

Clinical profile of children presented with seizure in tertiary care hospital PMCH Patna, a retrospective study

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Abstract

Objective: To find the common causes of seizure and to classify seizure types in various age groups as well to predict outcome in relation to different variables.

Design: Retrospective hospital-based, analytic and descriptive study.

Setting: The Department of Paediatrics, PMCH, Patna.

Participants/patients: This study includes all children in the age group 6 months to 15 years presented in the department of paediatrics with seizure.

Outcome Measure(s): Demographic analysis and analysis of different seizure types, analysis of patient based on the cause of seizure as well as outcome of patient presented with seizure in relation to demographic, fever diagnosis and status epilepticus.

Results: The total number of patient presented with seizure are 956 of them 574 were males and 382 were females. 562 had fever on presentation and most of them were less than 5 years of age amount to 562. The most common clinical seizure type were generalized tonic-clonic (60.5%). Seizure disorder (14.4%), febrile seizures (16.1%), central nervous system infections and neurocysticercosis were common etiologies. Tubercular meningitis was more common etiology in 6–10 years age group. Neurocysticercosis were more common in 11–15 years age group. Encephalitis were more common in children below 5 years of age.

Conclusions: seizures are one of the common cause of hospitalization and high mortality. It can be inferred from this study that CNS infection are the most common cause of acute symptomatic seizure. Thus improvement in health care facilities like sanitation and immunization is warranted to prevent it.

Keywords: Generalized tonic-clonic seizures, Neurocysticercosis, Encephalitis, Tubercular meningitis

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Introduction

Seizures are the most common paediatric neurological disorder. Four to ten percent of children suffer at least one episode of seizure in the first 16 years of life. The incidence is highest in children less than 3 years of age, with a decreasing frequency in older children^[1]. Seizures account for about 1% of all emergency department visits, and about 2% of visits of children's hospital emergency department visits^[2]. The incidence of epilepsy (recurrent unprovoked seizures) in children and adolescents seems relatively consistent across all populations studied, ranging from 50 to 100/100,000 person-years^[3]. In most of the studies, febrile seizures were reported to be the most common type seen in the paediatric population and account for the majority of seizures seen in children younger than 5 years of age^[2-4].

Central nervous system (CNS) infections are the main cause of seizures and acquired epilepsy in the developing world^[4,5]. Geographical variations determine

the common causes in a particular region. Acute seizures are common in meningitis, viral encephalitis and neurocysticercosis and in most cases are associated with increased mortality and morbidity, including subsequent epilepsy^[6-9]. The standardized mortality rate (SMR) in patients with a newly diagnosed unprovoked seizure ranges from 2.5 to 4.1 according to the study population and design. The SMR is highest in the youngest patients and in those with symptomatic seizure^[10]. In most children with newly diagnosed epilepsy, the long-term prognosis of epilepsy is favorable, and in particular, patients with idiopathic etiology will eventually reach remission^[11].

There are limited studies on causes and outcome of acute episode of seizure in developing countries. Most studies done so far have focused on epilepsy and clinical seizure types^[12,13]. In this retrospective study, we therefore analyzed the prevalence of various etiologies, the clinical spectrum of seizure disorders and primary outcome of children admitted with a first attack of acute seizure disorder.

Methods

Patient population: A retrospective hospital-based analytic and descriptive study was conducted in the Department of Paediatrics, PMCH Patna. During a period of 1 year from Oct.31 2014 to Nov. 01 2015, where 8872 children admitted in the age group 6 months

to 15 years in the Paediatric Department. Among these, 956 children (10.8%) were admitted with complain of seizure who are included in the study. Children with seizure onset in hospital were excluded from this study.

Methods: All children admitted in the department of paediatrics with complaints of seizure in the age group of 6 months to 15 years were included (those who developed seizure during course of hospital stay were excluded). Furthermore children were divided into three age groups (6months-5years), (6years-10years), and (11years-15years). The medical record of patient were used to obtained the following data: Age, Sex, Type of seizure, If associated with fever, Final diagnosis, Final outcome recorded as discharge after recovery, LAMA(Left Against Medical Advice), Expired and referred to other institutions.

