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**Dr. G Surenderan**  
Assistant Civil Surgeon,  
Uthiramerur Government  
Hospital, Kanchipuram, Tamil  
Nadu, India

**Dr. R Praveen Kumar**  
Assistant Professor,  
Department of Pediatrics,  
Rajah Muthiah Medical  
College and Hospital,  
Annamalai University,  
Chidambaram, Tamil Nadu,  
India

**Corresponding Author:**  
**Dr. G Surenderan**  
Assistant Civil Surgeon,  
Uthiramerur Government  
Hospital, Kanchipuram, Tamil  
Nadu, India

## Etiology and type of neonatal seizures

**Dr. G Surenderan and Dr. R Praveen Kumar**

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### Abstract

**Background:** Neonatal seizure is the most common disorder in neonate and the etiology varies among neonates.

**Materials and Methods:** In total of 100 neonates less than 28 days with seizures are taken into consideration and compared.

**Results:** Among the 100 neonates HYPOXIC ISCHEMIC ENCEPHALOPATHY was the most common cause followed by sepsis and metabolic causes. Subtle Seizures was the most common type followed by clonic and focal and myoclonic seizures.

**Discussion:** The initial evaluation based on examination and etiology of seizures is important for pediatrician to assess for the treatment given.

**Conclusion:** HIE is the most common cause of neonatal seizures. Subtle seizures are the most common type of neonatal seizures.

**Keywords:** Hypoxic ischaemic encephalopathy

### Introduction

Seizure in newborn period is a medical emergency and is the first sign of neurological dysfunction. The incidence varies from 0.5% in term to 20.2% in preterm babies. Incidence of seizures in newborn period is considerably higher than any other time of life reflecting the developmental events active in the immature brain.

Seizures in neonatal period are due to multiple etiologies. Hypoxic ischemic encephalopathy (HIE) being the leading cause in our country.

Neonatal seizures differ in clinical description from those seen in adults and seizures in preterm infant differ from those seen in term infants.

Four types of Neonatal seizures are identified. Subtle seizures are the most common type of seizures recorded in clinical studies followed by clonic type other types are tonic and myoclonic seizures.

Recent advances like video EEG and magnetic resonance imaging have provided important insights into the diagnosis etiology and management of neonatal seizures. Drug of choice in neonatal seizures is phenobarbitone (up to 40mg/kg). Phenytoin is the second line anticonvulsant. Refractory seizures are generally encountered in babies with HIE.

Prognosis of neonatal seizures depends on underlying etiology, gestational age, seizure pattern and EEG [5].

### Materials and Methodology

#### Materials

Method of collection of data:

- Place of Study : Neonatal Intensive care unit, RMMCH, Chidambaram
- Duration of Study : NOV 2019 -OCT 2020
- Study Subjects : Neonates presenting with seizures
- Study Design : Prospective Observational study

#### Selection Criteria

#### Inclusion Criteria

A) Neonates (first 28 days of life) presenting with at least one of the following clinical type of seizures:-

- Subtle seizures.
- Multifocal clonic seizures

- Generalized tonic seizures

Both inborn and outborn babies with neonatal seizures shall be included

**Exclusion Criteria**

- Neonates with isolated subtle phenomenon, apnea or paroxysmal autonomic changes, i.e., only subtle motor moments or apnea without tachycardia were excluded from the study
- Jitteriness in neonates
- Tetanic spasm in neonates

This study was conducted in the Division of pediatrics, Rajah Muthiah Medical College and Hospital from November 2019 to OCT 2020. All the babies admitted neonatal intensive care unit were included.

**Methods**

- Detailed Antenatal, Natal and Postnatal History.

- Thorough clinical examination.
- Lab investigations.

A detailed antenatal, natal and postnatal history was taken in all the cases. History of maternal disease during pregnancy was noted in all the cases.

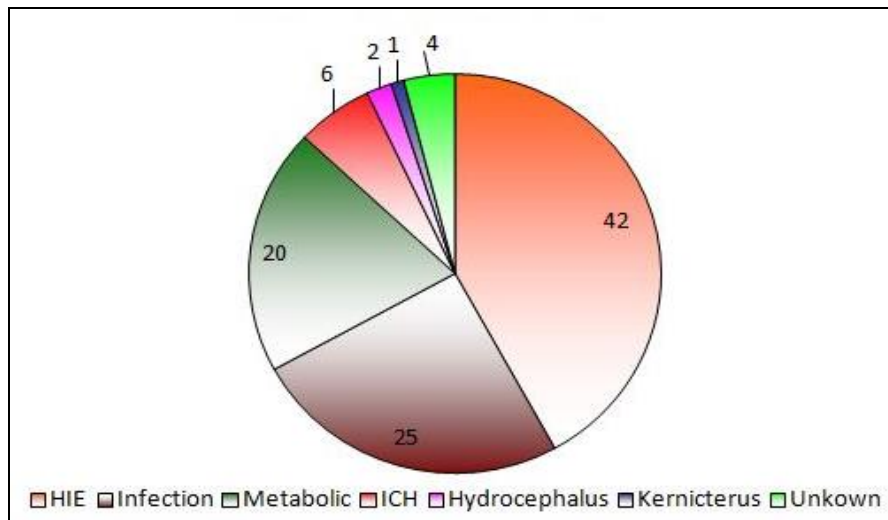
Physical examination, neurological examination, Gestational age assessment and systemic assessment were made in detail.

