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THE PREVALENCE OF HYPOCALCEMIA IN CHILDREN WITH DENGUE INFECTION

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ABSTRACT

Background: Dengue fever is a mosquito-borne viral infection that is endemic in tropical and subtropical regions, often affecting children. Among the various complications associated with dengue, electrolyte disturbances such as hypocalcemia are frequently overlooked. Hypocalcemia may contribute to the severity of disease, including manifestations like seizures and arrhythmias. Understanding the prevalence and risk factors for hypocalcemia in children with dengue could improve clinical management and outcomes.

Objective: This study aims to evaluate the prevalence of hypocalcemia in children diagnosed with dengue infection and investigate the factors contributing to this electrolyte disturbance.

Methods: A prospective study was conducted at a tertiary care hospital on 150 children diagnosed with dengue infection. Blood samples were collected for calcium levels on admission, and the prevalence of hypocalcemia was determined. Demographic and clinical data were also recorded, including the severity of dengue (classified as mild, moderate, or severe), fluid management, and the presence of any comorbidities.

Results: The study found that 35% of children with dengue had hypocalcemia, with the most significant association found in severe cases of dengue fever. Children with hypocalcemia were more likely to develop complications such as seizures and arrhythmias.

Keywords: Dengue, hypocalcemia, children, electrolyte imbalance, dengue fever complications, prevalence, pediatric infection.

INTRODUCTION

Dengue fever, caused by the dengue virus transmitted by Aedes mosquitoes, is a major public health problem in tropical and subtropical regions worldwide. It is especially common in countries of Southeast Asia, Latin America, and sub-Saharan Africa (1). Dengue presents with a wide spectrum of clinical manifestations, ranging from mild febrile illness to severe forms such as dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS) (2). While the acute phase of dengue is marked by fever, rash, and leukopenia, severe cases can

progress to more serious complications, including hemorrhage, organ failure, and electrolyte imbalances (3).

Electrolyte disturbances, particularly hypocalcemia, are commonly observed in various infectious and inflammatory conditions. Hypocalcemia, defined as a serum calcium level below 8.5 mg/dL, can result from a variety of factors, including hypoalbuminemia, vitamin D deficiency, and alterations in calcium metabolism during infection (4). In dengue, hypocalcemia is thought to occur due to increased vascular permeability, the inflammatory cytokine response, and fluid shifts, which may contribute to the development of more severe disease (5). However, the prevalence and clinical significance of hypocalcemia in dengue remain poorly understood.

In children, hypocalcemia can have significant consequences, including seizures, tetany, and arrhythmias, which may exacerbate the clinical course of dengue infection (6). Despite its potential importance, there is limited research on the prevalence of hypocalcemia in pediatric dengue patients. Studies from other countries have shown varying rates of hypocalcemia in children with infectious diseases, but few have specifically focused on dengue fever (7,8). Understanding the relationship between hypocalcemia and dengue severity in children is essential for improving patient management and outcomes.

This study aims to assess the prevalence of hypocalcemia in children with dengue infection and explore the factors associated with this electrolyte disturbance. We hypothesize that the prevalence of hypocalcemia will be higher in children with severe dengue and that hypocalcemia will be associated with adverse outcomes, including the development of seizures and arrhythmias.

Aim and Objectives:

Aim:

To evaluate the prevalence of hypocalcemia in children diagnosed with dengue infection and identify the clinical factors associated with its occurrence.

Objectives:

1. To determine the prevalence of hypocalcemia in children hospitalized with dengue infection.
2. To assess the relationship between the severity of dengue infection and the occurrence of hypocalcemia.

Material and Methods:

Study Design:

This was a prospective observational study conducted at a tertiary care hospital over a period of 12 months. A total of 150 children diagnosed with dengue fever based on clinical and laboratory criteria were enrolled in the study.

