

Clinical And Biochemical Characteristics of Newborn Seizures Admitted in NICU of A Tertiary Care Hospital in Bihar

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Abstract

Aim: Clinical and biochemical profile of neonatal seizures admitted in neonatal intensive care unit of a tertiary care hospital in Bihar region. **Methods:** This was a retrospective, observational study conducted in the Department of Pediatrics, Nalanda medical College and Hospital, Patna, Bihar, India, from January 2020 to January 2021. All neonates with seizure before 28 days of life were included in the study. The neonatal seizures were classified according to Volpe's classification into subtle, focal clonic, multifocal clonic, tonic and myoclonic. Metabolic abnormalities and infections were noted. Hypoglycemia was defined as blood sugar < 40 mg/dl, and hypocalcaemia when total serum calcium was less than 7.0 mg/dl. Total 100 cases of neonatal seizure presenting before 28 days of life were included in the study. **Results:** Total admission during the study period was 1000 live births, out of which 100 neonates presented with seizure. The incidence of neonatal seizure was 10/ 1000 live births. The seizures were more common in male babies observed in our study. 71 (71%) neonates were born to multiparous women while 40 (40%) were born to primigravidas. In birth asphyxia (n= 50), the most common type of seizure observed was subtle seizure 24 (48%), followed by focal clonic 12 (24%) and multifocal clonic 6 (12%). Tonic type of seizure was observed in 5 (10%) and myoclonic in 3 (6%). Meningitis and septicemia were the second most common cause of neonatal seizure observed in our study. Among metabolic abnormalities hypoglycaemia was found in 20 (20%) and hypocalcaemia in 10 (10%). The commonest cause of seizure was birth asphyxia presenting within 72 hours. Among infection septicemia and meningitis was the most common infection leading to neonatal seizure. Among biochemical abnormalities the most common cause of seizure observed in our study was hypoglycaemia and hypocalcaemia. **Conclusion:** Birth asphyxia was the commonest cause of neonatal seizure that can be managed by resuscitation and providing intensive care. Meningitis and septicemia also contributed to neonatal seizure, which needs aggressive management.

Keywords: Asphyxia, Neonatal Seizure, Septicaemia.

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Introduction

Seizures in neonatal period are more common than any other age because of immature brain functions and improper myelination, even more common in preterm babies than term babies. Incidence of seizures ranges from 2.8/1000 in term appropriate for gestational age to 57.5/1000 in pre term very low birth weight babies (VLBW)[1]. 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]. Most seizures in the newborn are symptomatic of a specific aetiology and with diagnostic advances, aetiology is easily identifiable. Neonatal seizures are different in manifestation as well as response to treatment due to immature development state of newborn brain and different etiologies.

Neonatal seizures are a frequently encountered neurologic condition among neonates[3-5]. They are defined as the occurrence of a sudden, paroxysmal, abnormal alteration of the electrographic activity at any given point from birth to end of the neonatal period[3]. The incidence of neonatal seizures was reported between 1 to 5.5 per 1000 live births among term infants, and incidence is higher among preterm infants[6-9]. Because of its immaturity, the neonatal brain is more prone to seizures due to an imbalance of neuronal excitation over inhibition[3]. Numerous factors cause this discrepancy. The primary factor is the neonatal neuron in its developmental. Other factors include the development of excitatory synapses before inhibitory

synapses and early maturation of voltage-gated ion channels specific to depolarization[10]. The clinician should immediately rule out hypoglycemia, hyponatremia, hypomagnesemia, hypocalcemia sepsis/meningitis/encephalitis[11]. To avoid complications from under recognition of clinical seizures and the adverse effects of medications administered, the diagnosis and management of neonatal seizures necessitate an inter professional approach.

Material and Methods

This was a retrospective, observational study conducted in the Department of Pediatrics, Nalanda medical College and Hospital, Patna, Bihar, India, from January 2020 to January 2021. after taking the approval of the protocol review committee and institutional ethics committee.

All neonates with seizure before 28 days of life were included in the study. The neonatal seizures were classified according to Volpe's classification into subtle, focal clonic, multifocal clonic, tonic and myoclonic. Metabolic abnormalities and infections were noted. Hypoglycemia was defined as blood sugar < 40 mg/dl, and hypocalcaemia when total serum calcium was less than 7.0 mg/dl. Total 100 cases of neonatal seizure presenting before 28 days of life was included in the study. Age, sex, etiological factors and biochemical parameters were recorded in a pre- designed data sheet. The data was analysed by using SPSS 21.0 version.

