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Original Article

Study of Clinical and Biochemical Abnormalities in Neonatal Seizures

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Abstract

Introduction: Neonatal seizures, by definition, occur within the first 4 weeks of life in a full-term infant and up to 44 weeks from conception for premature infants and are most frequent during the first 10 days of life.

Aim: To study the incidence of biochemical abnormalities associated with neonatal seizures.

Materials and Methods: A observational study was conducted in the Department of Paediatrics, Government Headquarters Hospital, Dindigul from January 2019 to 2019 in fifty newborns with seizures admitted in neonatal intensive care unit. After taking a complete history and appropriate physical examination, blood sample was collected for detecting metabolic abnormalities before instituting specific therapy.

Results: In fifty neonates, the preterm were 11 (22%), and the term was 39 (78%) babies with low birth weight were 23 (46%), 78% of neonates presented with seizures with the first 72 h, neonates with subtle seizures were 31 (62%), tonic seizure was 15 (30%), and clonic were 4 (8%). The biochemical abnormality noted was hypoglycemia 22%, hypocalcemia 18%, and hyponatremia 10%.

Conclusion: Biochemical abnormalities are common in neonatal seizures and often go unrecognized and may significantly contribute to seizure activity. Hence, a biochemical workup is necessary for all cases of neonatal seizures.

Key words: Hypocalcemia, Hypoglycemia, Neonatal seizures

INTRODUCTION

Seizure is defined as a paroxysmal involuntary disturbance of brain function. It may manifest as impairment or loss of consciousness, abnormal motor activity, behavioral abnormality, sensory disturbance, or autonomic dysfunction.[1] Any abnormal, repetitive, and stereotypic behavior in neonates should be evaluated as a possible seizure. Neonatal seizures, by definition, occur within the first 4 weeks of life in a full-term infant and up to 44 weeks from conception for a premature infant and are most frequent during the first 10 days of life.[2,3]

Neonatal seizures are a common problem with an incidence of 0.5–3/1000 term infants to 1–13% in preterm infants with very low birth weight.[3] The etiology of neonatal seizures is variable and can be primarily related to brain disorders, for example., hypoxic-ischemic encephalopathy, central nervous system (CNS) infections, CNS bleeds, and structural anomalies of the brain or secondary to metabolic problems, for example, hypoglycemia, hyponatremia, and other electrolyte disturbances or cryptogenic. In addition, biochemical disturbances are often identified in neonatal seizures as an underlying cause or associated abnormality.[4,5] Early identification of biochemical disturbances and timely correction can be rewarding as the seizures can be controlled by treating the specific metabolic defect, preventing CNS sequelae.

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Aim

To study the incidence of biochemical abnormalities associated with neonatal seizures.

MATERIALS AND METHODS

This observational study was conducted in the Department of Paediatrics, Government Headquarters Hospital,

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Dindigul from January 2019 to 2019 June; neonates with seizures admitted to the neonatal intensive care unit.

Detailed antenatal, natal, and postnatal history was taken as per the proforma enclosed. Baseline characteristics of convulsing neonates, including sex, gestational age, birth weight, head circumference, and length, were recorded at admission. Clinical details were recorded, i.e. age at onset of seizures, duration of seizure, number, and type of seizure. Clinical details of each seizure episode were recorded, such as age at onset of seizures, duration of seizure, number, and type of seizure. The seizure was classified into subtle, focal clonic, multifocal clonic, tonic, and myoclonic, per Volpe criteria.

All the cases were subjected to the following investigations - Complete blood count, blood glucose, serum calcium, serum magnesium, serum sodium, serum potassium, were done when indicated.

Data were collected and presented as mean, standard deviation, frequency, and percentage.

RESULTS

In this study, fifty neonates presented with seizures were included in the study, the male was 25 (50%), and the female was 25 (50%) [Figure 1].

In fifty neonates, the preterm were 11 (22%), and the term was 39 (78%) [Figure 2].

In fifty neonates, babies with low birth weight (<2.5 kg) were 23 (46%), and with normal birth weight (>2.5 kg) were 27 (54%). The mean birth weight was 2.82 kg [Figure 3].

