

A Hospital Based Observational Assessment of the Clinical Features of Hyponatremic Dehydration in Acute Gastroenteritis

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Received: 25-12-2022 / Revised: 15-01-2023 / Accepted: 04-02-2023

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Conflict of interest: Nil

Abstract

Aim: The aim of the present study was to evaluate the clinical features of hyponatremic dehydration associated with acute gastroenteritis.

Methods: The study was done in SKMCH, Muzaffarpur, Bihar, India. The Study population consisted from Infants to children aged till 12 years attending the paediatric department both OPD and IPD care for acute gastroenteritis are enroll in the study. A total of 100 Children including neonates were enrolled in the study. The duration of the study was six months.

Results: 100 cases were studied and analyzed to detect Gastroenteritis associated dehydration and its clinical features as a possible risk factor for hyponatremia. It was found that 60% of the males were having acute gastroenteritis while it was 40% in female subjects. The data also reveals that higher incidence of acute gastroenteritis was noted between 6 to 24 months of age while the lower incidence was found in the subjects above 36 months of age. Hyponatremia was occurred in 36 subjects with high incidence in lower age group in both the genders. Males (40%) were more affected than females (30%).

Conclusion: The clinical impression of the type of dehydration and electrolyte disturbances was fairly consistent with serum electrolytes values. This suggest that routine estimation of serum electrolytes is not necessary however it is necessary whenever electrolyte imbalance is suspected on clinical grounds and in cases which do not respond satisfactorily with routine fluid electrolyte therapy.

Keywords: Hyponatremia, Gastroenteritis, Dehydration, Vomiting, Diarrhea.

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Introduction

Diarrhea remains a major cause of child morbidity and mortality worldwide. [1] Diarrhea is a major cause of illness and death among children in developing countries, where around 1.3 billion episodes and 3.2 million deaths occur in children under 5 years of age. About 80% of deaths from diarrhea occur in the first

two years of life. [2] Malnourished children are at increased risk of complications. In some countries, the rate of income increases due to gastroenteritis, malnutrition, comorbidity and electrolyte imbalances (especially hyponatremia and hypokalaemia). The length of hospital stay is also longer than that of her non-native

colleagues. The costs for the gastroenteritis community are enormous, but are often underestimated. In addition, family costs, including lost work, are often not taken into account. [3]

The clinical manifestations of acute diarrhea are related to the severity of the lack of water and the type of electrolyte imbalance. As a result, the clinical detection of water and electrolyte disorders, especially hyponatremic dehydration, becomes important due to their serious neurological consequences. [4] Because the osmolality and volume of extracellular fluid are determined by their sodium content, this ion plays a key role in the regulation of water and electrolytes. In this sense, the biochemical change in children suffering from dehydration can be hyponatremic, isonatremic or hypernatremic. Other observed biochemical changes are hypokalaemia and metabolic acidosis. [5] The clinical impression of the type of dehydration and electrolyte changes was fairly in agreement with the values of the serum electrolytes. Bloating and abdominal distention correlated positively with hyponatraemia and hypokalaemia. Routine monitoring of serum electrolytes is not required. However, it is important if an electrolyte imbalance is suspected for clinical reasons and if they do not respond satisfactorily with routine fluid and electrolyte therapy. [6] Disorders of sodium and potassium levels in diarrhea-related dehydration cases can be a medical emergency that requires quick and appropriate diagnosis and treatment. [7]

Despite the fact that drugs are a typical reason for hyponatraemia, different causes ought to likewise be considered. Surveying the patient's liquid status and plasma osmolality can help in finding the reason. As hyponatraemia is regularly connected with liquid maintenance the osmolality is generally diminished, anyway different causes might be related with typical or expanded osmolality. [8] In neonate,

hypernatremic dehydration might be associated as a weight reduction with over 10% of birth weight toward the finish of first seven day stretch of life or if there is clinical discoveries of lack of hydration with hypernatremia. Hypernatremic dehydration is a possibly deadly condition in neonate which unfavorably influences focal sensory system, prompting destroying outcomes like intracranial discharge, thrombosis, and even demise. [9]

