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ORIGINAL ARTICLE

Frequency of Hypomagnesaemia in Severe Acute Malnutrition, Aged 6–59 Months

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ABSTRACT

Objective: to determine the frequency of hypomagnesaemia in severe acute malnutrition, aged 6 – 59 months.

Methodology: Patients admitted in Pediatric Medical Unit of Children Hospital, Lahore fulfilling the inclusion criteria were enrolled in the study. Their MUAC along with weight for height/length was taken and also examined for bilateral pitting edema. Venous sample was taken for serum magnesium level and studied in labs of CHL. Hypomagnesaemia was labeled as per operational definition. Treatment given in form of magnesium sulfate after confirming hypomagnesaemia.

Results: Of 200 cases, 58%(n=116) were between 6-36 months of age whereas 42%(n=84) were between 37-59 months. mean +sd was calculated as 34.9+11.36 months. 50.5%(n=101) were male while 49.5%(n=99) were female, mean magnesium level was calculated as 1.94+0.30 mg/dL. Frequency of hypomagnesemia in severe acute malnutrition, aged 6 – 59 months was recorded in 31.5%(n=63) of the cases.

Conclusion: frequency of hypomagnesemia is significantly higher in cases with malnutrition, however, a larger study is required to record the rate of this morbidity in our region.

Keywords: Malnutrition, hypomagnesemia, 6-59 months of age

INTRODUCTION

Malnutrition is thought to be a risk factor for illness and mortality in roughly 60% of the nearly 10 million avoidable deaths among children under the age of five globally each year. Malnutrition is a leading cause of avoidable illness and death among infants in developing nations.[1] In 2011 19 million serious acute malnourished children were reported under the age of five. Furthermore, this condition was responsible for over 7% of all casualties in this age range.[2]

Hypomagnesemia has garnered comparatively less attention in the medical literature in comparison to hyponatremia, hypokalemia, and hypocalcemia, despite the fact that it is the cation that is found in the body's intracellular abundant at the second highest concentration and in the extracellular abundant at the fourth highest concentration.[4]

The normal range for magnesium in the blood is between 0.74 mmol/L and 0.94 mmol/L (1.8 mg/dl to 2.3 mg/dl). A blood magnesium measurement that is lower than 1.8 mg/dl is considered to be indicative of hypomagnesaemia.[3]The vasomotor tone, blood pressure, and peripheral blood flow can all be modulated by magnesium. It has been demonstrated that a magnesium deficiency can cause vasoconstriction and can increase arterial endothelium damage.[6]

A research that was conducted by Karakelleoglu C et al revealed that the prevalence of hypomagnesaemia was 36% in malnutrition children, and the mortality rate was 33.3% in malnourished children who had hypomagnesaemia, in comparison to impoverished children who did not have hypomagnesaemia, for whom the mortality rate was only 6.2%.[6] While Zafar et al. 2010 demonstrated that the average blood magnesium level was within the hypomagnesaemia range (1.11 + 0.24) in patients whose weight was less than 60% of what is considered normal for their age, the mean serum magnesium level in the control group was within the normal range (1.01+0.78).[7] The purpose of this research is to investigate the most current patterns of hypomagnesemia in serious acute malnutrition in our population. It is possible that we will be able to create reference guides for the management of individuals with malnutrition if we are aware of this occurrence.

METHODOLOGY

We enrolled 200 children from Pediatric Medical Unit of Children Hospital, Lahore having age 6m-59m of both male and female, having acute severe malnutrition (mid upper arm circumference less than 115mm and weight for height/length less than 3SD with bilateral pitting edema) whereas children with feeding difficulties, and any co morbidities e.g CLD, CKD, AST, ALT, > 40kg, Creatinine > 1.3 mg/dl) were excluded from this trial. After taking informed consent from parents and approval from ethical committee, their information including name, age, gender, address and date of admission was recorded. Their MUAC along with weight for height/length was taken and also examined for bilateral pitting edema. Venous sample was taken for serum magnesium level and studied in labs of CHL. Hypomagnesaemia (serum magnesium level less than 1.8mg/dl) was labeled present. Treatment was given in form of magnesium sulfate after confirming hypomagnesaemia. Descriptive statistics were applied in the form of frequencies and percentage for qualitative variable like gender, hypomagnesemia , while mean and standard deviation for quantitative variable like age & serum magnesium level. Chi-Square test on the basis of the variant age group and levels of magnesium was formed to analyze the outputs of the study. P-Value < 0.05 was considered as statistically significant.

