Original Research Article

A study on assessment of type of Dehydration and dyselectrolytemia in children suffering from acute gastroenteritis

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Abstract

Introduction: clinical appraisal of degree and type of dehydration in children can help us in early and effective treatment and successful therapy of dehydration and dyselectrolytemia, so the aim of this study was to assess the type of Dehydration and dyselectrolytemia in children suffering from acute gastroenteritis.**Materials and Methods:** Children between the ages of 3 months to 5 year with Passage of loose stools more than 3 times per day were included in this study and the Duration of illness with the symptoms and signs suggestive of dehydration less than fourteen days follow the inclusion criteria. Children with associated chronic diseases like renal disorders, cystic fibrosis, diabetes mellitus, metabolic diseases, congestive heart failure adrenocortical disorders and malnutrition were excluded in this study.**Results:** In severe dehydration most common type of the dehydration was followed by hypernatremia (63.8%) followed by hyponatremia (19.4%) followed by isonatremia (16.6%). The result was statistically significant ($p<0.05$; Significant).**Conclusion:** It is essential to survey clinically for level of dehydration as well as for type or example of electrolyte disturbance. At that point we ought to affirm this clinical appraisal of dyselectrolytemia by proper biochemical examinations.

Keywords: dyselectrolytemia, dehydration, Children, gastroenteritis.

Introduction

The worldwide yearly proportion of the diarrhoea and dehydration is enormous, influencing 3.5 billion cases and causing roughly 2,000,000 deaths each year. Diarrhoea represents more than 20% of all deaths in less than 5 years old children. Critical dehydration with unusual electrolytes and acidic base status happens in 2.5% of all instances of diarrhoea that might be fatal[1].The primary reason of death in acute diarrhoea is dehydration which results from the deficiency of liquids and electrolytes in diarrhoeal stools. The clinical signs of intense diarrhoea are identified with the seriousness of water shortage and the sort of electrolyte disturbances[2].Electrolyte disturbances is notable in dehydration. Frequently test center facilities are not accessible or, regardless of whether accessible, there is an extensive delay in acquiring the outcomes. Thusly, clinical recognition of water and electrolyte disorder gets significant, especially Hyponatremic dehydration, because of its genuine neurological outcomes.Unsettling influence in sodium, potassium, chloride and bicarbonate have been concentrated by numerous workers, the significant particle of ECF is sodium (Na+)[3].An investigation directed in 2010 in Dhaka Shishu hospital showed that electrolyte disturbance in AGE was related with greater than before morbidity, with hyponatremic lack of hydration in 15% cases[4]. No new examinations exist in regards to the electrolyte disturbances influences happening in a child experiencing AGE. Likewise, there are no particular investigations depicting the clinical highlights related with Hyponatremic dehydration, and the hints to separating it from Isonatremic dehydration.The clinical indications of acute diarrhea are identified with the seriousness of the dehydration and the kind of electrolyte imbalance. Thus, the clinical identification of water and electrolyte problems, particularly hyponatremic drying out,gets significant due to their genuine neurological consequences[5]. In light of the fact that the osmolality and volume of extracellular liquid are dictated by their sodium content, this ions particle assumes a critical part in the regulation of water and electrolytes. In this sense, the biochemical conversion in children's experiencing dehydration can be hyponatremic, isonatremic or hypernatremic. Other noticed biochemical changes are hypokalaemia and metabolic acidosis[6]. The clinical impression of the type of dehydration and electrolyte changes was genuinely in concurrence with the values of the serum electrolytes. Swelling and abdominal expansion connected definitely with hyponatraemia and hypokalaemia. Routine checking of serum electrolytes isn't needed. Notwithstanding, it is significant if an electrolyte unevenness is suspected for clinical reasons and in the event that they don't react agreeably with routine liquid and electrolyte therapy.[7] Issues of sodium and potassium levels in diarrhea-related dehydration cases can be a health related crisis that requires speedy and appropriate determination and treatment[8].At last such a methodology of clinical appraisal of degree and type of dehydration in children can help us in early and effective treatment and successful therapy of dehydration and dyselectrolytemia, so the aim of this study was to assess the type of Dehydration and dyselectrolytemia in children suffering from acute gastroenteritis.

