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Clinical and Etiological Profile of Neonatal Seizures among Term Neonates in A Tertiary Care Hospital

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Abstract
As a result of the developmental neurophysiology, neonatal seizures (seizures within the first 28 days of birth) are relatively common, with an incidence of 1-4 per 1000 live births as many as 130 per 1000 preterm infants. Clinical seizure semiologies are difficult to discern in neonates and the seizures may have more subtle electro graphic signatures than older children or adults. To study the clinical and etiological profile of neonatal seizures in a tertiary care centre. Study was conducted among a total of 75 term neonates within the age group of 0-28 days presenting with seizures from July 2023 to November 2023 were enrolled in the study. All the term neonates with clinically identifiable seizures before 28 days of life were enrolled in the study. A total of 75 newborns were included in the present study. Among the 75 neonates 42 (56%) were male and 33 (44%) were female in our study. In our study, onset of seizure within 24 hours was found in 36 neonates, while convulsion from 24-72 hours in 17 neonates, from fourth day to seventh day of life 12 neonates presented with convulsions. 10 neonates developed seizures during 8-28 days. Birth asphyxia was found to be most common cause (32%) of neonatal sei
zure in our study, followed by Metabolic derangement (20%) and meningitis or septicemia (25.33%). In our study subtle seizure was most common type (50.66%), followed by clonic (28%), tonic (16%) and myoclonic type (5.33%). Early identification of at-risk pregnancies, institutional delivery and aseptic precautions with timely resuscitation is recommended to reduce morbidity and mortality due to neonatal seizures.

INTRODUCTION

Seizures are the most common and distinct clinical manifestation of neurological dysfunction in the newborn infant[1]. As a result of the developmental neurophysiology, neonatal seizures (seizures within the first 28 days of birth) are relatively common, with an incidence of 1-4 per 1000 live births as many as 130 per 1000 preterm infants[2]. Neonatal physiology and a paucity of myelin also means that neonatal seizures have different clinical manifestations than seizures in older children and adults. Clinical seizure semiologies are difficult to discern in neonates and the seizures may have more subtle electro graphic signatures than older children or adults[3,4]. The seizures in neonates may manifest as paroxysmal alteration in motor, sensory, behavioral or autonomic dysfunctions[5]. Three types of seizures are recognized

(a) Electro clinical seizures-an abrupt change in neurological function with corresponding EEG changes.
(b) Clinical only seizures-an abrupt change in neurological function without corresponding EEG changes.
(c) Electric seizures-recognized seizure activity only on EEG without any clinical attribute. Clinically neonatal seizures are differentiated into four major types based on their presentation as subtle, clonic, tonic and myoclonic seizures. Etiologically, about 80-85% of neonatal seizures are symptomatic and rest are idiopathic. The most common cause is hypoxic-ischemic encephalopathy (HIE); the other causes include hemorrhage, metabolic disturbances infections[6]. Seizures are often the first sign of neurological dysfunction in newborns[7]. The babies who survive may have adverse effects on motor, cognitive behavioral development or epileptic complications in the later part of the life[8].

Objective: To study the clinical and etiological profile of neonatal seizures in a tertiary care hospital.

MATERIALS AND METHODS

A hospital based prospective observational study was undertaken in the neonatal intensive care unit (NICU), Department of Paediatrics of a tertiary care hospital. After taking an informed written consent from the attendants of babies who were admitted in our neonatology section, a total of 75 consecutive neonates within the age group of 0-28 days presenting with seizures from July 2023 to November 2023 were enrolled in the study.

Inclusion Criteria:

- Newborns from birth to 28 days of life in full term infants
- Complaints or history of seizures, clinically apparent seizures
- Newborns who developed seizures during their hospital or NICU stay.

Exclusion Criteria:

- Neonates with gross congenital malformations e.g.-anencephaly, meningomyelocele, microcephaly etc.
- Neonates with jitteriness, tetanic spasms, benign neonatal sleep myoclonus
- Dysmorphic features suggestive of syndromic appearance.

