

An observational study to assess the Clinico-etiological profile of term neonates presented with seizures

Baibhav Prakash Sahay¹, Abu Irfan^{2*}

¹Senior Resident, Department of Pediatric, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India

²Senior Resident, Department of Pediatric, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India

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Abstract

Background: Neonatal seizures are the most common neurological dysfunction in the neonatal period. Neonatal seizures may arise as a result of diverse etiologies and can have varied presentations. **Aim:** The aim was to study the clinic-etiological profile of neonatal seizure in term neonates in Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India. **Material and methods:** This prospective study was done the Department of Pediatric, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India for one year. Total 120 term neonates with clinically identifiable seizures before 28 days of life were include in this study. Diagnosis of HIE was based on history, physical examination, Apgar score, arterial blood gas, brain MRI brain or cranial sonography. Diagnosis of neonatal infection was based on clinical manifestations, sepsis screening tests and blood culture, CSF analysis. **Results:** In the present study, 120 neonates with chief complaints of seizures were included. 64 (53.33%) were males and 56 (46.67%) were females. 77 (64.17%) neonates were between 37 to 39 weeks of gestation, while 43 (35.83%) neonates were between 40 to 41 weeks of gestation. 66 neonates had vaginal delivery and 54 neonates were delivered by cesarean section. Onset of seizure was day 1 in 39 (32.5%), day 2 in 31 (25.83%), and day 3 of life in 13 (10.83%) neonates. The most common type of seizure seen was focal clonic type (n=41, 34.17%); followed by subtle seizures (n=38, 31.67%), myoclonic (n=24, 20%), focal tonic (n=5, 4.17%), multifocal (n=8, 6.67%), and generalized tonic clonic type (n=4, 3.37%). Among the studied population, perinatal asphyxia was identified as the most common cause of neonatal seizure (n=42, 35%). This was followed closely by septicemia (n=29, 24.17%). Other significant causes identified were hypocalcemia (n=13, 10.83%), hypoglycemia (n=10, 8.33%), hyperbilirubinemia (n=8, 6.67%), intracranial hemorrhage (n=4, 3.33%) brain malformations (n=6, 5%). While, 6 (5%) neonates had hypomagnesaemia and 2 (1.67%) neonate had seizures due to lignocaine injection. **Conclusion:** Perinatal asphyxia is the most common cause of neonatal seizures among term neonates in our setup. The other causes followed in order are septicemia, metabolic (hypoglycemia, hypocalcemia, hypomagnesemia and hyperbilirubinemia), intracranial hemorrhages and brain malformations.

Keywords: Hypoglycaemia, Hypocalcaemia, Intracranial haemorrhage, Non-metabolic seizures, Primary metabolic.

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Introduction

Seizures are the most common and distinct clinical manifestation of neurological dysfunction in the newborn infant[1]. Neonatal seizures are a common neurological problem in neonates with a frequency of 1.5-14/1000 neonates[1-3] The occurrence of neonatal seizures per se has been positively correlated with structural brain damage and its consequent sequels at later stages in life. Historically seizures were divided in following clinical categories viz. focal clonic, multifocal clonic, tonic, myoclonic, & subtle seizures 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[1,4] Cerebral infarction and stroke the second most common cause of neonatal seizures occurs in otherwise well term infants, without previous risk factors[5,6] and involves left middle cerebral artery territory and presents with right sided clonic seizures. Intracranial hemorrhage is implicated in 10% to 15% of seizures, and amongst them Intra-ventricular hemorrhage or Periventricular hemorrhagic infarction is the most common Intracranial hemorrhage in preterm infants and constitutes around 45% seizures in preterm[7,8]. Central nervous system infections

*Correspondence

Dr. Abu Irfan

Senior Resident, Department of Pediatric, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India.