Patient presented with fever and without fever comprises two group: Those who presented with temperature more than and equal to 38°C and those who presented with temperature less than 38°C. Clinically seizures were classified as generalized tonic-clonic (GTC), partial, myoclonic, absence, and other seizures types based on the 1993 International League Against Epilepsy criteria^[14]. Febrile seizure was defined as seizures that occur between the age of 6 and 60 mo with a temperature of 38 °C or higher, that are not the result of central nervous system infection or any metabolic imbalance, and that occur in the absence of a history of prior afebrile seizures^[14]. Status epilepticus was diagnosed as, “a continuous seizure activity or recurrent seizure activity without regaining of consciousness lasting for > 30 min.”

Meningitis and encephalitis were diagnosed on the basis of clinical presentation and laboratory investigation which were verified with standard references^[15].

Seizure disorder is characterised two or more “unprovoked” seizures. Unprovoked seizures have what are considered natural causes, such as genetic factors or metabolic imbalances in your body. Diagnosis was made by observation, neurological examination, electroencephalogram (EEG), and in some cases more advanced brain imaging techniques and metabolic tests.

A stroke is caused by the interruption of normal flow of blood to the brain, either by a blockage or a rupture in the blood vessels. When a part of the brain doesn't receive its regular flow of blood that carries vital nutrients and oxygen, brain cells die, causing a loss of brain function. The diagnosis was made using different neuroimaging and other tests viz Head Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Ultrasound, Electroencephalogram (EEG), Electrocardiogram (ECG or EKG) done if a heart problem was present or suspected, blood samples taken to check for blood clotting problem.

Cerebral palsy was defined group of permanent disorders of the movement and posture development ,

causing limitation of activity and that are attributed to insult that occurred in the developing fetal or infant brain leading to non-progressive disturbances. The diagnosis of cerebral palsy was made on clinical ground by clinical assessment, laboratory testing or neuroimaging was not taken into consideration. The diagnosis was based solely on parent reports or observations of motor milestones attainment, such as head control, pulling to stand, sitting, and walking, as well as evaluation of muscle tone, posture and deep tendon reflexes.

Sample size calculation: For a large population with 95% confidence interval and significance level of 5% and margin of error of 5%, required sample size was calculated to be 383 or more^[16].

Results

Demographics and clinical seizure types in children with seizure: There was a total of 8872 patient admitted in the age group of 6 months to 15 years of age during the study period of 1 year. Out of these 956 (10.8%) had seizure. Among 956 patient with seizure 520 (54.4%) was in the age group of 6 months to 5 years and was associated with fever in 382(68%) of patient (Fig. 1). Fever was present on admission in 562(58.8%) of children. Afebrile seizure was common 150 (78.1%) in age group of 11 years to 15 years. There was 574(60%) males and 382 (40%)females with a male: female ratio of 1.5:1. There was a decreasing trend in the incidence of seizure with age, 6 months-5yrs 520 (54.4%)> 6 - 10years 244 (25.5%)> 11-15 years 192 (20.08%). Generalized tonic-clonic seizure were the most common seizure type in this study 562 (58.8%) and among them 375(66.7%) were febrile. These were followed by partial seizure 350 (36.6%), Absence seizure 27(2.8%) and Myoclonic seizure 11(1.2%). Other seizure types (Tonic, atonic) comprised 6(0.6%). In children with partial seizure 212(60.6%) were afebrile while in children who presented with Absence seizure 27(100%) were afebrile. Status epilepticus (Fig. 3) was present in 48(5.02%) of children and among them 21(43.8%) were febrile (Table 1)

