CLINICAL PROFILE OF NEONATAL SEIZURES IN A TERTIARY CARE CENTRE NICU

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ABSTRACT

BACKGROUND

Neonatal seizures are seizures occurring less than 28 days of life. Though neonatal seizures have been studied in various institutions, reported incidence varies widely because of inconsistent diagnostic criteria and subtle manifestation of neonatal seizures.

MATERIALS AND METHODS

This is a prospective study. All neonates delivered and developed seizures within 28 days of life were enrolled in this study to study the clinical profile of neonatal seizures like aetiology, various types, time of onset of seizures and biochemical abnormalities. The results are analysed using Epi info software.

RESULTS

Incidence of neonatal seizures was 11.7/1000 livebirths. Neonatal seizures were more common in preterm, LBW and twin deliveries. Also, higher among those delivered by breech and forceps deliveries.

CONCLUSION

Subtle seizures were more common in preterm neonates and in 24-72 hours of life, while multifocal seizures were more common in term neonates and in <24 hours of life. Mortality was higher in LBW and preterm babies. There was no difference in the immediate outcome of neonatal seizures with intrauterine nutritional status.

KEYWORDS

Neonatal Seizures, Gestational Age, Nutritional Status.

HOW TO CITE THIS ARTICLE: Jaganathan S, Muthulingam S. Clinical profile of neonatal seizures in a tertiary care centre NICU. J. Evid. Based Med. Healthc. 2017; 4(47), 2867-2870. DOI: 10.18410/jebmh/2017/569

BACKGROUND

Seizure[1] is an abnormal electrophysiologic activity and is a manifestation of an underlying brain dysfunction. Neonatal seizures are seizures occurring less than 28 days of life. Though neonatal seizures have been studied in various institutions reported incidence varies widely because of inconsistent diagnostic criteria[2] and subtle manifestation of neonatal seizures. Neonatal seizure has an adverse effect on the neurodevelopment of the baby and may predispose to cognitive, behavioural or epileptic complication later in life. The prognosis[3] of neonatal seizures depends on underlying aetiology, gestational age and EEG findings. Hence, it is indeed a real emergency to diagnose neonatal seizures as early as possible and treat it to prevent complications later in life.

Financial or Other, Competing Interest: None.
Submission 02-05-2017, Peer Review 08-05-2017,
Acceptance 08-06-2017, Published 12-06-2017.
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DOI: 10.18410/jebmh/2017/569

MATERIALS AND METHODS

Objectives of the study-

1. To study the incidence of neonatal seizures.
2. To analyse the baseline characteristics like sex, birth weight, gestational age, intrauterine nutritional status and the mode of deliveries.
3. To study the clinical profile of neonatal seizures like aetiology, various types, time of onset of seizures and biochemical abnormalities.
4. To study the immediate outcome of neonatal seizures.
    - Study period- August 2015 to August 2016.
    - Study design- Prospective study, descriptive study.
    - All neonates delivered and developed seizures within 28 days of life were enrolled in this study. 132 babies developed clinical seizures over this study period. In all neonates enrolled in our study, the following information outlined below was collected and recorded.

Baseline Characteristics

These included sex, birth weight, gestational age and intrauterine growth status. Gestational age of all neonates was assessed using the modified Dubowitz or new Ballard scoring and classified as preterm (less than 37 completed weeks (259 days)), term (37 to 416/7 weeks (260-294 days)) and post term (42 weeks (295 days) or more). With

the birth weight and gestational age, intrauterine status of these babies were categorised into Appropriate for Gestational Age (AGA), Small for Gestational Age (SGA) and Large for Gestational Age (LGA) using reference charts (ref. Cloherty).

Clinical Profile of Seizures

Each seizure episode reported by mother and subsequently observed by doctor in duty was recorded and relevant information was gathered like time of onset of seizures (<24 hrs., 24-72 hrs., >72 hrs.) and type of seizures. Seizures were classified according to Volpe's[4] classification into subtle, focal clonic, multifocal clonic, tonic and myoclonic seizures.

