Original Article

A

Frequency of Hypomagnesemia in Children with Acute Diarrhea

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ABSTRACT

Objectives: To see frequency of hypomagnesemia in children with acute diarrhea.
Study Design: Cross-sectional study
Place and Duration of Study: This study was conducted at the Peads OPD of Nishtar Hospital Multan from January 2015 to December 2016.
Materials and Methods: A total of 210 children with acute diarrhea were recruited. Serum magnesium levels of these children were checked and noted in the study proforma. All the data was entered on SPSS version 20 for analysis purpose.
Results: 110 (52.4%) were boys while 100 (47.6%) were girls. Mean age of these children was 20.48 ± 11.11 months. Mean duration of disease was 5.13 ± 3.91 days and 71.4% of these children presented within week of onset of diarrhea. Mean serum magnesium level was 1.52 ± 0.193 mEq/dl and hypomagnesemia was present in 110 (52.4%) children.
Conclusions: Serum Mg level was low in our study as hypomagnesemia was highly prevalent in children with acute diarrhea. Hypomagnesemia was significantly common in boys, children under 2 years of age, consuming water from hand pumps and prolonged disease duration.
Key Words: Hypomagnesemia, acute diarrhea, children.

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INTRODUCTION

Every child suffers with average three to four episode in first 2 years of life [1-2]. In children under 5 years of age, diarrhea is one the leading causes of preventable deaths all over the world but major burden is harbored by developing countries. Pediatric mortality due to diarrhea in the world is estimated to be around 1.87 million per year [3-4] and over 70 % of these children belong to developing countries which can be prevented by inexpensive treatment such as ORT, fluids and foods. According to the estimates of world Health Organization (WHO) more than 700 million episodes of diarrhea in children less than 5 years of age are reported from low and middle income countries.[5] Malnutrition, may further complicate the situation and change the treatment plan and also increases risks of contracting diarrhea in low and middle income countries which may lead to increase in disease burden along with extra financial stress on the suffering families in terms of medical costs, low productivity, poor quality of life, disease morbidity and mortality. Infectious microorganisms of diarrhea may include; bacterial pathogens such as E. coli, different viruses, protozoal species and helminthes which are transmitted through oral-fecal route of transmission [6, 7]. Among risk factors for pediatric diarrhea may include gender, age, geographical distribution, lack of access to safe drinking water, socio-economic status of the family, poor sanitation and hygiene and poor breastfeeding practices contribute to the burden of disease. This emphasizes towards well directed efforts to explore socio-demographic factors for policy makers to design certain preventive strategies to overcome magnitude of the problem.

Magnesium is second most common intracellular cation which is essentially required as a co-factor in more than 300 enzymatic reactions in our body [8-9]. These enzymatic reactions regulated different metabolic processes yet it is oftenly a neglected parameter being overlooked by majority of the clinicians. Hypomagnesemia is commonly noted in hospitalized patients up to 12% and may be as frequency as 60% among critically ill patients or those in ICU, though often remains undiagnosed and untreated. Symptomatic Mg depletions from our bodies may be a results of gastrointestinal or renal losses [10, 11].

Owing to the importance of the Magnesium in our bodies which often remains underreported and limited availability of the data among these children we conducted this study to ascertain current magnitude of the problem. There is no such study to determine frequency of hypomagnesemia in acute diarrhea in children, done in Pakistan.

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MATERIALS AND METHODS

We recruited a total of 210 children (under 5 years of age) suffering from acute diarrhea in this cross-sectional study from the pediatric OPD of Nishtar Hospital Multan. Diarrhea was defined according to the WHO guidelines as "Passage of more than watery stools in 24 hours". Children with persistent/chronic, bloody diarrhea and having acute renal failure were excluded from our study. Informed consent was taken from the parents of all these children before being registered in this study. After registration detailed clinical examination was conducted for these patients and 3 ml of venous blood sample was drawn and sent to the laboratory of the Nishtar Hospital Multan for serum Mg levels. Hypomagnesemia was defined as "Serum magnesium level <1.55 mEq/dL". Parents were interviewed for socio-demographic distribution (residential status, source of drinking water, socioeconomic status, mother's educational level and family system) and all the information was recorded in the pre – tested proforma for analysis. Statistical Package for Social Sciences (SPSS) version 20 was used for analysis purpose. Descriptive statistics were used to calculate mean and standard deviations and frequencies and percentages have been tabulated.

RESULTS

In this study we registered a total of 210 children with acute diarrhea. Of these 210 children, 110 (52.4%) were boys while 100 (47.6%) were girls. Mean age of these children was 20.48 ± 11.11 months (range 5 months to 54 months) while 140 (66.7%) were aged less than 2 years of age. Mean age of the boys was 17.95 ± 11.93 months while that girls was 23.26 ± 9.44 months (p = 0.000). Majority of our patients (71.4%) belonged to urban areas while 133 (63.3 %) belonged to poor families. Majority of the families of these children (47.6%) reported to consume water from hand pumps, from water supply was (42.9%) and only 20 (9.5%) reported drinking water from filtration plants. Majority of the mother of these children (76.2%) were illiterate and 61.9 % belonged to joint family system. Mean duration of disease was 5.13 ± 3.91 days and 71.4% of these children presented within week of onset of diarrhea. Mean serum magnesium level was 1.52± 0.193 mEq/dl and hypomagnesemia was present in 110 (52.4%) children.