Materials and methods

Intense the diarrhea in this examination was characterized as unusually loose or watery bowel movements at any rate at least multiple times in a 24-hour term that kept going under 14 days. All patients with intense watery loose between the ages of 2 months and 5 years were inspected by their pediatrician in their emergency ward as indicated by WHO models. The accompanying signs were viewed as indications of extreme lack of hydration: loss of consciousness or lethargy, sunken eyes, helpless liquor utilization or failure to drink, oliguria and decreased skin turgor. On the off chance that at any rate two of these

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signs were available, this was alluded to as serious dehydration. The story was made by featuring whether the participants had taken oral rehydration salts with salts (ORS) or not. Blood tests were taken before every IV treatment.Children between the ages of 3 months to 5 year with Passage of loose stools more than 3 times per day were included in this study and the Duration of illness with the symptoms and signs suggestive of dehydration less than fourteen days follow the inclusion criteria.Children with no symptoms or signs of dehydration and Children with causes of dehydration other than acute gastroenteritis were excluded in this study. Persistent diarrhea (>14 days) also follows the exclusion criteria.Children with associated chronic diseases like renal disorders, cystic fibrosis, diabetes mellitus, metabolic diseases, congestive heart failure adrenocortical disorders and malnutrition were excluded in this study.An informed written consent was gotten from the guardians at the time of admission. Detailed history of patients and demographic data was gotten from the guardians with importance to the case and point by point assessment was done according to recommended Performa. Those children meeting the incorporation standards were selected for the examination. Subsequent to evaluating the symptoms and signs of dehydration, the child was ordered into 3 degrees (mild, moderate and severe dehydration) according to table. After clinical evaluation for type of deselectrolytetmia(isonatremic, hyponatremic, hypernatremic, hyperkalemia and hypokalemia) as referenced underneath, it will be additionally affirmed by research facility examinations. Trial of extent (Z-test) was utilized to test the huge contrast between two extents. t-test was utilized to test the critical distinction between implies. $p \leq 0.05$ was considered statistically significant.

Results

This cross sectional study was conducted on 220 children of acute gastroenteritis aged 3 months to 2 years. Our study showed that acute gastroenteritis with dehydration was very common in infants under two years of age. Out of 220 cases, 72.3% cases were in the age group of 3-12 months and 29.2% were in age group of 13-24 months. In our study the incidence of acute gastroenteritis with dehydration was greater in males 132 (60.0%) as compared to females 88 (40.0%). Sex ratio was 1.6:1 in favour of males. The highest number of cases 154 (70.0%) belonged to mild degree of dehydration followed by 36 (16.3%) cases of severe and 30 (13.6%) cases of moderate degree of dehydration as shown in table.

