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A Study of Clinical Profile in Neonatal Seizures with Special Reference to Biochemical Abnormalities at NICU, RMMCH, Chidambaram

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Abstract
Objectives: *To study the presentation of seizures in neonate with special reference to clinical etiology and metabolic abnormalities. This study aims to find the etiology, metabolic abnormalities and time of onset in newborn presenting with neonatal seizures in NICU Rajah Muthaih Medical College.*
Materials and Methods: *This is prospective, observational hospital based study. This study include Hundred neonates, who had seizures within 28 days from birth admitted in Rajah Muthaih Medical College neonatal intensive care unit, were observed for etiological factor, clinical varient and metabolic abnormalities found in neonatal seizure.*
Results: *The result observed are subtle seizure forms the most common seizure, followed by clonic seizure [focal (25%), multifocal (12.5%). Tonic type of seizure in (7.5%) and myoclonic in (5%). Among metabolic abnormalities hypoglycaemia was found in (22%) and hypocalcaemia in (11%), followed by hyponatremia and hypokalemia Birth asphyxia is the most common cause of seizures, followed by infection and metabolic cause.*
Keywords: *Neonatal seizure, hypoglycaemia, clonic seizure, Birth asphyxia.*

Introduction

The neonatal seizure needed to be treated aggressively in order to prevent the neurological complication at later stage of life. Metabolic abnormalities are usually associated with the underlying hypoxia and infection. Hence in all cases of neonatal seizures with biochemical abnormalities underground screening is needed.

Seizures in neonatal period are more common in preterm babies when compared to the term babies. Very low birth weight[6] and low birth weight babies have increased chances of seizures when compared to term, adequate weight for gestational age.

Materials and Methods

This study is conducted in Rajah Muthiah Medical College between November 2016 to October 2018.

Neonates presented with seizure within 28 days of life are included in the study. 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.

Results

There were 1737 live births during the study period between November 2016 to October 2018, out of which 100 neonates with seizure with complete etiology and follow up are taken into the study.

The seizures were more common in male babies compared to female babies observed in the study.

1. Birth asphyxia and perinatal asphyxia within 3days of life is the commonest cause of seizure, followed by infection.[5]
2. Hypoglycaemia is the most common metabolic abnormality, followed by hypocalcemia, hyponatremia and hypokalemia.

Discussion

Distribution of etiology in study

Diagnosis	Gabriel et al (n=90) %	Present study (n=100) %
HIE	40	42
Infections	20	25
Metabolic	19	20

Metabolic work up

In metabolic work up 34 neonates had hypoglycemia, of which 15 neonates had isolated hypoglycemia while the remaining 19 neonates were associated with septicemia and HIE.[1] Out of 15 neonates with hypocalcemia, 4 neonates had isolated hypocalcemia and remaining 11 neonates were associated with other conditions. There was only one neonate with hypomagnesemia.

Hypoglycemia	34
Hypocalcemia	15
Hypomagnesemia	1
Hyponatremia	5

Seizure type and etiology

Out of 55 neonates with subtle seizure, the most common etiology was HIE (67%).[2-5] 4 neonates had infective etiology (13%). 50% of multifocal clonic type of seizure were due to infection (23 neonates) and 41% due to metabolic etiology (19 neonates). Out of 32 neonates with focal clonic type of seizure,[2-4] 44% were due to metabolic etiology and 50% of due to infection. Out of 19 neonates with generalized tonic type of the seizure, 31% were due to ICH and 47% were due to HIE.

