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RESEARCH ARTICLE
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FREQUENCY OF HYPONATREMIA IN CHILDREN WITH BRONCHIOLITIS

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ABSTRACT

Bronchiolitis is a common condition in children, with hyponatremia (low sodium levels) frequently complicating bronchiolitis. This electrolyte imbalance, often linked to elevated anti-diuretic hormone levels, is associated with increased morbidity and mortality. It is commonly observed in hospitalized children with bronchiolitis, pneumonia, or cystic fibrosis exacerbations. To determine the frequency of hyponatremia in children with bronchiolitis at Ittefaq Hospital, Lahore. This cross-sectional study was conducted in the Department of Pediatrics, Ittefaq Hospital, Lahore, from January 24, 2019, to July 24, 2019. A total of 264 cases were included. Patients' demographic details, including age, gender, and contact information, were recorded. A 5cc blood sample was collected aseptically by the duty nurse and analyzed for sodium levels in the hospital laboratory. The presence of hyponatremia was determined based on operational criteria. All data were entered and analyzed using SPSS software. The mean age of participants was 13.01 ± 6.94 months (range: 1–24 months). Among the cases, 141 (53.4%) were male, and 123 (46.6%) were female. Hyponatremia was identified in 70 (26.5%) cases, while 194 (73.5%) had normal sodium levels. The study found that hyponatremia occurs in 26.5% of children with bronchiolitis, highlighting the need for sodium level correction alongside standard therapy to improve outcomes. Addressing this can lead to better prognoses.

Keywords: Bronchiolitis, wheeze, sodium levels, hyponatremia.

Introduction:

Bronchiolitis is a prevalent respiratory condition among children, with a reported prevalence of 17.9% [1]. Approximately 10%–15% of these children require intensive care [2, 3]. Despite the substantial burden of bronchiolitis—a life-threatening respiratory condition clinicians continue to face challenges in predicting its disease course and determining the appropriate level of care [1,3].

Although bronchiolitis is a frequent condition, its diagnosis and management remain variable [4]. Bronchodilators and corticosteroids are standard therapies for children with acute severe asthma, which similarly presents with wheezing and dyspnea, but these treatments are not indicated for bronchiolitis [2,5,13].

Hyponatremia, characterized by low sodium levels, is a common complication in bronchiolitis and is recognized as one of the most frequent electrolyte abnormalities in hospitalized patients. Hyponatremia is associated with higher morbidity, prolonged hospital stays, increased treatment costs, and mortality [6, 7,11]. Cases with hyponatremia often require intensive care and mechanical ventilation [6]. Hyponatremia in children with bronchiolitis, pneumonia, or cystic fibrosis exacerbations is often linked to elevated anti-diuretic hormone (ADH) levels, resulting in inappropriate anti-diuresis [8.14].

Globally, the reported prevalence of hyponatremia in children with bronchiolitis ranges from 22% to 45% [3,15, 16]. The lack of local data on this subject highlights the need for research in this area. This study aims to determine the frequency of hyponatremia in children with bronchiolitis in the local population. Establishing the prevalence of hyponatremia will help clinicians consider sodium level correction alongside standard bronchiolitis therapy, potentially improving patient outcomes [9,10].

Materials and Method

A cross-sectional study was conducted at the Department of Paediatrics, Ittefaq Hospital, Lahore, from January 24 to July 24, 2019, using non-probability consecutive sampling. A sample size of 264 cases was estimated with a 5% margin of error, 95% confidence level, and a hyponatremia rate of 22%. Inclusion criteria were children aged 1 month to 5 years with Bronchiolitis for more than 2 days, while exclusion criteria included recent phototherapy or jaundice, bilirubin > 1.3 mg/dl, and recent hospitalization. Data was collected after obtaining informed consent, including basic information and a blood sample for sodium measurement. The data was analyzed using SPSS version 22, with descriptive statistics for quantitative data and frequencies/percentages for categorical data. Stratification by age, gender, bronchiolitis duration, and nourishment status was performed, with Chi-square tests applied post-stratification ($p \leq 0.05$ considered significant).

