



## Original Research Article

## To study the etiological factors for development of seizure disorder in neonatal age group

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## ABSTRACT

**Background:** This prospective study was conducted over the period of one year at M.Y. Hospital & Chacha Nehru Bal Chikitsalaya, Indore, in the Department of Pediatrics, M.G.M. Medical College, Indore.

**Materials and Methods:** Detailed history of present illness with duration of convulsion were enquired. A detailed history of mother during antenatal, natal and post natal period was taken. Type of delivery (vaginal/ LSCS; full term / preterm), enquired about the indication of LSCS. History of labour with particular ref to birth injury, asphyxia (delayed cry), neonatal history regarding jaundice & feeding history, detailed family history in relation to epilepsy convulsion and mental diseases were recorded.

**Result:** In 1st 24hrs birth asphyxia (88%) is most common cause of seizures. In 2 to 7 day age group most common cause were metabolic (hypoglycemia (28.5%) & hypocalcaemia (26%)). In > 7 day meningitis (80%) was the most common cause of seizures. P value was < 0.001. Out of 74 term babies most common cause of seizure was birth asphyxia (58%) followed by meningitis (16.2%), hypocalcaemia (13.5%), hypoglycemia (8.1%). Out of 26 preterm babies 30% had meningitis, 30% had hypoglycemia, 19.2% had hypocalcaemia, and 15.3% had birth asphyxia. 1 case of ICH was reported. P value was 0.004.

**Conclusion:** In present study out of total 100 cases most common etiology was birth asphyxia (47%), followed by meningitis (20%), hypocalcaemia (15%), and hypoglycemia (14%). During 1st 24 hrs. most common cause was birth asphyxia (88%). In 2 – 7 day age group metabolic abnormalities (hypocalcaemia & hypoglycemia) was most common (54.5%). And after 7 days meningitis (80%) was most common etiology. In term babies most common etiology was birth asphyxia (58%) followed by metabolic (21%) & meningitis (16.2%). In preterm babies most common cause was metabolic (50%) followed by meningitis (30%).

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## 1. Introduction

Neonates are at particular risk for development of seizures because of immature brain which gets easily involved in any form of systemic illness and the seizures are prone to cause lot of damage to the developing brain. Thus seizures have two fold impact in young infants. Wide variety of systemic illnesses which may precipitate seizures are like, asphyxia, infections, birth trauma, congenital malformation, metabolic causes etc. and are more likely to be manifested during this age group than any other period of life. Seizures especially in neonates are dissimilar from those in a child

or adult and many times go unnoticed fearing its effect on the brain which is recognized very late in childhood as developmental delay.<sup>1</sup>

The increased susceptibility of neonates to convulsion made us to identify the etiological profile in this age group of patient along with associated clinical presentation. At the same time early diagnosis and planning of appropriate therapy will be much useful which in turn reduce both morbidity & mortality.<sup>2</sup>

The generalized tonic and clonic convulsions so often seen in later infancy and childhood are seldom encountered in the newborn. The manifestations are more subtle and pleomorphic. The severity of convulsive movement is

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related to the size of baby, larger the baby more powerful are the twitching. Manifest seizures are uncommon among preterm infants.<sup>3</sup> Not all clinical seizures are detected by EEG, particularly certain subtle seizures, most generalized tonic seizures and the focal and multifocal seizures. Two explanations have been proposed – the first is that some seizures may originate at a sub cortical level and are not propagated to surface electrodes because of immature synaptogenesis and cortical projection in early infants. The other is that subtle and generalized tonic seizures are not infant epileptic, that is due to CNS hyper synchronous electrical discharge but are primitive brain stem and spinal motor patterns released from tonic inhibition normally exerted by the forebrain. The clinical type of seizures generally offers little clue to etiology.<sup>4</sup>

## 2. Materials and Methods

This prospective study was conducted over the period of one year at M.Y. Hospital & Chacha Nehru Bal Chikitsalaya, Indore, in the Department of Pediatrics, M.G.M. Medical College, Indore.