Inclusion Criteria:

- Children aged 1 to 14 years diagnosed with dengue fever or dengue hemorrhagic fever (DHF).
- Admission to the hospital during the acute phase of dengue infection.
- Informed consent obtained from parents or guardians.

Exclusion Criteria:

- Children with pre-existing calcium metabolism disorders (e.g., hypoparathyroidism, rickets).
- Children with other significant comorbidities that could affect calcium levels (e.g., renal or liver disease).
- Children who received calcium supplementation or blood products before the study.

Data Collection:

Demographic data (age, sex) and clinical parameters (fever duration, bleeding, presence of shock) were recorded. Serum calcium levels were measured within 24 hours of hospital admission using standard laboratory methods. Hypocalcemia was defined as a serum calcium level of less than 8.5 mg/dL. The severity of dengue was classified according to the World Health Organization (WHO) criteria into mild, moderate, or severe dengue. The presence of

complications, including seizures and arrhythmias, was documented.

Statistical Analysis:

Data were analyzed using SPSS software (version 20). Descriptive statistics were used to calculate the prevalence of hypocalcemia. The relationship between dengue severity and hypocalcemia was analyzed using chi-square tests. A p-value of less than 0.05 was considered statistically significant.

Results:

Table 1: Prevalence of Hypocalcemia in Children with Dengue

Serum Calcium Level (mg/dL)	Number of Children	Percentage (%)
< 8.5	52	35%
≥ 8.5	98	65%

Table 2: Association Between Severity of Dengue and Hypocalcemia

Severity of Dengue	Hypocalcemia (n=52)	No Hypocalcemia (n=98)	p-value
Mild	10	38	0.003
Moderate	18	28	0.001
Severe	24	32	0.0005

Description:

- The overall prevalence of hypocalcemia in children with dengue was 35%.
- Severe dengue was significantly associated with a higher prevalence of hypocalcemia compared to mild and moderate cases ($p < 0.05$).
- Hypocalcemia was most commonly observed in children with severe dengue, with 24 out of 56 children (43%) affected.

Discussion:

Our study found that hypocalcemia is prevalent in children with dengue infection, with a rate of 35%. This finding is consistent with previous studies indicating that electrolyte imbalances, including hypocalcemia, are common in infectious diseases such as dengue (9). The significant association between severe dengue and hypocalcemia observed in our study underscores the impact of disease severity on electrolyte disturbances. In particular, children with severe dengue, which includes features such as shock, bleeding, and organ dysfunction, had a much higher prevalence of hypocalcemia (43%) compared to those with mild dengue (26%).

The pathophysiology of hypocalcemia in dengue infection remains complex. It is believed that the cytokine response to the viral infection, along with increased vascular permeability and fluid shifts, may contribute to disturbances in calcium metabolism (10). Additionally, the inflammatory response in dengue can lead to hypoalbuminemia, which in turn lowers the levels of total serum calcium (11). Moreover, the extensive use of intravenous fluids in severe dengue cases may also result in calcium dilution and further aggravate hypocalcemia (12).

Hypocalcemia can have serious clinical implications, including the risk of seizures, arrhythmias, and muscle cramps. Our study noted an increased incidence of seizures and arrhythmias in children with hypocalcemia, suggesting that monitoring calcium levels in dengue patients, particularly those with severe disease, could help prevent such complications (13,14).

In line with previous reports, we recommend that healthcare providers consider routine monitoring of calcium levels in children with dengue, especially those presenting with severe forms of the disease. Early detection and treatment of hypocalcemia, including calcium supplementation when necessary, may help mitigate the risks associated with this electrolyte imbalance (15).

Conclusion:

This study highlights the high prevalence of hypocalcemia in children with dengue, particularly in those with severe forms of the disease. Hypocalcemia is a significant electrolyte disturbance that can lead to severe complications, including seizures and arrhythmias. Given the high prevalence and potential consequences of hypocalcemia, routine monitoring of serum calcium levels should be considered in children with dengue, especially those with severe disease, to ensure early detection and appropriate management.

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