Rate of Serum Electrolyte Derangement among Pakistani Children Having Acute Diarrhea and Dehydration K.P.K North Population Base Study (Pakistan)

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ABSTRACT

Purpose: To study serum electrolyte derangements among children with acutediarrhea presenting with dehydration.

Methodology: Cross-sectional and descriptive study in department of Pediatrics, MMC Hospital, Mardan (Pakistan) for from 01-02-2020 to 31-10-2020. A total of 390 children having acute diarrhea with dehydration were included. Five milliliters (5mls) of blood was drawn and estimation of serum Sodium and potassium levels were done.

Findings: In 390 cases, 218 (55.9%) were males while 172 (44.1%) were females. The mean age was 2.5±1.5 years. Out of 390 cases, 2(0.51%) had no dehydration, some dehydration was noted in 218 (55.9%) cases while 170 (43.59%) cases had severe dehydration. Hypernatremia was noted in 218 (55.9%) cases and hypokalemia was noted in 77(19.74%) cases.

Conclusion: High rate of hyponatremia and hypokalemia was seen in our study in children with acute diarrhea and dehydration. Hyponatremia and hypokalemia was significantly associated with age, gender and grades of dehydration.

Keywords: Rate, serum electrolyte, diarrhea, dehydration.
INTRODUCTION

Every child develops at least 2-3 attacks of diarrhea\(^1\-^2\). Pediatrics mortalities due to diarrhea are about 1.77 million/year in whole world. In this data, about 70% of these children belong to developing countries\(^3\-^4\). According to WHO, >700 million attacks of diarrhea in <5 years of age are reported in middle income countries\(^5\). Infectious microorganisms responsible may include E. coli, different viruses, protozoal species and helminthes which are transmitted through oral and fecal route\(^6\). Presence of different types of electrolyte disorders is associated with significant increase in mortality rates among children with diarrhea\(^7\). Electrolyte disorders may remain unrecognized and result in increased morbidity and mortality. Timely recognition, a high index of suspicion, and a thorough understanding of common electrolyte abnormalities is necessary to ensure their correction. Different studies have shown different incidences of electrolyte disorders among children with dehydration\(^8\). This study was undertaken to ascertain the frequency of different types of electrolyte disorders among children with diarrhea related severe dehydration, and to study the correlation of electrolyte, urea and creatinine levels with age of the patients. No study conducted previously had evaluated the correlation of electrolyte, urea, and creatinine levels with age of the patients\(^9\). According to research, none of these studies evaluated chloride levels in children of all age groups with dehydration\(^10\-^12\). Previous studies evaluated chloride levels only among children below one year and among children with malnutrition\(^12\-^14\-^16\). Parameters of this study included checking of chloride levels among pediatric patients with severe dehydration belonging to all nutritional statuses and age groups and we also studied correlation between levels of different electrolytes and renal function tests with age of the patients.

METHODOLOGY

This cross-sectional and descriptive study in pediatrics department, mmcHospital, Mardan with a duration of study was from 01-02-2020 to 31-10-2020. 390 patients with acute diarrhea. Sample size has been calculated by using following formula; \(n=z^2pq/d^2\), where, \(p=39.3\%\) (frequency of hypokalemia in acute diarrhea with dehydration), \(q =100-p\), \(d=\%\). Non-probability consecutive sampling technique was used.

Inclusion Criteria: Mean wise

Genders with age ranging from 6 month to 12 years with acute diarrhea/dehydration of duration < 15 days. While patients with chronic and bloody diarrhea and acute renal failure were excluded.

Data collection: Permission was taken from Institutional mmc hospital Ethical Committee for this study. Informed consent was taken from the parents. Five ml of blood was drawn for estimation of serum Sodium and potassium levels. All the data was analyzed using SPSS-2.2 Descriptive statistics was applied to calculate mean and SD for serum Na & K levels. Frequencies and percentages were tabulated for the categorical variables like Gender, age groups, grades of dehydration, hyponatremia and hypokalemia. P value <0.05 was considered as significant.
RESULTS

Table 1: Gender Distribution

| Gender  | n   | %age |
|---------|-----|------|
| Male    | 218 | 55.9 |
| Female  | 172 | 44.1 |
| Total   | 390 | 100  |

Table 2: Age distribution

| Age groups | n   | %age  |
|------------|-----|-------|
| Up to 5 Years | 276 | 70.77 |
| >5 Years    | 114 | 29.23 |
| Total       | 390 | 100   |

Table 3: Grades of dehydration

| Grades             | n   | %age  |
|--------------------|-----|-------|
| No Dehydration     | 02  | 0.51  |
| Some Dehydration   | 218 | 55.9  |
| Severe Dehydration | 170 | 43.59 |
| Total              | 390 | 100   |

