



ORIGINAL RESEARCH PAPER

Pediatrics

THE FREQUENCY OF HYPONATREMIA AND HYPOKALEMIA IN MALNOURISHED CHILDREN WITH ACUTE DIARRHEA

KEY WORDS: Electrolytes, Hyponatremia, Hypokalemia, Malnutrition.

Dr.Chandrashekhar Koli*

Assistant Professor & Consultant Paediatrician, Terna Medical College & Terna Superspeciality Hospital & Research Centre, Nerul, Navi Mumbai, India.
*Corresponding Author

Dr.Minakshi Bhat

Associate Professor & Consultant Paediatrician, Terna Medical College & Terna Superspeciality Hospital & Research Centre, Nerul, Navi Mumbai, India.

Dr.Surekha Joshi

Professor and H.O.D & Consultant Paediatrician Terna Medical College & Terna Superspeciality Hospital & Research Centre, Nerul, Navi Mumbai, India.

ABSTRACT

Methods: Data from patients aged 6 months -5 years admitted over 6 months period with acute diarrhoea was noted in a format .History, status of hydration , electrolytes ,nutritional status as per IAP noted.
Results: 103 patients with acute diarrhea, 24(23,30%) were without malnutrition. Hyponatremia observed in total 18(17.5%), 4.1% without malnutrition(1 in24),8.3% in grade 1(3 in 36) , 15.3% in grade 2(4 in 26),50% in grade 3(4 in 8) ,66.6% in grade 4(6 in 9) malnutrition. Hypokalemia noticed in 8.73% (9 out of 103), 4.16% (1 of 24) without malnutrition,5.6% in grade 1(2 of36), 7.7% in grade 2(2 of 26),37.5% in grade 3(3 of 8) and 55.5% in grade 4 (5 of 9)malnutrition.
Conclusion:Electrolyte disturbances are subclinical in malnourished children manifest during acute diarrhoea ,hence they should be monitored to avoid complications.

Introduction:

Malnutrition is a major global health problem , with the major burden being in South Asia and Sub-Saharan Africa(1,2).Many metabolic and electrolyte abnormalities are common in malnourished children which become more marked if accompanied by diarrhea.Severe malnutrition accounts for 2 million deaths annually with diarrhea being the most common complication. The prevalence of diarrhoea is 5-7 times more in malnourished as compared to normal children and its severity is 3 to 4 times greater in malnourished children as compared to normal children(3).

Among various electrolyte abnormalities observed in malnourished children,the sodium(Na) and potassium(K) abnormalities are commonest.Total body potassium is decreased in all malnourished children,due to decreased intake and poor muscle mass.The serum sodium is reduced in most children with malnutrition masking the sodium overload due to sodium retention.The association of diarrhea is known to worsen these abnormalities in malnourished children.(4,5,6).Hence early correction of hyponatremia and hypokalemia in malnourished patients with diarrhea can significantly reduce the mortality and morbidity.

The study was undertaken to determine the frequency of hyponatremia and hypokalemia in malnourished children with acute diarrhea.

Material Methods:

This prospective study was conducted in a tertiary care hospital of Navimumbai from first January 2018 to 31st July2018.All the children between the age group of 6months to 5years presenting with acute diarrhea were included in the study.A detailed history was obtained from parents.A thorough physical examination as done to assess the grade of dehydration.Anthropometric measurements such as weight,height,headcircumference and midarm circumference was taken.Their nutritional status was graded as per Indian Academy of Pediatrics(IAP) classification using weight for age as the reference(7).The blood sample was drawn for serum electrolytes under aseptic measures and was sent to laboratory.

Exclusion criteria:Children under 6months or above 5years,children suffering from chronic renal disease,cystic fibrosis,cardiac diseases,chronic diarrhea aand those receiving diuretics were excluded from study.

SPSS17 was used for data analysis and the results were written as percentages.

Results:

Of the 103 patients with acute diarrhea,24(23,30%) cases were without malnutrition,36(34.90%)had grade 1 malnutrition, 26(25.20%) had grade2 malnutrition,8(7.70%) cases had grade3 and 9(8.7%)cases had grade 4 malnutrition respectively.(Table 1).

