

A Prospective Study on the Clinical Features of Hyponatremic Dehydration in Acute Gastroenteritis

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Abstract

Introduction: Babies and children with gentle lack of hydration regularly have negligible or no clinical changes other than a lessening in pee yield. Alongside diminished pee yield in kids with moderate drying out regularly have dried mucous layers, diminished skin turgor, crabbiness, tachycardia with diminished hair like refill, and profound breath. **Methodology:** The study was done in Deccan College of Medical Sciences & Owaisi Group of Hospitals. 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. **Aims and Objectives:** To estimate the incidence of hyponatraemic dehydration in neonates and children. To evaluate the clinical features associated with acute gastroenteritis associated dehydration. **Results:** 80 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 GE was noted between 6 to 24 months of age while the lower incidence was found in the subjects above 36 months of age. **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.

Introduction

The investigations on recurrence and epidemiological attributes of side effect have appeared at be the main commonest arrangement variation from the norm in hospitalized wiped out grown-ups. In them, it's constantly identified with hypo-osmolality and conventional affiliation and is ascribed to disorder of wrong enemy of diuretic inner discharge emission (SIADH) or wiped out cell disorder. The information on the recurrence of side effect in debilitated youths is kept exclusively to some particular Infection, directing routine support liquids, that are commonly hypo-tonic saline and D5, could intensify the condition. Since a diminishing in sodium grouping of plasma is by all accounts a run of the mill occurrence in hospitalized patients, it's basic that analyzed kids are in risk of side effect should know at the most punctual [1].

The occurrence of hyponatremia has been exhibited to be an autonomous hazard factor for expanded mortality in medical clinic inpatients. As hyponatremia is the most well-known electrolyte unsettling influence experienced in clinical drug, it is fundamental that specialists and medical attendants realize how to properly deal with this condition. Extreme hyponatremia has for quite some time been perceived to be related with antagonistic results [2].

Babies and children with gentle lack of hydration regularly have negligible or no clinical changes other than a lessening in pee yield. Alongside diminished pee yield in kids with moderate drying out regularly have dried mucous layers, diminished skin turgor, crabbiness, tachycardia with diminished hairlike refill, and profound breath. A methodical audit of the exactness of clinically foreseeing at any rate 5% lack of hydration in kids found abnormal skin surface, and decreased

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respiratory example to be the best indicators [3]. No ongoing investigations exist with respect to the electrolyte unsettling influences happening in a youngster experiencing AGE. Like wise, there are no particular examinations portraying the clinical highlights related with Hyponatremic drying out, and the pieces of information to separating it from Isonatremic drying out [4].

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 [5]. 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 [6].

In spite of these examinations utilizing distinctive techniques for evaluating perception, all reliably discovered that intellectual impedance happens in patients with interminable hyponatremia. Be that as it may, the components clarifying this affiliation stay indistinct. In constant hyponatremia, serum sodium levels decrease bit by bit, permitting the body time to adjust. To anticipate swelling at first, the glial cells utilize the Na⁺-K⁺-ATPase framework to move sodium out of cells while likewise removing osmolytes [7]. The predominance of serious hyponatremia (serum sodium level under 125 mEq for every L) was 4.5%, 0.8%, and 10.3%, separately. It is assessed that hyponatremia happens in 4% to 7% of the wandering populace, with rates of 18.8% in nursing homes [8].

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 are 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 [9]. 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 [10].

Materials and Methodology

Place of Study: The study was done in Deccan College of Medical Sciences & Owaisi Group of Hospitals, the facility is 1000 bedded teaching hospital, in the heart of Hyderabad in Telangana State which provides tertiary level clinical care

Study Population: Study population consisted from Infants to children aged till 12 years attending the pediatric Department both OPD and IPD care for acute gastroenteritis are enroll in the study who is satisfying the criteria for Moderate to severe dehydration.

A total of 80 Children including neonates are enrolled in the study.

Period of Study: the study was conducted from January 2018 to December 2018.

Type of Study: Prospective, Observational Study

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.

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.

Ethical Approval: approval from institutional review board was obtained before the study was initiated.

Aims and Objectives

1. To estimate the incidence of hyponatraemic dehydration in neonates and children aged till 12 years.
2. To evaluate the clinical features associated with acute gastroenteritis associated dehydration.
3. To determine the clinical correlates of serum electrolytes in acute gastroenteritis.

Results

80 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 1)

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

Age distribution	Male		Female		Total	
	(n)	%	(n)	%	(n)	%
6m – 24m	41	51.2	29	36.3	70	87.5
25m-36m	4	5	1	1.2	5	6.2
Above 36m	3	3.7	2	2.5	5	6.2
Total	48	60	32	40	80	100

Hyponatremia was occurred in 28 subjects with high incidence in lower age group in both the genders. Males (41.5%) were more effected than females (31.2%). (Table 2). Lowest sodium level was 127mmol.

