International Journal of Contemporary Pediatrics
Amudhadevi S et al. Int J Contemp Pediatr. 2018 Nov;5(6):2314-2319
http://www.ijpediatrics.com
pISSN 2349-3283 | eISSN 2349-3291

DOI: http://dx.doi.org/10.18203/2349-3291.ijcp20184303

Original Research Article

A study on clinical profile of neonatal seizures in newborn babies born in Government Mohan Kumara Mangalam Medical College Hospital, India

Amudhadevi S., Kanchana P.*

Department of Paediatrics, Government Mohan Kumaramangalam Medical College Hospital, Salem, Tamil Nadu, India

Received: 21 August 2018
Accepted: 27 September 2018

***Correspondence:**
Dr. Kanchana P.,
E-mail: kanchana16580@gmail.com

ABSTRACT

Background: Seizures represent the most distinctive signal of neurological disease in the newborn period. The convulsive phenomena are the most frequent of the overt manifestations of neonatal neurological disorders. This study was aimed at providing a clear picture regarding the epidemiology, etiology, onset, types and mortality of neonatal convulsions in our hospital. This study was carried to assess the incidence, types of Neonatal convulsions, etiology, time of onset and its relationship with the etiology and to determine the mortality associated with neonatal convulsions.
Methods: This study was carried out in Government Mohan Kumaramangalam Medical College Hospital in June 2016 - May 2017.The Study Population is Newborn babies born in our hospital and admitted in Neonatal Intensive Care Unit. Babies born in other hospitals or at home with neonatal convulsions were excluded from the study. A detailed history was elicited for all recruited babies and was thoroughly examined. The baby's clinical progression was closely monitored, and relevant investigations done. Data were entered in Microsoft Excel and analyzed in SPSS version 12.
Results: There were 1385 neonatal cases admitted in the newborn ward in Govt. Mohan Kumaramangalam Medical College Hospital, Salem during the period of 12 months from June 2016 to May 2017. Of these, 104 neonates had convulsions. There were 4102 total live births in this period for 12 months from June 2010 to May 2011. Of these, 104 neonates had convulsions. So, the incidence of neonatal convulsions is 2.5%.
Conclusions: Since birth asphyxia is the commonest cause of neonatal convulsions, improvement in antenatal, perinatal care with early identification of high-risk mothers will reduce the incidence of birth asphyxia and thereby reduce the incidence of neonatal convulsions. Subtle seizures are the commonest type of clinical seizures; therefore, careful observation of at risk newborns is necessary.

Keywords: Birth Asphyxia, Neonatal convulsions, Tertiary care hospital

INTRODUCTION

Seizures represent the most distinctive signal of neurological disease in the newborn period. The convulsive phenomena are the most frequent of the overt manifestations of neonatal neurological disorders. Population based studies using a clinical definition of seizures indicate sharp decrease in incidence as birth weight of the newborn increase to 57.5% per 1000 in infants with birth weight lower than 1500g, but only 2.8

per 1000 for infants with birth weights of 2500 to 3999 g.[1-3]

The incidence of neonatal convulsions ranges from 0.5% to 20% in various studies. The discrepancies in incidence figures among various studies are due to varying conception ages of newborns and criteria for selection. Various studies revealed that the incidence was as low as 0.5% to as high as 14%.[4,5]

Neonatal seizures are common and may be the first manifestation of neurological dysfunction after a variety of insults.[6] Government Mohan Kumara Mangalam Medical College Hospital is a tertiary care hospital with an average of 4000 deliveries conducted every year. The neonatal nursery has an average of 1300 admissions every year.

This study is aimed at providing a clear picture regarding the epidemiology, etiology, onset, types and mortality of neonatal convulsions in our hospital. The objective of this study is

- To assess the incidence, the various types of presentation of Neonatal convulsions in our Hospital.
- To study the etiology of neonatal seizures, time of onset of neonatal seizures and its relationship with the etiology.
- To determine the mortality associated with neonatal convulsions.