In our study, the onset of seizures within 24 h was 12 (24%), 24–72 h was 27 (54%), 72 h to 1 week was 9 (18%), and >1 week was 2 (4%) [Figure 4].

In fifty neonates, the number of neonates with subtle seizures was 31 (62%), tonic seizure was 15 (30%), and clonic was 4 (8%) [Figure 5]. In fifty neonates, hypoglycemia was reported in 22% of neonates, followed by hypocalcemia in 18% neonates, hyponatremia in 10% of neonates, hypomagnesemia in 4% of neonates, hypernatremia in 4% of neonates, and hypoglycemia with hypocalcemia in 2% of neonates [Figure 6].

DISCUSSION

A seizure is not a disease but rather a symptom of CNS disturbance resulting from either local or systemic causes. In the newborn infant, seizures are often the signal of an underlying disease process that may produce irreversible cerebral damage. Therefore, it is important to diagnose and treat specifically the underlying cause of a seizure before such damage occurs.[5]

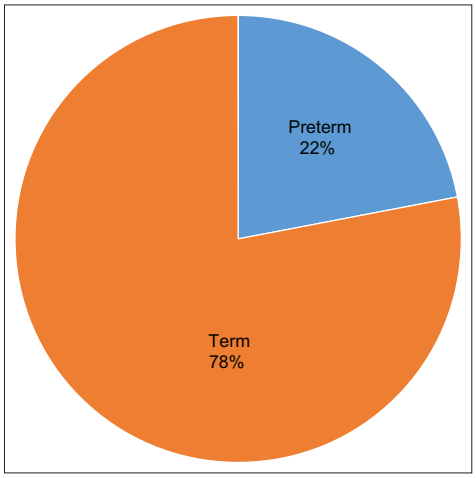

Figure 2: Term distribution

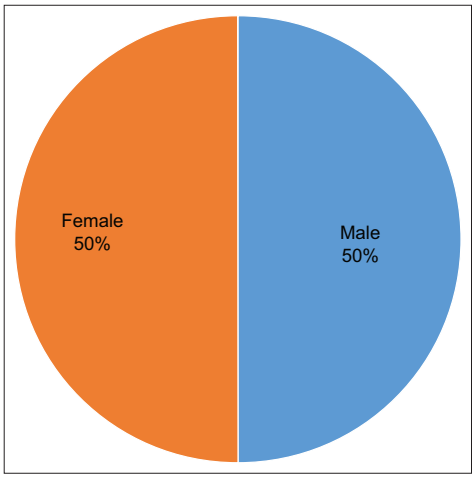

Figure 1: Gender distribution

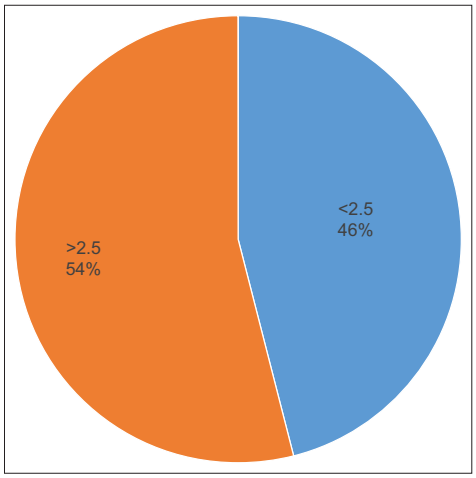

Figure 3: Birth weight distribution

The majority of neonates with seizures in my study were full-term neonates. A similar observation was seen in Aziz *et al.*,[6] where term babies constitute 65% and preterm 35%. Park *et al.*[7] and Das and Debbarma[8] reported a much higher incidence in term babies compared to preterm neonates. In a study by Al Marzoki 93.1% were weighting >2500 g, 2.3% were very low birth weight. In our study, 54% of neonates were weighing >2500 g.[9]