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

Age	Male				Females			
	Hyponatremic	Normal	Total	% affected	Hyponatremic	Normal	Total	% affected
6m – 24m	15	26	41	31.2	9	20	29	28.1
25m-36m	2	2	4	8.3	1	0	1	3.1
Above 36m	1	2	3	2	0	2	2	0
Total	18	30	48	41.5%	10	22	32	31.2%

Among 80 individuals, 25 were severely dehydrated and rest of them were moderately dehydrated (55n). The number of episodes of loose stools were correlating with the extent of dehydration. Higher the episodes the severe was the dehydration. (Table 3)

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

Age	Male				Females			
	Severe	Moderate	Total	%	Severe	Moderate	Total	%
6m – 24m	13	28	41	85.4	11	18	29	90.6
25m-36m	0	4	4	8.3	1	0	1	3.125
Above 36m	0	3	3	6.2	0	2	2	6.25
Total	13	35	48	100	12	20	32	100

Vomiting were associated with diarrhea in 52 subjects whereas 28 subjects were only complained of diarrhea. (Fig 1)

The subjects who were severely dehydrated showed both the manifestations of diarrhea and vomiting except 11 individuals.

Only 6 individuals showed hypokalemia without hyponatremia. About 3 subjects showed hypokalemia with hyponatremia (Fig 1)

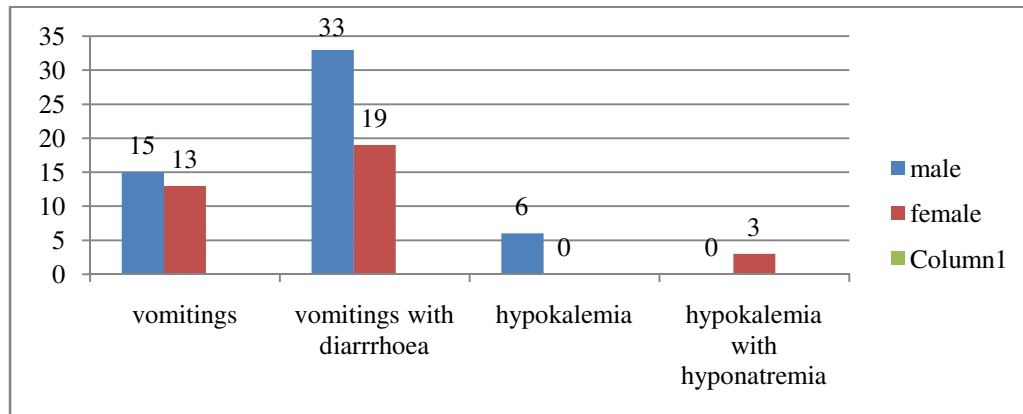


Figure-6: Distribution of clinical & objective features

Discussion

Diarrhoea remains the second most common cause of hyponatremia in children [1]. 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 of hyponatremia is much higher in hospitalized sick children [1].

While our study reveals that overall 30% of the population enrol in the study suffers from hyponatremia which includes both genders from the patients admitted for the gastroenteritis. Neurological complication and symptoms arising from severe hyponatremia can be treated with 3% hypertonic saline [2] while in our study the paediatric population is treated with isotonic saline (0.9%) with a dose of 20ml/kg till the symptoms of the dehydration is resolved and gastroenteritis is corrected followed by oral rehydration salts, as there were no neurological manifestations in the subjects.

Diarrhoea is the most concerning cause of dehydration in children as most of the fluids during gastroenteritis are lost. Our study reveals that prolong patient stay in the hospital is due to increase in the frequency of diarrhoea and so the risk of hyponatremia. Furthermore, emesis is also an important factor contributing to the fluid loss from the body resulting in electrolyte imbalance. As shown in our study, emesis and diarrhoea leads to hypokalemia as well in few subjects [6]. To

tackle this, we need to monitor potassium levels in conjunction with sodium levels. To treat dehydration in children, calculated amount of fluids need to be infused as warranted by a study which shows that the maintenance fluid need for ongoing losses and deficit needs have to be fulfilled by providing adequate fluids till normo-volemia is achieved[3].

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 [4].

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 [5], but in children the incidence of drug induced hyponatremia is very rare.

In our study the included population was only affected with gastroenteritis, hence there should be a broad category of diseases to be included in further research to know exactly the rare causes of hyponatremia in children.

Jagdishet.al in Turkish province found that 5.6% neonates experience serum sodium concentrations of more than 145 mmol/L in hypernatremia dehydration [6], while our study shows that 29.8% of the infants have serum sodium levels lower than 135 mmol/L in hyponatremic dehydration.

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.

Strengths

1. Prospective Study.
2. Helps in correcting hyponatremia in gastroenteritis in paediatric population.

Conclusions

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.

1. The prevalence of hyponatremia indicates that the values are on the borderline, hence considering the values during the treatment of gastroenteritis will helpful in correcting the electrolytes.
2. The Incidence of diarrhoea peaks in children less than 1 year of age and then decreases as age increases. The analysis of clinical presentation revealed that vomiting and fever were frequent accompanied with hyponatremic dehydration.

What study adds to existing knowledge- The present study was based on the very small sample size, hence a larger study group is recommended to come to a very definitive conclusion.

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