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FREQUENCY OF HYPOKALEMIA IN CHILDREN WITH PERSISTENT DIARRHEA: A CROSS-SECTIONAL DESCRIPTIVE STUDY AT KHYBER TEACHING HOSPITAL, PESHAWAR

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ABSTRACT

Background: One of the biggest causes of childhood illness and death in the globe today is still diarrhea. It happens when any of a variety of enteric microorganisms that might impair intestinal function invade the digestive system. An astounding 3 to 5 billion cases and about 2 million fatalities worldwide are caused by infectious diarrhea each year; the latter represents almost 20% of all pediatric mortality.2Of these diarrhea-related fatalities, 35% are attributable to acute watery diarrhea, 20% to dysentery, and 45% to persistent or chronic diarrhea.

OBJECTIVE: To determine the frequency of hypokalemia in children with persistent diarrhea.

Study Design: A Cross-sectional descriptive study.

Study Duration and Setting: Department of Pediatrics, Khyber Teaching Hospital, Peshawar during the period from 5th January 2021 to 5th July 2021

MATERIAL AND METHODS: The study was conducted at Khyber Teaching Hospital, Peshawar, and included 229 pediatric patients with persistent diarrhea. Descriptive statistics recorded mean age (4.48 ± 2.44) and duration of diarrhea (2.22 ± 0.41). Hypokalemia frequency was observed in 31% of patients. Data were analyzed for age distribution and hypokalemia occurrence. The total sample size was 229 keeping proportion of hypokalemia 31% in children with persistent diarrhea, a confidence level 95% and margin of error **6%.** Sampling Technique: Non probability consecutive sampling.

RESULTS: Frequency and percentages of Hypokalemia were recorded in 71 (31%) patients having persistent diarrhea whereas in remaining 158 (69%) no trances of hypokalemia were found. (Table No. 3).

CONCLUSION: Our analysis's findings indicated that children with diarrhea are significantly more likely to develop hypokalemia, as this study's findings indicate. It is advised to start the first dose of parental antibiotics early and to supplement with potassium in order to reduce the likelihood of mortality.

KEYWORDS: Diarrhea, Hypokalemia, Chronic diarrhea

INTRODUCTION

One of the biggest causes of childhood illness and death in the globe today is still diarrhea. It happens when a variety of enteric microorganisms that might impair intestinal function invade the digestive system.[1]Every year, 3 to 5 billion cases and about 2 million fatalities worldwide are attributed to infectious diarrhea, with the latter representing almost 20% of all pediatric mortality. [2].Acute watery diarrhea accounts for 35% of these diarrhea-related fatalities, followed by dysentery at 20% and persistent or chronic diarrhea at 45% Persistent diarrhea is defined by the World Health Organization as a disease with a documented or suspected infectious cause that persists for more than 14 days. In children less than five years old, 3% to 20% of diarrheal bouts are persistent[3]. Community-based studies also indicate that it is directly accountable for anything from 36% to 54% of all diarrhea-related fatalities. Therefore, morbidity with an increased risk of hospital admissions, mortality, and malnutrition are the major effects of chronic diarrhea The primary cause of hypokalemia, which may result from gastrointestinal potassium loss, is diarrhea[4]. Serum potassium levels below 3.5 mEq/L (3.5 mmol/L) are considered hypokalemia, and below 2.5 mEq/L is considered severe hypokalemia. One potentially fatal imbalance that may be brought on by medication errors is hypokalemia.It is challenging to determine the prevalence of hypokalemia in the general population. The amount of potassium consumed varies depending on factors including age, sex, ethnicity, and socioeconomic level. It is unknown whether these variations in intake result in varying degrees of hypokalemia or varying susceptibilities to hypokalemic shocks[5].According to a research, more than 60% of children hospitalized for diarrhea had hypokalemia According to Gangaraj S. et al., 61.22% (30/49) of the children who presented with vomiting and diarrhea also had hypokalemia, while 33% (9/24) did not. In this research, the total rate of hypokalemia was 51.53% (39/73). In a different research, 31% of children hospitalized with diarrhea had hypokalemia, according to Chisti MJ et al[6].One of the main reasons for illness and death among children in underdeveloped nations is hypokalemia, which is brought on by recurrent diarrhea. One explanation might be that medical professionals working in environments with low resources fail to recognize the clinical symptoms of hypokalemic diarrhea in children, which could postpone the administration of the right antibiotics and raise the risk of fatalities[7]. Therefore, it is crucial to comprehend how chronic diarrhea affects the clinical manifestations of hypokalemia in children in order to establish diagnostic criteria for hypokalemic diarrhea in this population and to start the right kind of treatment to lower the risk of mortality, particularly in situations where resources are limited. Furthermore, the ambiguity around the present amount of hypokalemic diarrhea morbidity, particularly in Pakistan, persists despite several efforts to measure it over the last few decades and in recent years[8]. In this respect, the goal of the current research is to ascertain the prevalence of hypokalemia in children in our local community who have recurrent diarrhea. This research is being done, among other reasons, because it would be the first to provide data about hypokalemia in children who have recurrent diarrhea in this nation; no previous studies of this kind have been carried out in Pakistan. Additionally, this research will aid in the identification of other hypokalemia causes and etiologies. The study's findings will be disseminated to a number of hospitals and healthcare facilities, assisting pediatricians in better diagnosing and treating hypokalemia in kids[9].