Table No. 1: Cross-tabulation of hypomagnesemia with regards to gender. (n = 210)

Gender	Hypomagnesemia		P - value
	Yes (n =110)	**No** (n = 100)	
Boys (n = 110)	70	40	**0.001**
Girls (n =100)	40	60	
Total	**210**		

Table No. 2: Cross-tabulation of hypomagnesemia with regards to age. (n = 210)

Age groups	Hypomagnesemia		P - value
	Yes (n =110)	**No** (n = 100)	
Up to 2 Years (n = 140)	85	55	**0.048**
More than 2 Years (n =70)	25	45	
Total	**210**		

Table No. 3: Cross-tabulation of hypomagnesemia with regards to disease duration. (n = 210)

Disease duration	Hypomagnesemia		P - value
	Yes (n =110)	**No** (n = 100)	
Less than 7 days (n = 150)	57	93	**0.000**
More than 7 days (n =60)	53	07	
Total	**210**		

Table No. 4: Cross-tabulation of hypomagnesemia with regards to source of drinking water. (n = 210)

Source of drinking water	Hypomagnesemia		P - value
	Yes (n =110)	**No** (n = 100)	
Hand pump (n =160)	90	70	**0.000**
Water Supply (n = 20)	00	20	
Filtration plant (n = 30)	20	10	
Total	**210**		

DISCUSSION

Reducing preventable childhood deaths is one of the Millennium Development Goals (MDGs) and diarrhea still continues to among one of the leading causes of deaths all over the world particularly in developing countries. [12-13]. Among risk factors for pediatric diarrhea may include gender, age, geographical distribution, lack of access to safe drinking water, socio-economic status of the family, poor sanitation and hygiene and poor breastfeeding practices contribute to the burden of disease. Hypomagnesemia is commonly noted in hospitalized patients up to 12% and may be as frequency as 60% among critically ill patients or those in ICU, though often remains undiagnosed and untreated [10, 11].

In this study we registered a total of 210 children with acute diarrhea. Of these 210 children, 110 (52.4%) were

boys while 100 (47.6%) were girls. Male gender predominance in children with acute diarrhea has previously been described in literature in many studies. Zahoor et al[14] reported 66 % male gender predominance which is same as that of our findings. However Ijaz et al[15] reported 1:1 male to female ratio which is different from our findings. Ezeonwu et al [16] from Nigeria has also reported 56 % male gender predominance which is in compliance with our study results.

Mean age of these children was 20.48 ± 11.11 months (range 5 months to 54 months) while 140 (66.7%) were aged less than 2 years of age. Mean age of the boys was 17.95 ± 11.93 months while that girls was 23.26 ± 9.44 months (p = 0.000). Zahoor et al [14] reported 93% children with acute diarrhea were aged less than 2 years which is in compliance with our findings. Another study by Bushra et al [17] also reported mean age of the patients with acute diarrhea was 2.5 ± 0.3 years which is again showing similar trends as that of our study. Ijaz et al [15] reported 2.18 years mean age in children with acute diarrhea which is similar to our results. Kazemi et al [18] from Iran also reported 18 ± 2 months mean age of children with acute diarrhea which is close to our study results.

Acute diarrhea in children is associated with poor sanitation facilities, poor socio-economic status and lack of access to safe drinking water. Similarly in our study, majority of our patients (71.4%) belonged to urban areas while 133 (63.3 %) belonged to poor families. Majority of the families of these children (47.6%) reported to consume water from hand pumps, from water supply was (42.9%) and only 20 (9.5%) reported drinking water from filtration plants. Majority of the mother of these children (76.2%) were illiterate and 61.9 % belonged to joint family system.

Mean duration of disease was 5.13 ± 3.91 days and 71.4% of these children presented within week of onset of diarrhea. Yilgawan et al [19] reported 4 ± 3.2 days mean duration of disease, which is similar to our study results.

Mean serum magnesium level was 1.52 ± 0.193 mEq/dl and hypomagnesemia was present in 110 (52.4%) children. Study conducted by Paul et al from Singapore [20] reported 47% children with acute diarrhea were diagnosed with hypomangnesemia which is close to that of our study results.

CONCLUSION

Serum magnesium level was low in our study as hypomagnesemia was highly prevalent in children with acute diarrhea. Hypomagnesemia was significantly more common in boys, children under 2 years of age, consuming water from hand pumps and prolonged disease duration. Pediatricians treating these patients should include serum Mg levels in their routine investigation list which will help to improve disease outcomes as well as help to decrease disease morbidity and mortality.

Conflict of Interest: The study has no conflict of interest to declare by any author.

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