METHODS

This study was carried out in Government Mohan Kumara Mangalam Medical College Hospital, Salem – 636001 in June 2016 to May 2017. The Study Population is Newborn babies born in our hospital and admitted in Neonatal Intensive Care Unit. All babies with Neonatal Convulsions, irrespective of Gestational age and Birth Weight, born in our hospital are included for the study. Babies born in other hospitals or at home with neonatal convulsions were excluded from the study. Institutional Ethics committee clearance was obtained to conduct the study in our hospital. Informed consent was obtained from parents and caregivers on behalf of the neonates before including them in the study. There is no added risk or harm to the baby because of the study. A semi structured validated questionnaire was filled for each neonate after obtaining informed consent.

A detailed history was elicited for all recruited babies and was thoroughly examined. The baby's clinical progression was closely monitored. Blood samples were drawn for analysis of sugar, calcium, electrolytes, complete blood counts, band-neutrophil ratio and a non-enteric culture. Urine was analyzed routinely, and culture was done. Lumbar puncture was done in all cases and CSF was analyzed for biochemical parameters, cytological analysis and CSF culture. Cranial ultrasound was done in all cases soon after stabilization. CT scan was done in 88 cases. EEG was done in 72 cases. Other investigations including urine for metabolic screening, x-ray chest, blood grouping, and serum bilirubin were done.

Data were entered in Microsoft Excel and analyzed in SPSS version 12. Descriptive statistics for all variables done and the tests of significances for associations were assessed using chi-square test.

RESULTS

There were 1385 neonatal cases admitted in the newborn ward in Govt. Mohan Kumara Mangalam Medical College Hospital, Salem during the period of 12 months from June 2016 to May 2017. Of these, 104 neonates had convulsions. There were 4102 total live births in this period for 12 months from June 2016 to May 2017. Of these, 104 neonates had convulsions. So, the incidence of neonatal convulsions is 2.5%.

Table 1: distribution of neonatal seizures according to gestational age.

Gestational age	Male	Female	No. of cases	%
Term: appropriate for gestational age (AGA)	34	21	55	52.9
Term: large for gestational age (LGA)	3	1	4	3.9
Term: small for gestational age (SGA)	7	15	22	21.2
Pre-term babies	12	8	20	19.2
Post term babies	2	1	3	2.8
Total	58	46	104	100

Among 104 babies with neonatal convulsions, 81 (77.9%) were full term, 20(19.2%) babies were pre-term babies and 3(2.9%) neonates were post term.

Table 2: Mode of delivery of babies with neonatal seizures.

Mode of delivery	Term	Pre-term	Post term	No. cases	%
Spontaneous vaginal delivery	47	15	1	63	60.6
Caesarian section	23	5	2	30	28.8
Outlet forceps delivery	11	0	0	11	10.6
Total	81	20	3	104	100

Among these 81 full term neonates, 55 (67.9%) were Appropriate for gestational Age, 22 (27.1%) were Small for gestational age and 4(5%) were Large for gestational Age (LGA). Among 81full term babies 44(54.3%) were

male and 37 (45.7%) were female neonates. Out of 20 pre-term babies 12 (60%) were male and 8 (40%) were female neonates and out of 3 post term babies 2 (66.7%) were male and 1 (33.3%) was female neonates.

Table 3: Day on onset of neonatal seizures.

Day on onset of neonatal seizures	No. of cases	%
0-2 days	62	59.6
3-4 days	16	15.4
5-6 days	13	12.5
7-28 days	13	12.5
Total	104	100

Table 2 shows Majority of Neonates in the present study were born by spontaneous vaginal delivery in 63 (60.6%) cases. Caesarian section was done in 30 (28.8%) and forceps delivery done in 11 (10.6%) cases.

Out of 63 (60.6%) Spontaneous vaginal deliveries 47 (74.6%) were term, 15 (23.8%) were preterm and 1 (1.6%) was post term. Out of 30 (28.8%) LSCS, 23 (76.7%) were term, 5 (16.6%) were preterm and 2 (6.7%) was post term. All the 11 (10.6%) Outlets forceps deliveries were term neonates. In present study 57 mothers had prolonged second stage of labor out of which 46 (80.7%) has birth asphyxia.18 mothers had meconium stained amniotic fluid, out of which 16 (88.9%) had birth asphyxia.

Table 4: Type of neonatal seizures.

Type of neonatal seizures	No. of cases	%
Subtle	53	51.0
Generalized tonic	21	20.2
Multifocal clonic	22	21.1
Focal clonic	7	6.7
Myoclonic seizures	1	1.0
Total	104	100

Table 3 shows, onset of seizures on the first two days of life was seen in 62 (59.6%) neonates, 3-4 days of life 16 (15.4%) neonates developed seizures and 5-6 days of life 13 (12.5%) developed convulsions. From 7-28 days of life 13 (12.5%) neonates developed convulsions in the present study.