Both hyponatremic and hypernatremic patients are usually experienced in a wide assortment of clinical circumstances. Most noticeable among the clinical signs of both of these electrolyte variations from the norm is focal sensory system symptomatology as well as scatters of sensorium. Not inconsistently, such patients have other related ailments, which may alter the clinical picture exhibited by the anomalies of salt and water balance. [10] Intense hyponatremia is characterized by beginning of side effects <48hrs. Patients with intense hyponatremia create neurologic manifestations coming about because of cerebral edema incited by water development into the mind. These may incorporate seizures, debilitated mental status or trance like state and death. While chronic hyponatremia creating over >48hrs should be considered "chronic." Most patients have chronic hyponatremia. The serum sodium focus is more often than not above 120meq/L. [11]

The aim of the present study was to evaluate the clinical features of hyponatremic dehydration associated with acute gastroenteritis.

Materials and Methods

The study was done in SKMCH, Muzaffarpur, Bihar, India. The Study population consisted from Infants to children aged till 12 years attending the paediatric department both OPD and IPD care for acute gastroenteritis are enroll in the study. A total of 100 Children

including neonates were enrolled in the study. The duration of the study was six months

Sample collection and analysis: After obtaining informed consent from the parents of cases, they are subjected to detailed history and clinical examination and the findings are entered in the Performa. Blood samples are collected and measures of serum electrolytes & Sr Calcium are measured and compared with that of the clinical aspects of the patient i.e diarrhea, vomiting, thirst, fever, abdominal distention and convulsions followed by urine analysis. The approval from institutional review board was obtained before the study was initiated.

Inclusion criteria

1. Watery diarrhoea of 4 or more episodes per day.
2. Age group less than 12 years.
3. Signs and symptoms suggestive of mild dehydration.
4. Without any other severe complications

Exclusion criteria

1. Diarrhoea of 12 or more episodes per day.
2. Haematological disorders, chronic illness.
3. Signs suggestive of mild or no dehydration

Statistical analysis: Statistical analysis was done with EpiInfo, SPSS and Microsoft Excel.

Results

Table 1: Age and Gender Distribution of the Subjects in Study

Age distribution	Male N%	Female N%	Total
6m – 24m	50 (50)	35 (35)	85 (85)
25m-36m	6 (6%)	2 (2)	8 (8)
Above 36m	4 (4)	3 (3)	7 (7)
Total	60 (60)	40 (40)	100 (100)

100 cases were studied and analyzed to detect Gastroenteritis associated dehydration and its clinical features as a possible risk factor for hyponatremia. It was found that 60% of the males were having acute gastroenteritis while it was

40% in female subjects. The data also reveals that higher incidence of acute gastroenteritis was noted between 6 to 24 months of age while the lower incidence was found in the subjects above 36 months of age.

Table 2: Incidence of Hyponatremia with respect to age and Gender

Age	Male				Female			
	Hyponatremic	Normal	Total	% affected	Hyponatremic	Normal	Total	% affected
6m – 24m	20	30	50	33.34	11	25	36	27.5
25m-36m	1	3	4	1.66	1	0	1	2.5
Above 36m	3	3	6	5	0	3	3	0
Total	24	36	60	40	12	28	40	30

Hyponatremia was occurred in 36 subjects with high incidence in lower age group in both the genders. Males (40%) were more affected than females (30%).

Table 3: Incidence of severity of dehydration with Respect to age and gender

Age	Male				Female			
	Severe	Moderate	Total	%	Severe	Moderate	Total	%
6m – 24m	20	30	50	83.34	16	20	36	90
25m-36m	0	4	4	6.66	1	0	1	2.5
Above 36m	0	4	6	10	0	3	3	7.5
Total	20	40	60	100	16	24	40	100

Among 100 individuals, 36 were severely dehydrated and rest of them was moderately dehydrated (64). The number of episodes of loose stools was correlating with the extent of dehydration. Higher the episodes the severe were the dehydration.

