STUDIES ON HUMAN FASCIOLIASIS IN EGYPT

2. SERUM IRON AND COPPER IN CHRONIC FASCIOLIASIS

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ABSTRACT

Twenty-three patients diagnosed as established fascioliasis were enrolled in the present study. Fasciola cases were investigated for serum iron, copper and their carrier proteins together with haemoglobin and some blood indices. A significant reduction in serum iron was detected in the examined group. This reveals the occurrence of iron deficiency anaemia in patients with chronic fascioliasis.

INTRODUCTION

Human fascioliasis is becoming a public health problem among Egyptians (Farag et al., 1979; Osman, 1985 & 1991). In human infection mild to moderate and even severe anaemia has been reported (Ashton and Beresford, 1974; Archimandritis et al., 1976; Osman 1985 and Acuna, and Braun, 1987), especially in heavy infections. However, the mechanism and the type of anaemia in this parasitic infection have not yet been fully investigated.
The present work aimed to study blood indices together with the serum iron and its carrier transferrin and total iron binding capacity together with serum copper and its carrier ceruloplasmin in patients with chronic fascioliasis.

**MATERIAL and METHODS**

Twenty-three patients suffering from chronic fascioliasis, with age group ranging from 15-35 years as well as 11 controls of matched age and sex were included in this work. Patients were diagnosed by stool examination using Kato-katz technique (Katz et al., 1970). Then the following investigations were done. (1) Complete blood picture (Dacie and Lewis, 1969). (2) Serum iron (Trinder, 1956) and total iron binding capacity (Ramsay, 1957) (3) Serum transferrin (Mancini et al., 1965). (4) Serum copper (Meret and Hankin, 1971) and (5) Serum ceruloplasmin (Mancini et al., 1965).

**RESULTS**

Results are presented in tables 1, 2 and 3.
TABLE 1. Haemoglobin, red blood cells and blood indices of the studied groups.

<table>
<thead>
<tr>
<th></th>
<th>Hb (g/dl)</th>
<th>RBC's (x10^6/mm³)</th>
<th>PCV (%)</th>
<th>MCV (fl)</th>
<th>MCHC (g/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>14.5±1.190</td>
<td>4.140±0.680</td>
<td>44.00±4.40</td>
<td>95.84±6.47</td>
<td>33.80±2.70</td>
</tr>
<tr>
<td>Mean ± S.D.</td>
<td>12.1±0.963</td>
<td>4.418±0.565</td>
<td>39.94±3.395</td>
<td>91.59±12.20</td>
<td>30.48±3.30</td>
</tr>
<tr>
<td>P</td>
<td>&lt;0.001 *</td>
<td>≥0.05</td>
<td>&lt;0.02 *</td>
<td>&gt;0.05</td>
<td>&lt;0.01 *</td>
</tr>
<tr>
<td></td>
<td>Iron (µg/dl)</td>
<td>TIBC (µg/dl)</td>
<td>UIBC (µg/dl)</td>
<td>% saturation</td>
<td>Transferrin (IU/ml)</td>
</tr>
<tr>
<td>------------------</td>
<td>--------------</td>
<td>---------------</td>
<td>--------------</td>
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<td>---------------------</td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean ± S.D.</td>
<td>106.1±24.93</td>
<td>332.2±51.09</td>
<td>232.1±43.95</td>
<td>31.54±6.36</td>
<td>33.60±2.70</td>
</tr>
<tr>
<td><strong>Fasciola</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Mean ± S.D.</td>
<td>77.9±21.26</td>
<td>358.3±74.06</td>
<td>282.0±70.50</td>
<td>22.44±6.57</td>
<td>128.47±27.63</td>
</tr>
<tr>
<td><strong>P</strong></td>
<td>&lt;0.01*</td>
<td>&gt;0.05</td>
<td>&lt;0.05*</td>
<td>&lt;0.001*</td>
<td>&gt;0.05</td>
</tr>
</tbody>
</table>
TABLE 3. Serum copper and ceruloplasmin of the studied groups.

<table>
<thead>
<tr>
<th></th>
<th>Copper (µg/dl)</th>
<th>Ceruloplasmin (IU/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean ± S.D.</td>
<td>123.00±23.56</td>
<td>165.85±30.67</td>
</tr>
<tr>
<td>Fasciola</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean ± S.D.</td>
<td>90.55±35.54</td>
<td>168.56±42.07</td>
</tr>
<tr>
<td>p</td>
<td>&gt;0.05</td>
<td>&gt;0.05</td>
</tr>
</tbody>
</table>

DISCUSSION

The presence of anaemia in human fascioliasis was reported in several studies (Hardman et al., 1970; Perry et al., 1972 and Ragab & Farag 1978).

In the present work serum iron, copper and their carrier proteins together with haemoglobin and some blood indices were investigated in patients with fascioliasis. Patients with chronic fascioliasis showed a significant reduction in their serum iron when compared to the controls. This reduced level was reflected on the patient's haemoglobin, haematocrit as well as mean corpuscular haemoglobin concentration which were significantly reduced in these patients. Total serum iron binding capacity did not differ in the fascioliasis group from the control values. Transferrin, a Beta-1-globulin synthesized by the liver, which acts as transport protein for iron did not show any significant change in the Fasciola group. This is expected because in established fascioliasis, the lesion is mainly in the biliary passages (Jones et al., 1977). Total iron binding capacity (TIBC) of the plasma can usually be equated with the transferrin concentration (Tietz, 1982). When unsaturated iron binding capacity was calculated, it was found to be significantly increased in the Fasciola group, and its percent saturation was subsequently significantly reduced. Copper is an es-
sential trace element required for haemoglobin synthesis (Henry, 1979). The liver is the only site for synthesis of ceruloplasmin the copper carrying protein (Walshe & Briggs, 1962). Ceruloplasmin is an α2-glycoprotein containing 6-7 copper atoms per molecule (Titz, 1982).

In the present work, neither copper, nor ceruloplasmin showed significant difference between fascioliasis and control groups. In some parasitic infections, such as in advanced schistosomiasis, copper concentration was found to be increased (Fayez et al., 1973; Khalifa et al., 1973 and Soliman et al., 1975) due to hepatic cell involvement. Ceruloplasmin can be decreased in severe hepatocellular disease and may be increased in chronic cholestasis (Henry, 1979).

Results of the present study indicate the occurrence of iron deficiency anaemia in cases suffering from fascioliasis. This may be due to the haemorrhage which the young fluke cause during their migration within the liver (Facey and Marsden, 1960). Blood loss within the bile was reported as a contributing factor (Borey 1969). Thus an iron supplement is recommended for patients with fascioliasis to prevent the occurrence of anaemia.

REFERENCES


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