Table 5: Etiology of neonatal seizures.

Etiology of neonatal seizures	No. of cases	%
Birth asphyxia	67	64.4
CNS infection	21	20.2
BINS	1	1
Hypoglycemia	10	9.6
Hypocalcemia	3	2.9
Intra ventricular hemorrhage	2	1.9
Total	104	100

Table 5 shows that Birth asphyxia is the commonest cause of neonatal convulsions in the present study. 67 (64.4%) babies had Birth asphyxia and 21 (20.2%) neonates had CNS Infection. In present study, 10 (9.6%) neonates had Hypoglycemia and 1 (1%) baby had Benign Idiopathic Neonatal Seizures (BINS).

In the present study, 3 (2.9%) of babies had convulsions due to Hypocalcemia and 2 (1.9%) had convulsions due to Intra ventricular Hemorrhage (IVH). In present study, 22 (21.2%) neonates had mixed etiology, of these, 13 (59.1%) had birth asphyxia associated with hypoglycemia and 9 (40.9%) had birth asphyxia associated with hypocalcaemia.

Table 6: Association for severity of birth asphyxia and incidence of convulsions.

Birth asphyxia	Convulsions	No convulsions	Total (%)
Mild	10 (3.6%)	271 (95.4%)	281 (100)
Moderate	53 (48.2%)	57 (51.8%)	110 (100)
Severe	4 (66.7%)	2 (33.3%)	6 (100)
Total	67 (16.8%)	330 (83.2%)	397 (100)

In this study, 10 neonates had hypoglycemic seizures, of these, 4 (40%) had subtle, 4 (40%) had multifocal, 1(10%) had focal and 1 (10%) had generalized tonic seizures. In neonates with Hypocalcaemia convulsions, 2 (66.7%) babies had Generalized Tonic seizures, and 1 (33.3%) baby had subtle seizures. In neonates with Intra ventricular Hemorrhage, both 2 (100%) babies had multifocal seizures.

Multiple causes for convulsions were noted in babies of birth asphyxia and septicemia. In our present study, out of 67 cases of birth asphyxia 13 (19.4%) had hypoglycemia and 9 (13.4%) had hypocalcaemia. Among babies of central nervous system infections 4 (19%) cases had hypoglycemia. Chi square test- χ^2 value is 122.98; p value < 0.01 significant.

Table 7: Association between Etiology and time of death.

Etiology	0-2 days	3-4 days	5-6 days	7-28 days
Birth asphyxia	2	0	0	0
CNS infection	0	0	0	2

Table 6 shows, 281, 110 and 6 neonates had mild, moderate and severe Birth Asphyxia, respectively. Out of 281 mild birth asphyxiated babies, 10 (3.6%) had convulsions. Out of 110 moderate birth asphyxiated babies, 53 (48.2%) had convulsions and out of 6 severe birth asphyxiated babies, 4 (66.7%) had convulsions. Out of 397 total asphyxiated babies, 67 (16.8%) had convulsions. The difference observed is statistically significant (p- value <0.01). Cranial Ultra Sonogram

(USG) is a reliable non-invasive method of assessing babies with neonatal convulsions. 12 (11.5%) babies in this study had abnormal Ultra sonogram findings.

The abnormal Ultra Sound findings are cerebral edema, Hydrocephalus and Intra ventricular hemorrhage. Out of 104 cases, EEG was done for 72 cases which showed abnormal findings in about 18(17.3%) of cases. Abnormal EEG findings were slow waves, spike waves, ictal discharges and basal rhythm abnormalities. Out of 104 cases, CT scan was done in 88 cases.

Abnormal CT scan findings included cerebral edema, hydrocephalus and intra ventricular hemorrhage. In a case of intrauterine infection with cytomegalovirus peri ventricular calcification with hydrocephalus was seen. Of these 104 neonatal seizures in this study group, 4 babies died a mortality rate of 3.8%. In the present study, out of 104 neonatal convulsive babies, 4(3.8%) were died. Of these 4 deaths, 2 (50%) neonates died due to Severe Birth asphyxia and 2(50%) babies died due to Central nervous system Infection. In present study, out of 4 deaths, 3 were male babies and 1 was female baby with mortality rate more in male babies. As per table 7, all deaths due to Birth Asphyxia were seen within 48 hours of life and deaths due to CNS Infection were seen after 7 days of life.