Discussion

Diarrhoeal disorders are a major public health problem worldwide, more so in low- and middle-income countries. This condition contributes to significant mortality as well as morbidity in children under five years of age. Over the last few years, India has witnessed a steady reduction of mortality in children younger than age of 5 years, with total deaths having declined from 2.5 million in 2001 to 1.5 million in 2012. [12] Such remarkable reduction could actually happen due to the inception and successful implementation of health programs like expanded program on immunization, program for the control of diarrheal diseases and acute respiratory infection. Whereas the overall mortality among children under-5 years has reduced considerably, diarrhoeal diseases still account for a high proportion of such deaths. In children less than 5 years of age, diarrhoea is the 3rd most common cause of death which is responsible for 13% deaths in this age-group. It is estimated that diarrhoea still kills over 300,000 children in India each year. [13] Due to such high burden, it is very important to monitor information on diarrheal diseases, its determinants as well as preventive and control strategies to ensure better planning

and organization of health services in a community.

In our study the most effected age population was 6 to 24 months and more effected were males In a study by SV Prasad et al found that 29.8% of the sick children is suffering from hyponatremia who require emergency care and must hospitalize while compared to the reported data in adult population, it also states that frequency oh hyponatremia is much higher in hospitalized sick children. [14] As stated by Jacob in his study that incidence of diarrhoea is high in children particularly in developing countries, but very low proportion of the effected children visits to the clinic. Our study also supports this results that children effected with diarrhoea is less frequently hospitalized than gastroenteritis. [15] As mention in the book of Australian prescribers that approximately 5% of the outpatients and 15% of the inpatients are drug induced hyponatremia in adults [16], but in children the incidence of drug induced hyponatremia is very rare.

Jagdish et al. in Turkish province found that 5.6% neonates experience serum sodium concentrations more than 145 mmol/L in hypernatremia dehydration while our study shows that 29.8% of the infants have serum sodium levels lower than 135 mmol/L hyponatremic dehydration. [17] However, Samadi AR et al [18] showed that incidence of hyponatremia was different among different age groups and the incidence of hyponatremia increases with age. In the

present study, incidence of hypernatremia was significantly higher in infants as compared to older children (78.6% vs 21.4%, $p < 0.01$). Such higher prevalence of hypernatremia in younger infants might be attributed to the use of over concentrated ORS or formula milk and larger evaporative water loss through skin of young children. [19]

Many studies have been conducted in the past to determine the prevalence of various electrolyte disorders in children with gastroenteritis. [20] These studies show that sodium disorders are more common in children with severe dehydration. Studies in South Asia show that hyponatremia is more common in pediatric age groups than hypernatremia. This study shows that hypernatremia is more common than hyponatremia in children with severe dehydration. [21]

Clinical management of hyponatremia depends on treating the fundamental causes however precise assurance of etiology of hyponatremia is not known, additionally, a clinical history might be hard to get because of pediatric population. Hence proper history from the parents and pediatrician clinical judgment is the most broadly acknowledged methods for acquiring precise conclusion of hyponatremia and its treatment in pediatric population.

Conclusion

The clinical impression of the type of dehydration and electrolyte disturbances was fairly consistent with serum electrolytes values. This suggest that routine estimation of serum electrolytes is not necessary however it is necessary whenever electrolyte imbalance is suspected on clinical grounds and in cases which do not respond satisfactorily with routine fluid electrolyte therapy. In summary, it can be said that electrolyte disturbances are very common in children with acute diarrhea. The degree of dehydration and the age of less than 12

months seem to be good prognostic factors for electrolyte imbalance. Early diagnosis and treatment are very important to prevent complications.

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