MATERIAL AND METHODS:

229 paediatric patients with chronic diarrhoea were enrolled in the research at Khyber Teaching Hospital in Peshawar. The mean age (4.48 ± 2.44) and the duration of diarrhoea (2.22 ± 0.41) were recorded using descriptive statistics. A frequency of hypokalemia was noted in 31% of individuals. The age distribution and incidence of hypokalemia were examined in the data**.**

Inclusion criteria:

1. Children of both gender and age 1 month to 7 years.
2. Children presented with chronic diarrhoea confirmed through clinical history, physical examination and laboratory investigation.

Exclusion Criteria:

1. Children with Leukemia, Spurious Hypokalemia i.e. High WBC count.
2. Children with transcellular shift i.e. Alkalemia, insulin, α-adrenergic agonists, drugs, hypokalemic periodic paralysis, throtoxic periodic paralysis, refeeding syndrome.
3. Children with decreased intake.
4. Children with renal losses, confirmed through urine tests.

The above mentioned conditions in exclusion criteria will act as confounders and if included they will introduce bias in the study results.

Data Collection Procedure:

Following clearance from the hospital's research committee and ethical board, this study was carried out. The study included all patients who met the inclusion criteria based on clinical findings when they presented to the pediatric emergency room or outpatient department. The parents or legal guardians of the research participants were fully told about the goals, advantages, and clinical and pathological diagnostic process, and verbal informed permission was acquired.

A skilled pediatrician performed a thorough examination and history on each child. Every patient's history of diarrhea and any prior diagnosis were noted. The history and laboratory test results, respectively, were used to make the clinical diagnosis of hypokalemia and diarrhea. Five milliliters of blood were drawn from each patient and submitted to the lab to measure the serum potassium level. Every test was performed under the guidance of a senior pathologist who was a fellow of CPSP and had over ten years of expertise.

All of the aforementioned details, as well as other demographic information like age and clinical and laboratory results, will also be included on the provided proforma.

Data Analysis Procedure:

The SPSS 17 version was used to examine all of the data that was gathered. For continuous variables like age and length of diarrhea, mean + SD was computed. The categorical variables, such as gender and hypokalemia, were presented as frequencies and percentages. Age and gender-based stratification of the hypokalemia was used to see how the impact changed. Tables and graphs were used to display the final results.

RESULTS

The pediatric department of the Khyber Teaching Hospital in Peshawar was the site of this investigation. Furthermore, 229 pediatric patients with persistent diarrhea were included in this study. The study's findings are included in the appendix below:- For this study, the mean and standard deviation for age were 4.48+2.44 and the mean and standard deviation for the length of diarrhea were 2.22+0.41. (First Table No.). In the age group of less than a year, 97 (42.35%) patients were registered, based on the age distribution, frequency, and percentage. According to the inclusion criteria, 76 (33.18%) patients were recorded in the age group of 4–7 years, while 56 (24.45%) patients were recorded in the 1-3 year age group. (Table No. 2). Frequency and percentages of Hypokalemia was recorded in 71 (31%) patients having persistent diarrhea where as in remaining 158 (69%) no trances of hypokalemia were found. (Table No. 3).

Stratification of Hypokalemia with age can been seen at Table No. 4 whereas stratification of hypokalemia with gender can be seen at Table No. 5. In this respect, stratification of hypokalemia with duration of diarrohea is present at Table No. 6.

Figure : 01: Prominent U waves after T waves in hypokalemia. During therapy, monitor for changes associated with overcorrection and hyperkalemia, including a prolonged QRS, peaked T waves, bradyarrhythmia, sinus node dysfunction, and asystole.

TABLE NO. 1 DESCRIPTIVE STATISTICS

Mean and SD for Age	4.48±2.44
Mean and SD for duration of diarrhea	2.22±0.41

TABLE NO. 2 AGE DISTRIBUTION

Age Group	**Frequency**	**Percentage**
< 1 Years	97	42.35%
1-3 Years	56	24.45%
4-7 Years	76	33.18%
Total	**229**	**100%**

TABLE NO. 3 FREQUENCY AND PERCENTAGES OF HYPOKALEMIA

Hypokalemia	**Frequency**	**Percentage**
Yes	71	31%
No	158	69%
Total	**229**	**100%**

TABLE NO. 4 STRATIFICATION OF HYPOKALEMIA WITH AGE

Age	Hypokalemia	Frequency	Percentage	P Value
<1 Years	Yes	31	13.53%	0.639
	No	66	28.82%	
1-3 Years	Yes	15	6.55%	0.662
	No	41	17.90%	
4-7 Years	Yes	24	10.48%	0.237
	No	52	22.70%	