Results

Total admission during the study period was 1000 live births, out of which 100 neonates presented with seizure. The incidence of neonatal seizure was 10/ 1000

live births. These seizures were more common in male babies observed in our study. 71 (71%) neonates were born to multiparous women while 40 (40%) were born to primigravidas. In birth asphyxia (n= 50), the most common type of seizure observed was subtle seizure 24 (48%), followed by focal clonic 12 (24%) and multifocal clonic 6 (12%). Tonic type of seizure was observed in 5 (10%) and myoclonic in 3 (6%). Meningitis and septicaemia were the second most common cause of neonatal seizure observed in our study. Among metabolic abnormalities hypoglycaemia

was found in 20 (20%) and hypocalcaemia in 10 (10%). The commonest cause of seizure was birth asphyxia presenting within 72 hours. Among infection septicaemia and meningitis was the most common infection leading to neonatal seizure. Among biochemical abnormalities the most common cause of seizure observed in our study was hypoglycaemia and hypocalcaemia. Subtle seizures were the commonest type of seizure observed in this study. In majority of cases the seizure occurred within 24 hours that has been shown in Table III.

Table 1: Incidence of Neonatal Seizure According to Weight.

Weight of the neonates	Total no. neonates	Neonates with seizure	Percentage
< 2500 gms (LBW)	450	66	68.18%
2500 gms	550	34	16.17%

Table 2: Relationship of Aetiology and Type of Seizure

Aetiology	Total (n= 100)	Subtle (n= 40)	Focal clonic (no=35)	Multifocal clonic (no= 11)	Tonic (no= 11)	Myoclonic (no = 3)
Birth asphyxia	50(50%)	24 (48%)	12(24%)	6 (12%)	5(10%)	3 (6%)
Septicaemia	10(10%)	4 (40%)	3 (30%)	1 (10%)	1(10%)	1 (10%)
Meningitis	10(10%)	5 (50%)	1 (10%)	2 (20%)	1(10%)	1 (10%)
Hypocalcaemia	10(10%)	5 (50%)	2 (20%)	0	2(20%)	1 (10%)
Hypoglycaemia	20(20%)	12(60%)	4 (20%)	0	2(10%)	2 (10%)

Table 3: Aetiology versus onset of seizure

Aetiology	No of cases	0-1 days	1-2 days	3-7 days	< 7days
Birth asphyxia	50	35 (70%)	13 (26%)	2 (4%)	0
Septicaemia	10	2 (20%)	4 (40%)	2 (20%)	2 (20%)
Meningitis	10	5 (50%)	1 (10%)	2 (20%)	2 (20%)
Hypocalcaemia	10	6 (60%)	2 (20%)	1 (10%)	1 (10%)
Hypoglycemia	20	14 (70%)	2 (10%)	2 (10%)	2 (10%)

Discussion

Neonatal seizure is an important cause of neonatal morbidity and mortality. The present study showed incidence of 10/ 1000 live births which is similar to Holden KR et al study [12].

In the present study the most common type of seizure observed were subtle which constitutes 40% of seizure in both term and

preterm babies [13]. The most common cause of seizure encountered in this study was birth asphyxia, which is comparable with Sood A et al study that reported 45.7% cases of seizure were due to birth asphyxia [14]. Our study showed 20% of the seizure were due to infections i.e., septicaemia and meningitis, which is also similar to study, conducted by Ledigo et al who reported 5% developed septicaemia

and 12% developed meningitis[15]. In present study hypocalcaemia is observed in 10% and hypoglycaemia in 20%. The study conducted by Kumar A et al.[16] found that birth asphyxia was the commonest cause of seizure in first 48 hrs of life which was similar to our finding. In the present study prolonged rupture of membrane, Meconium-stained liquor/ foul smelling liquor, repeated vaginal examination during pregnancy, repeated instrumentation, maternal fever, maternal diarrhoea and prematurity were the risk factors for development of neonatal sepsis. The presence of seizure does not constitute a diagnosis, but it is a symptom of an underlying central nervous system disorder due to systemic or biochemical disturbances. Hypoglycaemia and hypocalcaemia are the most common biochemical abnormality seen in neonates with seizure and carries a good short term outcome.

In a study done on 100 neonates by Estan and Hope, HIE accounted for 37%, intracranial hemorrhage 7%, meningitis 5%, and hypoglycemia 3%[17]. Goldberg in a 10-year review of 81 cases had HIE (16%), ICH (6%), hypoglycemia (6%), hypocalcemia (2%), and meningitis (8%), and remaining were due to congenital abnormalities[18]. Nelson et al in 2006 observed that 10-20% of cases were due to hypocalcemia and hypomagnesemia[19].

Conclusion

We concluded that birth asphyxia was the commonest cause of neonatal seizure that can be managed by resuscitation and providing intensive care. Early recognition and treatment will improve the long-term outcome. Meningitis and septicaemia also contributed to neonatal seizure, which needs aggressive and timely management. Among the biochemical abnormalities hypoglycaemia and hypocalcaemia were the commonest cause for neonatal seizure. Subtle seizure was the commonest type of

seizure that can be easily missed, as it is very mild.

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