



“ Study of Clinico-etiological profile of Neonate with Neonatal Seizure Admitted in NICU at a Tertiary care Hospital in Bihar ”

Dr. Satish Kumar

Assistant Professor, Department of Paediatrics, J.L.N. Medical College & Hospital, Bhagalpur.

Dr Ankur Priyadarshi

Assistant Professor, Department of Paediatrics, J.L.N. Medical College & Hospital, Bhagalpur.

ABSTRACT

Background: Neonatal seizures (NS) are the most frequent and distinctive clinical manifestation of neurological dysfunction in the newborn infant. Infants with NS are at a high risk of neonatal death or neurological impairment/epilepsy disorders in later life.

Objective: To determine the incidence and etiology of seizures among neonates admitted to NICU at JLN Medical College & hospital, Bhagalpur

Methodology: The present study is a descriptive study which was conducted in the NICU at JLN Medical College & hospital, Bhagalpur a tertiary care hospital in Eastern Bihar with a period of one year from February 2016 to January 2017. During the study period, all admitted neonatal cases were examined and data on neonatal seizures was ascertained. Among admitted neonates, having seizures either at presentation or during their stay in the hospital were investigated for its cause. In order to determine the etiology of seizures, metabolic profile including blood glucose, serum calcium and sodium levels and other necessary tests were done in all cases.

Results: Seizures were observed in 140/1240 (11.2%) of neonatal admissions and 57.1% neonates had seizures during the first 72 hours of life. Commonest types of seizures observed in this study were subtle (42.2%) followed by tonic (32.8%), clonic (20%) and myoclonic (5%) seizures. Hypoxic ischemic encephalopathy was found to be the commonest cause (50.7%) of neonatal seizures, followed by hypoglycemia (18.6%) and hypocalcemia (10%).

Conclusion: Neonatal seizures were found in about 11% of neonatal admissions and presented most commonly as subtle type. Birth asphyxia was the commonest etiology of neonatal seizures, followed by the metabolic causes.

KEYWORDS : Neonatal Seizures, Neonates, Birth Asphyxia, Hypoglycemia, Hypocalcemia,

INTRODUCTION

Neonatal seizures (NS) are the most frequent and distinctive clinical manifestation of neurological dysfunction in the newborn infant. Infants with NS are at a high risk of neonatal death or neurological impairment/epilepsy disorders in later life. Though mortality due to NS has decreased from 40% to about 20% over the years, the prevalence of long-term neurodevelopment sequelae has largely remained unchanged at around 30%. The National Neonatal Perinatal Database (NNPD; 2002-03), which collected data from 18 tertiary care units across the country, has reported an incidence of 10.3 per 1000 live-births. The incidence was found to increase with decreasing gestation and birth weight - for example, preterm infants had almost twice the incidence when compared to term neonates (20.8 vs. 8.4 per 1000 live-births) while very low birth weight infants had more than 4-fold higher incidence (36.1 per 1000 live-births). Worldwide, 130 million children are born in a year and three quarters of them are in developing countries¹. Recognition of the contributory factors towards neonatal seizures would enable us to identify the quantum of a problem in our circumstances. Moreover this may also provide an opportunity to devise effective strategies for the reduction of morbidity and mortality caused by the neonatal seizures.

MATERIAL AND METHODS

The present study is a descriptive study which was conducted in the NICU at JLN Medical College & hospital, Bhagalpur a tertiary care hospital in Eastern Bihar within a period of one year from February 2016 to January 2017. All admitted neonates, having seizures either at presentation or during their stay, were investigated especially for cause of seizures. Cases with clinical diagnosis of neonatal tetanus were excluded from the study. A detailed history including gestational age, mode of delivery, birth events, Apgar scores and antenatal problems was recorded. Age of onset of seizures and frequency was also noted. Seizures were classified as subtle, clonic, tonic or myoclonic on the basis of detailed description⁷. Consent of the parents/ caregivers was taken and a thorough physical examination at the time of presentation or onset of seizures was carried out including neurological assessment. In order to determine the etiology of seizures, metabolic profile including blood glucose, serum calcium and sodium levels were done in all cases. Serum magnesium, arterial blood gas analysis and serum bilirubin levels were done in selected cases. In cases of suspected septicemia, full septic work-up including complete blood counts, blood cultures and CSF examination with culture was done. Cranial ultrasound and CT scan was done in cases where diagnosis of