Determination of Aetiology

Antenatal history of infections including TORCH, PIH and perinatal history of haemorrhage, chorioamnionitis and foetal distress like meconium-stained liquor was recorded. Mode of delivery, history of birth asphyxia, details of resuscitation, Apgar scores were recorded. All babies were examined daily including standard neurological examination till they were discharged.

Investigations

Essential investigations done in all the subjects including Haemoglobin (Hb), Packed Cell Volume (PCV), Total Count (TC), Differential Count (DC), platelets, blood glucose, serum calcium, C-Reactive Protein (CRP), blood for NEC, CSF analysis and urine for metabolic screening. Ultrasound cranium and EEG were done as early as possible. CT scan if there was any abnormal ultrasound, serum magnesium if there any refractory hypocalcaemia. All babies were treated as per the standard treatment protocol.

Various parameters like incidence, sex, birth weight, gestational age, intrauterine nutrition, mode of delivery, clinical type of seizure, time of onset, aetiology and immediate outcome were analysed. Statistical analysis was done using Epi info software.

Incidence

Of 11,248 livebirths delivered in RSRM during the study period, 132 neonates presented with neonatal seizures (11.7/1000 livebirths), 0.58% of term babies, 5.18% of preterm babies and 2.8% of post-term babies were having neonatal seizures. Of all 2986 admissions in NICU per year, 4.4% of babies were neonatal seizures.

Of 132 babies studied, 76 (57.5%) were males and 56 (42.5%) were females in the ratio of 1.4:1 with male preponderance.

Birth Weight

74 (56.1%) were low birth weight babies and 58 (43.9%) were having birth weight >2.5 kg when compared to overall livebirths 2.9% of LBW babies and 0.7% of babies of birth weight >2.5 kg developed seizures.

Outcome

Of 132 babies, 19 (14.4%) died and 113 (85.6%) discharged to home.

It was found that 49 (37.1%) babies were AGA, 68 (51.5%) babies were SGA and 15 (11.4%) were LGA. Neonatal seizures found to be more prevalent in SGA babies.

1.1% of babies delivered vaginally, 1.1% of babies delivered by LSCS, 28% of babies delivered by breech and 2.6% of babies delivered by forceps developed neonatal seizures.

Of 132 babies, 128 were delivered as singleton babies and 4 babies born as twins, which was about 1.2% and 2.7% of total singleton and twin deliveries, respectively.

Birth asphyxia contributes to about 53% of cases followed by sepsis 33.3%, hypoglycaemia 26.5% and hypocalcaemia 18.2%. Cause remains unknown in 3% of cases.

Subtle seizures (40.9%) were the commonest of all seizures closely followed by multifocal clonic (35.6%) (Figure 1).

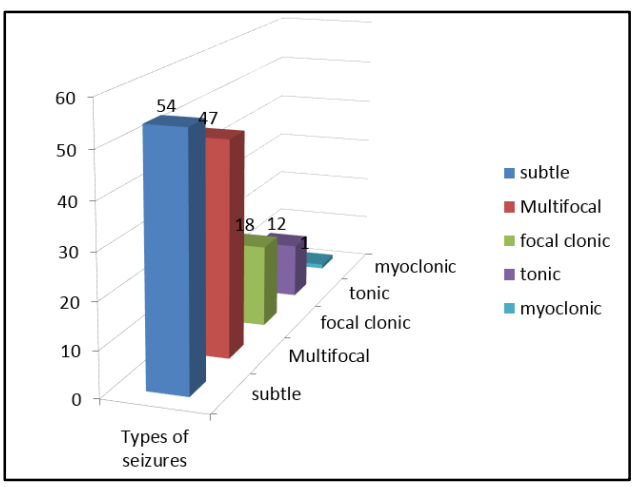

Figure 1. Types of Seizures

Types	<24 Hrs. (n=52)	24-72 Hrs. (n=64)	>72 Hrs. (n=16)
Subtle (n=54)	17 (32.7) (31.5)	32 (50) (59.3)	5 (31.3) (9.3)
Multifocal clonic (n=47)	28 (53.8) (59.6)	15 (23.4) (31.9)	4 (25) (8.5)
Focal clonic (n=18)	4 (7.7) (22.2)	10 (15.6) (55.6)	4 (25) (22.2)
Tonic (n=12)	2 (3.8) (16.7)	7 (10.9) (58.3)	3 (18.8) (25)
Myoclonic (n=1)	1 (100)	0	0
( ) - 1 - vertical percentage ( ) - 2 - horizontal percentage			

