



HYPONATREMIA IN CHILDREN HOSPITALIZED AT NISHTAR HOSPITAL, MULTAN.

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Article received on:

04/02/2019

Accepted for publication:

09/05/2019

ABSTRACT... Objectives: Acute gastroenteritis is a common illness that leads to significant morbidity and mortality in pediatric population. This study was aimed to determine the frequency of hyponatremia among hospitalized children having acute gastroenteritis. **Study Design:** Cross-sectional Study. **Setting:** Unit-II, Department of Pediatric Medicine, Nishtar Medical College and Hospital, Multan. **Period:** From 1st January 2018 to 30th June 2018. **Material & Methods:** A total of 232 children aged 1-12 years of either sex, clinically assessed cases of acute gastroenteritis with duration of illness < 7 days, were considered. Mean and standard deviation was calculated for quantitative variables while frequencies and percentage were tabulated for the qualitative variables. Post stratification chi-square test was applied to see effects of studied variables and P value <0.05 was considered as significant. **Results:** Mean age of our study cases was 2.33 ± 2.11 years. Majority of patients, 135 (58.2%) were boys, 143 (61.6%) from urban areas and 161 (69.4%) were having poor socioeconomic status. History of hypotonic IV fluid therapy was positive in 18 (7.8%) and history of ORS intake was positive in 71 (30.6%). Mean duration of illness was 4.19 ± 1.27 days. Mean serum sodium level 135.37 ± 2.20 mEq/L. Hyponatremia was present in 90 (38.8%). Male gender, poor socioeconomic status, no use of hypotonic IV fluid therapy, no intake of ORS and disease duration of >3 days were significantly associated (P value < 0.05) with hyponatremia. **Conclusion:** Frequency of hyponatremia was high in children with AGE. Male children, poor socioeconomic status, no use of hypotonic IV fluid therapy, no intake of ORS and prolonged disease duration were significantly associated with hyponatremia.

Key words: Acute Gastroenteritis, Frequency, Hyponatremia, ORS.

Article Citation: Joiya SJ, Khan MA, Ahmad Z, Ibrahim M. Hyponatremia in children hospitalized at Nishtar Hospital, Multan. Professional Med J 2020; 27(5):880-884. DOI: 10.29309/TPMJ/2020.27.05.3220

INTRODUCTION

Acute gastroenteritis (AGE) is one of the most common illnesses of childhood. AGE is estimated to be a reason for 10% of hospitalizations in the United States in children less than 5 years of age. Symptoms of AGE are mostly seen as vomiting, diarrhea, abdominal pain and fever and many a times pathogen dependent.¹⁻³ While no treatment is needed for self-limiting virus induced acute gastroenteritis, dehydration caused by diarrhea and emesis is of great concern and should be treated vigorously because it is the most important complication and a major reason for hospital admissions.⁴ Hyponatremia is considered to be one of the most frequent electrolyte disturbances in children who are hospitalized.⁵ Normally, serum sodium concentration is regulated by osmo-receptors interacting with the thirst center,

the vasopressin and kidney axis. Children with gastroenteritis have elevated anti-diuretic hormone (ADH) levels.⁶

In literature, varying frequency rates of hyponatremia have been reported in children with acute gastroenteritis. Badeli et al from Iran reported 40.7% hyponatremia in AGE.³ Moritz et al. reported 18.5 % frequency of hyponatremia in children with AGE.⁷ Hanna et al also reported 18.5% frequency of hyponatremia among targeted population.⁶

Hyponatremia is associated with worse outcomes in children having AGE.^{6,7} Varying results are found regarding frequency of hyponatremia while not much work has been done locally so we aimed this research to establish the content

of hyponatremia in hospitalized children. The results will produce baseline data of our admitted children which was compared with those of already reported in literature. Moreover findings will also help our national researchers to design future advanced studies.

MATERIAL & METHODS

This was a descriptive, cross-sectional study, done at Unit-II, Department of Pediatric Medicine, Nishtar Medical College and Hospital, Multan, from 1st January 2018 to 30th June 2018.

