Original Research Article

A study of clinico-biochemical profile of neonatal seizure: A tertiary care hospital study

Wakil Paswan[1*], Bankey Behari Singh[2]

[1]Assistant Professor, [2]Associate Professor and Head
Department of Pediatrics, A.N.M.M College Hospital, Gaya, India
[*]Corresponding author email: **paswanwakil@gmail.com**

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Abstract

Background: Seizure is the most frequent sign of neurologic dysfunction in the neonate. Biochemical disturbances occur frequently in neonatal seizures either as an underlying cause or as associated abnormalities. Early recognition and treatment of biochemical disturbances are essential for optimal management and satisfactory long-term outcome. The aims were to study the biochemical abnormalities in neonatal seizures and to describe the clinical presentation, time of onset and its relation to etiology of neonatal seizures.

Materials and methods: The present study included 125 neonates presenting with seizures admitted to neonatal unit. Detailed antenatal, natal and postnatal history was taken and examination of baby was done. Then relevant investigations including biochemical parameters were done and etiology of neonatal seizures and their associated biochemical abnormalities were diagnosed.

Results: In the present study out of 125 neonates studied. 112 were full-term of which, 97 (77.6%) were AGA and 15 (12%) were SGA, 11(8.8%) were preterm and 2 (1.6%) was post-term babies. 121 (96.8%) were hospital deliveries and 110 (88%) were spontaneous vaginal deliveries. 78 (62.4%) were with birth weight > 2.5 kg. In our study, 90 (72%) cases had on set of seizures within first 3 days. The highest number was seen on first day of life 70(56%). Subtle seizures were the most common type of seizures in our study 52 (41.6%). Birth asphyxia was the most common cause of neonatal seizures in our study 68(54.4%), followed by neonates meningitis 21 (16.8%) and metabolic disorders 12 (9.6%). The most common biochemical abnormality detected in neonatal seizures in Hypocalcemia and Hypoglycemia.

Conclusions: Hypoxic ischemic encephalopathy was the commonest etiology of neonatal seizures and in them most of the seizures had on onset in the first 72 hours. Overall focal clonic and subtle

seizures were the commonest seizure types encountered. Hypocalcemia was the commonest biochemical abnormality in primary metabolic seizures. Biochemical abnormalities were commonly associated with other etiologies like asphyxia, intracranial hemorrhage and meningitis; hence these should be actively sought for and treated for optimal seizure control.

Key words

Neonatal seizures, Birth asphyxia, Hypoxic ischemic encephalopathy, Hypoglycemia with hypocalcemia.

Introduction

Seizures are possibly the most important and common indicator of significant Neurologic dysfunction in the Neonatal Period [1]. Seizure incidence is higher during this period than in any other period in life. 57.5 per 1000 in infants with birth weights <1500 g and 2.8 per 1000 In infants weighing between 2500 and 3999 g have seizures [1].

A seizure is defined as paroxysmal electrical discharges from brain which may manifest as motor, sensory, behavioural or autonomic dysfunctions [1]. Seizures in neonatal period can be subtle, focal clonic, multi focal clonic, tonic spasm and myoclonic- Spasm. Focal clonic or tonic and generalized myoclonic seizures are associated with electrographic discharges, whereas the subtle, generalized tonic and other myoclonic seizures are not associated with EEG discharges [1]. Common causes of convulsions in newborn are hypoxic ischemic encephalopathy, cerebral infarction and stoke intra cranial hemorrhage, Intra cranial infections, metabolic disturbances and undetermined, etc. [2]. Tonic seizure and myoclonic seizures were associated with unfavorable outcome and found in infants with hypoxic ischemic encephalopathy and intra cranial hemorrhage. Most common Biochemical abnormality associated with neonatal convulsion is hypocalcemia, hypoglycemia, hypomagnesemia, Hyponatremia. hypogiycaemia in 50% cases associated with unfavourable outcome [2].

Our aim was to identify the etiology, its clinical type and biochemical changes in cases of neonatal convulsions in our region.

