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Original Article

Correlation between Hypokalaemia and Hypomagnesemia

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Abstract :

Introduction : Experimental and clinical observations indicate a close relationship between magnesium and potassium status of our body. Such study in our country is meagre which lead us to conduct this study.

Methodology : This was a prospective study conducted in a tertiary care urban hospital in Dhaka City. 183 children were included randomly from either sex.

Result : 71 Patients were hypokalaemic (38.8%) and the rest 112 (61.2%) were normokalaemic. Serum magnesium level was 2.004 mmol/L in hypokalaemic children whereas in normokalaemic children serum magnesium level was 2.17 mmol/L. A positive correlation was found between hypokalaemia and hypomagnesemia.

Key words : Hypokalaemia, Hypomagnesemia.

Introduction :

Quantitatively potassium is the most important intracellular cation and magnesium is the second most abundant intracellular cation. Potassium is abundant in muscle cells whereas bone rather than the muscle is the major store of magnesium[1]. Experimental and clinical observations indicate a close relationship between magnesium and potassium status of our body. In case of electrolyte depletion in children, the magnesium level in the soft tissue might be kept up at the expense of bone, thus potassium to magnesium ratio would tend to fall[1]. In rats with severe potassium and magnesium depletion, muscle is always more depleted of potassium than magnesium and the potassium to magnesium ratio falls[2]. In animals specially fed on specifically magnesium deficient diets a depletion of tissue potassium has been demonstrated which correlates with and may be relatively greater than that of magnesium[3]. It has been suggested that this drainage of potassium might be due to interference with the magnesium dependant mitochondrial system of energy production required for maintenance of normal potassium balance within the cell[4]. These lead us to study the correlation between potassium and magnesium balance in children.

Materials and Methods :

This was prospective study conducted in a tertiary care urban hospital in Dhaka city among hospitalized children. Age of the study group was 6-60 months. 183 children were included randomly form either sex but those patients who received magnesium or potassium therapy were excluded from the study. Serum magnesium and potassium level was estimated and the values obtained were analyzed to explore correlation between hypokalaemia and hypomagnesenia.

Result :

Table 1 : Age distribution

Age	No	%
6-12 Months	90	49.2%
1-5 Years	93	50.8%

Table II : Sex distribution

Sex	No	%
Male	101	55%
Female	82	45%

Table III : Monthly income

Income	No	%
<3000 Tk.	145	72.2%
>3000 Tk.	38	27.8%

Table IV : Serum Potassium level

Serum Potassium	No	%
<3.5 mmol/L	71	38.8%
3.5-5.5 mmol/L	112	61.2%

Table V : Serum Magnesium level

S. Potassium	Magnesium level
Hypokalemia	2.004 meq/L
No hypokalemia	2.170 meq/L

Discussion :

This study showed that serum potassium level was low in 71 patients (38.8%) whereas 112 patients (61.2%) had normal serum potassium level (3.5-5.5 mmol/L). None of our study patients had hyperkalaemia. Mean serum magnesium level of hypokalaemic children was 2.004 mmol/L whereas that of normal children was 2.170 mmol/L. We found a significant

correlation between serum potassium and serum magnesium level. In one study done by R Whang et al 53 (61%) of 87 hypokalaemia patients were hypomagnesemic. They asserted that there is a strong correlation between hypokalaemia and hypomagnesemia[5]. J. C Boyd et al also observed frequent hypomagnesemia in hypokalamic Patients[6]. Both experimental and clinical observation emphasize the importance of correcting hypomagnesemia in hypokalaemic patients[7]. Because cellular potassium depletion accompanies magnesium depletion and repletion of cellular potassium is impaired (refractory potassium depletion) in presence of hypomagnesemia. This resistance to cellular potassium repletion in presence of concurrent magnesium depletion may be due to impaired cellular cation pump activity[8], diminished sodium-potassium pump density[9] or increased cellular membrane permeability to pottassium[10] , or may result from all of these mechanisms working in concert. BL Nicholas et al found that muscle capacity of potassium in edematous malnutrition is reduced and potassium supplements are of no effect unless primary nutritional deficiency including magnesium depletion are treated[11] . Maclntyre and Davidsson found the evidence of secondary potassium depletion, sodium retention , nephrocalcinosis and hypercalcemia in magnesium deficiency[12] . It has been suggested that this drainage of potassium might be due to interference with the magnesium dependent mitochondrial system of energy production required for maintenance of normal potassium balance within the cell. Geven WB et al found a positive correlation between erythrocyte potassium and erythrocyte magnesium content, as well as magnesium and potassium concentration of mononuclear cells[13].

Conclusion :

This prospective study was carried out to see the correlation between hypokalaemia and hypomagnesemia in children in a tertiary level urban hospital in Bangladesh. Serum potassium and serum magnesium levels of 183 children of either sex, aged 6-60 month were estimated and values obtained were analyzed to explore hypokalaemia and hypomagnesemia. A positive correlation was revealed between hypokalaemia and hypomagnesemia among hospitalized children. This study establishes a scientific basis of concurrent management of hypokalaemia and hypomagnesemia.

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