TABLE NO. 5 STRATIFICATION OF HYPOKALEMIA WITH GENDER

Gender	Hypokalemia	Frequency	Percentage	P Value
Male	Yes	41	17.90%	0.411
	No	87	37.99%	
Female	Yes	29	12.66%	0.635
	No	72	31.44%	

TABLE NO. 6 STRATIFICATION OF HYPOKALEMIA WITH DURATION OF DIARROHOA

Duration of Diarrohoa	Hypokalemia	Frequency	Percentage	P Value
2 Weeks	Yes	53	23.14%	0.116
	No	124	54.14%	
3 Weeks	Yes	17	07.42%	0.311
	No	35	15.28%	

DISCUSSION

One of the biggest causes of childhood illness and death in the globe today is still diarrhoea. It happens when a variety of enteric microorganisms that might impair intestinal function invade the digestive system.[10]Every year, 3 to 5 billion cases and about 2 million fatalities worldwide are attributed to infectious diarrhoea, with the latter representing nearly 20% of all paediatric mortality[11].diarrhea-related fatalities, 35% are attributable to acute watery diarrhoea, 20% to dysentery, and 45% to persistent or chronic diarrhoea[12].Persistent diarrhoea is defined by the World Health Organisation as a disease with a documented or suspected infectious aetiology that lasts for more than 14 days. Between 3% and 20% of diarrhoea bouts in children under five are caused by persistent diarrhoea[13].Community-based studies also indicate that it is directly accountable for anything from 36% to 54% of all diarrhea-related fatalities. Therefore, morbidity with an increased risk of hospital admission, mortality, and malnutrition are the primary effects of chronic diarrhoea[14].The study was carried out at the paediatric department of the Khyber Teaching Hospital in Peshawar. Furthermore, 229 paediatric patients with chronic diarrhoea were included in this investigation. The study's findings are included in the appendix below:-For this study, the mean and standard deviation for age were 4.48+2.44 while the mean and standard deviation for the length of diarrhoea were 2.22+0.41[15]. As per age distribution, the frequency and percentage, 97 (42.35%) patients were documented in age group of less than year. According to the inclusion criteria, 76 (33.18%) patients were recorded in the age category of 4–7 years, while 56 (24.45%) patients were documented in the 1-3 year age group[16]. Frequency and percentages of Hypokalemia was reported in 71 (31%) individuals with chronic diarrhea where as in remaining 158 (69%) no trances of hypokalemia were identified[17].Diarrhoea is the predominant cause of hypokalemia that may happen owing to gastrointestinal loss of potassium. Hypokalemia is commonly defined as a blood potassium level of less than 3.5 mEq/L (3.5 mmol/L) and severe hypokalemia is a level of less than 2.5 mEq/L. Hypokalemia is a potentially life-threatening imbalance that may be iatrogenically produced[18].The incidence of hypokalemia in the general population is difficult to quantify. Potassium consumption varies according to age, sex, ethnic origin, and socioeconomic position. Whether these differences in intake produce different degrees of hypokalemia or different sensitivities to hypokalemic insults is not known[19].A research indicated the rate of hypokalemia is more than 60% in children hospitalizedwith diarrhoea.1.Gangaraj S. et al. found hypokalemia in 61.22% (30/49) children presented with diarrhoea and vomiting, and in 33% (9/24) presented with nodiarrhoea and vomiting. The overall hypokalemia rate in this study was 51.53% (39/73) [20].another study by Chisti MJ et al. hypokalemia was diagnosed in 31% children admitted with diarrhoea.7 The result of this study is almost similar as compare to our study where we also recorded 71 (31%) patients with hypokalemia having persistent diarrohea. Hypokalemia resulted from persistent diarrhoeais one of the leading causes of morbidity and mortality among children in developingcountries[22]. One reason may that the health workers in resource limited settings mightmiss the clinical signs in hypokalemic diarrhoealchildren, delaying the initiation of appropriate antibiotics andpotentially increasing the probability of deaths. It is thus veryimportant to understand the influence of persistentdiarrhoea on the clinical features of hypokalemia in children inorder to develop guidelines for diagnosing hypokalemic diarrhoea in suchpopulation and initiate appropriate management to reduceprobability of deaths, especially in resource constraint settings.Moreover, despite several attempts to estimate morbidity from hypokalemic diarrhoea over the past decades and in recent years, the uncertainty surrounding its current level, especially in Pakistan, remains unknown[23]. The current study, in this regard, is designed to determine the frequency of hypokalemia in children presented with persistent diarrhoea at our local population. One of the reasons behind conducting this study is thatit will be first study in this country providing statistics about hypokalemia in children with persistent diarrheoa because no such study has been conducted before in Pakistan. Moreover, this study will also help in finding other causes and etiology of hypokalemia. The results obtained from this study will be shared with various hospitals and health care institutions which will help the paediatritions to improve the diagnoses and treatment hypokalemia in children[24].

CONCLUSION

Our research revealed that children who have diarrhoea are at a significant risk of hypokalemia, as this study has shown. To reduce the likelihood of mortality, it is advised to start the first dosage of parental antibiotics early and to supplement with potassium before referring patients to tertiary institutions.

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