MAGNESIUM LEVEL IN SERUM AND CEREBROSPINAL FLUID IN PATIENTS WITH PROTEIN MALNUTRITION*

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In paediatric practice in developing countries like India, the occurrence of malnutrition is fairly common. It is an accepted fact that malnutrition leaves indelible marks on both physical and mental growth in a growing child (Parekh et al. 1970, Udani 1963).

Besides these facts, the mortality among malnourished children is high and many such deaths occur without any forewarning or serious symptomatology. Although many possible reasons are attributed to these sudden deaths, the reduced level of magnesium (Mg++) is one of the causes of such deaths. It is reported that therapy directed against Mg++ deficiency may help.

The aims of this paper were (a) to ascertain the actual level of Mg++ in serum and cerebrospinal fluid (C.S.F.), (b) to assess if there is any correlation between the degree of malnutrition and Mg++ level, and (c) to find out whether Mg++ level has any significant diagnostic or prognostic value.

**Materials and Methods**

58 children with kwashiorkor were studied. The material is drawn from the inpatients of the Paediatric Department of the Chingleput Medical College Hospital over a period of one year. The C.S.F. and serum Mg++ levels were estimated in the biochemistry department of the Central Leprosy Training and Research Institute, Chingleput.

The oedema cases were graded as mild, moderate and severe. Mild—puffiness of dorsa of feet and hands; moderate— definite swelling of face, legs and hands; severe—massive swelling all over the body. Particular care was exercised in assessing the mental status and the influence of Mg++ level on it. The serum and C.S.F. Mg++ was estimated using the titan yellow method (Anderson 1957). The normal values (Sepaha et al. 1966) for serum magnesium is 1.65-2.35 mEq/L with an average of 1.92 mEq/L, and for C.S.F. magnesium is 2.25 to 3.15 mEq/L with a mean of 2.62 mEq/L.

**Observations and Discussion**

There were 30 males and 28 females.

Three children were less than 1 year, 16 between 1-2 years, 29 between 2-5 years, and 10 were 5 years and above.

The age of occurrence of malnutrition in this communication is consistent with many reported studies, namely, that gross malnutrition is uncommon during the first year of age because breast feeding is still commonly practised in this country.

In order to ascertain whether the fall in the serum Mg++ is directly correlated with the severity of oedema the data were analysed further as under (Table 1).

Out of the 58 cases with oedema, severe reduction in Mg++ level of less than 1 mg. %
was seen in 15 cases and moderate reduction (1-1.5 mg.%) in 38 cases. Out of the 12 patients with severe oedema, only 4 had a marked reduction in serum Mg++ and 8 had a moderate reduction (Table 2). Thus it can be seen that although malnutrition is associated with a fall in serum Mg++, there is no linear correlation between degree of fall of Mg++ and the severity of oedema.

Out of the 12 children with severe oedema C.S.F. Mg++ level was between 1-1.5 mg.% in 10, and only 3 had a moderate reduction to the range of 1.5-2 mg.% Of the 30 cases with manifest oedema, severe reduction in C.S.F. Mg++ was seen in 21. Thus C.S.F. Mg++ level showed a better correlation with oedema than did serum Mg++.

The level of C.S.F. Mg++ may influence the mental status of the cases. Our data are shown in Table 3.

Among the apathetic group, 23 out of 30 had moderate reduction and 5 out of 30 had severe reduction of C.S.F. Mg++ level i.e., less than 1 mg.%. But of those with peevishness, 11 out of 21 had a moderate reduction and none had a severe reduction in C.S.F. Mg++ level. It can be stated that the sensorium of malnourished children is influenced by the level of C.S.F. Mg++. This is understandable because Mg++ is required for the oxidative phosphorylation of nerve cells.

Table 2. Correlation between C.S.F. Mg++ and clinical status.

<table>
<thead>
<tr>
<th>Less than 1 mg.</th>
<th>1-1.5 mg.%</th>
<th>1.5-2 mg.%</th>
<th>2-3 mg.%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild oedema</td>
<td>4</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>Moderate oedema</td>
<td>2</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Severe oedema</td>
<td>0</td>
<td>10</td>
<td>3</td>
</tr>
</tbody>
</table>