The age of onset of seizure activity, type of seizure, duration and frequency of seizure episode were noted.

**Result**

**Etiology of Seizures**

The predominant cause of neonatal seizure in this study was HIE (42%) followed by infective cause of seizure (25%). 20% of neonates had metabolic causes of seizure, 6% of neonates had ICH, 2% had hydrocephalus and 1% had kernicterus.



**Fig 1:** Etiology of Seizures

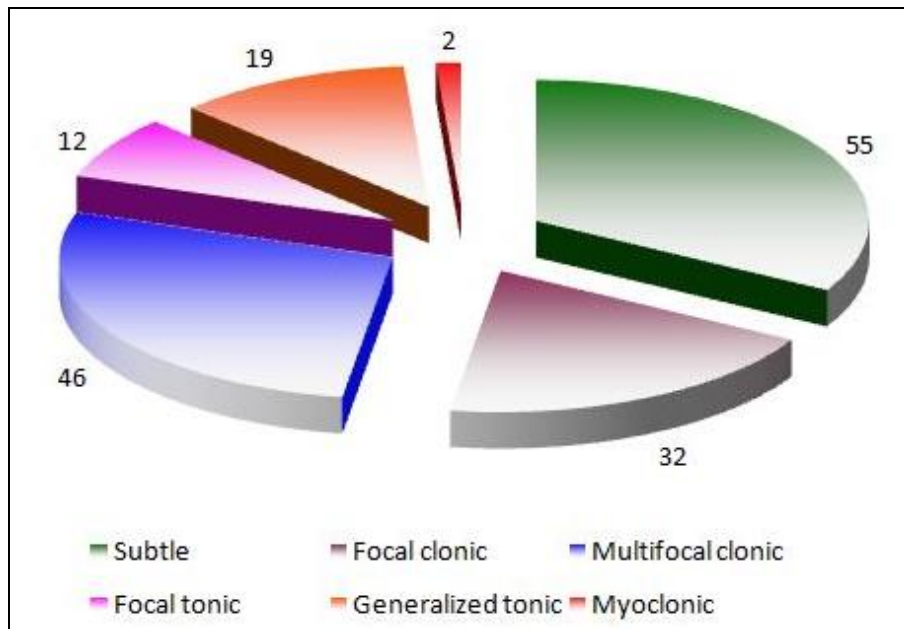
**Seizure type and etiology**

Out of 55 neonates with subtle seizure, the most common etiology was HIE (67%). 7 neonates had infective etiology (13%). 50% of multifocal clonic type of seizure were due to infection (23 neonates) and 41% due to metabolic etiology

(19 neonates). Out of 32 neonates with focal clonic type of seizure, 44% were due to metabolic etiology and 50% of due to infection. Out of 19 neonates with generalized tonic type of the seizure, 31% were due to ICH and 47% were due to HIE.

**Table 1:** Seizure Type and Etiology

Types	HIE	Infection	Metabolic	Hyd.	Ker.	Unk.
Subtle (27)	18(67%)	4 (13%)	12 (47%)	-	1	1
Focal clonic (15)	1 (6%)	8(50%)	7 (44%)	-	-	-
Multifocal clonic (24)	4 (9%)	12(50%)	8 (41%)	-	-	-
Focal tonic (4)	3 (42%)	-	-	-	-	1 (8%)
Generalized tonic (8)	5 (47%)	-	-	1 (11%)	1	1
Myoclonic (2)	-	-	-	-	-	2



**Fig 2:** Types of Seizures

**Etiology of seizure**

In this study, HIE was the leading cause of neonatal seizure. It was seen in 42% of neonates. Infective cause was the second commonest etiology (25 causes), 20 neonates had metabolic causes for seizure, among which Hypoglycemia was noted in 15 neonates, Hypocalcemia in 4 and Hypomagnesemia in 1.

**Distribution of Etiology of Seizure**

**Table 2:** Distribution of etiology of seizure

Diagnosis	Gabriel <i>et al.</i> [1] (n=90) %	Present study (n=100) %
HIE	40	42
Infections	20	25
Metabolic	19	20

This study is in comparison with the study of Gabriel *et al.*, where HIE continues to be a major marker of seizures. In most of the studies of neonatal seizures, HIE was the most dominating cause of seizures.

**Types of seizure**

In this study, subtle seizures dominated (55 neonates) the picture. It was followed by multifocal clonic (46 neonates) and focal clonic (32 neonates). Only 2 neonates presented with myoclonic seizures. This study is in comparison with study by Scher *et al.* [2], where subtle seizures were the most predominant clinical type seen in neonates (71%) followed by clonic seizures.

Mixed seizure type was present in most of the neonates, seizure was found alone or in combination with the other seizure. Subtle seizures were specifically associated with tonic or clonic seizure.

Mizrahi *et al.* [3] in the study of neonatal seizure also observed the mixed clinical seizure types in many of the cases.

**Conclusion**

Seizures are multi-factorial in etiology and HIE is the commonest cause followed by infections and metabolic

causes.

Clinically, subtle seizure activity is more commonly observed followed by clonic type.

Neonates with subtle seizures are more likely to be normal at discharge. Tonic seizures have the highest morbidity and mortality, among all seizure types.

HIE carries the worst prognosis and the metabolic causes carry good prognosis, among all etiological factors for seizure.

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