

## A STUDY ON NEONATAL SEIZURE AMONG INTENSIVE CARE ADMITTED NEWBORNS AT TERTIARY CARE CENTRE, KUPPAM

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### ABSTRACT

#### BACKGROUND

Neonatal seizures typically depict a significant underlying neurological disease. The recognition of aetiology and clinical profile for neonatal seizure is often helpful with respect to prognosis and treatment.

The aim of this study was to know the clinical profile of neonatal seizures and to assess the role of biochemical abnormality in a neonatal seizure.

#### MATERIALS AND METHODS

This was a prospective observational study. Total 118 patients, admitted in the neonatology unit of PESIMSR, presenting with neonatal seizures between January 2016 to June 2017 were included in the study.

#### RESULTS

Neonatal seizure incidence was noted in 11.3% of the hospitalised neonates, with subtle seizure being the most frequently seen type. HIE (Hypoxic-Ischemic Encephalopathy) was the most common cause (58.47%) observed. Total 50.85% seizures were observed on the first day. Primary biochemical abnormalities occurred in 7.6% of the cases and secondary in 56.8%. Among the primary biochemical abnormalities leading to neonatal seizures, hypoglycaemia in 4.2% of cases was noted to be the commonest abnormality followed by hypocalcaemia and hypomagnesaemia in 1.7% each.

#### CONCLUSION

Neonatal seizure is a commonly seen disorder in hospitalized new born with incidence of 11.3%. The most common aetiology being HIE followed by sepsis and biochemical abnormalities. Subtle seizures were most common type observed.

#### KEYWORDS

Neonatal Seizures, Hypoxic Ischemic Encephalopathy, Biochemical Abnormalities, Sepsis.

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#### BACKGROUND

Seizures are the most common and distinctive clinical manifestation of neurologic dysfunction in the newborn infant. Newborn infants with seizures are at risk for neonatal death and survivors at risk for neurologic impairment, developmental delay, and later epilepsy. Despite increasingly sophisticated neonatal intensive care, clinicians managing seizures remain challenged by difficult prognostic and therapeutic questions.<sup>1</sup>

The estimated rate of seizures in term newborns is said to be approximately 1–5 per 1,000 live births.

However, population-based studies do not take into account the low diagnostic accuracy of diagnosis by clinical

observation alone and gold standard continuous, prolonged video-electroencephalogram monitoring is not widely available enough to make population-based predictions, therefore the true incidence remains unknown. Neonatal seizures carry a high risk for early death. Among survivors, the outcome depends largely on the underlying disease process and severity of underlying brain injury.<sup>2</sup>

Seizures are often the first sign of neurological dysfunction in newborn but their clinical expression at this age is quite variable, poorly organized and often subtle. Volpe in 1973 has classified seizures into five clinical types, viz. subtle, multifocal clonic, focal clonic, generalized tonic and myoclonic. Neonatal seizures are difficult to investigate and consequently determination of aetiology and initiation of therapy may be delayed which results in poor neurological outcome. Neonatal seizures can be due to various causes like hypoxic-ischemic encephalopathy, intracranial haemorrhage, meningitis, hypoglycaemia, hypocalcaemia, congenital malformation, etc.<sup>3</sup>

#### Aims and Objectives

To know the clinical profile of neonatal seizures including the seizure pattern, time of onset and possible aetiology.

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## MATERIALS AND METHODS

### Study Design

Prospective observational study.

### Study Period

18 months between January - 2016 to June – 2017.

### Study Population

All admitted neonates to Newborn Intensive Care Unit (NICU), Paediatric Department.

### Study Setting

PES Institute of Medical Sciences and Research, Kuppam, Chittoor, Andhra Pradesh.

### Inclusion Criteria

1. All newborns admitted to NICU irrespective of birth weight, gestational age, place of birth and type of delivery presenting with seizures at admission or developing during the hospital stay.
2. Newborns with recurrent subtle seizures

### Exclusion Criteria

1. Neonates with isolated subtle phenomenon, apnoea or paroxysmal autonomic changes, i.e., only subtle motor moments or apnoea without tachycardia were excluded from the study.
2. Jitteriness in neonates.
3. Tetanic spasm in neonates.
4. Neonates with congenital anomalies.

