CEREBROSPINAL FLUID LACTATE DEHYDROGENASE AND GLUTAMINE IN MENINGITIS

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(Received on September 27, 2004)

Abstract: The cerebrospinal fluid concentration of Glutamine and Lactate dehydrogenase (LDH) were studied in patients with pyogenic and tubercular meningitis. Significant increase in Glutamine and LDH level (P<0.001) were observed in the test group when compared to the control group. LDH and glutamine may not be useful in differentiating viral from other meningitis. It may act as corroborative evidence of meningitis.

Key words: lactate dehydrogenase glutamine meningitis

INTRODUCTION

The information yielded by examination of Cerebrospinal fluid (CSF) is often of crucial importance in the diagnosis of neurological disease (1). Various biochemical markers in CSF including lactate dehydrogenase (LDH) have been studied in diverse neurological conditions like leptomeningeal carcinomatosis, stroke and different types of meningitis (2-4). Levels of amino acids serine, glutamine and alanine have been found to be elevated in CSF of patients with amyotrophic lateral sclerosis (5). CSF concentration of glutamine was also found to be elevated in patients with chronic epilepsy (6). This study was undertaken to study the pattern of CSF glutamine and LDH in patients with meningitis.

METHODS

Patients

The study was conducted on 23 patients admitted at Kasturba Hospital, Manipal, with history suggestive of meningitis. The normal healthy individuals used as controls for CSF analysis were the cases other than suspected meningitis or encephalitis in whom CSF analysis was done as a workup of their underlying condition; examples were CSF obtained during spinal anesthesia (20 cases) and CSF obtained in a secondary syphilis (3 cases) where CSF was normal otherwise. The diagnosis of meningitis was made on the basis of clinical evidence of meningeal irritation, CSF protein, glucose and pleocytosis. Tubercular and pyogenic meningitis were included. The diagnosis of
The diagnosis of pyogenic meningitis was made on the basis of CSF leucocytic pleocytosis with >90% neutrophils and CSF glucose less than 1/3 of corresponding blood glucose with or without positive CSF culture or gram stain. The diagnosis of tuberculous meningitis was made on the basis of CSF leucocytic pleocytosis with >80% lymphocytes and increased CSF protein with positive polymerase chain reaction (PCR) or positive culture for *Mycobacterium Tuberculosis*. Lumbar puncture was done in each case under local anaesthesia. CSF was analysed for cells, protein, sugar, glutamine and LDH. CSF culture, gram stain and PCR were done when indicated. Informed consent was obtained in each case.

**RESULTS AND DISCUSSION**

A total of 23 patients and equal number of controls were included. Out of 23 patients with meningitis, 6 were pyogenic and 17 were tuberculous meningitis. Table I depicts serum levels of glutamine and LDH in these patients and controls.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Group</th>
<th>Mean±SD</th>
<th>Median</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glutamine (mg/dl)</td>
<td>Control</td>
<td>8.43±1.37</td>
<td>8</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>Test</td>
<td>70.86±53.49**</td>
<td>54</td>
<td>10</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>LDH (U/L)</td>
<td>Control</td>
<td>17.56±4.45</td>
<td>17</td>
<td>9</td>
<td>20</td>
</tr>
<tr>
<td>Test</td>
<td>287.52±764.12**</td>
<td>78</td>
<td>10</td>
<td>3650</td>
<td></td>
</tr>
</tbody>
</table>

P<0.001**, n = 23

The values of both glutamine and LDH are increased significantly (P<0.001) in patients with meningitis (Table II). Although CSF level of LDH was found to be elevated in patients with meningitis in some studies (9), glutamine level has not been reported. In our study we found significant difference between control and meningitis group with respect to both LDH and glutamine. Both can be explained on the basis of inflammation and increased permeability of blood brain barrier. Increased CSF level of amino acids including glutamine has been reported in experimental portal systemic encephalopathy (10). Estimation of glutamine in CSF of patients with meningitis being significantly raised, may indicate severity of inflammation and needs further study. Nand N, et al has found significantly elevated levels of CSF LDH in
TABLE II

<table>
<thead>
<tr>
<th></th>
<th>Glutamine (mg/dl)</th>
<th>LDH (U/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Rank (Test Group)</td>
<td>34.85</td>
<td>34.04</td>
</tr>
<tr>
<td>Mean Rank (Control Group)</td>
<td>12.15</td>
<td>12.96</td>
</tr>
<tr>
<td>Mann-Whitney U</td>
<td>3.50</td>
<td>22</td>
</tr>
<tr>
<td>Z</td>
<td>5.75</td>
<td>5.33</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
</tr>
</tbody>
</table>

Statistically significant difference in the distribution of Glutamine and LDH was observed between the two groups (P<0.001).

made due to small number of patients. LDH and glutamine in CSF may not be useful in differentiating viral from other meningitis but it may act as a corroborative evidence of meningitis.

ACKNOWLEDGEMENTS

The authors are thankful to Dr. Sreemathi Mayya, Selection grade lecturer, Department of Medical education for her statistical help. We are grateful to Kasturba Medical College, Manipal Academy of Higher Education (MAHE - A Deemed University), Manipal, Karnataka, India for the constant support and encouragement throughout this study.

REFERENCES