Table 1. Types of Seizures in Various Times of Onset

In 64 (48.5%) babies seizure occur between 24 and 72 hrs., whereas 52 (39.4%) babies had their seizure in <24 hrs.

Multifocal seizures (53.8%) were common in <24 hrs., while subtle seizures (50%) were common in 24-72 hrs., which is statistically significant (p-0.0295) (Table 1).

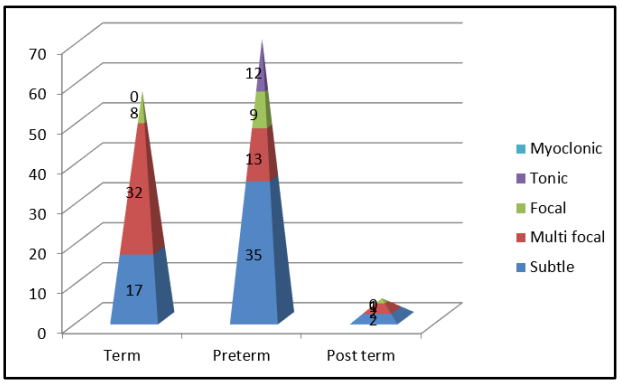

Figure 2. Gestational Age Wise Distribution of Types of Seizures

Multifocal clonic seizures (68.1%) were common in term babies while subtle seizures (64.8%) (Figure 2) were common among preterm babies, which is statistically significant (p - 0.0006).

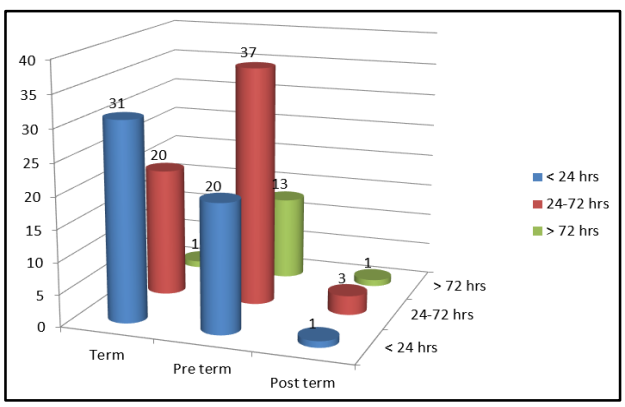

Figure 3. Gestational Age and Time of Onset of Seizures

In term babies, 54.4% (31) babies developed seizures in <24 hrs., whereas in preterm babies, 52.9% (37) (Figure 3) developed seizures between 24-72 hrs. with the significant p value of 0.012.

Gestational Age	AGA	SGA	LGA	Total
Term	19	28	10	57
Row %	33.3	49.1	17.5	100
Col %	38.8	41.2	66.7	43.2
Preterm	27	38	5	70
Row %	38.6	54.3	7.1	100
Col %	55.1	55.9	33.3	53
Post Term	3	2	0	5
Row %	60	40	0	100
Col %	6.1	2.9	0	3.8
Total	**49**	**68**	**15**	**132**
Row %	**37.1**	**51.5**	**11.4**	**100**
Col %	**100**	**100**	**100**	**100**

Table 2. Distribution of Neonatal Seizures in Intrauterine Nutrition

Of 132 babies, 57 were term and 70 were preterm. Of term babies, 28 (49.1%) were SGA and 19 (33.3%) were AGA. Of preterm babies, 38 (54.3%) were SGA and 27 (38.6%) were AGA (Table 2).