Intracranial hemorrhages (ICH) or post-asphyxial brain damage was considered. For rare causes of inborn errors of metabolism, screening tests including serum ammonia level, urinary ketones and reducing substances were performed.

Statistical Analysis. Statistical analyses were performed by using SPSS version 10 software.

RESULTS

Out of 1240 neonates were admitted to NICU at JLN Medical College & hospital (11.2%) neonates met the entry criteria. Out of 140 cases, 81(58%) were males and 59 (42%) were females. 45(32.1%) neonates had their first seizure within 24 hours of birth, 80 (57.1%) had seizures in the first 72 hours (Table I). Commonest type of seizures observed in this study were subtle 59(42.1%) followed by tonic (32.8%), (Table 2). Hypoxic ischemic encephalopathy (HIE) was the common etiological factor (50.7%) for neonatal seizures followed by metabolic causes (28.6%), infections (11.5%) and intracranial hemorrhage (2.9%). Among metabolic causes, hypoglycemia was the commonest factor accounting for seizure activity in 26 (18.6%) cases, 14 (10%) had hypocalcemia. Neonatal sepsis was diagnosed in 15.72% cases, with supportive evidence of sepsis, out of which 16 (11.5%) also had evidence of bacterial meningitis. More than one etiological factor was diagnosed in several cases. Amongst the rare causes, 2.1% cases had kernicterus. 6 (4.2%) remained undiagnosed, in spite of performing all available tests. Neonatal death occurred in 36 (25.8%) cases

TABLE 1 NEONATAL SEIZURES: AGE DISTRIBUTION (n=140)

AGE	FREQUENCY	PERCENTAGE (%)
<1 Days	45	32.1
1-3 Days	35	25
4-7 Days	28	20
>7 Days	32	22.9

Table 2 TYPES OF NEONATAL SEIZURES (n=140)

Types of Seizures	Frequency (n=159)	%age
Subtle	59	42.2
Tonic	46	32.8
Clonic	28	20
Myoclonic	7	5

Table 3 NEONATAL SEIZURES: ETIOLOGICAL FACTORS

Diagnosis	Frequency	%
Hypoxic ischemic encephalopathy	71	50.7
Hypoglycemia	26	18.6
Hypocalcaemia	14	10
meningitis	16	11.5
Intracranial hemorrhage	4	2.9
Kernicterus	3	2.1
Unspecified	6	4.2