DISCUSSION

In the present study, 104 neonates with seizures were studies in 12 months period. Here, only institutionally delivered babies were included in the study. In present study, the incidence rate was 2.5%. But many studies done in various places stated that the incidence rate was ranges from 0.5% to 15%.[4,5] In the present study, out of 104 babies, 81 (77.9%) were full term, 20(19.2%) babies were pre-term babies and 3(2.9%) neonates were post term.

Among these 81 full term neonates, 55 (67.9%) were Appropriate for gestational Age i.e., ≥2500 gms (AGA), 22 (27.1%) were Small for gestational Age i.e., ≤2500 gms (SGA) and 4(5%) were Large for gestational Age i.e., ≥3999 gms (LGA). Majority of neonates with seizures in present study were full term babies (81 cases – 77.9%). Birth asphyxia was the commonest cause (64.1%) of seizures in full term babies and is associated with perinatal complications like prolonged second stage of labour seen in 46 (88.5%), meconium stained amniotic fluid (MSAF) in 16 (30.8%) followed by 12(18%) preterm babies.

Similar observation was seen in study by Sandh R et al where term AGA babies were 81.2% followed by preterm babies in 18.8% and Digra SK et al where term AGA babies were 84 (82.3%) out of 102 cases.[7]

Small for gestational age babies constitute significantly for neonatal seizures cases. In present study, 21.2% were SGA babies, similar observation was seen in study of neonatal seizures by Rima SM et al, were SGA babies were 24(20%) out of 122 term babies and Digra SK et al SGA babies including preterm were18 (17.6%) out of 102 cases. Neonatal seizures have no sex prediction.[7,8] However, in present study, male to female ratio was 1.3:1. Similar studies of neonatal seizures by Mahaveer L et al where male to female ratio was 2:1 and Digra SK et al stated that male female ratio was 2.4:1.[7,9] In present study, majority of neonates with seizures were born by normal vaginal delivery (60.6%) followed by caesarean section (28.8%) and outlet forceps delivery (10.6%).

In a study of neonatal seizures by Mahaveer L et al 68.7% were born by normal vaginal delivery, 28.1% by caesarean section and 3.1% by forceps delivery.[9] In the study by Moyaedi AR, et al.[10] 65.6% were born by vaginal delivery and 34.5% were by caesarean section which is comparable to our studies.

In the present study, majority of babies with birth asphyxia had prolonged second stage of labour i.e., 46 of 67 (68.7%) had difficult delivery, 16 (23.9%) Meconium stained amniotic fluid, 6 (8.9%) mothers had pregnancy induced hypertension. One baby with central nervous system infection had intrauterine infection with Cytomegalovirus. Myles TD et al found slightly higher incidence of birth asphyxia with prolonged second stage of labour compared to normal second stage of labour.[11] In present study, 62 out of 104 neonates (59.6%) had onset within first 48 hours of life. Taksande AM et al stated that 71 (64.5%) out of 110 cases seizures occurred in the first 48 hrs of life.[12] In the present study, 13 (12.5%) neonates had convulsions from 7-28 days, the similar study done by Digra SK et al where the onset of convulsions from 7-28 days were 9 (8.8%; n=102).[7]

In the present study, subtle seizures are the commonest 53(51.0%) type of seizures followed by multifocal clonic 22(21.1%) and generalized tonic 21(20.1%). Similar results were seen in studies done by Philip BJ et al stated that subtle seizures were the commonest occurring in 51% (27 of 53), Holanda MRR et al were also subtle seizures (59.6%) were the commonest type of seizures and Taksande AM et al stated that the subtle seizures were the commonest occurring 42.7% followed by focal clonic (23.6%) and tonic (20.9%).[12-14]

