Effect of Starvation on Total Serum Proteins Level of Freshwater Catfish *Clarias batrachus*

(Received May 5, 1987; Revised received August 8, 1987)

**Sudhish Chandra**
Department of Zoology, B.S.N.V. College, Lucknow

Starvation resulted in a continuous loss in total serum proteins level of freshwater *Clarias batrachus*. The rate of depletion in serum protein level was faster after 2nd and 4th months of starvation.

Serum proteins of the blood play an important role in regulating osmotic pressure, water balance and hormones in the living system. Changing ecophysiological conditions affects majority of fishes by severe depletion of food during some parts of the year, resulting in short term starvation, and this causes marked changes in metabolic processes of fish body, as has been variously reported for a number of fishes. This communication presents results on total serum protein levels of a freshwater catfish *Clarias batrachus*, following experimental starvation of 5 months.

**MATERIALS AND METHODS**

Method of collection, transport, maintenance of fishes and experimental procedure were the same as described earlier. After every month total serum protein level of four starved and four control fish were determined. Blood was collected in a dry tube, by severing off the caudal end and allowed to clot and clear serum decanted in a clean dry tube.

**RESULTS**

The results obtained on total serum protein level of control and starved fish during experiment have been summarized in Table 1. Effect of starvation were evident from the
continuous and regular decrease in total serum protein levels in C. batrachus. The level declined to 1.00–0.67 gm/100 ml after first month of starvation, from the control value, revealing a loss of 18.03% from the initial level (4.88±0.80 gm/100 ml). The loss in its level increased to 32.83% and 42.63% after 2nd and 3rd month of starvation respectively. With further increase in starvation period serum protein levels decreased gradually to 57.55% and 65.17% respectively from the initial level. Statistically values obtained for the total serum proteins after 3rd, 4th and 5th month of starvation were significant (P < 0.01), while after 1st and 2nd months were not significant (P > 0.01), versus control.

**DISCUSSION**

The fishes are able to withstand long periods of starvation and their survivability differs from fish to fish\(^1\)\(^\text{-}^4\). It has generally been seen that starvation causes depletion in various body and blood constituents of the fishes\(^1\)\(^\text{-}^4\). A considerable reduction in the concentration of blood proteins have been observed\(^1\)\(^\text{-}^5\), but a slight rise in its level was noted in A. japonica\(^6\). Cresch and Boucha\(^7\) observed that the level diminishes to about half after 4 to 6 months and the decline was prominent during the first month of starvation. In C. batrachus total serum protein levels had become nearly half of the initial level at the end of 4th month and the depletion continued till 5th month of starvation, when the experiment was concluded. These significant changes in serum protein levels may plausibly be correlated with their active involvement in transporting nutrient materials needed by an anabolic mechanism at the cellular level and mediating transfer of catabolic products to the sites of excretion. A considerable reduction in concentration of serum proteins was found after starvation of only 15 days in S. cantilda\(^9\). Kosmina\(^10\) observed decrease in serum albumin of starving Lota lota after an initial rise but a steady increase in relative content of globulin, clearly establishing that albumin is the principal victim of starvation. In C. batrachus first observation was made after 1 month of starvation when the level dropped by 18.03% only; however, the rate of loss was faster after 2nd and 4th month of starvation. Lonsdale\(^11\) has opined that in active fish the effect is felt sooner than in sluggish fish, which was evident in C. batrachus also. Murachi\(^12\) noted that the erythrocyte sedimentation rate was greatly reduced after 7 weeks of starvation in C. carpio and further observed that plasma proteins must have been lost since the specific gravity and viscosity of plasma was affected. Gradual and marked losses noted in blood urea\(^1\), non protein nitrogen\(^1\) and transaminase levels following starvation in C. batrachus, which are related with the protein metabolism, further support the present observations.
### Table 1: Total serum protein levels of starved and healthy *C. batrachus*.

<table>
<thead>
<tr>
<th>Control and Period of starvation</th>
<th>No. of observations</th>
<th>Total serum Proteins gms./100 ml Mean ± S.D. Range in Parentheses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>20</td>
<td>4.88 ± 0.80 (4.00—6.00)</td>
</tr>
<tr>
<td>Post starvation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 month</td>
<td>4</td>
<td>4.00 ± 0.97 (2.80—5.20)</td>
</tr>
<tr>
<td>2 month</td>
<td>4</td>
<td>3.27 ± 0.73 (2.40—4.20)</td>
</tr>
<tr>
<td>3 month</td>
<td>4</td>
<td>2.80 ± 0.65 (2.00—3.60)</td>
</tr>
<tr>
<td>4 month</td>
<td>4</td>
<td>2.07 ± 0.73 (1.20—3.00)</td>
</tr>
<tr>
<td>5 month</td>
<td>4</td>
<td>1.70 ± 0.57 (1.00—2.40)</td>
</tr>
</tbody>
</table>

### REFERENCES


