------------------------|-----------------|-----------------|-----------------|-----------------|
| Sex                                           | No. of Fishes   | Hb %            | P.C.V. %        | R.B.C. 6 Count*10 |
| ♂                                             | 11              | 50.5 ± 2.1      | 28.0 ± 0.097    | 2.9 ± 0.27       |
| ♀                                             | 10              | 46.0 ± 2.83     | 26.1 ± 0.084    | 2.2 ± 0.23       |

P≤0.05
Table 2: Means of some blood parameters of *Arius bilineatus* infected with *Hamatopeduncularia* sp. (± S.E.)

<table>
<thead>
<tr>
<th>sex</th>
<th>Status of infection</th>
<th>No. of Fishes</th>
<th>Hb %</th>
<th>P.C.V. %</th>
<th>R.B.C. Count*10</th>
<th>W.B.C. Count*10</th>
</tr>
</thead>
<tbody>
<tr>
<td>♂️</td>
<td>A</td>
<td>5</td>
<td>40.3±1.12</td>
<td>23.1±0.93</td>
<td>2.02±0.031</td>
<td>16.3±1.12</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>5</td>
<td>24.6±2.37</td>
<td>8.8±1.03</td>
<td>1.01±0.06</td>
<td>23.1±1.36</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>6</td>
<td>25.0±1.6</td>
<td>9.4±0.87</td>
<td>0.90±0.04</td>
<td>30.4±2.21</td>
</tr>
<tr>
<td>♂️</td>
<td>A</td>
<td>6</td>
<td>33.6±0.97</td>
<td>20.3±1.07</td>
<td>1.70±0.01</td>
<td>13.5±1.18</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>5</td>
<td>20.2±1.1</td>
<td>6.9±0.96</td>
<td>0.72±0.03</td>
<td>22.0±2.11</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>5</td>
<td>20.9±0.98</td>
<td>7.2±0.88</td>
<td>0.69±0.02</td>
<td>28.6±2.01</td>
</tr>
</tbody>
</table>

P≤0.05

Table 3: Means of some blood parameters of *Arius bilineatus* infected with *Caligus* sp. (± S.E.)

<table>
<thead>
<tr>
<th>sex</th>
<th>Status of infection</th>
<th>No. of Fishes</th>
<th>Hb %</th>
<th>P.C.V. %</th>
<th>R.B.C. Count*10</th>
<th>W.B.C. Count*10</th>
</tr>
</thead>
<tbody>
<tr>
<td>♂️</td>
<td>A</td>
<td>6</td>
<td>38.0±2.06</td>
<td>22.3±1.63</td>
<td>2.00±0.27</td>
<td>15.2±1.20</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>5</td>
<td>28.5±1.94</td>
<td>11.5±0.99</td>
<td>1.23±0.18</td>
<td>20.4±2.03</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>7</td>
<td>31.4±2.1</td>
<td>12.0±1.79</td>
<td>1.02±0.11</td>
<td>28.6±3.15</td>
</tr>
<tr>
<td>♂️</td>
<td>A</td>
<td>6</td>
<td>30.4±1.87</td>
<td>19.0±1.91</td>
<td>1.63±0.19</td>
<td>12.0±0.97</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>5</td>
<td>25.7±1.05</td>
<td>9.4±1.33</td>
<td>1.11±0.20</td>
<td>21.3±2.10</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>5</td>
<td>28.9±1.93</td>
<td>10.1±1.75</td>
<td>0.93±0.13</td>
<td>25.9±1.24</td>
</tr>
</tbody>
</table>

P≤0.05
Table 4: Means of some blood parameters of *Arius bilineatus* infected with *Hamatopeduncularia* sp. and *Caligus* sp. (± S.E.)

<table>
<thead>
<tr>
<th>SEX</th>
<th>STATUS OF INFECTION</th>
<th>NO. OF FISHES</th>
<th>HB %</th>
<th>P.C.V. %</th>
<th>R.B.C. 6 COUNT*10</th>
<th>W.B.C. 3 COUNT*10</th>
</tr>
</thead>
<tbody>
<tr>
<td>♂</td>
<td>A</td>
<td>6</td>
<td>30.0 ±2.71</td>
<td>19.2 ±2.07</td>
<td>1.50 ±0.02</td>
<td>28.4 ±0.96</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>5</td>
<td>18.0 ±1.63</td>
<td>6.3 ±0.21</td>
<td>0.62 ±0.01</td>
<td>31.3 ±1.43</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>5</td>
<td>16.2 ±1.34</td>
<td>5.2 ±0.13</td>
<td>0.51 ±0.01</td>
<td>29.0 ±1.62</td>
</tr>
<tr>
<td>♀</td>
<td>A</td>
<td>7</td>
<td>26.0 ±2.35</td>
<td>15.3 ±1.62</td>
<td>1.11 ±0.03</td>
<td>27.5 ±0.89</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>5</td>
<td>15.5 ±0.98</td>
<td>5.0 ±0.71</td>
<td>0.48 ±0.01</td>
<td>28.5 ±1.11</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>6</td>
<td>14.1 ±1.13</td>
<td>4.5 ±0.21</td>
<td>0.33 ±0.03</td>
<td>26.8 ±1.34</td>
</tr>
</tbody>
</table>

P≤0.05

**DISCUSSION**

The results showed that higher values of blood parameters were in males fishes than in those of females, this results agreed with Sopinska (1983), Al-Daraji (1995), Jori (1998 & 2006). Such differences between sexes may be attributed to some genetic differences (Fourie & Hattingh, 1976), while Raizada *et al.*., (1983) suggest that these differences are related to differences in the metabolic rate which are higher in males than in females.

The declining in Hb, P.C.V., R.B.C. counts values and increasing in W.B.C. counts in all status of infection when compared with healthy (uninfected) fishes was also noticed in fishes infected with some vibrios (Harbell *et al.*, 1979) or with other bacterial agents (Iwama *et al.*, 1986) or naturally infected with protozoan parasites (Hoffmann & Lommel, 1984) or with helminth or/and with crustacean parasites (Al-Daraji, 1995, Khamees, 1996, Jori, 1998 & 2006).

The higher effect of *Hematopeduncularia* sp. on the blood parameters in comparion with these of *Caligus* sp. may be attributed to the high feeding activity of the monogenean parasites on its host tissues. Kabata (1970) stated that blood feeding parasites can be expected to exert a significant influence on the composition and volume of host blood.

Fishes with ergasilids infection, may can be undergoes asphyxia status...
(Kabata, 1985), also the crustaceans can cause gill erosion extending beyond the epithelial layer causing obstructed branchial blood vessels and hyperplasia of epithelium which reduces the respiratory function of the gills (Paperna & Overstreet, 1981), in addition to mixed feeding of ergasilids on its host including blood cells and integument cells (Kabata, 1970).

Mixed infections have higher effect on blood parameters than single infections, which may be attributed to the interaction between asphyxia and anemia (Jori, 1998 & 2006).

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295.
Parasites and blood parameters of *Arius bilineatus*

*Hamatopeduncularia* sp. and *Caligus* sp. on *Arius bilineatus* (Val., 1840) showed significant effects on fish blood parameters.

The results showed that the affected fish had lower hemoglobin, hematocrit, and white blood cell counts compared to healthy fish. The incidence of affected fish was higher than in the control group. The number of red blood cells increased, while the number of white blood cells decreased.

The infected male and female fish had higher blood parameters than the healthy fish. The findings of the study suggest that the parasites and blood parameters of *Arius bilineatus* are closely related.