E-mail: abuirfan87@gmail.com

during intrapartum or postnatal period can be associated with seizure[9]. Biochemical disturbances occur frequently in neonatal seizures either as an underlying cause or as an associated abnormality [10,11]. Metabolic disturbances could be more commonly transient and rapidly correctable or less commonly inherited as persistent causes. Infants of diabetic mothers, small for gestational age infants, infants with birth asphyxia are at more risk of hypoglycemia. Late onset hypocalcaemia due to use of high phosphate infant formula has been cited as common cause of seizures[12,13]. However commonly hypocalcaemia occurs in infants with trauma, hemolytic disease, asphyxia and IDM and usually coexists with hypoglycemia and hypomagnesemia[14] and presents at 2-3 days of life. Hypomagnesaemia with serum<1.5 mg/dl can occasionally manifest with tetany and seizures at 2-4 weeks of age and has secondary hypocalcaemia associated. Hypophosphatemia may be caused by ingestion of milk formulas containing high amounts of phosphorous, excessive parenteral administration of phosphorus, impaired renal function, and hypoparathyroidism[15]The present study was conducted to determine the etiological factors for term neonatal seizures in our hospital.

Material and methods

This prospective study was done the Department of Pediatric, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India for one year.

Inclusion criteria

- Total 120 term neonates with clinically identifiable seizures before 28 days of life.

Exclusion criteria

- Preterm neonates,
- Babies with neonatal tetanus,
- Babies with obvious congenital malformation

Methodology

A detailed antenatal, natal, postnatal, and family history was obtained and documented in predesigned proforma. Diagnosis of HIE was based on history, physical examination, Apgar score, arterial blood gas, brain MRI brain or cranial sonography. Diagnosis of neonatal infection was based on clinical manifestations, sepsis screening tests

and blood culture, CSF analysis. Metabolic disorders were considered as hypoglycemia (serum glucose <40mg/dl), hypocalcemia (Total serum Ca <8mg/dl in full term.), and hypomagnesaemia (serum magnesium levels < 1.5 mg/Dl). Intracranial hemorrhages were diagnosed by CT scan brain. The results were analyzed by appropriate statistical methods.

Results

In the present study, 120 neonates with chief complaints of seizures were included. 64 (53.33%) were males and 56 (46.67%) were females. 77 (64.17%) neonates were between 37 to 39 weeks of gestation, while 43 (35.83%) neonates were between 40 to 41 weeks of gestation. 66 neonates had vaginal delivery and 54 neonates were delivered by cesarean section.

Table 1: Gender wise distribution of cases

Gender	No. of patients	%
Male	64	53.33
Female	56	46.67
Total	120	100

Table 2: Distribution of cases according to onset of seizures

Day of onset	Number of patients	%
1	39	32.5
2	31	25.83
3	13	10.83
4	7	5.83
5	4	3.33
6	6	5
7	6	5
>=8	14	11.67
Total	120	100

Table 3: Distribution of cases according to type of seizures

Type of seizure	Number of patients	%
Focal clonic	41	34.17
Subtle	38	31.67
Myoclonic	24	20
Focal tonic	5	4.17
GTCS	4	3.33
Multi focal	8	6.67
Total	120	100

Onset of seizure was day 1 in 39 (32.5%), day 2 in 31 (25.83%), and day 3 of life in 13 (10.83%) neonates. The most common type of seizure seen was focal clonic type (n=41, 34.17%); followed by subtle seizures (n=38, 31.67%), myoclonic (n=24, 20%), focal tonic (n=5, 4.17%), multifocal (n=8, 6.67%), and generalized tonic clonic type (n=4, 3.37%). Among the studied population, perinatal asphyxia was identified as the most common cause of neonatal seizure (n=42,

35%). This was followed closely by septicemia (n=29, 24.17%). Other significant causes identified were hypocalcemia (n=13, 10.83%), hypoglycemia (n=10, 8.33%), hyperbilirubinemia (n=8, 6.67%), intracranial hemorrhage (n=4, 3.33%) brain malformations (n=6, 5%). While, 6 (5%) neonates had hypomagnesaemia and 2 (1.67%) neonate had seizures due to lignocaine injection.