### 2.1. Duration

### 2.2. Case selection

100 consecutive cases of seizure admitted in our NICU were included in the study. The inclusion criteria was the cases either presenting with seizures or who developed seizures during hospital stay. Cases were studied from clinical & biochemical aspects.

### 2.3. Clinical study

Detailed history of present illness with duration of convulsion were enquired. A detailed history of mother during antenatal, natal and post natal period was taken. Type of delivery (vaginal/ LSCS; full term / preterm), enquired about the indication of LSCS. History of labour with particular ref to birth injury, asphyxia (delayed cry), neonatal history regarding jaundice & feeding history, detailed family history in relation to epilepsy convulsion and mental diseases were recorded.

Examination of all cases was conducted after patients' admission. General examination was carried out along with complete anthropometric measurement. Thorough neurological examination followed by examination of other system was carried out in every case. In each case type of convulsion, their duration & frequency was recorded in detail. Cases of birth asphyxia were staged according to Sarnat staging criteria.

### 2.4. Investigation

#### 1. Hematological examination:

##### a) Hb

##### b) Erythrocyte and leucocyte count

##### c) Differential WBC count

#### 2. Biochemical:

##### a) Blood sugar – hypoglycemia was labeled if blood glucose < 45 mg/dl

##### b) Serum calcium – hypocalcemia labeled with S.Ca < 7 mg%

##### c) Serum sodium & potassium : Hyponatremia < 130 meq/l Hypertatremia > 150 meq/l Hypokalemia < 3.5 meq/l Hyperkalemia > 5.5 meq/l

3. CSF examination: Lumbar puncture was done on all the babies when meningitis was suspected or where the cause of seizure could not be explained.

Procedure: under all aseptic precaution CSF was obtained by lumbar puncture and two sample each of 3 ml were collected, one in a plain vial for routine examination and other in dry sterilized tube for culture. Tension & appearance of the fluid was noted and Pandy's test was performed.

CSF cell count was done with the help of Newbars chamber. A smear made from the centrifuged sediment and stained with leishman stain & cell were counted.

Bacteriological examination: Smear were obtained by gram's method and stained with methylene blue, and studied for presence of organisms. Zeihl nelson method was used for acid fast bacilli. The centrifuged deposits were cultured.

Out of four atleast two were required positive for diagnosis:

##### a) Positive CSF culture

##### b) CSF pleocytosis (> 20 cells/mm<sup>3</sup> with a predominance of polymorphs)

##### c) Decreased CSF sugar < 40 mg% or less than 50% of simultaneously obtained blood sugar sample with CSF protein > 40 mg%.

##### d) Definitive bacteria on a stained smear of the spinal fluid.

4. CRANIAL USG: was done for evaluation of size of ventricles and possible intraventricular hemorrhage. Ultra sonic scanner is used by directing waves through anterior fontanelle which serves as acoustic window to obtain best image and echoes.

##### 5. EEG: was done within 8 days of seizure.

##### 6. CT SCAN / MRI

Data were analyzed using Chi2 test. P value < 0.05 was taken as significant.

## 3. Results

Table 1 Out of 100 cases most common cause of seizure was birth asphyxia (47%), followed by metabolic 39%(hypoglycemia (14%), & hypocalcaemia (15%)) followed by meningitis (20%).

Cases of Benign Neonatal Convulsion were found and 1 each of IVH and Cong CMV/NMD.

**Table 1:** Etiology

Etiology	Male	Female	Total
Birth asphyxia	30	17	47
Meningitis	12	7	20
Hypoglycemia	9	5	14
Hypocalcemia	9	6	15
ICH	1	0	1
BNC	1	1	2
Cong CMV/NMD	1	0	1
Total	64	36	100

**Table 2:** Relationship of day of appearance of convulsion with its etiology

Etiology	< 1 day	2– 7 day	> 7 day	Total	P value
Birth asphyxia	38(88.4%)	9(21.5%)	0	47	< 0.001
Meningitis	1(2.4%)	7(16.7%)	12(80%)	20	< 0.001
Hypoglycemia	2(4.6%)	12(28.6%)	0	14	< 0.001
Hypocalcaemia	2(4.6%)	11(26.3%)	2(13.3%)	15	< 0.001
ICH	0	1(2.3%)	0	1	
BNC	0	2(4.6%)	0	2	
Cong CMV/NMD	0	0	1(6.7%)	1	
Total	43	42	15	100	

Table 2 In 1st 24 hrs. birth asphyxia (88%) is most common cause of seizures. In 2 to 7 day age group most common cause were metabolic (hypoglycemia (28.5%) & hypocalcaemia (26%)). In > 7 day meningitis (80%) was the most common cause of seizures. P value was < 0.001.

