Correlation of Hyponatremia with Hepatic Encephalopathy and Severity of Liver Disease

Muhammad Omar Qureshi, Nasir Khokhar, Atif Saleem and Tariq Khan Niazi

ABSTRACT

Objective: To assess the frequency of low serum sodium levels and to correlate it with the severity of liver disease and hepatic encephalopathy (HE) in patients coming to the tertiary care hospital.

Study Design: Observational study.

Place and Duration of Study: Shifa International Hospital, Islamabad, from January 2011 to January 2012.

Methodology: A total of 202 patients with hepatic encephalopathy and chronic liver disease had serum sodium measured. The HE was graded according to the West Haven classification (4 grades). Relationship of hyponatremia was correlated with severity grade of encephalopathy using Spearman rank correlation test.

Results: Out of 202 patients, 62 (30.7%) patients had serum sodium less than 130 meq/l. Out of 202, HE was present in 69 (34.15%) patients and out of these, 38 had grade III-IV HE and 31 had grade I - II HE. Out of 69 patients with HE 57 had sodium less than 135 (p < 0.001).

Conclusion: Hyponatremia was a common feature in patients with cirrhosis and its severity increased with the severity of liver disease. The existence of serum sodium concentration < 135 mmol/L was associated with greater frequency of hepatic encephalopathy compared with patients with serum sodium concentration > 135 mmol/L.

Key Words: Hyponatremia. Hepatic encephalopathy. Cirrhosis.
Data was analyzed using Statistical Package for Social Sciences (SPSS) version 16.0. Frequencies of all variables were calculated and sodium levels were correlated with different relevant variables using spearman rank correlation. P-value less than 0.05 was considered significant.

RESULTS

In the current study, we analyzed 202 patients with liver cirrhosis who were hospitalized. Out of 202 patients, 90 (44.6%) were males and 112 (55.4%) females. Eighty-one (40.1%) patients were of the age greater than 60 years. Regarding Child’s class, 16 (7.9%) were in class A, 85 (42.1%) in class B, and 101 (50%) in class C. More patients with severe hyponatremia belonged to Child class C (Table I).

Patients with significant hyponatremia had higher incidence of HE (Table II, Figure 1).

DISCUSSION

Hyponatremia cases are mostly dilutional in nature.8,9 Hyponatremia resulting from the impairment of solute-free water excretion is commonly accompanied by portal hypertension.10 These results showed that severe hyponatremia is associated with increased severity of HE. In a Korean study, prevalence of hyponatremia at a serum sodium ≤ 135 mmol/L was 47.9% in hospitalized patients, and that of severe hyponatremia at a serum sodium ≤ 130 mmol/L was 27.1%.11 In fact, the severity of hyponatremia, particularly at serum sodium concentrations ≤ 130 mmol/L, corresponded to higher risks for developing ascites, hepatic encephalopathy and other complications of cirrhosis, compared with the risks in patients with a serum sodium ≥ 136 mmol/L.4,7

Results of this study indicate that more than one half (57.9%) of patients had values of serum sodium concentration below the normal range (< 135 meq/l) and 30.7% had values < 130 meq/l. Low serum sodium levels were more frequent in patients with severe liver failure (Child-Pugh class C) irrespective of age and gender of the patient.4 The frequency of serum sodium < 130 mmol/L in these patients is in accordance with a study by Borroni et al. who reported hyponatraemia in 30% of cases.11 In a Pakistani study it was found to be 26.7%.3

In this study, the prevalence of HE was greater (34.15%) as compared to other national and international studies. The patients with serum sodium < 130 meq/l had a significantly greater frequency (64%) of HE. Many of them had grade III-IV HE as compared to patients with normal serum sodium concentration. In previous studies, internationally as well as in Pakistan, there is correlation between hyponatremia and presence of HE, but this is even more highlighted in this study.

The relationship between hepatic encephalopathy and serum levels may be explained on the basis of more severe liver failure among patients with serum sodium < 130 meq/l, and the possibility that the two events may be pathophysiologically linked.12 Low serum sodium levels in patients with cirrhosis are associated with a remarkable reduction in the cerebral concentration of organic osmolytes that probably reflect compensatory osmoregulatory mechanisms against cell swelling.13-15 A major advance in our ability to treat hyponatremia is the introduction and approval of aquaretics (vaptans) which are vasopressin V2-receptor antagonists.16

CONCLUSION

Hyponatremia was a common feature in patients with cirrhosis and its severity increased with the severity of liver disease. The existence of serum sodium concentration < 135 mmol/L was associated with greater frequency of hepatic encephalopathy. It was also noticed that more severe the hyponatremia, greater will be the grade of hepatic encephalopathy. Close monitoring of serum sodium concentration should be performed in patients with cirrhosis in order to prevent the rapid development of cirrhosis related complications.

Table I: Hyponatremia and severity of liver disease.

<table>
<thead>
<tr>
<th>Sodium level</th>
<th>Child class</th>
<th>Total</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>Significant hyponatremia</td>
<td>0</td>
<td>17</td>
<td>45</td>
</tr>
<tr>
<td>Mild hyponatremia</td>
<td>3</td>
<td>21</td>
<td>31</td>
</tr>
<tr>
<td>Normal sodium</td>
<td>13</td>
<td>47</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>85</td>
<td>101</td>
</tr>
</tbody>
</table>

Table II: Relation of sodium level with hepatic encephalopathy.

<table>
<thead>
<tr>
<th>Sodium level</th>
<th>Hepatic encephalopathy</th>
<th>Total</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
<td>Mild</td>
<td>Mod-severe</td>
</tr>
<tr>
<td>Significant hyponatremia</td>
<td>22</td>
<td>15</td>
<td>25</td>
</tr>
<tr>
<td>Mild hyponatremia</td>
<td>38</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Normal sodium</td>
<td>73</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>133</td>
<td>31</td>
<td>38</td>
</tr>
</tbody>
</table>

Figure 1: Severity of hepatic encephalopathy in relation to serum sodium.
REFERENCES


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