But in a study of neonatal seizures by Arun S et al generalized tonic seizure was commonest type of seizure, followed by subtle seizures.[15] According to most of the studies, birth asphyxia is the commonest cause of neonatal seizures followed by infectious or metabolic causes. Intra ventricular hemorrhage constitutes small percentage of seizures. In present study, neonatal seizures during the first 48 hours (55.8%) were mostly due to birth asphyxia (93.5%) and onset of seizures due to birth asphyxia during first 4 days was seen in 65 cases (62.5%). Similar study was seen in Taksande AM et al where the onset of seizures in first 48 hours due to birth

asphyxia was seen in 47 cases (41.8%; n=110).[12] Seizures due to hypoglycemia begin for second day and peak for fifth day and again decreases as the days go on. In present study, out of 10 cases of hypoglycemia, 6 (60%) begin convulsing on fifth day of life. At the end of first week, seizures are mostly due to neonatal meningitis, which also extends to early second week and later. In a study of neonatal seizures by Taksande AM et al revealed that seizures due to hypoglycemia peaked at 3-7 days (5 out of 9 cases) and seizures due to meningitis peaked at late first week and later (5 out of 9 cases).[12]

In the present study, 38 (56.7%) of neonatal seizures with birth asphyxia had subtle seizures followed by generalized tonic in 13 (19.4%) neonates, multifocal seizures in 11 (16.4%) cases, focal seizures in 4(6%) and 1 (1.5%) had myoclonic seizures. A similar study done by Taksande AM et al stated that out of 47 birth asphyxiated babies, 15 (31.9%) had subtle, 12 (25.5%) had focal clonic, 10 (21.2%) had multifocal, 9 (19.1%) had tonic and 1 (2.1%) had myoclonic seizures and also same study stated that out of 9 meningitis babies, 1 (11.1%) had subtle, 4 (44.4%) had focal clonic, 1 (11.1%) had multifocal, 3 (33.3%) had tonic seizures. There was no correlation between type of neonatal seizures with etiology in present study with $p>0.05$.[12]

Birth asphyxiated babies developed seizures within first 48 hours and more so within first 24 hours and babies with seizures within 24 hours have poor prognosis. Finer MM et al showed that 48% of infants having seizures within 24 hours were significantly handicapped compared to 2% whose seizures began after 24 hours.[16] The risk factors for birth asphyxia are preventable if identified early and proper resuscitation of the baby after delivery could reduce the birth asphyxia significantly. The diagnosis of hypoglycemia should not be delayed, as it can lead to brain damage. In a study of hypoglycemia by Lawerence LD et al, 41% of hypoglycemic neonates were SGA babies.[17]

In present study, 3 babies had hypocalcemia and all of them had onset of seizures between 7-28 days i.e., late onset hypocalcemia. This is due to feeding of neonates with phosphate rich milk e.g., cow's milk, formula feeding. Hypocalcemia should be diagnosed early and treated with intravenous calcium. In a study by Cockburn F et al serum calcium was low in neonates who were top fed, then the babies who were breastfed.[18]

Neonatal meningitis is one of the important causes of neonatal seizures. In the present study, 21 neonates had meningitis (20.2%). Of these, 5 had seizures between 3-4days, 6 had seizures between 5-6 days and 10 had seizures between 7-28 days. Early onset meningitis is usually acquired from the maternal genital tract or ascending infection through ruptured membranes. Common organisms in early onset sepsis are *E. coli* and *Klebsiella*. Late onset is usually due to acquired infections e.g., *Staphylococcus Aureus*, *Streptococcus pneumonia*, *Klebsiella*, *E. coli and Pseudomonas*. The risk factors are handling the neonates without hand washing and unhygienic practices. A study done by Tushar Parikh B et al revealed that late onset meningitis is more common than early onset meningitis.[19] Mortality rate in present study is 4(3.8%) cases. Mortality rate in studies conducted by Moayedi AR et al and Taksande AM et al were 13.6% and 19 % respectively.[10,19] According to Moyaedi AR et al birth asphyxia and infections were the commonest causes of death in newborn babies with seizures.[10]

CONCLUSION

Since birth asphyxia is the commonest cause of neonatal convulsions, improvement in antenatal, perinatal care with early identification of high-risk mothers will reduce the incidence of birth asphyxia and thereby reduce the incidence of neonatal convulsions. Subtle seizures are the commonest type of clinical seizures, which is difficult to identify, therefore careful observation of at-risk new-borns is necessary. Subtle seizures are the commonest type seizures, so paramedical staffs and mothers should be sensitized to identify subtle seizures.

