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STUDY ON BIOCHEMICAL ABNORMALITIES AND CLINICAL PROFILE OF BABIES ADMITTED WITH NEONATAL SEIZURES IN NICU OF A TERTIARY CARE HOSPITAL

Paediatrics

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ABSTRACT

Background: Neonatal seizures (NS) are the most frequent clinical manifestation of neurological dysfunction in newborns. They are mostly caused by disorders of the central nervous system (CNS). However, they can also be due to immaturity of the infant's brain, Biochemical disturbances occur frequently in NSEarly recognition and treatment of biochemical disturbances is essential for management and satisfactory long term outcome. **Aims & objectives:** To study clinical profile, etiology and biochemical abnormalities in newborns with neonatal seizures **Design:** Prospective observational study **Methods:** This is an Observational Study conducted for one year from 1st Oct 2020 to 30th Sep 2021 in NICU, Alluri Sitarama Raju Academy of medical sciences, Eluru. A total of 50 newborns presenting with seizures who met the inclusion criteria were enrolled in study.Results were summarized and presented using appropriate graphical presentation in the form of tables and graphs. **Results:** In majority of cases,the type of seizures was subtle (40%).Others are focal clonic (28%), GTCS (12%), multifocal clonic (10%), myoclonic (8%) andclonic (2%).Most common etiologyfound was HIE &sepsis (36% each), followed by hyponatremia (28%), hypoglycemia (22%), hypocalcemia (18%), IC bleed (8%), hypomagnesemia (4%), and meningitis and unknown cause (2% each).In 42% of cases, there were no abnormalities. **Conclusion:** Most common cause of neonatal seizures is HIE during first 5 days of age, most common type being subtle type. So in all cases of birth asphyxia we need to monitor for seizures in first 5 days.Biochemical abnormalities are associated with almost all cases of neonatal seizures.

KEYWORDS

Neonatal seizures(NS), Neonatal intensive care unit (NICU), Electroencephalography (EEG)

INTRODUCTION:

Neonatal seizure is the most common clinical manifestation of central nervous system dysfunction in the neonates. The cause of newborn seizures is unknown, however it is thought to be associated to brain illnesses such as HIE, CNS infections, CNS bleeding, and anatomical abnormalities of the brain, as well as metabolic issues.

Neonatal seizures are paroxysmal, repeated, and stereotyped episodes, just like any other form of seizure. They are typically clinically subtle, unobtrusive, and difficult to distinguish from normal interictal behaviour or physiological occurrences.

Volpe's system of five basic categories of newborn seizures is the most extensively adopted.

- Subtle seizures (50%)
- Tonic seizures (5%)
- Clonic seizures (25%)
- Myoclonic seizures (20%)
- Non-paroxysmal repetitive behaviours

The most prevalent cause of neonatal seizures is hypoxia-ischemia, which can occur before, during, or after delivery. The common metabolic causes areHypoglycemia, Hypernatremia, Hyponatremia, Hypocalcemia, Hypomagnesemia, Inborn errors of metabolism. Seizures in newborns can run in families, and some have hereditary origins. The potassium channelopathy benign familial newborn convulsions are inherited in an autosomal dominant pattern. Ohtahara syndrome (early infantile epileptic encephalopathy) is an uncommon condition caused by a number of mutations.Neonatal seizures have traditionally been discovered solely by direct clinical observation in most neonatal intensive care units (NICUs).Neonatal convulsions are characterized by electro clinical dissociation. As a result, ictal EEG/aEEG results should be used to diagnose neonatal seizures, and continuous EEG/aEEG monitoring should be used to assess therapy efficacy. Two aspects must be considered in the treatment of neonatal seizures. The therapy of the seizures as well as the underlying etiology. It is preferable to receive etiology-specific treatment. This is especially true for seizures linked to acute metabolic problems like hypoglycemia and hypocalcemia, as well as seizures linked to CNS or systemic infections including bacterial meningitis, septicemia, and herpes simplex infection. Antiepileptic medicines should only be considered when respiratory and circulatory support has been established, as well as the identification and implementation of etiology-specific therapy. Because some epileptic seizures in neonates are brief, rare, and self-limiting, it is not required to treat them all. Overtreatment is possible during the acute stage, particularly if the seizures are accompanied by deteriorated vital signs such bradycardia, hypotension, or desaturation.