Etiology	Term (61)	Preterm (39)
HIE	40(95%)	2(5%)
Infection	12(48%)	13(52%)
Metabolic	10	10
ICH	-	6
Hydrocephalous	2	-
Kernicterus	-	1
Unknown	3	1

Seizure types and etiological factors for different seizures

Types	HIE	Infection	Metabolic	Hyd.	Ker.	Unk.
Subtle (27)	18(67%)	4 (13%)	12 (47%)	-	1	1
Focal clonic (16)	1 (6%)	8(50%)	7 (44%)	-	-	-
Multifocal clonic (23)	4 (9%)	12(50%)	8 (41%)	-	-	-
Focal tonic (6)	3 (42%)	-	-	-	-	1 (8%)
Generalized tonic (8)	5 (47%)	-	-	1 (11%)	1	1
Myoclonic (2)	-	-	-	-	-	2

Natal factors

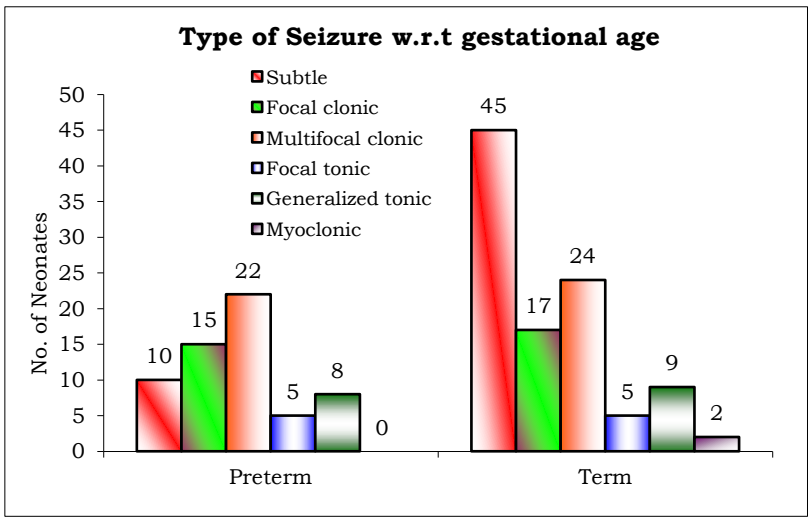
Out of 100 neonates included in this study, 42% of neonates had history of birth asphyxia, 39% had fetal distress and 21% had PROM.[8]

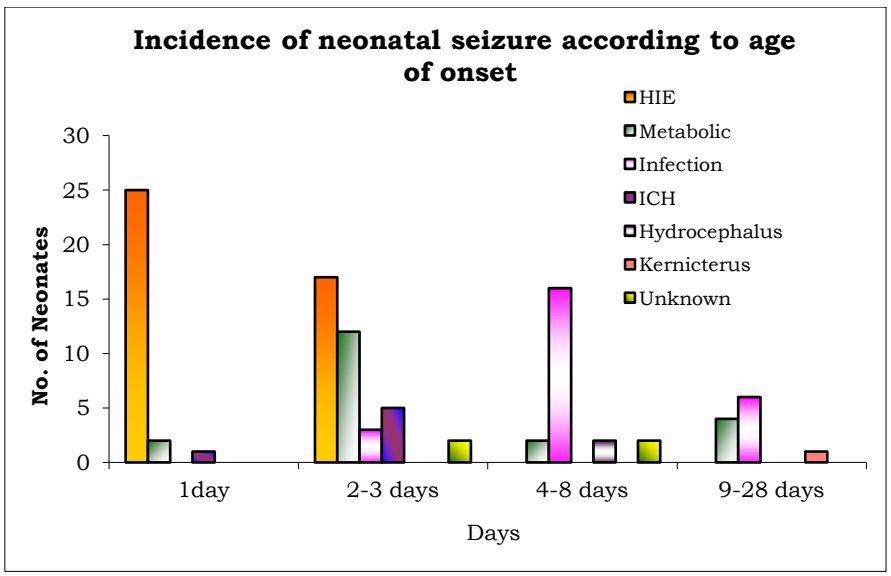
Distribution by Natal Factors

Natal factors	No. of neonates	Percentage
Fetal distress	39	39%
Birth asphyxia	42	42%
Prolonged labour	19	19%
CPD	15	15%
MSAF	19	19%
PROM	21	21%
Cord around the neck	6	6%
Abnormal lie	3	3%