Out of total 19 deaths, 15 (78.9%) babies were delivered preterm and 4 (21.1%) were term, which is statistically significant ($p<0.05$).

Of 19 deaths, 16 (84.2%) were low birth weight and 3 (15.8%) were born of normal birth weight. Mortality was significantly higher in LBW babies.

DISCUSSION

Of 132 neonatal seizures, 43.2% were term and 53% were preterm, which was about 0.58% of all live term babies and 5.18% of all live preterm babies, respectively. This is similar to Kumar et al,[5] who reported as incidence in term babies was 0.69% and 6.14% in preterm. Incidence is more in preterm, which is attributed due to the involvement of multiple factors[6] like maternal medical illness, socioeconomic status, health facilities available, etc. The occurrence of neonatal seizures is more in SGA than AGA, which is similar to Ajay et al (52.2%). Though equal number of deaths have occurred in both groups, SGA babies are more likely to go for complications because of underlying metabolic disturbances like hypoglycaemia, hypocalcaemia, hypothermia, etc.

In our study, 57.5% were low birth weight babies and 42.5% were born of normal weight, which is 2.9% of all LBW babies and 0.7% of babies weighing >2.5 kg, respectively. Kumar et al[5] reported 11.65% in LBW and 0.59% in normal birth weight babies. Shah GS[7] reported the incidence of neonatal seizures was 2 times higher in LBW babies. 19 (14.4%) babies died in our study, which is similar to Shah GS et al who reported 15% in his study. Ajay et al reported 10% deaths and stated that the leading risk factors were prematurity, LBW and severe birth asphyxia. In our study also, the mortality is significantly higher in preterm and LBW babies. It was found that more incidence of seizures in breech and forceps deliveries. Similarly, Maheswari et al[8] AIIMS, New Delhi, in her study found that more number of babies delivered by forceps develop seizures when compared to normal deliveries. Vaginal breech and emergency LSCS babies were significantly more likely to have low 5 mins. Apgar score require admissions in NICU and showed increased susceptibility towards birth trauma, birth asphyxia, neonatal seizures and death. Birth asphyxia (53%) is the most common cause of neonatal seizures in our study similar to the previous studies as said above. This is because ours is a tertiary centre and cases were referred with complications like untreated or partially-treated PIH, antepartum haemorrhage, varying presentations of baby, foetal distress with meconium-stained liquor and undue prolongation of stages of labour. Sepsis, the next common cause of neonatal convulsions in our study similar to studies by Shah GS et al (20%) and Ledigo et al (17%). Frequent per vaginal examinations, prolonged premature rupture of membranes, poor hygiene of mother and family members contribute to increased sepsis.

Subtle seizures (40.9%) are the commonest of all types followed by multifocal seizures (35.6%). Subtle seizures were common in preterm babies and multifocal seizures were common in term babies, both are statistically

significant, which is comparable to Mizrahi et al[9] 39.4% of babies developed seizures in <24 hrs. 48.5% in 24-72 hrs. and 12.1% in >72 hrs. Sanjeev et al[10] reported seizures occurring more in <24 hrs. However, 87.9% of cases had seizures in <72 hrs. of life. This is similar to Ajay et al and Shah GS et al. Multifocal seizures found to be common in <24 hrs. of life while subtle seizures were common in 24-72 hrs. of life, which is statistically significant.

CONCLUSION

1. Incidence of neonatal seizures was 11.7/1000 livebirths.
2. Neonatal seizures were more common in preterm, LBW and twin deliveries. Also, higher among those delivered by breech and forceps deliveries.
3. 87.9% of neonatal seizures occurred within 72 hours of life.
4. Birth asphyxia was the most common cause of all neonatal seizures followed by sepsis.
5. Subtle seizures were the commonest type of seizure observed followed by multifocal clonic.
6. Subtle seizures were more common in preterm neonates and in 24-72 hours of life, while multifocal seizures were more common in term neonates and in <24 hours of life.
7. Mortality was higher in LBW and preterm babies. There was no difference in the immediate outcome of neonatal seizures with intrauterine nutritional status.

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