RESULTS

Age distribution of the patients shows that 58%(n=116) were between 6-36 months of age whereas 42%(n=84) were between 37-59 months, mean +sd was calculated as 34.9+11.36 months. Gender distribution shows that 50.5%(n=101) were male while 49.5%(n=99) were females. Mean magnesium level was calculated as 1.94+0.30mg/ dL. Frequency of hypomagnesaemia in severe acute malnutrition, aged 6 – 59 months was recorded in 31.5%(n=63) of the cases whereas 68.5%(n=137) had no findings of the morbidity.

Table 1:

Variables		No. of patients	%
Age(months)	6-36	116	58
	37-59	84	42
Gender	Male	101	50.5
	Female	99	49.5

Table 2: Mean Magnesium Level

Magnesium level (mg)	Mean	SD
	1.94	0.30

Table 3: Frequency of Hypomagnisemia

Variables		Hypomagnesemia		P value
		Yes	No	
Age(months)	6-36	34	82	0.43
	37-59	29	55	
Gender	Male	25	76	0.03
	Female	38	61	

DISCUSSION

Children who are malnourished have a greater risk of developing serious infections as a direct result of their compromised immune reactions. Undernutrition has an effect on a number of elements of immunity, including cell-mediated immune responses, the generation of cytokines, and antibody reactions, specifically those that require assistance from T cells. The high incidence of bacterial and infectious illnesses in underdeveloped countries is a significant factor in the region's widespread malnutrition.

The rationale of study was to see recent trends of hypomagnesaemia in severe acute malnutrition in our population. By knowing this frequency we may be able to formulate guide lists for management of patients with malnutrition. We compared our results with previous studies where Karakelleoglu C et al revealed that frequency of hypomagnesaemia was 36% in malnourished children and mortality was 33.3% in malnourished children with hypomagnesaemia as compared to malnourished children without hypomagnesaemia where it was 6.2%.[6] The findings of our study are in-agreement regarding frequency of hypomagnesemia in malnourished children.

Zafar et al. 2010 showed mean serum magnesium level was in hypomagnesaemia range (1.11 + 0.24) in cases having weight less than 60% of expected for age as compared to control in which mean serum magnesium level was in normal range (1.01 + 0.78).[7] These findings also support our findings. Another study by Cahit K. et al, in 2011, investigated the effects of hypomagnesemia in malnutrition. It included 25 children with severe acute malnutrition(SAM). During the period of these patients, four (16%) mortalities within the first four days after admittance. Three of the four deceased patients with SAM had serum Mg3+ levels that were lower than the normal value, while six of the 21 remaining patients with SAM had serum Mg3+ levels that were lower than the normal value. The chances ratio for mortality was 7.5 times greater in the malnourished children with hypomagnesaemia (n=9) compared to the malnourished children who did not have hypomagnesaemia (n=16). The formula for the odds ratio is odds ratio = (3/1)/ (6/15). The outcomes of this research suggested that hypomagnesemia should be given more consideration as a potential risk factor for mortality in SAM.[8]

Children are at the greatest risk for malnutrition due to a low dietary intake, inaccessibility to food, inequitable distribution of food within the household, inappropriate food storing and preparation, dietary taboos, and contagious illnesses. Children are also at the greatest risk for obesity due to a low dietary intake and inequitable distribution of food within the household.[9] Magnesium deficiency is most commonly caused by an insufficient consumption of magnesium or an ineffective utilization of the magnesium that is accessible. This is typically the outcome of infections or parasitic infestations.[10] On the other hand, there is a dearth of information regarding serum magnesium level in human biological systems. Similar to our demographic, the general population and particularly children in other studies[9,11] do not have adequate background amounts of many important components. This is especially true for children. The levels of magnesium in children are of particular interest because a sufficient consumption of magnesium is essential for the health, proper development, and proper functioning of the body beginning in prenatal life and continuing all the way through childhood. The levels in children are of particular interest because of this.

It has been suggested that they play significant parts in the immunophysiologic processes that take place. Zinc, for instance, plays a substantial role in the processing of nucleic acids, as well as in cell reproduction, tissue healing, and overall development. It is a component of more than 200 different enzymes. In order to effectively shield the biological system from the oxidation that is brought on by peroxides, it is necessary for selenium's anti-oxidation activities to be present in glutathione peroxidase.[12] However, we are of the view that all malnutrition cases should undergo for electrolytes investigations so that proper management of these patients may be started earlier.

CONCLUSION

We concluded that the frequency of hypomagnesemia is significantly higher in cases with malnutrition, however, a larger study is required to record the rate of this morbidity in our region.

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