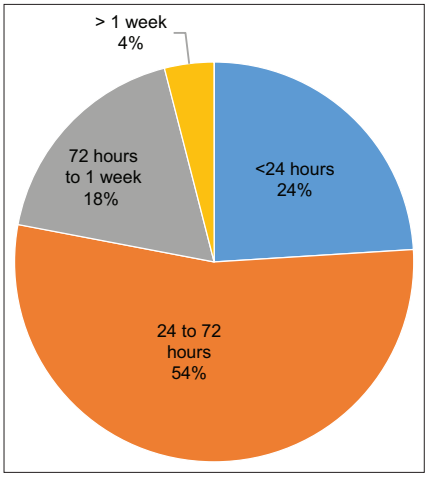

Figure 4: Onset of seizure distribution

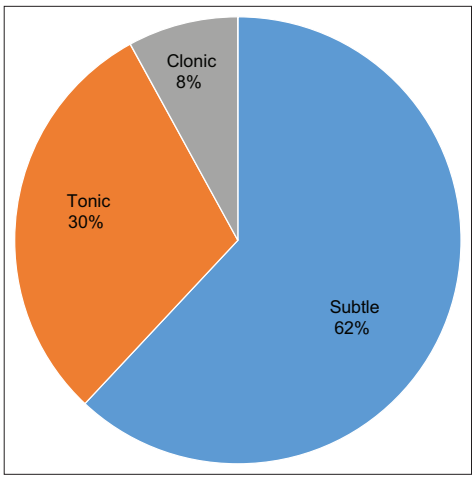

Figure 5: Type of seizures distribution

In a study by Aziz *et al.*, 83 neonates (83%) presented with seizures within the first 72 h of life.[6] Rose and Lombroso also found early-onset seizures in 75 (50.33%) babies, whereas Coen *et al.* found that 81% of babies had early-onset seizures, similar to the present study.[10,11] In our study, 78% of neonates presented with seizures with the first 72 h.

Sudia *et al.* where subtle seizures occurred in 63.33% followed by generalized tonic in 19.33% and multifocal clonic in 10% of neonates.[12] Das and Debbarma in their studies on neonatal seizures, also observed subtle seizures to be the most common type contributing about 42.6%, followed by tonic in 33.9%, and clonic in 15.7% of neonates.[8] Various studies by Yadav *et al.*,[13] Park *et al.*,[7] and Nawab and Lakshmipathy[14] also reported subtle seizures to be the most common type observed in their studies which were comparable with my study.

In our study, hypoglycemia was reported in 22% of neonates, followed by hypocalcemia in 18% neonates, hyponatremia in 10% of neonates, hypomagnesemia in 4% of neonates, hypernatremia in 4% of neonates, and hypoglycemia with hypocalcemia in 2% of neonates, which is similar with the findings published by Kumar *et al.*, Sood *et al.*, Arunkumar *et al.*, Madhusudhan *et al.* and Yadav *et al.*[15-19]

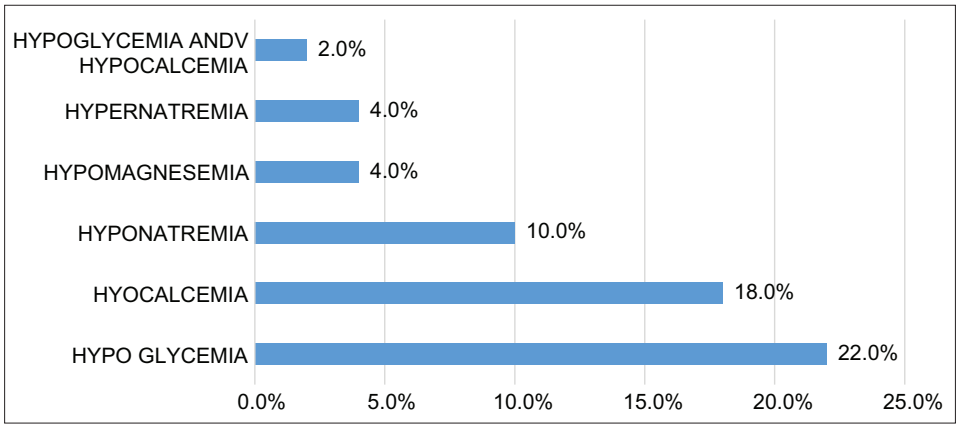

Figure 6: Biochemical abnormalities distribution

CONCLUSION

Early recognition and treatment of biochemical disturbances are essential for optimal management and satisfactory long-term outcome. The common metabolic causes for neonatal seizures include hyponatremia, hypoglycemia, hypocalcemia, and hypomagnesemia.

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