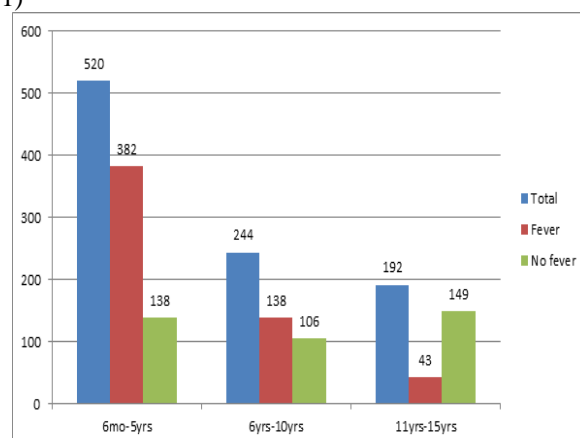


Fig. 1: Age & fever distribution of children with seizures

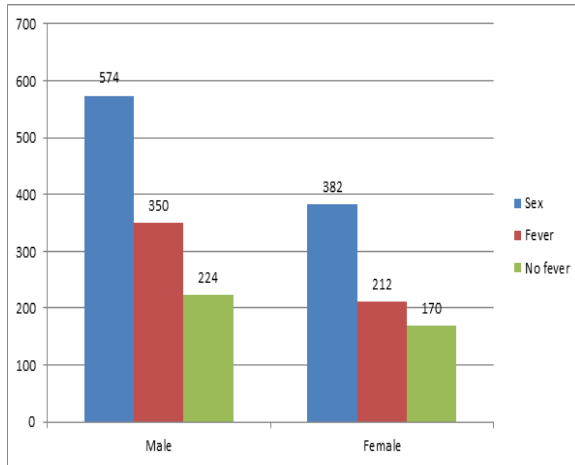


Fig. 2: Sex & fever distribution of children with seizures

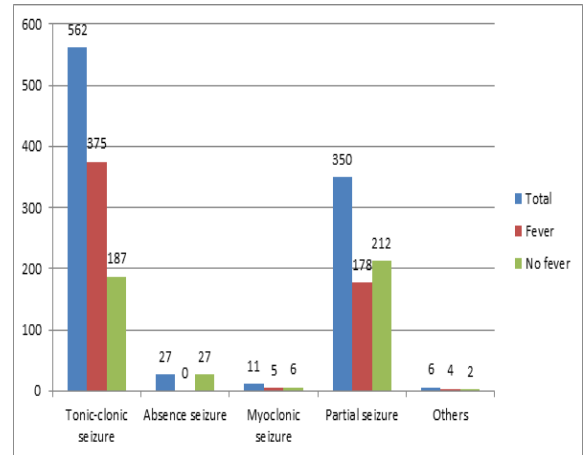


Fig. 3: Seizure type & fever distribution of children with seizures

Table 1: Demographic data and clinical seizure type of patients with seizure

		Fever (%)	No fever (%)	Total (%)
Sex	Male	350(62.3)	224(56.9)	574(60.04)
	Female	212(37.7)	170(43.1)	382(40)
	Total	562	394	956
Age	6 month -5yrs	382(68)	138(35)	520(54.4)
	6yrs -10yrs	138(24.6)	106(27)	244(25.5)
	11yrs -15 yrs	42(7.8)	150(38)	192(20.08)
	Total	562	394	956
Type of seizure	GTC	375(66.7)	187(47.5)	562(58.8)
	Partial	178(31.7)	172(43.7)	350(36.6)
	Absence	0	27(6.9)	27(2.8)
	Myoclonic	5(0.9)	6(1.5)	11(1.2)
	Status E	21(3.7)	27(6.9)	48(5.02)
	Others	4(0.7)	2(0.5)	6(0.6)
	Total	562	394	956

Analysis of patients based on etiology: Meningitis was the most common cause of seizure 170(17.8%) followed by febrile seizure 154(16.1%), Encephalitis 148(15.5%), Seizure disorder 138(14.4%), Tubercular meningitis 122(12.8%), Neurocysticercosis 101(10.6%).

Other diagnosis made were cerebral palsy 64(6.7%), stroke 17(1.8%) and miscellaneous etiologies includes electrolyte imbalance, neurocutaneous syndrome, brain abscess, hepatic and enteric encephalopathy, cerebral malaria, congenital CNS malformations accounting for 42(4.4%) of cases (Fig. 4).

