

Neuromuscular Manifestations of Hypokalaemia in Children with Diarrhea

Dr Partha Kumar Chaudhuri¹, Dr Sunanda Jha², Dr Anil Kumar Chaudhary³

^{1,2}Assistant Professor, ³Professor Department of Pediatrics and Neonatology, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India

Abstract :

Background: Diarrheal disease is one of the major causes of morbidity and mortality in children. The clinical manifestation and outcome are related to the severity of water deficit and pattern of electrolyte disturbance.

Objective: To study prevalence of hypokalaemia in children with diarrhea and its neuromuscular manifestations

Methodology: Clinical signs suggestive of hypokalaemia like lethargy, muscular weakness, abdominal distention, decreased bowel sound were carefully looked. These signs were correlated with potassium status

Results: In the present study 21% of patient with diarrhea were hypokalaemic where as 78% of the patient were normokalaemic. The present study shows that incidence of lethargy, muscular weakness, abdominal distention and faint or absent bowel sound increased with increasing severity of hypokalaemia. These signs were significantly higher in case of hypokalaemia than normokalaemia. Diminished or absent bowel sound (71.4%) was the commonest neuromuscular manifestation of hypokalaemia followed by abdominal distention (66.7%), lethargy (42.8%) and muscular weakness (28.6 %). The present study shows that neck flop was the commonest form of muscular weakness seen in patient with hypokalaemia

Conclusion: Thus our result highlights the importance of diarrhea related hypokalaemia and its neuromuscular manifestations. Hypokalaemia is relatively not a common and serious complication of diarrhea and its manifestation is reversible if it is diagnosed early and treated accordingly.

Keywords: Diarrhea, Hypokalaemia, Neuromuscular

I. Introduction

Diarrheal disease ranks among the top three killers of paediatric subjects in the developing world. In developing countries, on an average every child suffers 3.3 episodes every year.¹ The clinical manifestation and outcome are related to the severity of water deficit and pattern of electrolyte disturbance.² Potassium along with other electrolyte is lost in diarrheal stool of ages but more in cases of children. Muscle weakness, arrhythmia, ileus and nephropathy have been reported in hypokalaemia.³

II. Aims

The present study was done to know the prevalence of hypokalaemia in children with diarrhea. Neuromuscular manifestations of hypokalaemia were also studied so that early diagnosis and appropriate treatment can promptly reverse these manifestations.

III. Materials And Method

This study was done in Rajendra Institute of Medical Sciences (RIMS), Ranchi during the period July 2014 to June 2015. The subject of the study was selected from children upto five years of age brought with history of diarrhea. Age, sex and weight are noted of each patient. Beside a through clinical examination, clinical signs suggestive of hypokalaemia like lethargy, muscular weakness, abdominal distention, decreased bowel sound was carefully looked for on admission and assessed periodically. Patient with muscular weakness was subjected to detailed neurological examination. These signs were correlated with potassium status. Two ml of venous blood was taken before any fluid therapy is started, for estimation of serum potassium level. Serum potassium was estimated by flame photometer. Patient with pneumonia, fever (>38° C), convulsions and acute renal failure (after investigation) were excluded from study.

IV. Result And Analysis

A total of 100 patient having diarrhea is observed in the present study. Majority of children were male (65%) and age wise majority of children were below one year of age. 78% of cases were having normal serum potassium, 21% cases were having hypokalaemia and 1% case was having hyperkalaemia (table1). Mild hypokalaemia was present in 15% of cases, moderate in 5% of cases and severe in 1% of cases. Lethargy was present in 5 out of children 15 (33.5%) children with mild hypokalaemia, 3 out of 5 (60%) children with

moderate hypokalaemia and 1 child (100%) with severe hypokalaemia (table2). Muscular weakness was present in 2 out of 15 children (13.3%) with mild hypokalaemia, 3 out of 5 children (60%) with moderate hypokalaemia and 1 child (100%) with severe hypokalaemia. Bowel sound was faint or absent in 9 out of 15 children (60%) with mild hypokalaemia, all children (100%) with moderate hypokalaemia and 1 case (100%) with severe hypokalaemia. Abdominal distention was present in 7 out of 15 children (46.7%) with mild hypokalaemia, all children (100%) with moderate hypokalaemia and 1 child (100%) with severe hypokalaemia.