Incidence of neonatal seizure according to age of onset

Commonest cause of seizure in first day of life was HIE (25%). Between 2-3rd day, 17% of neonates with HIE and 12% of neonates with metabolic cause had seizures. Between 4-8th days of life, the predominant cause for seizure was infection 16% and 6% of neonates with infection had seizure between 9-28th days.[15]



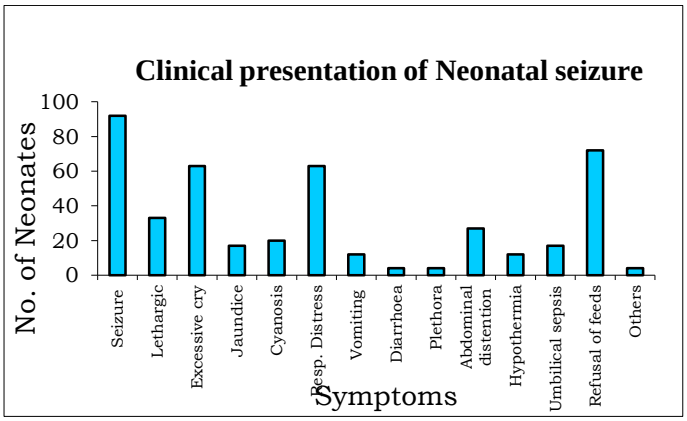


Antenatal factors

Out of 100 mothers 82 mothers had regular Antenatal checkup and was immunized against tetanus. 52 mothers had anemia, 26 mothers had infection and 16 mothers had PIH.[7]

Distribution by Antenatal Factors

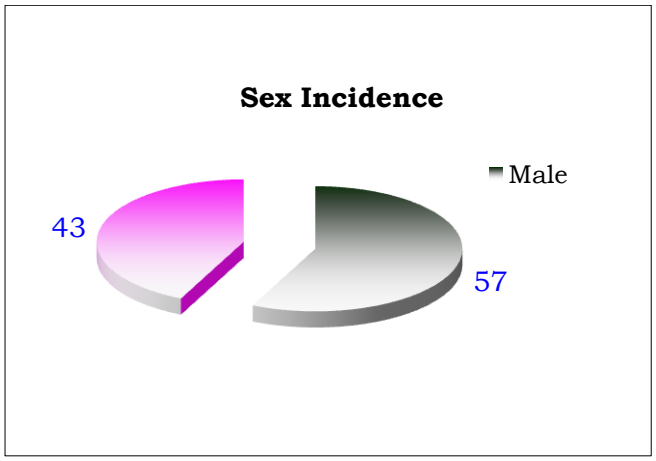
ANF	No. of mothers	Percentage
ANC	82	82%
TT	82	82%
Anemia	52	52%
Diabetes	6	6%
PIH	16	16%
APH	5	5%
Multiple Gestation	10	10%
Infection	26	26%
Cardiac Disease	5	5%
Oligohydramnios	3	3%
Epilepsy	4	4%



Age and Seizures

Out of 100 neonates the maximum no. of neonates had seizures between 24 to 74 hrs (39%) followed by 28% of neonates had seizures within 24hrs. 22% of neonates had seizure between 4 to 7 days and 11% of neonates had seizure beyond 1st week of life.[12-14]

Sex incidence



Time of Onset of Seizures

Age	No. of Neonates	Percentage
< 24 hrs	28	28%
24-72hrs	39	39%
4-7days	22	22%
8-28days	11	11%

In CNS examination, neonatal reflexes were normal in 30 neonates and absent in 30 neonates. 31 neonates had decreased neonatal reflexes and increased neonatal reflexes in 9 neonates.[6]

With regards to muscle tone, 27 neonates were normal. Decreased muscle tone was seen in 61 neonates and increased muscle tone in 12 neonates.