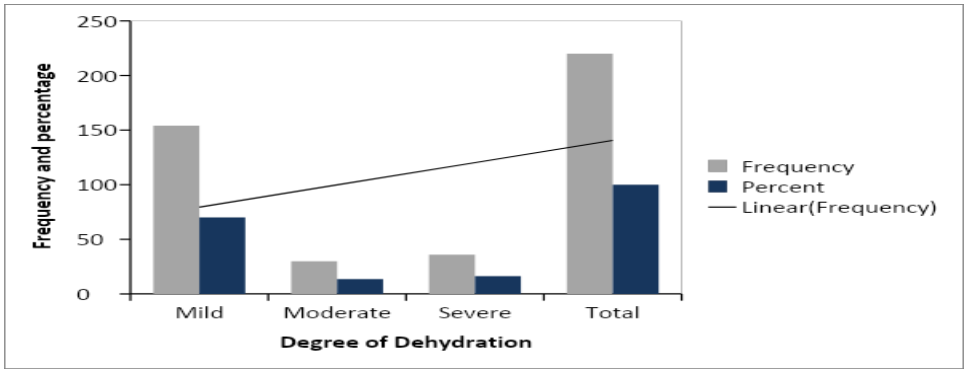

Fig 1: Incidence of Various Degrees of Dehydration

Above table shows that in mild dehydration most common type of the dehydration was isonatremia (92.8%) followed by hyponatremia (5.08%) followed by hypernatremia (1.29%). In moderate dehydration most common type of the dehydration was isonatremia (53.3%) followed by hypernatremia (26.6%) followed by hyponatremia (20%). In severe dehydration most common type of the dehydration was followed by hypernatremia (63.8%) followed by hyponatremia (19.4%) followed by isonatremia (16.6%). The result was statistically significant ($p<0.05$; Significant).

Table 1: Serum sodium level in relation to various degrees of dehydration

Degree Of Dehydration	Type of Dyselectronemia biochemically(Sodium)			otal
	Hypernatremia	Hyponatremia	Isonatremia	
Mild	2(1.29%)	9(5.08%)	143(92.8%)	154(100.00%)
Moderate	8(30.43%)	6(20%)	16(53.3%)	30(100.00%)
Severe	23(63.8%)	7(19.4%)	6(16.6%)	36(100.00%)
Total	33(15%)	22(10%)	165(750%)	220(100.0%)

Above table shows that neurological signs were uncommon in isonatremia. In hyponatremia 52.3% cases showed lethargy, 38.0% cases showed irritability, 47.6% showed seizures. In hypernatremia 62.8% cases showed lethargy, 82.8% cases had seizures and 34.2% cases had seizures; and 76% cases presented with thick skin. In Isonatremic dehydration 3.6% cases presented with lethargy and 11% cases presented with irritability. The result was statistically significant Above table shows that patient those who had hypokalemia biochemically. Out of those 45.5% presented with paralytic ileus as clinical sign.The above table shows that death was seen in 2% of cases and all the cases had severe degree of dehydration. The result was statistically highly significant (Highly Significant)

Table 2: Clinical Signs Suggestive Of Dyselectrolytemia (Sodium)

Dyselectrolytemia	Total No.of cases	Dyselectrolytemia Clinically(Sodium)			
		Lethargy	Irritability	Seizures	Thick Skin
Isonatremia	164	6(3.6%)	19(11.5%)	0(0%)	0(0%)
Hyponatremia	21	11(52.3%)	8(38.0%)	10(47.6%)	0(0%)
Hypernatremia	35	22(62.8%)	29(82.8%)	12(34.2%)	24(68.5%)
Total	220	39(17.7%)	56(25.4%)	22(10%)	24(10.9%)

Above table shows that in mild dehydration most common type of the dehydration was isokalemia (91.5%) followed by hypokalemia (8.4%). In moderate dehydration most common type of the dehydration was isokalemia (80%) followed by hypokalemia (20%). In severe dehydration all cases had isokalemia. The result was not statistically significant (p>0.05; Not Significant).

Table 3: Serum Potassium Level In Relation To Various Degrees of Dehydration

Degree of Dehydration	Type of Dyselectronemia biochemically (Potassium)		Total
	Isokalemia	Hypokalemia	
Mild	141(91.5%)	13(8.4%)	154(100.0%)
Moderate	24(80%)	6(20%)	30(100.0%)
Severe	36(100.00%)	0(0.0%)	36(100.0%)
Total	201(91.3%)	19(8.6.0%)	220(100.0%)

The above table shows that death was seen in 2% of cases out of which 57.1% cases had hypernatremia and 42.8% cases had isonatremia. No mortality was seen in hyponatremic cases.