Need For The Study

- The total incidence of newborn seizures is 1.8 to 3.5 per 1,000 live births, according to reports.
- Biochemical problems account for 65 percent of all cases, either as the primary cause or as accompanying abnormalities, and are frequently underdiagnosed.
- Early detection and repair of metabolic abnormalities can be beneficial in preventing CNS sequelae.

Aims and objectives

- To study on clinical profile and etiology in newborns with neonatal seizures.
- To assess biochemical abnormalities in newborns with neonatal seizures.

MATERIALS AND METHODS:

This is an Prospective Observational Study conducted for one year from 1st October 2020 to 30th September 2021 in Alluri sitaramaraju academy of medical sciences, a tertiary care centre in Eluru. After receiving written informed consent from the parents/guardians, neonates presenting with seizures who met the inclusion criteria were enrolled in the study.

In all cases, a detailed history will be taken, with an emphasis on the onset of the first seizure, duration of the seizure, number of seizures, type of seizure, antenatal, natal, and postnatal risk factors and systemic examination with special reference to the central nervous system.

Each seizure episode's clinical facts were documented, including the age at which the seizures began, the duration of the event, and the number and kind of seizures.

Inclusion Criteria:

- Babies with neonatal seizures in NICU

Exclusion Criteria:
- Neonates with Major congenital abnormalities
- Out born babies treated with anticonvulsants
- Babies whose parents not given consent.

RESULTS:
Data was entered in Microsoft Excel. Data was analyzed using SPSS version 21.0. The results were summarized and presented using appropriate graphical presentation in the form of tables and graphs.

Table 1: Frequency Distribution Of Type Of Seizures

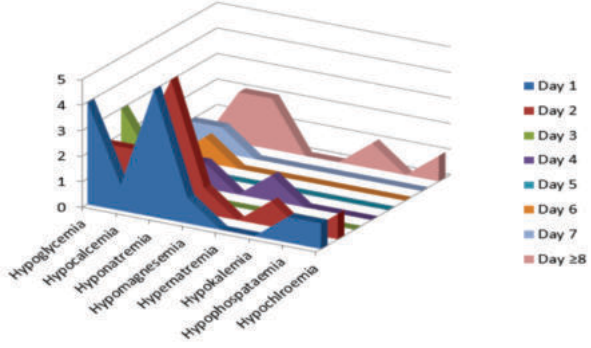
TYPE OF SEIZURES	Frequency	Percent
FOCAL CLONIC	14	28.0
SUBTLE	20	40.0
CLONIC	1	2.0
GTCS	6	12.0
MULTIFOCAL CLONIC	5	10.0
MYOCLONIC	4	8.0
Total	50	100.0

Table 2: Frequency Distribution Of Etiology

ETIOLOGY	Frequency	Percent
HIE	18	36.0
IC BLEED	4	8.0
MENINGITIS	1	2.0
HYPOGLYCAEMIA	11	22.0
HYPONATRAEMIA	14	28.0
HYPOCALCAEMIA	9	18.0
HYPOMAGNESMIA	2	4.0
SEPTICEMIA	18	36.0
UNKNOWN	1	2.0

Table 3: Frequency Distribution Of Biochemical Abnormalities

BIOCHEMICAL BNORMALITIES	Frequency	Percentage
HYPOGLYCEMIA	11	22.0
HYPOCALCEMIA	9	18.0
HYPONATREMIA	14	28.0
HYPERNATREMIA	1	2.0
HYPOMAGNESEMIA	2	4.0
HYPOPHOSPATAEMIA	1	2.0
HYPOKALEMIA	2	4.0
HYPOCHLOREMIA	3	6.0
NO BIOCHEMICAL ABNORMALITIES	21	42.0