Among 21 cases of hypokalaemia, 15 (71.4%) cases had diminished or absent bowel sound, 14 (66.7%) cases had abdominal distention, lethargy was present in 9 (42.8%) cases and muscular weakness was present in 6 (28.6 %) cases (table3).

Out of 6 cases of muscular weakness; 3 cases had only neck flop, 2 cases had neck flop along with mild weakness of muscle power and variable degree of hypotonia, 1 case had neck flop along with weakness of muscle power of trunk and limb with hypotonia and diminished reflexes.

Table1: Distribution of cases in different ranges of serum potassium level (K⁺)

Normokalaemia K ⁺ 3.5-5.5 mEq/L	Hypokalaemia K ⁺ <3.5 mEq/L			Hyperkalaemia K ⁺ >5.5 mEq/L
	Mild 3-3.5 mEq/L	Moderate 2-2.9 mEq/L	Severe <2 mEq/L	
78 cases (78%)	15 cases (15%)	5 cases (5%)	1case (1%)	1 case (1%)

Table 2: Showing correlation of grades of hypokalaemia and clinical signs.

Clinical signs		Hypokalaemia K ⁺ < 3.5mEq/L			
		None	Mild	Moderate	severe
Lethargy	Absent	70	10	2	0
	Present	9	5	3	1
Muscular Weakness	Absent	79	13	2	0
	Present	0	2	3	1
Bowel Sound	Normal	74	6	0	0
	Absent/ Faint	5	9	5	1
Abdominal distention	Absent	76	7	0	0
	Present	3	8	5	1

Table3 Neuromuscular manifestation among hypokalaemic group

Neuromuscular manifestations	No of cases	Percentage(among 21cases of hypokalaemia)
Diminished or absent bowel sound	15	71.4
Abdominal distention	14	66.7
Lethargy	9	42.8
Muscular weakness	6	28.6

V. Discussion

In the present study 21% of patient with diarrhea were hypokalaemic where as 78% of the patient were normokalaemic. This observation is similar to the finding of other authors Kc M et al,⁴ Nathoo et at,⁵ and Mittal et al.⁶ Whereas few authors have reported very high incidence of hypokalaemia in diarrhea like Zaman et al.⁷ Among hypokalaemic group the present study observed that most of hypokalaemia is of mild type (71.4%). This correlates well with finding of Zaman et al.⁷ Incidence of hyperkalaemia was 1% in the present study similar to the finding of Mittal et al.⁸

The present study shows that incidence of lethargy, muscular weakness, abdominal distention and faint or absent bowel sound increased with increasing severity of hypokalaemia. Lethargy, muscular weakness, abdominal distention and faint or absent bowel sound was significantly higher in case of hypokalaemia than normokalaemia. The present observation compares well with the observation of Zaman et al⁷ and Chhabra et al.⁸ Hypokalaemia causes change in resting membrane potential, limit increase in blood flow in exercising muscle ,thereby causing acute weakness.⁹

Diminished or absent bowel sound (71.4%) was the commonest neuromuscular manifestation of hypokalaemia followed by abdominal distention (66.7%), lethargy (42.8%) and muscular weakness (28.6 %). The present study shows that neck flop was the commonest form of muscular weakness seen in patient with hypokalaemia similar to the finding of Chhabra et al.⁷ Hypokalaemia is known to produce muscle weakness which may be mimicking poliomyelitis or Guillain –Barré syndrome.^{10, 11}

VI. Conclusion

Thus our result highlights the importance of diarrhea related hypokalaemia and its neuromuscular manifestations. Hypokalaemia is relatively not a common and serious complication of diarrhea and its manifestation is reversible if it is diagnosed early and treated accordingly.

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