DISCUSSION

Neonatal seizures have unique properties that have proved challenging for both clinicians and basic science researchers. Seizures represent the most distinctive signal of neurologic disease in the newborn period. After a dramatic occurrence, they are the most frequent cause of neonatal neurologic disorders. Neonatal seizures are an important example of age-specific seizure syndrome. Compared with seizures in older ages, neonatal seizures differ in etiology⁸, clinical manifestations⁹, electroencephalographic finding¹⁰, management plan and prognosis. They are usually poorly organized and often focal. Generalized tonic clonic convulsions tend not to occur during the first month of life because of immaturity of CNS. A seizure discharge is usually not propagated throughout the neonatal brain to produce a generalized seizure. Neonatal seizures are unique and require special classifications. They can be classified in a number of ways e.g. clinical presentations of seizure i.e. tonic, clonic, myoclonic and subtle; presence of EEG findings or site of brain involvement or time of first appearance of seizures. In all these classifications, common identifiable causes include hypoxic ischemic encephalopathy, infections, metabolic derangements, developmental anomalies and intracranial hemorrhage (ICH). In the present study, 140 cases were found to have seizures. The incidence 11.2% is comparable with other studies ranging from 1.5 to 14%. Incidence rate usually varies in population based and institution based studies, being lower in population based studies¹ (1.8%-4.4%) as compared to institution based studies⁶. It is also worth noting that up to two-thirds of deaths in children 7 days (Table-1). Gabriel et al has reported in their study that 70% seizures occurred in the first 3 days and 83% in the first week of life. Subtle seizures were found commonest in the present study (Table-II), consistent with other studies.⁶ Better sensitization of resident and nursing staff can lead to higher detection rate from neonatal centers. We have found a group fatality rate of 25.8%. This is within the range (18% to 63%) reported in clinical based studies of neonatal seizures. The relatively high mortality rate is secondary from increased admission of critically ill, severely asphyxiated neonates in neonatal unit of tertiary care centers and included in this study. Hypoxic ischemic encephalopathy was the commonest cause of neonatal seizures, followed closely by the metabolic causes and sepsis. Greater awareness regarding the health of the mother, importance of neonatal visits, hospital deliveries by trained staff, early breast feeding and detection of sick cases with early referral is required to minimize the incidence of birth asphyxia, infections and hypoglycemia. It is thought that morbidity and mortality from neonatal seizures can be prevented to a certain extent by taking these simple measures. Broad measures, such as ensuring safe deliveries, appropriate neonatal resuscitation, prevention and early treatment of infections in the newborn period, early breast feeding and detection of sick cases with early referral is required to minimize the burden.

CONCLUSION

Neonatal seizure is not an uncommon neurological disorder and was found in about 11.2% of neonatal admissions and presented most commonly as subtle type. Birth asphyxia was the commonest etiology of neonatal seizures, followed by the metabolic causes. Mortality rate in neonatal seizures is quite high in our hospitalized patients.

REFERENCES

1. World health report 2005: Make every mother and child count. Geneva: WHO; 2005.
2. Jalil F. Perinatal health in Pakistan: A review of the current situation. *Acta Paediatr* 2004; 93: 1273-79.
3. Bhutta ZA. Maternal and child health in Pakistan: challenges and opportunities. Oxford University Press; 2004.
4. Lawrence R, Mathur A, Nguyen. A pilot study of continuous limited-channel EEG in term infants with encephalopathy. *J Pediatr* 2009; 154(6): 835-41.
5. Stone BS, Zhang J, Mack DW. Delayed neural network degeneration after neonatal hypoxia-ischemia. *Ann Neurol* 2008; 64(5): 535-46.
6. Sattar SA, Hameed MN, Maqbool S. Incidence and Etiology of Neonatal Seizures. *Pak Petiatr J* 2006; 30(4): 168-73.
7. Behrman RE, Kliegman RIV, Jenson HB. *Nelson's Textbook of Pediatrics*. 19th Ed. Philadelphia: W.B Saunders; 2011. P. 2033-2037.

8. Tekgul H, Gauvreau K, Soul J, Murphy L, Robertson R, Stewart J, et al. The current etiologic profile and neurodevelopmental outcome of seizures in term newborn infants. *Pediatrics* 2006; 117(4): 1270-80.
9. Murray DM, Boylan GB, Ali I, Ryan CA, Murphy BP, Connolly S, et al. Defining the gap between electrographic seizure burden, clinical expression and staff recognition of neonatal seizure. *Arch Dis Child* 2008; 93: 187-91.
9. Shellhas RA, Gallagher PR, Clancy RR. Assessment of Neonatal Electroencephalography (EEG) Background by Conventional and Two Amplitude-Integrated EEG Classification Systems. *J Pediatr* 2008; 153: 369-74. 1
10. Shellhas RA, Gallagher PR, Clancy RR. Assessment of Neonatal Electroencephalography (EEG) Background by Conventional and Two Amplitude-Integrated EEG Classification Systems. *J Pediatr* 2008; 153: 369-74