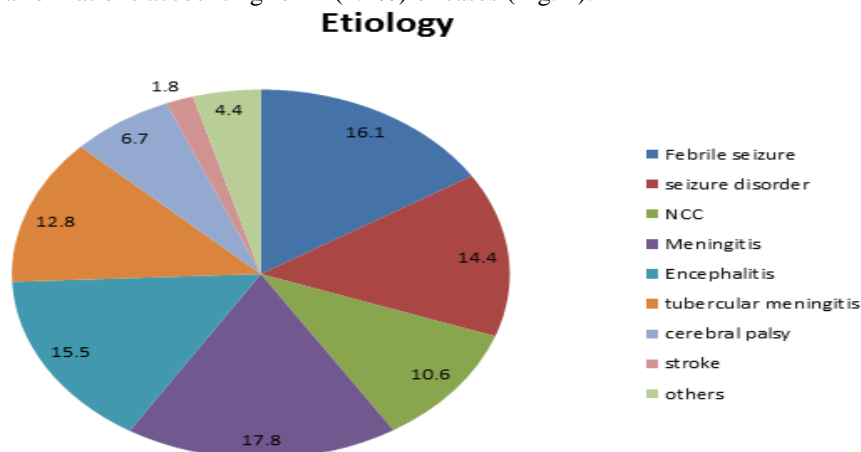


Fig. 4: Etiological diagnosis of children with seizures

Febrile seizure account for 29.6% of seizure in age group of 6 months - 5 years (Fig. 5) and was the most common etiology of seizure in this age group. NCC were more common in 11-15 years age group as against encephalitis which were common in 6 months to 5 years age group. Tubercular meningitis were more common in 6 -10 years age group (Table 2).

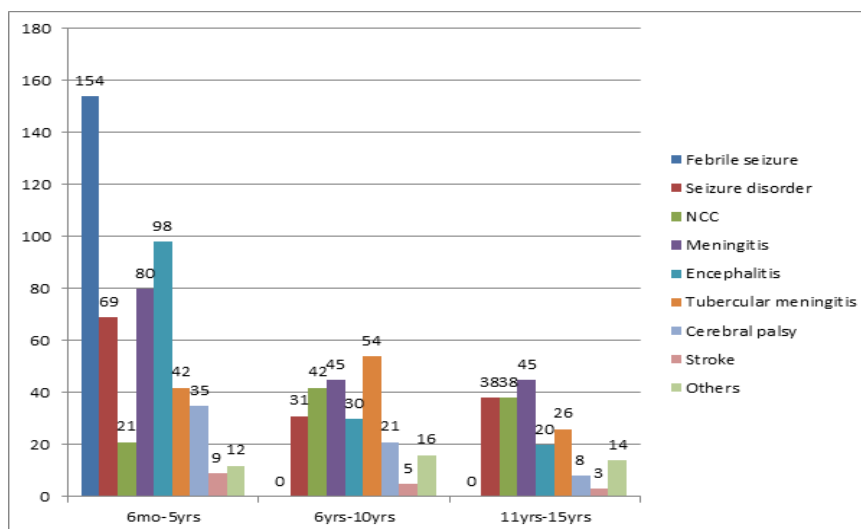


Fig. 5: Etiology & age group distribution of children with seizures

Table 2: Diagnosis of patients with seizure based on age groups

Diagnosis	6 month-5 years n (%)	6 years-10years n (%)	11years-15years n (%)	Total n (%)
Febrile seizure	154 (29.6)			154 (16.1)
Seizure disorder	69 (13.3)	31 (12.7)	38 (19.8)	138 (14.4)
NCC	21 (4.03)	42 (17.2)	38 (19.8)	101 (10.6)
Meningitis	80 (15.4)	45 (18.4)	45 (23.4)	170 (17.8)
Encephalitis	98 (18.8)	30 (12.3)	20 (10.4)	148 (15.5)
Cerebral palsy	35 (6.7)	21 (8.6)	8 (4.2)	64 (6.7)
Stroke	9 (1.7)	5 (2.05)	3 (1.6)	17 (1.8)
Tubercular Meningitis	42 (8.07)	54 (22.1)	26 (13.5)	122 (12.8)
Others	12 (2.3)	16 (6.6)	14 (7.3)	42 (4.4)
Total	520 (54.4)	244 (25.5)	192 (20.08)	956

Outcome in relation to gender, fever, status and diagnosis: The final outcome was made as discharge, death during stay in hospital, those who left against medical advice and those referred to other specialty centre for further management. 750 (78.5%) were discharged after successful treatment, 89 (9.3%) of children died during stay in hospital, 99(10.4%) had left against medical advice, and remaining 18(1.9%) cases were referred to other speciality centre for further management. The outcome between male (Expired 8.5%) and female (Expired 10.5%) were insignificant as with those presented with fever(Expired 10.5%) or without fever(Expired 7.6%). Among 48 children with status epileptics 20 (41.7%) expired. Most of the children who were diagnosed as neurocysticercosis (96%) and febrile seizure (96.8%) recovered and discharged successfully. Mortality was nil in patient with NCC. High mortality rate was found in Children who

diagnosed as encephalitis, stroke and tubercular meningitis 25%, 17.6% and 13.1% respectively (Table 3).