### Method of Collection of Data (Including Sampling Procedure, if any)

Neonates presenting with seizures during the period of 18 months from January 2016 to June 2016, if satisfying the inclusion criteria were enrolled into the study, after getting written informed consent from the parents/guardians. Total number of neonatal admissions during the study period was 1014, out of which 118 fulfilled the inclusion criteria and were included in the study.

A detailed history in all cases was recorded on a self-designed proforma with emphasis on the age of onset of first seizure, duration of seizure, number of seizures, type of seizure, antenatal, natal and post-natal risk factors (which includes maternal drug addiction / withdrawal, maternal diabetes, prolonged rupture of membranes, perinatal asphyxia, traumatic delivery, preterm, small for date, Low birth weight baby, septicaemia, meningitis, intracranial bleed and hyperbilirubinemia).

Detailed clinical examination was done including vitals, general physical examination and systemic examination with special reference to central nervous system. Necessary investigations such as complete blood counts, C-reactive protein, blood culture, serum electrolytes, blood glucose and neurosonogram were done as per our protocol.

## RESULTS

Total number of neonatal admissions during the study period was 1014, out of which 118 fulfilled the inclusion criteria and were included in the study. Majority 105 (88.98%) of the neonates in the study group were term neonates, and 13 (11.02%) were preterm. Of these, 53 cases (45%) were inborn and 65 cases (55%) were outborn (referred to our hospital from outside). Male neonates were 71 (60.17%) and 41 (39.83%) were female. Male neonates predominated in the study. Subtle seizures were the commonest, as seen in 55 cases (46.61%) followed by tonic 36 cases (30.51%), combined seizures occurred in 10 cases (8.47%). In our study Out of 118 cases, 98(83%) had seizures during the first 3 days of life. Among them majority 60(50.85%) had convulsions on day 1 of life. 12(10.17%) cases had seizures after 7 days of life. Table 1

In this study, majority 69 (58.47%) of neonatal seizures was due to HIE, followed by sepsis 17 (14.41%) and IVH in 10 (8.5%). Primary biochemical abnormality accounted for 9 (7.63%) of the cases. Hypoglycaemia in 4.2% of cases was noted to be the commonest abnormality. It was followed by hypocalcaemia and hypomagnesaemia in 1.7% each.

| Etiology \ day of Onset | <24 Hours | 2-3 Days  | 4-7 Days | > 7 Days  | Total      |
|-------------------------|-----------|-----------|----------|-----------|------------|
| Hie                     | 48        | 20        | 0        | 1         | 69         |
| Ivh                     | 6         | 3         | 0        | 1         | 10         |
| Biochemical             | 2         | 4         | 2        | 1         | 9          |
| Sepsis                  | 3         | 7         | 3        | 4         | 17         |
| Meningitis              | 0         | 0         | 1        | 3         | 4          |
| Idiopathic              | 1         | 4         | 2        | 3         | 9          |
| <b>Total</b>            | <b>60</b> | <b>38</b> | <b>8</b> | <b>12</b> | <b>118</b> |

**Table 1. Distribution of cases based on Correlation of 'Day of Onset' and Etiology**

## DISCUSSION

1014 neonates were admitted to the neonatology unit during the study period. Out of them, 118 neonates had seizures, an incidence of 11.37 % in hospitalized neonates. 55.1% of the cases were outborn since our hospital is a tertiary care hospital in a rural place; we receive more number of cases from outside. According to a study done by Rao MS et al in 2014, showed that out of 1500 neonates admitted in NICU, 200 (13.3%) developed neonatal seizures.<sup>4</sup>

Su-Ching Hu and Kun-Long Hung showed that Neonatal seizures was diagnosed in 22 (18%) among 122 neonatal admissions in NICU in 2015.<sup>5</sup> In another study done by Das et al, 1200 neonates were admitted in NICU during the study period from 2013 to 2015. Out of it, 115 neonates had episodes of neonatal seizures (9.6%).<sup>6</sup>

In majority (46.61%) of the cases subtle seizures were noted as the commonest type of seizure followed by tonic and clonic, which share the same results with study done by Su-Ching Hu and Kun-Long Hung in Cathay General Hospital, Taipei in 2015, Subtle seizures were 77.2% followed by tonic (13.7%) and clonic (9.1%) seizures.<sup>4</sup> In a study by Arun Kumar A,<sup>7</sup> Subtle seizures were the

commonest (38%) while tonic, clonic, myoclonic and combined seizures constituted 30%, 19%, 2% and 11% respectively, Das et al in 2015 also found among 115 neonates subtle seizures in 49 (42.6%) followed by tonic 39 (33.9%) and clonic 10 (8.7%).<sup>6</sup>