Table 4: Hyponatremia in study cases

| Hyponatremia | n   | %age |
|--------------|-----|------|
| Yes          | 218 | 55.9 |
| No           | 172 | 44.1 |
| Total        | 390 | 100  |
Table 5: Hypokalemia in study cases

| Hypokalemia | n   | %age  |
|-------------|-----|-------|
| Yes         | 77  | 19.74 |
| No          | 313 | 80.26 |
| Total       | 390 | 100   |

DISCUSSION

In 390 cases, 218(72.7%) cases were males and 172(28.2%) cases were females. One of the study showed that there are 62.4% cases with male dominance. This study is in accordance with the current study. In another study, it is reported that there are 60.3% male cases. This is also in favor of this study. As per the Mardan Region, it had 62% male dominance. These results are in accordance with this study. In this study, mean age was 2.62±1.54 years. Our study showed that 218(92.6%) cases were of age up to 5 years. A study conducted by Moyo and colleagues showed maximum cases up to 5 years. These results are in favor of this results.

Regarding electrolytes disturbances, a study conducted in Nigeria has reported 58.5% hyponatremia and 32.1% hypokalemia in acute diarrhea having dehydration. This study is in favor of our study.

CONCLUSION

Hypernatremia and hypokalemia was seen in KPK region during this study in children with acute diarrhea and dehydration. Hypernatremia and hypokalemia was significantly associated with age, gender and grades of dehydration.

REFERENCES

1. Black RE, Cousens S, Johnson HL, Lawn JE, Rudan I. Global, regional, and national causes of child mortality in 2008: a systematic analysis. Lancet 2010; 375:1969-87.
2. Saeed A, Abd H, Sandstrom G. Microbial aetiology of acute diarrhoea in children under five years of age in Khartoum, Sudan. J Med Microbiol. 2015 Apr;64(Pt 4):432-7.
3. Bhutta ZA, Das JK, Walker N et al. Interventions to address deaths from childhood pneumonia and diarrhea equitably: what works and at what cost? Lancet. 2013;381:1417–29.
4. Rahman AE, Moinuddin M, Molla M et al. Childhood diarrhoeal deaths in seven low- and middle-income countries. Bull World Health Organ. 2014 Sep 1;92(9):664-71.
5. Mladenova Z, Steyer A, Steyer AF et al. Aetiology of acute paediatric gastroenteritis in Bulgaria during summer months: prevalence of viral infections. J Med Microbiol. 2015 Mar;64(Pt 3):272-82.
6. Rathaur VK, Pathania M, Jayara A. Clinical study of acute childhood diarrhoea caused by bacterial entero pathogens. J Clin Diagn Res. 2014 May;8(5):PC01-5.

7. Moyo SJ, Gro N, Matee MI et al. Age specific aetiological agents of diarrhoea in hospitalized children aged less than five years in Dar es Salaam, Tanzania. BMC Pediatr. 2011 Feb 23;11:19. doi: 10.1186/1471-2431-11-19.

8. Bilal A, Sadiq MA, Haider N. Frequency of hyponatraemia and hypokalaemia in malnourished children with acute diarrhoea. J Pak Med Assoc. 2016 Sep;66(9):1077-1080.

9. Zahoor S, Afzal MF, Iqbal SMJ et al. Rotavirus diarrhoea in children below 5 years of age. Pak Paed J Jul - Sep 2012;36(3):128-31.

10. Okposio MM, Onyiriuka AN, Abhulimhen-Iyoha BI. Point-of- Admission Serum Electrolyte Profile of Children less than Five Years Old with Dehydration due to Acute Diarrhoea. Trop Med Health 2015;43(4):247-52.

11. Weizman Z, Houri S, Ben-Ezer Gradus D. Type of acidosis and clinical outcome in infantile gastroenteritis. J Pediatr Gastroenterol Nutr 1992; 14:187-91.

12. Odey FA, Etuk IS, Etukudoh MH, Meremikwu MM. Hypokalaemia in children hospitalised for diarrhoea and malnutrition in Calabar, Nigeria. Niger Postgrad Med J 2010; 17:19-22.

13. Petzold A. Disorders of plasma sodium. N Engl J Med 2015; 372:1267. 11. Chouchane S, Fehri H, Chouchane C, Merchauui Z, Seket B, Haddad S, et al. Hypernatremic dehydration in children: retrospective study of 105 cases. Arch Pediatr 2005; 12:1697-702.

14. Rand SE, Colberg A. Neonatal hypernatremic dehydration secondary to lactation failure. J Am Board Fam Pract 2001; 14:155-8.

15. Ergenekon E, Unal S, Gücüyener K, Soysal SE, Koç E, Okumus N, et al. Hypernatremic dehydration in the newborn period and long-term follow up. Pediatr Int 2007; 49:19-23.

16. Bolat F, Oflaz MB, Güven AS, Özdemir G, Alaygut D, Dogan MT, et al. What is the safe approach for neonatal hypernatremic dehydration? A retrospective study from a neonatal intensive care unit. Pediatr Emerg Care 2013; 29: 808-