Data Collection Procedure: All the term neonates with clinically identifiable seizures before 28 days of life were enrolled in the study. A detailed antenatal, natal, postnatal 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

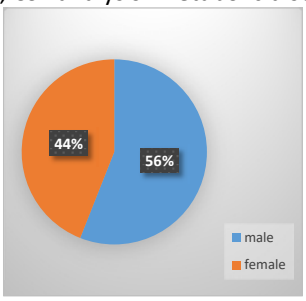

Fig. 1: Seizure incidence per gender

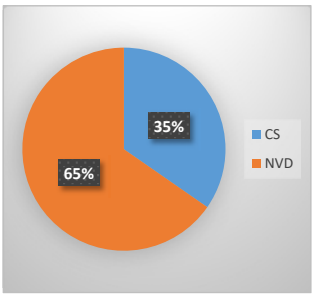

Fig. 2: Mode of delivery

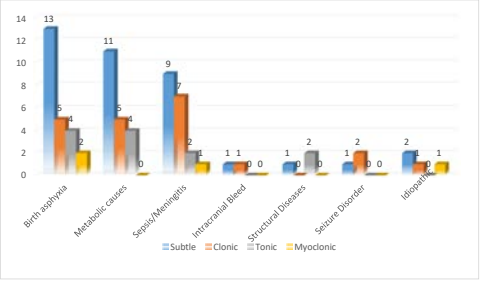

Fig 3: Etiological causes and type of seizure

Table 1: Maternal Characteristics of the neonates

Age of the mother	<18	3
	19-29	29
	30-39	37
	>40	6
Maternal Parity	Nulliparous	32
	multiparous	43
Delivery status	Inborn	51
	out born	24
Delivery type	Caesarean	26
	Vaginal delivery	49
Antepartum risk factors	PIH	14
	Oligohydramnios	2
	GDM	15
Intrapartum risk factors	PROM	5
	Maternal fever	2

Table 2: Time of onset of First episode of seizure

<24 hours	36 (48%)
24-72 hours	17(22.66%)
4-7 days	12(16%)
8-28 days	10(13.33%)

Table 3: Distribution based on type of seizure

Etiology	Number	Subtle	Clonic	Tonic	Myoclonic
Birth asphyxia	24(32%)	13	5	4	2
Septicemia/meningitis	20(26.66%)	11	5	4	-
Metabolic	19(25.33%)	9	7	2	1
Intra cranial Bleed	2(2.6%)	1	1	-	-
Structural disorders	3(4.1%)	1	-	2	-
Seizure disorder	3(4.1%)	1	2	-	-
Idiopathic	4(5.33%)	2	1	-	1
Total	75	38(50.66%)	21(28%)	12(16%)	4(5.33%)

considered as hypoglycemia (serum glucose<40mg/dl), hypocalcemia (Total serum calcium <8mg/dl) and hypomagnesemia (serum magnesium levels <1.5mg). Intracranial hemorrhages were diagnosed by CT scan brain. In addition, complete blood counts, band cell count, absolute neutrophil count, micro-ESR, blood culture, USG cranium, MRI/CT and CSF analysis were done as per the requirement in individual cases. Baseline characteristics of convulsing neonate including sex, gestational age, weight, head circumference and length were recorded at admission. Clinical details of each seizure episode were recorded i.e. age at onset of seizures, duration of seizure, number and type of seizure. Seizure was classified into subtle, clonic, tonic and myoclonic as per criteria by Volpe[9].

Statistical Analysis: Statistical analysis was done, using the statistical package of social services (SPSS 20) for Windows Software. Continous data were presented as mean ± standard deviation, if normally distributed and median (interquartile range) if data were non normal. Categorical variables are presented as frequency and percentages (n., %).

RESULTS AND DISCUSSIONS

A total of 75 newborns were included in the present study. Among the 75 neonates 42(56%) were male and 33 (44%) were female in our study (Figure 1). The male preponderance in our study was in accordance with the studies carried out by Digra[10] and Pravin[11] in which males constituted around 70.5% and 76.5% of total neonatal seizure cases respectively. However, according to study by Lanska[12] male sex was not associated with increased risk of neonatal seizures. Male preponderance in our study may be attributed to gender bias towards male child in our society and to the fact that male infants are better cared for and more likely to seek prompt medical attention. 26 (34.66%) neonates were born by caesarean section and 49(65.33%) by vaginal delivery (Fig. 2). Babies developed through vaginal delivery had more chance of developing birth asphyxia. This was found similar with the study done by Sabzehei[15] (47% and 53%respectively). 43 neonates (57.33%) were >2.5kg, 24(32%) neonates between 2 and 2.5kg8 (10.66%) neonates were <2kg.

In our study, onset of seizure within 24 hours was found in 36(48%) neonates, while convulsion from 24-72 hours in 17(22.66%) neonates, from fourth day to seventh day of life 12(16%) neonates presented with convulsions. 10(13.33%) neonates developed seizures during 8-28 days (Table 2). These findings are in agreement with those of in studies by the Volpe[9] and Lanska[12] study where majority of the neonatal seizure cases had early onset of seizure.

