SERUM MAGNESIUM LEVELS IN CHILDREN WITH FEBRILE CONVULSIONS

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ABSTRACT

BACKGROUND

Febrile convulsions are the most common type of seizure disorder in children. A febrile seizure is an event in infancy and early childhood usually occurring between 6 months and 5 years of age, associated with fever but without evidence of intracranial infection or defined cause like CNS infection, metabolic imbalance.

OBJECTIVE

To determine whether there is any derangement of serum magnesium, in children with febrile convulsion.

METHODOLOGY

100 patients presenting with febrile seizures admitted in the department of paediatrics in Rajarajeswari Medical College and Hospital, Bangalore and willing to participate in this study will be taken irrespective of gender, social status, cast, creed, and religion. In this prospective case-control study, febrile seizure cases are included in the case group and control included cases with fever only without convulsion or any medical history of convulsions. Roche 9180 electrolyte analyser was used to measure the magnesium levels.

RESULTS

A total of 100 study subjects were included, who were diagnosed as febrile seizures (Both simple and complex). None of the subjects were lost during the course of the study. Normal range for serum magnesium is taken as 1.8–2.5 mg/dl. The mean value for magnesium in case group is 2.1 with SD 0.15 and in the control group it was 2.13 with a SD of 0.22.

CONCLUSION

All the case subjects had serum magnesium level in the normal range with a mean of 2.1 mg/dl. This result indicates that there is no role for serum magnesium in a case of febrile seizures.

KEYWORDS

Febrile Seizures, Serum Magnesium.

willing to participate in this study will be taken irrespective of gender, social status, cast, creed, and religion.

This study is a prospective case-control clinical study on patients, with febrile convulsions. Patients with complaints of fever with convulsion or fever with history of convulsion will be included in the study group. Control group, this group will include patients with fever only without convulsion or any medical history of convulsions.

**Inclusion Criteria**
Patients aged above 5 months and below 60 months of either sex with or without a history of febrile seizures, with or without fever during presentation.

**Exclusion Criteria**
Patients below the age of 5 months or above 60 months, absence of fever in presenting complaint, gastrointestinal diseases leading to electrolyte imbalance, CNS infections like meningitis or encephalitis, metabolic disorder, neurological or structural abnormalities in the brain or skull, SAM.

Blood sample will be taken at the time of admission to the department and three day fever recording will be done. The samples will be analysed using Roche 9180 electrolyte analyser.

The study control group will include patients with fever only and without any seizure or seizure history in the past. Samples will be drawn for these patients also on the day of admission, and analysed using Roche 9180 electrolyte analyser.

Prior to inclusion of the children in the study, a detailed history of presenting complaints was recorded by our history included duration of fever, time of onset of seizures, type of seizures, duration of seizures, past and family history of seizures. In addition, history suggestive of any triggering factors for febrile episode like cough, cold, nasal discharge, ear discharge, burning micturition or crying during micturition were also recorded.

Vitals signs, i.e. Heart rate, respiratory rate, and blood pressure were measured and recorded. The axillary temperature was recorded in all children with mercury thermometer placed in axilla placed for three minutes.

Anthropometric measurements namely weight, height, mid-arm circumference and head circumference were recorded.

This was followed by general examination and systemic examination in detail. Those children who showed features of any chronic congenital or acquired illness were excluded. Those who showed features of intracranial infection like altered sensorium, meningeal signs, bulging anterior fontanel etc were also excluded.

Two millilitres of whole blood was collected by venepuncture under strict aseptic precautions and sent to biochemistry laboratory for assessment of serum magnesium levels. Roche 9180 electrolyte analyser was used to measure the magnesium levels.

The Statistical analysis was performed by STATA11.1 (College station TXUSA), after completion of data collection the data were recorded into Microsoft in Excel 2007. The data were Transfer to Statistical packages of STATA 11.1.

Scatter plot were derived for serum magnesium data and it’s showing the distribution of serum magnesium in this study.

**RESULTS**
A total of 100 study subjects were included, who were diagnosed as febrile seizures (both simple and complex). None of the subjects were lost during the course of the study.

Normal range for serum magnesium is as 1.8–2.5 mg/dl. According to the diagnosis during admission and during the course of the treatment, 82% were simple febrile seizures and 18 of them were complex febrile seizures.

The mean value for magnesium in case group is 2.1 with SD 0.15 and in the control group it was 2.13 with a SD of 0.22. “P” value was calculated as 0.233, which is not statistically significant.

<table>
<thead>
<tr>
<th>Magnesium</th>
<th>Case</th>
<th>Control</th>
<th>p-value</th>
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</thead>
<tbody>
<tr>
<td>(Mg)</td>
<td>(mg/dl)</td>
<td>(mg/dl)</td>
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<tr>
<td>2.1±0.15</td>
<td>2.13±0.22</td>
<td>0.233</td>
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**DISCUSSION**
Magnesium (Mg) is the fourth most common cation in the body and third most common intracellular cation. It is mainly found in muscle, other soft tissues, bone and erythrocyte.[5]

It is also involved in neuronal function and it inhibits the facilitatory effects of calcium on synaptic transmission and also exerts a voltage dependent blockage of N-methyl-D-aspartate (NMDA) receptor channel.[6]

The actions of magnesium on nervous system is that it reduces the release of acetylcholine at the neuromuscular junction by antagonising calcium ions at the presynaptic junction, reduced excitability of nerves, and acts as anticonvulsant, reverses cerebral vasospasm.[7]

It has been suggested that low serum Mg has occasionally been associated with significant effects on the central nervous system especially in causing seizures.

It is suggested that an alterations in Mg concentrations in plasma and intracellular matrix gives rise to a functional impairment of the cell membranes, which might trigger seizures. Recent evidences indicate that the deficiency of Mg can play a significant role in febrile convulsion.[7,8]
Therefore, it is assumed that the deficiency of these elements can have contributing effect in the incidence of febrile convulsion.

Majority (99%) of magnesium is intracellular, the normal serum magnesium concentration is 0.7–1.15 mmol/l (1.7–2.8 mg/dl).[8]

Magnesium plays an important role in establishing the electrical potential across cell membranes as a result of its involvement in the Na+/K+ ATPase system, which is responsible for maintaining sodium and potassium gradients across cell membranes and normal potassium concentration.[9]

Magnesium also affects calcium metabolism; the production of cyclic adenosine monophosphate (cAMP) is magnesium dependent, which in turn controls the release of parathyroid hormone. Not surprisingly deficiency of magnesium is often associated with hypocalcaemia.[5,6]

The mean age for the cases of febrile seizures in this study was found to be 1.97 years±1.33 years. It’s been a general finding in this study that the age of onset for febrile seizure is in the second year of life, and it’s usually the first episode. Gender wise distribution of febrile cases in this study shows male predisposition, were total effected male kids were 55 and females were 45.

CONCLUSION
A febrile seizure is the most common type of seizure disorder in children. In this study all the case subjects had serum magnesium level in the normal range with a mean of 2.1 mg/dl. This result indicates that there is no role for serum magnesium in a case of febrile seizures.

REFERENCES