Materials and methods

The present study was retrospective, observational study conducted in the Neonatal Intensive Care Unit Department of Pediatrics A.N.M.M College Hospital Gaya from January 2017 to December 2017. All neonates with seizures 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 were defined as blood sugar <40mg/dl, and hypocalcaemia when total serum calcium was less than 7.0 mg/dl. Total 125 cases of neonatal seizure presenting before 28 days of life were included in the study. Age, Sex, etiological factors and biochemical parameters were recorded in a predesigned data sheet.

Results

The total number of neonates admitted to Neonatal Unit of Department of Pediatrics A.N.M Medical College Gaya during the period of January 2017 to December 2017 was 1322. Out of it, 125 neonates had episodes of neonatal seizures. **Table - 1** shows out of 125 neonates, preterm babies were 11(8.8%) term babies were 112 (89.6%) and post-term babies were 2 (1.6%), 77.6% babies were AGA and 12% neonates were SGA in our study. **Table - 2** show among the babies 80 (64%) Were male and 45 (36%) were female in our study. place of delivery of babies with neonatal seizures is shown in **Table - 2** (3.2%) babies were born at home and 121 (96.8%) babies at hospital in our study. **Table - 3** shows 110(88%) babies were born by spontaneous vaginal delivery, 12(9.6%) babies

by cesarean section and 3(2.4%) were by forceps delivery. **Table - 4** shows in our study 78(62.4%) babies were >2.5 kg, 35 (28%) neonates between 2 and 2.5 kg and 12 (9.6%) neonates between 1 and 2 kg. Day of onset of neonatal seizures is shown in **Figure - 1**. In our study onset of seizure within 24 hours of delivery was found in 70(56%) of neonates, while convulsions within 48 hours of delivery were seen in 5(4%) babies. Convulsions in first 3 days of life together were seen in 90 (72%) neonates, 23(18.4%) developed seizures during 8-28 days **Table - 5** show most common Type of seizure was subtle type which presented 52 new born constituted 41.6% approximately. The clonic seizure was Present in 45 (36%) and Tonic seizures was present in 26 (20.8%) and Myoclonic seizures 2 (1.6%) in babies.

Table – 1: Distribution of neonatal seizures according to gestational age.

	N	%
Term AGA	97	77.6
Term SGA	15	12
Pre-term	11	8.8
Post-term	2	1.6

Table – 2: Distribution of Gender and Place of Delivery of Babies with Neonatal Seizures.

Sex-wise distribution of neonatal seizures	125(100%)
Male, n(%)	80(64%)
Female, n (%)	45(36%)
Place of delivery of babies with neonatal seizures	125(100%)
Home Delivery, n(%)	4(3.2%)
Hospital delivery, n(%)	121(96.8%)

Table – 3: Type of delivery of babies with neonatal seizures.

	No	%
Spontaneous vaginal	110	88%
Cesarean section	12	9.6%
Outlet forceps	3	2.4%

Table - 6 shows most common etiology in our study was birth asphyxia found in (54.4%) cases of neonatal convulsions. Neonates with meningitis or septicemia constituted 21(16.8%) Metabolic derangement as cause of neonatal convulsion was found in 12 (9.6%) our study. Intracranial bleed was etiology of seizures in 8 (6.4%). Kernicterus was etiology of seizures 4(3.2%) and Miscellaneous 12 (9.6%) among biochemical abnormalities the most common causes of seizure observed in our study was hypoglycemia and hypocalcemia.

Table – 4: Birth Weight of Babies with Seizures.

Birth weight (kg)	No (%)
>2.5	78(62.4)
2-2.5	35(28)
1-2	12(9.6)
<1	---
Total	125(100%)

Table – 5: Type of Neonatal convulsion.

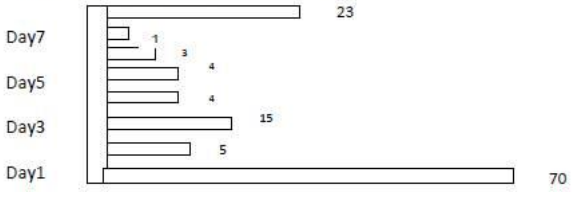
Type	No	%
Subtle Seizures	52	41.6%
Clonic Seizures	45	36%
Tonic Seizures	26	20.8%
Myoclonic	2	1.6%

Table – 6: Etiology of Neonatal seizure.