Table 4: Distribution of seizures according to aetiology

Aetiology of seizures	Number of patients	%
HIE	42	35
Sepsis	29	24.17
Hypocalcaemia	13	10.83
Hypoglycaemia	10	8.33
Hypomagnesaemia	6	5
Intracranial haemorrhage	4	3.33
Hyperbilirubinemia kernicterus	8	6.67
Brain malformation	6	5
Drug withdrawal	2	1.67
Total	120	100

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. The most common cause is hypoxic-ischemic encephalopathy (HIE); the other causes include hemorrhage, metabolic disturbances, and infections [16]. In our

present study, 64 (53.33%) neonates were male and 56 (46.67%) were females with slight male predominance. This finding was similar to the studies done by the Sahana G et al, Sabzehei MK et al, Parvin R et al and Moayedi AR et al [17-20]. 66 (55%) babies with neonatal seizure were born through the vaginal delivery and 54 (45%) babies were through the LSCS. This was found similar with the study done

by Sabzehei MK et al (53% and 47% respectively)[18].Of the 120 neonates with seizures, 39 (32.5%) had seizures on day 1 followed by 31 (25.83%) on day 2 of life, 13(10.83%) on day 3, and 14 (11.67%) on day ≥8 days of life. A total of 83 (69.17%) neonates had seizures within first 3 days of life. Similar findings were found by the Sahana G et al and Ronen Gabriel et al[17,21].Based on clinical seizure types, focal clonictype (n=41, 34.17%); followed by subtle seizures (n=38, 31.67%), myoclonic (n=24, 20%), focal tonic (n=5, 4.17%), multifocal (n=8, 6.67%), and generalized tonic clonic type (n=4, 3.37%). This was found in concordance with the study done by Aziz A et al and Verma YS et al (Table 3)[22,23]Perinatal asphyxia was the most common cause of neonatal seizures identified in 35% of neonates. This was found to be in concordance with the study done by Najeeb S et al (46%) Sabzehei MK et al (34%), Glass HC et al (38%) and Malik BA et al (35%)[18,24-26]. In other studies, done by Verma YS et al (70%) of neonates had seizures due to hypoxic ischemic encephalopathy[23]In the present study 29(24.17%) of 120 babies had sepsis (septicemia and meningitis). This was found similar to the study done by Parvin R et al (26%, n=51), Sabzehei MK et al (24.4% n=102) and was found to be (29%) by the study done by Najeeb S et al[24] In another study done by Malik BA et al 15 34% of babies had septicemia. in this study 10 (8.33%) babies had seizure only due to hypoglycemia without any comorbidities. This was seen in concordance with the study done by Kumar A et al (11.11%), Sahana G et al (9.17%)[27,17] This is probably because of depletion of glycogen storage and inadequate feeding during early post-natal days. isolated hypocalcemia causing seizures were found in 13(10.83%) of the 120 neonates studied. This was found similar to the study done by Parvin R et al 15.65% (n=51) and Taksande AM et al (n=110) where they found to be 11.8% and Verma YS et al found it to be 11.67% (n=60) In 6 (5%) cases neonatal seizure was caused by hypomagnesemia. Similar finding was seen by Taksande A. M et al[28]Seizures due to hyperbilirubinemia (kernicterus) was seen in 8(6.67%) neonates in the present study. Similar findings were found in study done by Najeeb S et al (n=6, 6%).²⁴ 4 (3.33%) neonates had seizures due to intracranial hemorrhage. Similar findings were seen by Najeeb S et al (n=100, 4%) and SudiaS et al (n=90, 4.6%) [24,29] Seizures due to lignocaine toxicity was seen in 2(1.67%) neonate in our study, similar finding was seen by Malik BA et al (n=2, 1%)[26]

Conclusion

Perinatal asphyxia is the most common cause of neonatal seizures among term neonates in our setup. The other causes followed in order are septicemia, metabolic (hypoglycemia, hypocalcemia, hypomagnesemia and hyperbilirubinemia), intracranial hemorrhages and brain malformations. Early identification of at risk pregnancies, institutional delivery and aseptic precautions with timely resuscitation is recommended to reduce morbidity and mortality due to neonatal seizure.

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