

Clinico-etiological profile of neonatal seizures in term neonates at a tertiary hospital

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Abstract

Background: The occurrence of seizure may be the first indication of a neurological disorder, and the time of onset of seizure has a relationship with the etiology of seizures and prognosis. Present study was aimed to evaluate the clinicoetiological profile of neonatal seizures in in term neonates admitted at the newborn unit of a tertiary care teaching hospital. **Material and Methods:** Present study was hospital based, observational study conducted in fullterm neonates (confirmed gestational age > 37 completed weeks), admitted in view of neonatal seizure/s. **Results:** During study period 58 neonates satisfying study criteria were evaluated. Majority of neonates were male (58.62 %), had birthweight less than 2.5 kg (39.66 %) and had vaginal delivery (62.07 %). Subtle seizures (48.28 %) was most common type of seizure followed by focal clonic (22.41 %), multifocal clonic (15.52 %), tonic (10.34 %) and myoclonic (3.45 %). Most common etiology for neonatal seizure was birth asphyxia (53.45 %), followed by hypoglycemia (13.79 %), meningitis (8.62 %), hypocalcemia (6.9 %), kernikterus (3.45 %) and idiopathic (6.9 %). Majority patients were managed with phenobarbitone alone (74.14 %). Most patients were discharged uneventfully (87.93 %), 6.9 % took discharge against medical advice. Mortality was noted in 3 cases, due to septicemia. **Conclusion:** Birth asphyxia, meningitis, hypoglycemia and hypocalcemia were major causes of neonatal seizures in term neonates.

Keywords: Birth asphyxia, meningitis, hypoglycemia, neonatal seizures

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INTRODUCTION

A seizure is defined as paroxysmal electrical discharge from brain which may manifest as motor, sensory, behavioural or autonomic dysfunctions.¹ It results from excessive synchronous electrical discharge, due to depolarization of neurons because of inward movement of sodium ions and instead of hyperpolarization, depolarization of neuron on inward movement of chloride ion in immature newborn.² Neonatal seizures are clinically

described as abnormal, stereotyped and paroxysmal dysfunctions in the central nervous system (CNS) occurring within the first 28 days after birth in full-term infants.³ Factors that contribute to high incidence include the neonate's brain being more prone to seizures due to maturational factors, late gestational and birth-related injuries. Recognition of neonatal seizures is crucial and difficult because the signs can be subtle and/or absent.⁴ The occurrence of seizure may be the first indication of a neurological disorder, and the time of onset of seizure has a relationship with the etiology of seizures and prognosis.⁵ Present study was aimed to evaluate the clinicoetiological profile of neonatal seizures in in term neonates admitted at the newborn unit of a tertiary care teaching hospital.

MATERIAL AND METHODS

Present study was hospital based, observational study conducted in Department of Pediatrics, Surabhi Institute of Medical Sciences, Mittapally Village, Siddipet Mdl And Dt, India. Study period from January 2021 to December

2021 (1 year). Institutional ethical committee approval was obtained for this study.

Inclusion criteria: Full term neonates (confirmed gestational age > 37 completed weeks), admitted in view of neonatal seizure/s, parents willing to participate in present study.

Exclusion criteria: Neonates with obvious congenital malformation e.g., anencephaly, large occipital meningocele, microcephaly, multiple malformations, dysmorphic features with “syndromic appearance”, etc. Neonates gestational age less than 37 weeks, Seizures occurring after 1 month of age, Neonatal tetanus cases. Parents not willing to participate.

Study was explained to parents and written consent was taken from parents. Neonates who had clinically apparent convulsions, history of convulsions or who developed convulsions during hospitalization were considered for study. Detailed antenatal history (maternal age, past

medical history, parity, gestational age, history of illness during pregnancy, medication during pregnancy), afterbirth events such as, any evidence of fetal distress, Apgar score, type of delivery and medication given to mother during delivery were noted. Baseline characteristics of convulsing neonate (sex, gestational age, arthropometry), clinical details of each seizure episode (age at onset of seizures, duration of seizure, number and type of seizure) were recorded. Laboratory investigations such as complete blood count, blood glucose, total serum calcium levels, Na⁺, K⁺, and magnesium were sent. Whenever required, additional investigations such as blood culture, USG cranium, MRI/CT, and CSF analysis were done. Seizure was classified into subtle, focal clonic, multifocal clonic, tonic, and myoclonic. Treatment details, clinical course and outcome was noted. Data was collected and compiled using Microsoft Excel and statistical analysis was done using descriptive statistics.

RESULTS

During study period 58 neonates satisfying study criteria were evaluated. Majority of neonates were male (58.62 %), had birthweight less than 2.5 kg (39.66 %) and had vaginal delivery (62.07 %).

Table 1: Baseline characteristics

Characteristics	Number of patients (N = 58)	Percentage
Gender		
Male	34	58.62%
Female	24	41.38%
Birth weight		
< 2.5 kg	23	39.66%
2.5 - 4 kg	21	36.21%
>4 kg	14	24.14%
Mode of delivery		0.00%
Vaginal (vertex)	36	62.07%
Vaginal (breech)	1	1.72%
Lower segment caesarean section	21	36.21%

In present study, subtle seizures (48.28 %) was most common type of seizure followed by focal clonic (22.41 %), multifocal clonic (15.52 %), tonic (10.34 %) and myoclonic (3.45 %).