CNS Outcome

	Findings	No. of seizures	Percentage
Neonatal reflex	Normal	30	30%
	Increased	9	9%
	Decreased	31	31%
	Absent	30	30%
Tone	Normal	27	27%
	Increased	12	12%
	Decreased	61	61%

CRP study

Blood CRP had been done in all 100 cases, out of which 27 were positive. Out of 25 suspected septicemia cases, 23 were positive.[8-10]

Distribution of Positive CRP

Specimen	No. of neonates	Positive	Negative
Blood	100	27	63
Septicemia	25	23	2

Conclusion

1) Seizures are multi-factorial in etiology and HIE is the commonest cause followed by infections and metabolic causes.[11]
2) In metabolic causes, Hypoglycemia is the most common biochemical abnormality, followed by hypocalcemia
3) Clinically, subtle seizure activity is more commonly observed followed by clonic type.

4) During the entire neonatal period, seizures are more commonly seen in the first week of life.
5) Hypoglycemia and hypocalcemia are mostly associated with HIE
6) Metabolic causes of seizures carry the good prognosis if treated promptly
7) Neonates with subtle seizures are more likely to be normal at discharge. Tonic seizures have the highest morbidity and mortality, among all seizure types.
8) HIE carries the worst prognosis and the metabolic causes carry good prognosis, among all etiological factors for seizure.

Reference

1. Jensen FE. Developmental factors regulating susceptibility to perinatal brain injury and seizures. Curr Opin Pediatr 2006;18(6):628–33.
2. Rahman S, et al. Inborn errors of metabolism causing epilepsy. Dev Med Child Neurol. 2013;55(1):23–36.
3. Uria-Avellanal C, Marlow N, Rennie JM. Outcome following neonatal seizures. SeminFetal Neonatal Med. 2013.
4. Rakhade SN, Jensen FE. Epileptogenesis in the immature brain: emerging mechanisms. Nat Rev Neurol. 2009; 5(7):380–91.
5. Dzhala VI, Staley KJ. Excitatory actions of endogenously released GABA contribute to initiation of ictal epileptiform activity in the developing hippocampus. J Neurosci. 2003;23(5):1840–6.
6. Temko A, et al. Robust neonatal EEG seizure detection through adaptive background modeling. Int J Neural Syst. 2013; 23(4):1350018.
7. Temko A, et al. Inclusion of temporal priors for automated neonatal EEG classification. J Neural Eng. 2012; 9(4):046002.
8. Slaughter LA, Patel AD, Slaughter JL. Pharmacological treatment of neonatal seizures: a systematic review. J Child Neurol. 2013;28(3):351–64
9. Lynch NE, et al. The temporal evolution of electrographic seizure burden in neonatal hypoxic ischemic encephalopathy. Epilepsia. 2012;53(3):549 –57
10. Glass HC, et al. Neonatal seizures: treatment practices among term and preterm infants. Pediatrv Neurol. 2012; 46(2):111–5
11. Talos DM, et al. Antiepileptic effects of levetiracetam in a rodent neonatal seizure model. Pediatr Res. 2013; 73(1):24–30.
12. Kilicdag H, et al. The effect of levetiracetam on neuronal apoptosis in neonatal rat model of hypoxic ischemic brain injury. Early Hum Dev. 2013; 89(5): 355–60.
13. Sharpe CM, et al. A seven-day study of the pharmacokinetics of intravenous levetiracetam in neonates: marked changes in pharmacokinetics occur during the first week of life. Pediatr Res. 2012; 72(1):4.
14. Lundqvist M, et al. Efficacy and safety of lidocaine for treatment of neonatal seizures. Acta Paediatr. 2013; 102(9): 863–7.3–9.
15. Clark AM, et al. Intravenous topiramate: Comparison of pharmacokinetics and safety with the oral formulation in healthy volunteers. Epilepsia. 2013;54(6):1099– 105.