Table 3 Out of 74 term babies most common cause of seizure was birth asphyxia (58%) followed by meningitis (16.2%), hypocalcaemia (13.5%), hypoglycemia (8.1%).

Out of 26 preterm babies 30% had meningitis, 30% had hypoglycemia, 19.2% had hypocalcaemia, and 15.3% had birth asphyxia. 1 case of ICH was reported.

Value was 0 004

## 4. Discussion

### 4.1. Etiology

The commonest etiology in our study was birth asphyxia (47%), followed by meningitis (20%), followed by hypocalcaemia (15%) and hypoglycemia (14%).

Dr. Maya Prasad et al. (2010)<sup>5</sup> reported most common cause of seizures were birth asphyxia (37.7%) followed by hypoglycemia (19.2%), IC bleed (9.6%).

Our results are consistent with Sheth et al. (1997)<sup>6</sup> who reported most common cause of seizure in new born period is hypoxic ischemic encephalopathy.

Sood A et al.(41) and Kumar A et al. (1995)<sup>7</sup> reported that birth asphyxia as etiology of seizure was seen in 45.71% and 48.27% cases respectively which are comparable with the results of our study.

### 4.2. Relationship of Gestational Age with Its Etiology

Out of 74 term babies most common cause of seizure was birth asphyxia (58%) followed by meningitis (16.2%), hypocalcaemia (13.5%), and hypoglycemia (8.1%). Out of 26 preterm babies most common cause of seizure was metabolic (50%) followed by meningitis (30.7%) and 15.3% had birth asphyxia (P value = 0.004).

Manoel R.R. Holanda et al. (2006)<sup>8</sup> reported that in term babies most common cause of seizure is birth asphyxia (64%). In pre term babies metabolic and IVH (each 36.6%) equally accounted for seizures.

Amar. M. Taksande et al. (2005)<sup>9</sup> reported that In term babies most common cause of seizures were birth asphyxia 37(48.5%), followed by septicemia 15(19.4%) and meningitis 8(10.3%). In preterm babies most common cause were birth asphyxia 10 (30.3%), followed by septicemia 7 (21.2%). IVH was seen in 6(18.1%) neonates followed by hypocalcaemia in 3(9.09%), hypoglycemia in 4 (12.2%) and hypomagnesaemia in 2 (6.06%) neonates.

## 5. Conclusion

In present study out of total 100 cases most common etiology was birth asphyxia (47%), followed by meningitis (20%), hypocalcaemia (15%), and hypoglycemia (14%).

During 1st 24 hrs most common cause was birth asphyxia (88%). In 2 – 7 day age group metabolic abnormalities (hypocalcaemia & hypoglycemia) was most common (54.5%). And after 7 days meningitis (80%) was most common etiology.

In term babies most common etiology was birth asphyxia (58%) followed by metabolic (21%) & meningitis (16.2%).

**Table 3:** Relationship of gestational age with its etiology

Etiology	Term	Preterm	Total	P Value
Birth asphyxia	43	4	47	0.004
Meningitis	12	8	20	0.004
Hypoglycemia	6	8	14	0.004
Hypocalcaemia	10	5	15	0.004
ICH	0	1	1	0.004
BNC	2	0	2	0.004
Cong	1	0	1	0.004
CMV/NMD				
Total	74	26	100	

In preterm babies most common cause was metabolic (50%) followed by meningitis (30%).

Out of total 47 cases of birth asphyxia 35 (74.4%) belong to stage II & 12 (25.6%) to stage III.

## 6. Source of Funding

None.

## 7. Conflict of Interest

None.

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