Table 2: Type of Seizures

Type of seizures	Number of patients (N = 58)	Percentage
Subtle	28	48.28%
Focal clonic	13	22.41%
Multifocal clonic	9	15.52%
Tonic	6	10.34%
Myoclonic	2	3.45%

In present study, most common etiology for neonatal seizure was birth asphyxia (53.45 %), followed by hypoglycemia (13.79 %), meningitis (8.62 %), hypocalcemia (6.9 %), kernikterus (3.45 %) and idiopathic (6.9 %).

Table 3: Etiology wise distribution

Etiology	Number of patients (N = 58)	Percentage
Birth asphyxia	31	53.45%
Hypoglycemia	8	13.79%
Meningitis	5	8.62%
Idiopathic	4	6.90%

Hypocalcemia	4	6.90%
Kernikterus	2	3.45%
Hypercalcemia	2	3.45%
Hypomagnesemia	1	1.72%
Hypermagnesemia	1	1.72%

In present study majority patients were managed with phenobarbitone alone (74.14 %).

Table 4: Response to AED/Treatment

AED/Treatment	Number of patients (N = 58)	Percentage
Phenobarbitone	43	74.14%
Phenobarbitone + Phenytoin	11	18.97%
Phenobarbitone + Phenytoin + Levcitaram	4	6.90%
Dextrose	8	13.79%
Calcium	4	6.90%

Most patients were discharged uneventfully (87.93 %), 6.9 % took discharge against medical advice. Mortality was noted in 3 cases, due to septicemia.

Table 5: Outcome

Outcome	Number of patients (N = 58)	Percentage
Discharge	51	87.93%
Mortality	3	5.17%
Discharge against advice	4	6.90%

DISCUSSION

The occurrence of seizures may be the first indication of neurological disorder and the time of onset of seizures has a correlation with the etiology of seizures and prognosis. Diverse medical conditions in the newborn can be associated with neonatal seizures. Hypoxia-ischemia is nonetheless traditionally considered the most common cause of neonatal seizures.⁶ Cerebral infarction and stroke the second most common cause of neonatal seizures occurs in otherwise well term infants, without previous risk factors.⁷ Biochemical disturbances occur frequently in neonatal seizures either as an underlying cause or as associated abnormalities and are often underdiagnosed. Early recognition and treatment of these biochemical disturbances are essential for optimal management and satisfactory long-term outcome.⁸ Reddy KV *et al.*,⁹ studied 84 neonates, 46 were males and 38 were females. 29 neonates had seizures within first 24 hours and 22 neonates had seizures on day 2. Perinatal asphyxia was seen in 28 neonates and septicemia was seen in 21 neonates. Perinatal asphyxia was the most common cause for neonatal seizures in term neonates, followed by septicaemia and metabolic disturbances. Singh SD *et al.*,¹⁰ noted that 12.26 % developed clinical seizures. The most common cause of neonatal seizure was hypoxic ischemic encephalopathy (n=69, 59%), followed by infection (n=20, 17.09%), and metabolic disturbances (n=16, 13.7%). The outcomes were mortality (n=16, 13.7%), post neonatal seizure (n=18, 15.4%), developmental delay (n=31, 26.5%), vision impairment (n=19, 16.2%) and hearing impairment (n=26, 22.2%). Low Apgar scores at one minute ($p=0.03$) and five

minutes ($p=0.001$), early onset seizure ($p<0.001$), and more than one drug used for seizure control ($p=0.001$) were early prognostic factors for adverse outcome. In study by Bagla J *et al.*,¹¹ incidence of neonatal seizure was 11.93/1000 live births. The seizures were more common in male babies and in term newborns (72%). Half of the babies with neonatal seizures were low birth weight (LBW), but seizures were significantly more in appropriate for gestation age in comparisons to small for gestation age babies. Seizure frequency was not different in babies born intramural or extramural and also in deliveries conducted by doctors, nurses, or TBAs. Subtle seizures were the most common pattern observed in both term and preterm newborns (38.9%) followed by generalized tonic (22.3%). Birth asphyxia was most common etiology followed by meningitis. In study by Yadav RK *et al.*,¹² frequency of neonatal convulsion was 5.52%. Perinatal asphyxia was most common etiological factor in term or post term babies and presentation of seizures was early, intra cranial bleed and metabolic abnormality was common cause of convulsions in premature babies and presentation of seizure was somewhat late. Subtle seizure was most common type of fits followed by clonic type of seizures. Hypocalcemia was most common biochemical derangement. In study by Venkatesh G *et al.*,¹³ incidence of seizures in late preterm and term neonates was 0.76% in our study. Hypoxic ischemic encephalopathy (HIE) was the commonest etiology (50.4%) followed by sepsis(24.8%). Majority of HIE neonates presented within 12 hrs of life (89%). Hypoglycemia (21.2%) was the commonest primary metabolic abnormality followed by

hypocalcemia (9.7%). Clonic type was the most commonest type (82.3%) of seizure followed by subtle (73.5%) seizure Neonates with seizure are at risk of death, whereas survivors are at risk of neurological sequelae, developmental delay, later epilepsy and cognitive impairment. So, we need an early diagnostic work-up to determine the causes. Neuroimaging like TC-USG, CT-brain and MRI-brain have significant role in this.

CONCLUSION

Birth asphyxia, meningitis, hypoglycemia and hypocalcemia were major causes of neonatal seizures in term neonates. Broad measures, such as ensuring safe deliveries, appropriate neonatal resuscitation, prevention and early treatment of infections in the newborn period, early breast feeding and detection of sick cases with early referral is required to minimize the burden.

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