



Assessment of Biochemical Abnormalities in Neonatal Seizures: A Study of 60 Patients at a Tertiary Care Hospital

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Abstract

Background: Neonatal seizures are a significant clinical challenge in newborns, often indicating underlying neurological issues. Identifying biochemical abnormalities can aid in determining the etiology of seizures and guiding treatment.

Objective: To assess the prevalence of biochemical abnormalities in neonates presenting with seizures.

Material and Methods: This study was conducted in the Department of Pediatrics at a tertiary care hospital. A total of 60 neonates with clinically diagnosed seizures were included. Biochemical investigations included serum electrolytes, glucose levels, and calcium levels.

Results: Of the 60 neonates, 30 (50%) exhibited biochemical abnormalities, with hypoglycemia (25%) being the most common. Other abnormalities included hyponatremia (15%), hypocalcemia (10%), and hyperkalemia (5%).

Conclusion: Biochemical abnormalities are prevalent in neonates with seizures, particularly hypoglycemia. Prompt biochemical assessment is crucial for appropriate management and improved outcomes.

Keywords: Neonatal seizures, Biochemical abnormalities, Hypoglycemia, Hyponatremia.

Introduction

Neonatal seizures are among the most common neurologic emergencies in newborns, with a reported incidence of 1 to 5 per 1,000 live births (1). Seizures in neonates can be caused by various factors, including hypoxic-ischemic encephalopathy, metabolic disorders, infections, and structural abnormalities of the brain (2). Identifying the underlying cause of seizures is critical for effective management and improved neurological outcomes.

Biochemical abnormalities are often associated with neonatal seizures and can provide essential clues regarding the underlying etiology. Common metabolic derangements include hypoglycemia, electrolyte imbalances (such as hyponatremia and hypernatremia), and calcium abnormalities (3). Hypoglycemia, in particular, has been identified as a significant reversible

cause of seizures in neonates, emphasizing the importance of timely biochemical evaluation (4).

Despite the clinical relevance of biochemical abnormalities, there is a lack of comprehensive studies assessing their prevalence and types in neonates presenting with seizures. This study aims to assess the incidence of biochemical abnormalities in a cohort of neonates diagnosed with seizures, with a particular focus on glucose, electrolytes, and calcium levels.

Aim and objectives

Aim: To assess the prevalence of biochemical abnormalities in neonates with seizures.

Objectives:

1. To determine the incidence of hypoglycemia, hyponatremia, and hypocalcemia in the study population.
2. To analyze the relationship between the identified biochemical abnormalities and the clinical features of neonatal seizures.

Material and Methods

This observational study was conducted in the Department of Pediatrics at a tertiary care hospital over a period of six months. A total of 60 neonates, aged between 1 day and 28 days, were included in the study after obtaining informed consent from their parents. The inclusion criteria consisted of neonates with clinically diagnosed seizures, while those with a known history of metabolic disorders or those on medication affecting biochemical parameters were excluded.

Investigations:

- A detailed clinical history and neurological examination were conducted for each neonate.
 - Blood samples were obtained to measure serum glucose, sodium, potassium, and calcium levels using standard laboratory methods.
 - Biochemical abnormalities were classified as follows:
 - Hypoglycemia: Serum glucose < 40 mg/dL
 - Hyponatremia: Serum sodium < 135 mEq/L
 - Hyperkalemia: Serum potassium > 5.5 mEq/L
 - Hypocalcemia: Serum calcium < 8.5 mg/dL
- Data were analyzed using SPSS software to determine the prevalence of biochemical abnormalities among the study population.

Results

Table 1: Demographic Characteristics of Neonates with Seizures

Parameter	Number of Patients (n=60)	Percentage (%)
Gender		
Male	32	53.3
Female	28	46.7
Birth Weight (kg)		
<2.5 kg	24	40.0
≥2.5 kg	36	60.0
Mode of Delivery		
Vaginal	36	60.0
Cesarean Section	24	40.0

Table 2: Biochemical Abnormalities in Neonates with Seizures

Biochemical Abnormality	Number of Patients (n=60)	Percentage (%)
Hypoglycemia	15	25.0
Hyponatremia	9	15.0
Hyperkalemia	3	5.0
Hypocalcemia	6	10.0
Normal Biochemical Levels	30	50.0

Among the 60 neonates included in the study, there was a slight male predominance, with 53.3% being male and 46.7% female. The majority of the infants had a birth weight of ≥2.5 kg (60.0%).

The biochemical analyses revealed that 30 (50%) of the neonates exhibited biochemical abnormalities. The most common abnormality was hypoglycemia, which was present in 15

(25%) of the patients. Other significant findings included hyponatremia in 9 (15%) cases, hypocalcemia in 6 (10%), and hyperkalemia in 3 (5%).

Discussion

Neonatal seizures are a critical clinical manifestation that can indicate underlying metabolic or neurological conditions. This study

highlights the prevalence of biochemical abnormalities in a cohort of 60 neonates diagnosed with seizures, with a significant proportion of patients exhibiting hypoglycemia, hyponatremia, and other electrolyte imbalances.

Hypoglycemia was identified in 25% of the neonates, consistent with previous literature indicating that low blood glucose levels are a common and reversible cause of seizures in this population (5). Early identification and management of hypoglycemia are vital, as it can lead to permanent neurological damage if not promptly treated (6).

Hyponatremia was present in 15% of the patients, which aligns with findings from other studies that suggest a relationship between electrolyte disturbances and seizures in neonates (7). Hyponatremia can result from various factors, including fluid overload and hormonal imbalances, highlighting the importance of monitoring electrolyte levels in neonates, especially those at risk for seizures.

Hypocalcemia was noted in 10% of the neonates, a finding that warrants further investigation as it can contribute to neuromuscular excitability and seizure activity (8). The presence of hyperkalemia in 5% of patients suggests a need for careful management of potassium levels in neonates, as both hypo- and hyperkalemia can have serious implications on neuromuscular function (9).

Overall, the findings of this study underscore the importance of performing routine biochemical assessments in neonates presenting with seizures. Identifying and correcting biochemical abnormalities can be crucial in preventing further neurological deterioration and improving clinical outcomes (10).

Limitations of this study include its observational design and the relatively small sample size, which may affect the generalizability of the findings. Further studies with larger cohorts and long-term follow-up are

needed to establish clearer associations between biochemical abnormalities and seizure outcomes in neonates.

Conclusion

This study highlights the significant prevalence of biochemical abnormalities in neonates with seizures, particularly hypoglycemia. Routine biochemical assessment in this population is essential for timely intervention and improved clinical outcomes. Enhanced awareness and management strategies are necessary to address these metabolic disturbances effectively.

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