Results

Table 1: Descriptive Statistics of Demographic and Clinical Variables

Variable	Value
Age (days)	Mean = 13.01, S.D. = 6.94, Range = 23, Min = 1, Max = 24
Gender	Male = 141 (53.5%), Female = 123 (46.5%)
Nourishment Status	Malnourished = 89 (33.7%), Well-nourished = 175 (66.3%)
Duration of Bronchiolitis	<7 days = 137 (51.9%), ≥7 days = 127 (48.1%)

Table 2: Hyponatremia Comparison with Demographic Variables

Variable	Hyponatremia (Yes)	Hyponatremia (No)	Total
Age Group (months)			
<1 year	27 (23.7%)	87 (76.3%)	114
1-2 years	43 (28.7%)	107 (71.3%)	150
Gender			
Male	38 (27.7%)	103 (73.0%)	141
Female	32 (25.2%)	91 (74.0%)	123
Nourishment Status			

Variable	Hyponatremia (Yes)	Hyponatremia (No)	Total
Malnourished	25 (28.1%)	64 (71.9%)	89
Well-nourished	45 (25.7%)	130 (74.3%)	175
Duration of Bronchiolitis			
<7 days	38 (27.7%)	99 (72.3%)	137
≥7 days	32 (25.2%)	95 (74.8%)	127
Total	70 (26.5%)	194 (73.5%)	264

Table 3: Chi-Square Analysis Results

Comparison	Chi-Square	P-value	Significance
Age Group & Hyponatremia	0.825	0.364	Insignificant
Gender & Hyponatremia	0.029	0.840	Insignificant
Nourishment Status & Hyponatremia	0.171	0.679	Insignificant
Duration of Bronchiolitis & Hyponatremia	0.218	0.640	Insignificant

Table 4: Prevalence and Clinical Impact of Hyponatremia

Study Comparison	Hyponatremia (%)	Findings
Current Study	26.5%	Hyponatremia found in 70/264 cases, no significant association with age, gender, duration, or nourishment status
Cheil General Hospital Study	13.5%	Identified risk factors: older age, male gender, high CRP, co-infections
2017 Prospective Study	57%	Higher prevalence in infants ≤6 months, significant for bronchiolitis severity
Al Shibli Study	45%	Hyponatremia mostly mild, no significant associations with viral etiology or treatment factors
ICU-based Multicenter Study	16%	Hyponatremia linked with longer ICU stays and mechanical ventilation

The descriptive statistics provide a comprehensive overview of the study population, with a mean age of 13.01 days, showing a broad age range (1 to 24 days). The gender distribution is nearly balanced, with a slight male predominance (53.5%). The majority of infants were well-nourished (66.3%), and the sample shows a nearly even split in the duration of bronchiolitis, with 51.9% having bronchiolitis for less than seven days and 48.1% for seven days or more. These factors provide a baseline for understanding the general profile of the infants in the study (Table:1).

Table represents that the prevalence of hyponatremia in this study was 26.5%, which varied slightly across demographic variables. In the age group comparison, infants aged 1-2 years had a slightly higher percentage of hyponatremia (28.7%) compared to those under 1 year (23.7%). Males had a higher proportion (27.7%) of hyponatremia compared to females (25.2%). While malnourished infants had a slightly higher rate of hyponatremia (28.1%) compared to well-nourished infants (25.7%), no significant association was found across these groups. Furthermore, hyponatremia prevalence was similar in infants with both shorter and longer durations of bronchiolitis (27.7% and 25.2%, respectively).

Table 3 indicates that the chi-square tests did not reveal significant associations between hyponatremia and the demographic variables of age group, gender, nourishment status, or duration of bronchiolitis (p-values > 0.05). This suggests that hyponatremia in this study population may not be strongly influenced by these demographic and clinical factors.

Table 4 depicts that Prevalence The current study found a hyponatremia prevalence of 26.5%, which is higher than the 13.5% found in the Cheil General Hospital study, where risk factors included older age, male gender, high CRP, and co-infections. In comparison, the 2017 prospective study reported a much higher prevalence (57%) in infants aged 6 months or younger, with a

significant association with bronchiolitis severity. Similarly, the Al Shibli study found a 45% prevalence, but with mild cases and no significant associations with viral etiology or treatment factors. The ICU-based multicenter study, with a prevalence of 16%, found a link between hyponatremia and prolonged ICU stays and mechanical ventilation. Overall, the hyponatremia prevalence in the current study is comparable to other studies but does not show any distinct clinical associations.

Conclusion: The study concludes that hyponatremia is prevalent in 26.5% of cases, highlighting the need for sodium level correction alongside standard therapy to improve patient outcomes. Addressing hyponatremia may contribute to better prognosis and treatment results.

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