Etiology	No	%
Hypoxic Ischemic Encephalopathy	68	54.4
Intracranial bleed	8	6.4
Meningitis/ Septisemia	21	16.8
Metabolic	12	9.6
Kernicterus	4	3.2
Miscellaneous*	12	9.6

*Miscellaneous includes undetermined, structural anomaly, IEM etc.

Figure-1 Day of onset of Neonatal seizures.



Discussion

Seizures are most common neurological disorders in new born period. In our study, out of 125 neonatal with seizures 112 (89.6%) were full-term neonates, of which 97 (77.6%) were appropriate for gestational age and 15(12%) were

small for gestational age. 11(8.8%) were preterm and 2 (1.6%) baby was post-term baby. Majority of neonates with seizure in our study were full-term babies, birth asphyxia was the most common cause of seizures in full-term babies. Similar observations were seen in study by Moayedi and Zakeri where term AGA babies were 83.6%, preterm were 12.7% and post-term were 3.6% [3]. In our study, neonatal seizures were more common in male babies 64% in our study, cases were 78 (62.4%) with birth weight> 2.5 kg 35(28%). between 2 and 2.5 kg and12 (9.6%) were between 1 and 2 kg. Study by Moayedi and Zakeri also showed similar finding of 73.6% had >2.5 kg and 22.7% had <2.5kg [3]. In our study majority of neonates with seizures were born with normal vaginal delivery 110 (88%) followed by LSCS 12 (9.6%) and outlet forceps delivery 3(2.4%). In a study of neonatal seizures by Mahaveer, et al., 68.7% were born by normal vaginal delivery, 28.1% by lower segment cesarean section and 3.1% by forceps delivery [4]. In our study, 70(56%) neonates out of 125 neonates with seizures had onset within the first day of life. 75(60%) within 48 hours and 102 (81.6%) within 1 week, 23 (18.4%) neonates had after 8 days of life to 28 days of life. This Presentation is consistent with earlier studies (5-7). We found in our study, subtle seizure in 52 (41.6%) which were most commonly associated with birth asphyxia, followed by clonic seizures in 45 (36%). Aziz, et al. [8] reported, clonic convulsions are more common while Taksande, et al. [9] reported subtle seizures as the most common and occurring in 50% cases. Birth asphyxia is the most common cause of neonatal seizure in our study 68(54.4) followed by meningitis in 21 (16.8%) Metabolic seizures were seen in 12 (9.6%), 8 (6.4%) of Intracranial hemorrhage, kernicterus 4 (3.2%), Miscellaneous 12 (9.6%). Frequency of birth asphyxia as a cause of neonatal convulsions reported by previous authors like Sood, et al. [10]; Kumar, et al. [6] and Aziz, et al. [8], was 45.71% 48.2% and 44%, respectively and comparable to our data. Our findings are comparable and more likely confounded by hygiene.

The most common Biochemical abnormality in our study was Hypocalcaemia. Hypocalcaemia as cause of Neonatal Convulsion was found in 12 (9.6%). These finding were comparable to previous studies. Neonatal infection /meningitis were Present in 21 (16.8%) cases in our study. Rabindran, et al. [7] reported Meningitis as a cause of Neonatal seizure in 7.69% cases where as Legido A, et al. [11] reported 17.2% while Aziz A, et al. [8] reported 22% incidence of Neonatal Infection in Neonatal seizures. Intra ventricular bleed was there in around 8 (6.4%) in our study. Bushra, et al. [12] reported the ICH was there are around 9.5% of cases. Incidence of Intra ventricular hemorrhage was much higher in preterm than term Neonates Roseet AI [13] also Scher MS, et al. [14] reported higher Incidence of Intra ventricular hemorrhage in preterm.

Conclusion

Hypoxic ischemic encephalopathy was the commonest etiology of neonatal seizures and in them most of the seizures had an onset in the first 72 hours. Overall focal clonic and subtle seizures were the commonest seizure types encountered. Hypocalcemia was the commonest biochemical abnormality in primary metabolic seizures. Biochemical abnormalities were commonly associated with other etiologies like asphyxia, intracranial hemorrhage and meningitis; hence these should be actively sought for and treated for optimal seizure control.

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