A total of 232 children aged 1-12 years of either sex, clinically assessed cases of AGE with duration of illness less than 7 days, were enrolled adopting non-probability consecutive sampling. Children with renal disease, cardiac problems, history of hypertension, using diuretic, having edema, history of adrenal dysfunction, neurological illness, meningitis and sepsis, or patients taking medication that can potentially cause hyponatremia and those with the history of excessive intake of salt or water were excluded from the study. A child was counted hyponatremic having a serum Na⁺ level <135 mEq/L.

A specialized proforma was developed to record the findings of this study. Permission was sought from Institutional Ethical Committee. Informed consent was acquired from parents / guardians of these children describing them objectives of this study, ensuring them confidentiality of the information provided and fact that there was no risk involved to the patients. Venous blood sample of 3ml was drawn and sent to Institute's laboratory for serum analysis (for serum Sodium levels), test was performed by a senior Pathologist having 5 years of experience after post-graduation.

SPSS-18 was used for data analysis. Means and standard deviations were computed for quantitative variables while frequencies and percentage were tabulated for the categorical variables. Effect modifiers like age, gender, duration of illness, hypotonic IV fluid therapy and ORS intake were controlled by making stratified tables. Post stratification chi-square test was applied and p value <0.05 was considered as

significant.

RESULTS

Out of a total of 232, 135 (58.2%) were boys while 97 (41.8 %) were girls. Mean age was 2.33 ± 2.11 years, ranging 1 to 10 years. Majority, 178 (76.7%) were aged up to 5 years. Of these 232 cases, 89 (38.4%) belonged to rural areas while 143 (61.6%) from urban areas and 161 (69.4%) belonged to poor while (30.6%) to medium or above socioeconomic status.

History of hypotonic IV fluid therapy was positive in 18 (7.8%) and history of ORS intake was positive in 71 (30.6%). Mean duration of illness was 4.19 ± 1.27 days while 134 (57.8%) had disease duration more than 3 days.

Mean serum sodium level 135.37 ± 2.20 mEq/L with minimum serum Sodium level was 131 mEq/L while maximum serum sodium level was 139 mEq/L. Hyponatremia was noted in 90 (38.8%) children.

When hyponatremia was stratified with regards to study variables, male gender, poor socioeconomic status, no use of hypotonic IV fluid therapy, no intake of ORS and disease duration of >3 days were significantly associated (P value < 0.05) with hyponatremia.

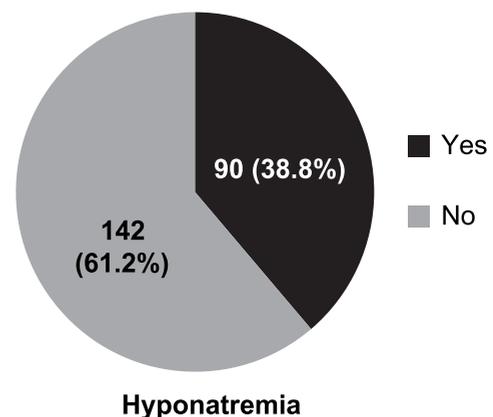


Figure-1. Distribution of hyponatremia among study cases (n=232).

Study Variables		Hyponatremia (n=232)		P-Value
		Yes (n=90)	No (n=142)	
Gender	Male (n =135)	72 (80.0%)	63 (27.2%)	0.001
	Female (n = 97)	18 (20.0%)	79 (72.8%)	
Age Groups (years)	Up to 5 (n =178)	72 (80.0%)	106 (74.6%)	0.426
	> 5 (n = 54)	18 (20.0%)	36 (25.4%)	
Area of Residence	Rural (n = 89)	36 (40.0%)	53 (37.3%)	0.782
	Urban (n =143)	54 (60.0%)	89 (62.7%)	
Socio-economic status	Poor (n = 161)	54 (60.0%)	107 (75.4%)	0.019
	Middle Income or above (n = 71)	36 (40.0%)	35 (24.6%)	
Hypotonic IV Fluid Therapy	Yes (n = 18)	18 (20.0%)	00 (0.0%)	0.001
	No (n = 214)	72 (80.0%)	142 (100%)	
ORS intake	Yes (n = 71)	09 (10.0%)	62 (43.7%)	0.001
	No (n = 161)	81 (90.0%)	80 (56.3%)	
Disease Duration (days)	Up to 3 (n = 98)	27 (30.0%)	71 (50.0%)	0.001
	> 3 (n = 134)	63 (70.0%)	71 (50.0%)	