Table 4: Final Outcome In Relation To Various Types of Dyselectronemia

FinalOutcome	Type of Dyselectronemia biochemically			Total
	Hypernatremia	Hyponatremia	Isonatremia	
Death	8(57.1%)	-	6(42.8%)	14(100.0%)
Discharge	29(14.0%)	17(8.2%)	160(77.6%)	206(100.0%)
Total	37(16.8%)	17(7.7%)	166(75.4%)	220(100.0%)

Discussion

In present study, acute gastroenteritis was the reason for dehydration in every one of the 220 examination cases. Our examination showed that acute gastroenteritis with dehydration was very common in newborn children under five years old. Out of 220 cases, 71.5% cases were in the age group of 3-12 months and 28.5% were in age group of 13- 24 months. It was more common in age group of 3- 12 months because infants and young children, tend to be more susceptible to volume depletion as a result of vomiting, diarrhea or increase in insensible water losses. Sarita KC et al (2018) showed a similar trend with 18.7%, 61.5%, 19.8% of the cases in age group of 1 - 5 months, 6 - 23 months and 24-60 months respectively[9].This study shows that hypernatremia is more common than hyponatremia in children with severe dehydration[10]. In particular, 89.2% of the population examined showed at least one or more forms of electrolyte imbalance[11].Matthias Mariere Okposio and others have found electrolyte imbalance in more than three quarters of the affected children[12]. In the Ritika study, isonatremia was the most common dehydration (71.5%), followed by hyponatremic dehydration (22%) and hypernatremic dehydration (6.5%). 170 children (85%) had normokalaemia and 30 cases (15%) had hypokalaemia and none of the cases had hyperkalaemia. Six cases of hyponatraemia were associated with hypokalaemia. Of the 21 children who received appropriate ORS rehydration therapy before admission, only 5 had hyponatremia and none of them had hypernatremia. Therefore, the concentration of ORS made at home has played an important role in the electrolyte imbalances that occur with gastroenteritis. Using diluted ORS often leads to hyponatremia. ORT seems to be the optimal way of rehydration for most children[12].Dehydration and electrolyte imbalance are common complications of acute diarrhea in children[13].In fact; children have significant physiological differences compared to adults due to their entire body surface area, immature kidney structures and endocrine systems, as well as a higher metabolic rate. Each of these factors causes them to develop fluctuations in the water and electrolyte balance[14].The volume depletion raises aldosterone levels, further increasing urinary K+ losses and preventing correction of metabolic alkalosis and hypokalemia until the volume depletion is corrected[15]. Sarita KC et al (2018),[15]also reported that hypokalemia was more common than hyperkalemia which implies that loss of potassium is relatively greater than loss of water during diarrhea. Therefore, hypokalemic children are required to have close monitoring of serum potassium level, and potassium replacement is necessary as early as needed. In this study, there was no significant (p value 0.315) relationship found between degree of dehydration and serum potassium this may be because of the reason that potassium is major intracellular ion. In our study, potassium imbalance was assessed on basis of clinical signs. Among clinical signs of hypokalemia, 45.5% cases presented with paralytic ileus and result was statistically significant (p <0.05). The study conducted by Majeed R et al[16] was in agreement showing that potassium imbalance presented with various clinical sign like

abdominal distension (84.6%) weakness of limbs (26.92%) and paralytic ileus (23.07%) cases.

Conclusion

It is vital to survey clinically for level of dehydration as well as for type or example of electrolyte disturbance. At that point we ought to affirm this clinical appraisal of dyselectrolytemia by proper biochemical examinations. Additionally, we should see if there is any connection between's various levels of dehydration and type of dyselectrolytemia. Such a technique can assist us with arranging a suitable, ideal and more successful administration of these patients by restoration of their body homeostasis as far as osmolality not withstanding the volume consumption. Such an effort can go a long way to significantly reduce the morbidity and mortality in infants suffering from acute gastroenteritis and dehydration particularly in agricultural nations like India.

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