As seen in the above table 1, the most common seizure noted in this study was Hypoxic-ischemia (58.47%), followed by sepsis (17.8%) which included meningitis as well, later intraventricular bleed (8.47%), primary biochemical (7.63%) and idiopathic (7.63%). Among the neonates grouped under idiopathic, 3 cases were declared dead before a proper diagnosis was established, 4 were referred for further evaluation on attenders' request and for 2, the diagnosis was not established as all parameters were normal.

This result is consistent with studies done by Madhusudhan K et al from Gandhi Medical College, Secunderabad, Telangana, where an observational study involving 120 neonates with seizures admitted to NICU from January 2013 to August 2014 was done. HIE was found to be the major cause (49.2%), followed by septicaemia (25.8%).<sup>8</sup> Nawab T et al, Arun Kumar et al and D Das et al also found similar results where the most common aetiology for seizure was hypoxic – ischemia 60%, 44% and 56% respectively, followed by sepsis 22.7%, 30% and 21% respectively.<sup>6,7,9</sup>

## CONCLUSION

Neonatal seizure is a commonly seen disorder in hospitalized new born with incidence of 11.3%, predominantly in term, male newborns and mostly seen on the first day of life with subtle type as described in this study. The most common aetiology being HIE as seen in 69 cases followed by sepsis and biochemical abnormalities. Isolated biochemical abnormalities without other co-morbid conditions causing seizures accounted for 9 cases. 55 cases of neonatal seizures with identifiable aetiology had biochemical abnormality. Hypoglycaemia was the most common primary seizure causing biochemical abnormalities. As neonatal seizures are known to cause long term morbidity and mortality, prevention of seizures by monitoring and preventing asphyxia, sepsis and routine biochemical workup is necessary for all hospitalized newborn.

## Limitations

In retrospect, we noted certain limitations to the study-

- A Larger sample size would probably have yielded more consistent and definitive results for comparison of other electrolyte abnormalities.
- None of the neonates were screened for IEM (Inborn Errors of Metabolism) as the service was unavailable at the current centre.
- Bedside EEG was not done as it was not available in our hospital.

## REFERENCES

- [1] Tekgul H, Gauvreau K, Soul J, et al. The current etiologic profile and neurodevelopmental outcome of seizures in term newborn infants. *Pediatrics* 2006;117(4):1270-1280.
- [2] Glass HC, Glidden D, Jeremy RJ, et al. Clinical neonatal seizures are independently associated with outcome in infants at risk for hypoxic-ischemic brain Injury. *J Pediatr* 2009;155(3):318-323.
- [3] Kumar A, Gupta A, Talukdar B. Clinico-etiological and EEG profile of neonatal seizures. *Indian J Pediatr* 2007;74(1):33-37.
- [4] Rao MS, Rao GC, Sultana A, et al. Clinical, etiological, biochemical, microbiological and neurosonogram factors in related with neonatal seizures in Visakhapatnam, India. *Int J Contemp Pediatr* 2017;4(2):568-572.
- [5] Hu SC, Hung KL, Chen HJ. Neonatal seizures: incidence, etiologies, clinical features and EEG findings in the neonatal intensive care unit. *Epilepsy J* 2017;3(1):117.
- [6] Das D, Debbarma SK. A study on clinico-biochemical profile of neonatal seizure. *J Neurol Res* 2016;6(5-6):95-101.
- [7] Arunkumar AR, Sudha Reddy VR, Sumathi ME, et al. Biochemical abnormalities in neonatal seizures in a tertiary care rural teaching hospital of south India. *National Journal of Basic Medical Sciences* 2013;4(1):47-50.
- [8] Madhusudhan K, Suresh NS, Babu TR, et al. Study of biochemical abnormalities in neonatal seizures with special reference to hyponatremia. *Int J Contemp Pediatr* 2016;3(3):730-734.
- [9] Nawab T, Nithya SL. Clinical profile of neonatal seizures with special reference to biochemical abnormalities. *Int J Contemp Pediatr* 2016;3(1):183-188.