Birth asphyxia was found to be most common cause (n-24, 32%) of neonatal seizure in our study (Fig. 3), followed by Metabolic derangement (n-20,26.66%) and meningitis or septicemia (n-19,25.33%). Intra cranial bleed, structural disorders and seizure disorder were attributed in n-2(2.6%), n-3(4%) and n-3 (4%) respectively. No cause could be ascertained in 4 (5.33%) of the cases. These findings were consistent

with the studies conducted by Dingra SK *et al* and Parvin[10,11]. Parvin R *et al* found perinatal asphyxia as a cause of neonatal seizure in 56.86% cases. Other causes were septicemia (15.67%), meningitis (11.76%), kernicterus (3.92%), neurometabolic disorder (3.92%) and idiopathic (1.96%). In the study by Dingra[10], birth asphyxia was seen in 67.65% followed by infections (septicemia and meningitis). Similarly in the study by Kumar[7], perinatal asphyxia was the most common etiology for neonatal seizure.

In our study subtle seizure was most common type (50.66%), followed by clonic (28%), tonic (16%) and myoclonic type (5.33%). According to John H. Menkes and Harvey B. Sarnat[13] subtle seizures were the most common type accounting for 71% of seizures seen in term infant and 68% of seizures seen in preterm infant. According to Joseph J Volpe in one study of infants more than 36 weeks of gestation subtle seizures comprises of 85% and in another study subtle seizures account for 70-75% of all clinical seizures[14]

CONCLUSION

The present study shows perinatal asphyxia is the most common cause of neonatal seizures among term neonates in our setup. The other causes followed are septicemia, metabolic (hypoglycemia, hypocalcemia, hypomagnesemia), 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 seizures.

Limitations: It is a single center study with relatively small sample size. A larger sample size can throw more insight into this. A more robust multi centric study is the need of the hour.

REFERENCES

1. Volpe, J.J., 2001. Neonatal Seizures. In: Neurology of the New- Born., Saunders, W.B., (Ed.)., Philadelphia, Pennsylvania Colony, ISBN-13: 9780323508650, pp: 178-214.
2. Glass, H.C., R.A. Shellhaas, C.J. Wusthoff, T. Chang and N.S. Abend et al., 2016. Contemporary profile of seizures in neonates: A prospective cohort study. J. Pediatr., 174: 98-1030.
3. Malone, A., C.A. Ryan, A. Fitzgerald, L. Burgoyne and S. Connolly,et al 2009. Interobserver agreement in neonatal seizure identification. Epilepsia, 50: 2097-2101.
4. Murray, D.M., G.B. Boylan, I. Ali, C.A. Ryan and B.P. Murphy,et al 2008. Defining the gap between electrographic seizure burden, clinical expression and staff recognition of neonatal seizures. Arch. Dis. Child. Fet. Neon. Edi., 93: 187-191.
5. Das, D. and S.K. Debbarma, 2016. A study on clinico-biochemical profile of neonatal seizure. J. Neurol. Res., 6: 95-101.
6. Kang, S.K. and S.D. Kadam, 2015. Neonatal seizures: Impact on neurodevelopmental outcomes. Front. Pediatr.s, Vol. 3 .10.3389/fped.2015.00101.
7. Kumar, A., A. Gupta and B. Talukdar, 2007. Clinico-etiological and eeg profile of neonatal seizures. Indi. J. Pediatr, 74: 33-37.
8. Levene, M., 2002. The clinical conundrum of neonatal seizures. Arch. Dis. Chil. Fet. Neon. Editi., 86: 75-77.
9. Digra, S.K. and A. Gupta, 2007. Prevalence of seizures in hospitalized neonates. Sci., 9: 27-29.
10. Parvin, R., A. Salim, M. Rahman, K. Chowdhury and A. Sultana,et al 2014. Neonatal seizures: Correlation between clinico-etiological profile and eeg findings. Bangl. J. Child. Heal, 38: 19-23.
11. Lanska, M.J., D.J. Lanska, R.J. Baumann and R.J. Kryscio, 1995. A population-based study of neonatal seizures in fayette county, kentucky. Neurology, 45: 724-732.
12. Menkes, J.H. and H.B. Sarnat, 2005. Child Neurology. In: Child Neurology., Lippincot, W. and Wilkins., (Eds.)., Philadelphia, Philadelphia county, southeastern Pennsylvania, ISBN-14: 978-0781723855, pp: 991-995.
13. Volpe, J.J., 2008. Neonatal Seizures. In: Neurology of the Newborn, Saunders, E., (Ed.)., Philadelphia, Pennsylvania, ISBN-13: 9781909962675, pp: 203-244.
14. Sabzehei, M.K., B. Basiri and H. Bazmamoun, 2014. The Etiology, Clinical Type, and Short Outcome of Seizures in Newborns Hospitalized in Besat Hospital/Hamadan/ Iran. Iran. J. Chi. Neu., 8: 24-28.