Table-I. Stratification of hyponatremia with regards to study variable.

Hyponatremia	Serum Sodium level (mEq/L)		P-Value
	Mean	SD	
Yes(n = 90)	132.90	1.05	0.001
No(n = 142)	136.93	0.972	

Table-II. Stratification of hyponatremia with regards to mean serum sodium levels (n = 232).

DISCUSSION

Diarrhea is amongst the leading causes of morbidity and mortality specially amongst children in the developing countries.⁸⁻¹² Major global pediatric associations advise oral rehydration solutions (ORS) to restore

mild to moderate dehydration.^{13,14} Continuing breastfeeding is advisable for hydration and nutrition.¹⁵ Hyponatraemia and hypokalaemia are quite frequent with diarrhea and increase chances of adverse outcome.¹⁶⁻¹⁸

We noted 135 (58.2%) male and 97 (41.8 %) female. Similar results have been reported in many different studies all over the world. A study conducted by Al-Lamkiet al¹⁹ from Oman documented 80% male preponderance. A local study by Bilal et al²⁰ noted 61.3% whereas Zahoor S et al²¹ also reported 66% male, while 1:1 ratio amongst male and female has also been reported.²² A study by Ezeonwu and colleageus²³ also found 56% male.

Mean age of our study cases was 2.33 ± 2.11 years and most, 178 (76.7%) were aged up to 5 years. Bilal et al²⁰ recorded mean age as 1.9 years while similar findings were noted by studies done by Fatima et al²⁴, Ijazet et al²² and Kazemi et al²⁵ found mean ages of children with AGE as 2.5±0.3 years, 2.18 years and 18 ± 2 months respectively.

History of hypotonic IV fluid therapy was positive in 18 (7.8%) and history of ORS intake was positive in 71 (30.6%). Mean duration of illness was 4.19 ± 1.27 days while 134 (57.8%) had disease duration more than 3 days. Our results were similar to Bilal et al²⁰ from Rawalpindi who found 3.2 ± 1.7 days mean duration of the illness whereas Yilgawan et al²⁶ got mean duration of illness as 4 ± 3.2 days.

In literature, varying frequency rates of hyponatremia have been reported in children with AGE. Mean serum sodium level 135.37 ± 2.20 mEq/L (with minimum serum Sodium level was 131 mEq/L while maximum serum sodium level was 139 mEq/L. Hyponatremia was present in 90 (38.8%). Bilal et al²⁰ noted this frequency to be 33% while an Iranian study by Badeli et al²⁷ reported 40.7% hyponatremia in AGE³ which seem consistent with our findings. On the other hand, Hanna et al⁶ and Moritz et al⁷ reported a lower prevalence of hyponatremia as 18.5% in acute gastroenteritis.

CONCLUSION

Frequency of hyponatremia was high in children with AGE. Male children, poor socioeconomic status, no use of hypotonic IV fluid therapy, no intake of ORS and prolonged disease duration were significantly associated with hyponatremia. Hyponatremia leads to significant morbidity of the disease and hospitalization in children with acute gastroenteritis so clinicians treating such patients should monitor serum sodium level on routine basis.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

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2	Muhammad Azam Khan	Supervision, Methodology, Discussion.	
3	Muhammad Ibrahim	Data collection.	
4	Zahid Ahmad	Data analysis, Drafting.	