Among 103 patients with acute diarrhea,58(56.31%) were boys aand45(43.7%) were girls.Hyponatremia was observed in total18(17.5%) cases of diarrhea.Regarding the grade of malnutrition,hyponatremia was observed in only 4.1% children without malnutrition(1 in24),8.3% in grade 1(3 in 36 cases), 15.3% in grade 2(4 in26 cases),50% in grade 3(4 in 8 cases) and 66.6% in grade 4(6 in 9 cases) malnutrition respectively(Table 2).

Hypokalemia was noticed in 8.73% cases(9 out of 103) with acute diarrhea.The frequency of hypokalemia was 4.16%(1 out of 24) in children without malnutrition,5.6% in grade 1(2 out of36),7.7% in grade 2(2 out of 26),37.5% in grade 3(3 out of 8) and 55.5% in grade 4(5 out of 9)malnutrition respectively.(Table 3).

Discussion

Diarrhoea and malnutrition are serious health problemsin the children of developing countries.Fatality rate in a case of diarrhea increases when superimposed upon malnutrition.Various studies have shown that malnutrition is associated with increased incidence and duration of acute diarrhoea.It is also a risk factor for acute diarrhoea and respiratory mortality(8-13).

In our study of 103 cases with diarrhoea,24(23.30%) were without malnutrition and 79(76.7%) cases had various grades of malnutrition as per IAP Classification.The study conducted by Shah RH etal 76.4% children had malnutrition(14).Most common electrolyte abnormality seen in our study was hyponatremia detected in17.5%(18 out of103) cases of diarrhoea followed by hypokalemia(8.73%).A study conducted by Sameen I etal showed that diarrhoea (50%) was the most common infection and hyponatremia (22.6%) the most common electrolyte abnormality in severely malnourished patients(15) . only one case of diarrhoea without malnutrition had hyponatremia and the percentage of hyponatremia increased with the grade of malnutrition. Hyponatremia was noticed in 50% cases with Grade 111 and

66.6% cases of grade1V malnutrition having diarrhoea. Similar observations were made by Samadi AR and Memon Y et al. They also observed direct relation of hyponatremia to the degree of malnutrition(16,17). In our study none of the patients had hypernatremia.

Memon et al. found hypernatraemia in 1.5% cases with acute gastroenteritis and malnutrition.

Hypernatraemia could be due to inadequate free water intake by the patients or increased intake of sodium through improperly prepared oral rehydration solution. Hypernatremia in association with malnutrition and diarrhoea is associated with risk of neurological damage and high mortality(18).

The incidence of hypokalemia was very low in our study(8.73%) as compared to study by Singhi S et al who reported hypokalemia in 24% and hyperkalemia in 7% respectively(19). The study conducted by Rehana et al and Memon et al showed hypokalemia in 37% and 62% children with malnutrition and diarrhoea (17,20). The low incidence could be because of early reporting to hospital and early initiation of treatment.

Many studies conducted in the past have reported that the patients presenting with hyponatremia and hypokalemia have significant mortality as compared to patients having normal electrolyte levels(21,22).

Ortuno et al in their case series reported hypokalemic induced paralysis secondary to acute diarrhoea. In malnourished children varying degree of electrolyte and other abnormalities are present which get aggravated by acute diarrhoeal diseases.

Conclusion

Electrolyte disturbances are often subclinical in malnourished children, but become obvious during the episode of acute diarrhoeal disease. Hence serum electrolytes of every malnourished child with acute diarrhoea should be estimated in order to do immediate correction and avoid serious life threatening outcome.

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Table 1: Malnutrition Status

Malnutrition grades (as per IAP)	Weight for age	Number of cases	percentage(%)
Normal	>80%	24	23.30
1	71-80%	36	34.90
11	61-70%	26	25.20
111	51-60%	8	7.7
1V	<50%	9	8.7
Total		103	100

Table 2: Hyponatremia in relation to nutritional status

Malnutrition grades	Number of cases	children with hyponatremia	percentage(%)
Normal	24	1	4.1
1	36	3	8.3
11	26	4	15.3
111	8	4	50
1V	9	6	66.6
Total	103	18	17.5

Table 3: Hypokalemia in relation to nutritional status.

Malnutrition grades	Number of cases	children with hypokalemia	percentage(%)
Normal	24	1	4.16
1	36	2	5.6
11	26	2	7.7
111	8	3	37.5
1V	9	5	55.5
Total	103	9	8.73

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