Graph 1: Area Graph Incidence Of Biochemical Abnormalities According To Day Of Onset Of Seizure

Table 4: Incidence Of Biochemical Abnormalities In Neonates With Co-morbid Conditions

Co-morbid Conditions	Hypoglycemia		Hypocalcemia		Hyponatremia		Hypomagnesemia	
	YES	NO	YES	NO	YES	NO	YES	NO
HIE	2 (18.2%)	16 (41%)	1 (11.1%)	17 (41.5%)	9 (64.3%)	9 (25%)	1 (50%)	17 (35.4%)
IC BLEED	0	4 (10.2%)	1 (11.1%)	3 (7.3%)	0	4 (11.1%)	0	4 (8.3%)
SEPSIS	3 (27.3%)	15 (38.5%)	3 (33.3%)	15 (36.6%)	3 (21.4%)	15 (41.7%)	0	18 (37.5%)
MENINGITIS	0	1 (2.6%)	0	1 (2.4%)	0	1 (2.7%)	0	1 (2.1%)
Total	11 (22%)	39 (78%)	9 (18%)	41 (82%)	14 (28%)	36 (72%)	2 (4%)	48 (96%)

DISCUSSION:
In majority of cases (40%), the type of seizures was subtle; in 28% of cases, it was focal clonic seizures; in 12% of cases, it was GTCS; in 10% cases, it was multifocal clonic seizures; in 8% of cases myoclonic and in 2% of cases, it was clonic.

Most common etiology for neonatal seizures found was HIE and sepsis (36% each), followed by hyponatremia(28%), hypoglycemia(22%), hypocalcemia (18%), IC bleed (8%), hypomagnesemia (4%), and meningitis and unknown etiology (2% each).

In 42% of cases, there were no abnormalities. In 28% of cases, there was hyponatremia. In 22% of cases, hypoglycemia was seen. In 18% of cases, hypocalcemia was seen. Hypochloremia, hypomagnesemia, hypokalemia, hyponatremia and hypophosphatemia were seen in 6%, 4%, 4%, 2% and 2% respectively.

In hypoglycemia cases, in 36.4%, 18.2%, 27.3%, 9.1%, 9.1% cases, neonatal seizures occurred on day 1, 3, 2, 4 and day 7 respectively. In hypocalcemia cases, in 22.2% each, neonatal seizures occurred on day 2 and day ≥8; in 11.1% cases each seizures occurred on day 1, 3, 4, 6 and 7. In hyponatremia cases, in 35.7% each, neonatal seizures occurred on day 1 and 2; in 14.3% cases, seizures occurred on day ≥8; in 7.1% cases each seizures occurred on day 3 and 4. In hypomagnesemia cases, in 50% each, neonatal seizures occurred on day 1 and 2. In 100% of hypernatremia cases, neonatal seizures occurred on day 4. In hypokalemia cases, in 50% each, neonatal seizures occurred on day 2 and ≥8. In 100% of hypophosphatemia cases, neonatal seizures occurred on day 1. In hypochloremia cases, in 33.3% each, neonatal seizures occurred on day 1, 2 and ≥8.

In those cases with hypoglycemia, 2 cases were with HIE and 3 cases were with sepsis. Among the cases with hypocalcemia, one case was with HIE, one case was with IC bleed and 3 cases were with sepsis. Among the cases with hyponatremia, 9 cases were with HIE and 3 cases were with sepsis. Among the cases with Hypomagnesemia, one case was with HIE.

CONCLUSION:
Most common cause of seizures in neonates is HIE during first 5 days of age, the most common type being subtle seizures. So in all cases of birth asphyxia we need to monitor the babies for seizures in first 5 days. As most common type of seizures is subtle seizure, there is high chance of missing such cases. So, strict monitoring is essential to diagnose seizures as early as possible.

Biochemical abnormalities are associated with almost all babies with neonatal seizures. Also preterm babies need to be monitored regularly for these as they are easily preventable and treatable causes.

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