Infection is the second most common Etiology in present study which implies that maternal infections should be treated promptly and screening of mothers for bacterial and TORCH infections should be done and strict aseptic precaution should be taken in labour ward and neonatal ward. Initiation of early and adequate feeding should be established to prevent hypoglycemic and hypo calcaemic seizures. In tertiary care hospitals, continuous EEG monitoring facilities should be made available to identify non-clinical seizures and subtle seizures. In all NICU, bed side USG should be available to detect CNS abnormalities so as to initiate specific treatment.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Lanska MJ, Lanska DJ. Neonatal seizures in the United States: results of the national hospital discharge survey. Neuroepidemiol. 1996;15(3):117-25.
2. Lanska MJ, Lanska DJ, Baumann RJ, Kryscio RJ. A population-based study of neonatal seizures in Fayette County, Kentucky. Neurol. 1995;45(4):724-32.
3. Ronen GM, Penney S, Andrews W. The epidemiology of clinical neonatal seizures in Newfoundland: a population-based study. J Pediatr. 1999;134(1):71-5.
4. Holden KR, Mellits ED, Freeman JM. Neonatal seizures I. Correlation of prenatal and perinatal events with outcomes. Pediatr. 1982;70(2):165-76.

5. Brown JK, Cockburn F. Clinical and chemical correlates in neonatal convulsions. Lancet. 1972;1:135-9.
6. Ravneet S. A clinical study of seizures in neonates. In: Shah NK, Agrawal R,Yewale V, editors. Abstracts XXX National Conference of the Indian Academy of Pediatrics.2003:209-10.
7. Digra SK, Gupta A. Prevalence of seizures in hospitalized neonates. JK Sci. 2007;9(1):27-9.
8. Saliba RM, Annegers FJ, Waller DK, Tyson JE, Mizrahi EM. Risk factors for neonatal seizures: a population-based study, Harris County, Texas. Am J Epidemiol. 2001;154(1):14-20.
9. Mahaveer L, Vilhekar KY, Pushpa C. Clinico-biochemical profile of Neonatal seizures in a rural medical college. In: Fernandez A, Dadhich JP, Suluja S, Editors, Abstracts, XXIII Annual Convention of National Neonatology Forum; 2003:121-122.
10. Moayedi AR, Zakeri S, Moayedi F. Neonatal seizure: etiology and type. Iran J Child Neurol. 2007:23-6.
11. Myles TD, Santoloya J. Maternal and neonatal outcomes in patients with a prolonged Second stage of labour. Obsterics and Gynecol. 2003;102:52-8.
12. Taksande AM, Vilhekar K, Jain M, Lakra M. Clinico-biochemical profile of neonatal seizures. Indian J Pediatr. 1995;52:424-7.
13. Philip BJ. Prediction of outcome based on clinical seizures type in newborn infants. J Pediatr. 2002;140(6):707-12.
14. Holanda MR, Melo ÁN. Comparative clinical study of preterm and full-term newborn neonatal seizures. Arquivos de neuro-psiquiatria. 2006;64(1):45-50.
15. Arun S. Clinical profile of seizures in neonatal intensive care unit. In Abstracts, XXIII Annual Convention of National Neonatology Forum 2003;18:109-111.
16. Finer NN, Robertson CM, Richards RT, Pinnell LE, Peters KL. Hypoxic-ischemic encephalopathy in term neonates: perinatal factors and outcome. J Pediatr. 1981;98(1):112-7.
17. Lawrence LD, Leinz GA, Rosita PS. Treatment of neonatal hypoglycemia with continuous intravenous infusion. J Paediatr. 1977:91(5):779-82.
18. Cockburn F, Brown JK, Belton NR, Forfar JO. Neonatal convulsions associated with primary disturbance of calcium, phosphorus, and magnesium metabolism. Arch Dis Childhood. 1973;48(2):99.
19. Tushar PB, Rekha UH, Ruchi NN. C-reative protein and diagnosis of neonatal meningitis. In: Fernandez A, Dadhich JP, Saluja S, Editors. Abstracts, XXIII Annual Convention of National Neonatology Forum; 2003;18(21):157-8.

Cite this article as: Amudhadevi S, Kanchana P. A study on clinical profile of neonatal seizures in newborn babies born in Government Mohan Kumara Mangalam Medical College Hospital. Int J Contemp Pediatr 2018;5:2314-9.