Discussion

This was a hospital based retrospective analytic and descriptive study of children presented with seizure in a tertiary care centre PMCH Patna from October 31, 2014 to November 1, 2015. This study aimed to analyse demographics, clinical seizure types, etiologies and outcome of those children. This study excludes neonates and infants under 6 months of age because frequently they comprise one spectrum of diseases like septicemia, hypoxic-ischemic encephalopathy, and metabolic disorders^[17].

Demographics and clinical seizure types: Many studies done before shows high incidence of seizure in

younger age group of children and a decreasing trend in older ones as well as more common incidence of seizure in males^[2,5]. In our study also most children were younger than 5 years of age, even though not very significant but males had higher prevalence compared to female. Seizures presented with fever in 58.8% of cases. Generalized tonic-clonic seizure was found to be the commonest clinical seizure type and had higher incidence among children presenting with febrile seizure which is in accordance with the previous studies^[4,5,7]. In the setting of higher incidence of neurocysticercosis in developing countries partial seizure is common^[8]. Partial seizures represented 350 (36.6%) of children in the current study.

Etiological profile: First attack of seizure can have many possible etiologies, neurologic/developmental causes, infection, metabolic disturbances, traumatic head injury, toxins, febrile seizure etc^[4-6]. One of the most common cause of seizure attack was reported to be due to febrile seizure^[2-4]. In our study febrile seizures constitute (29.6%) and was found to be main the etiology of a first attack of seizure in children less than 5 years of age. Overall, meningitis was found to be the commonest etiology in children aged 6 months to 15 years (17.8%) followed by febrile seizure (16.1%), encephalitis(15.5%) and seizure disorder (14.4%).

Primary outcome of acute seizure: In our study the mortality rate during hospital stay among children admitted with acute episode of seizure was found to be similar with the mortality reports from other developing countries and amounting to 9.3%^[4]. The difference in outcome among male (expired 8.5%) and female (expired 10.5%) was not so significant. Fever was found to be independently associated with increased mortality during the acute illness (mortality among febrile patient 10.5% and among afebrile patient with seizure 7.6% which is not similar to the reports from other studies, this may be due to Bihar being endemic for encephalitis which present with fever and has high mortality. Meningitis and encephalitis causes significant childhood mortality and morbidity^[4,6]. There was poor outcome in children diagnosed with encephalitis and status epilepticus^[18] there was good outcome in those children diagnosed with febrile seizure and neurocysticercosis.

As evident from this study first acute attack of seizure due to neurocysticercosis and CNS infections comprises a big bunch of cases. With improvement in sanitation and routine immunization for Hib and Japanese encephalitis vaccine most of these can be prevented. So attempt should be made towards these preventive measures to decrease the mortality from seizure, more over further intensive study need to be done to identify the burden of other etiological agents of CNS infections, so that appropriate targeted preventive measures can be taken and at the same time health care facilities need further preparedness for emergency

management of seizure to decrease mortality and morbidity associated with seizure.

Limitations of the study

In this study outcome was defined as mortality during stay in hospital. Morbidities like neurological dysfunction and impact on scholastic performance were not studied in follow up. The details of other causes contributing for seizures could not be specified due lack of investigations (e.g. Inborn error of metabolism). Multicentric prospective study is needed to find out details regarding these problems.

Conclusion

Acute episodes of seizures are among the commonest cause of hospitalization with high mortality. It can be inferred from this study that most of acute symptomatic seizures are caused by CNS infections like meningitis, encephalitis, tubercular meningitis and neurocysticercosis as well as by febrile seizure which can be prevented with improvement in health care facilities like sanitation and immunization and preparedness to deal with acute episodes of seizure.

Already Known: There are limited studies on causes and outcome of acute episode of seizure in developing countries. Most studies had done so far have focused on epilepsy and clinical seizure types^[12,13].

What this Study Adds: In this study, we have also analyzed the prevalence of various etiologies of seizure and primary outcome of children admitted with acute seizure disorder.

Authors' contributions: AKJ designed the study, TI drafted the manuscript, deduced the data and revised it. AK planned the study with TI, AK and TI conducted the data analysis, interpreted the data, and revised the manuscript. AKJ and AK critically revised the manuscript. All the authors approved the final document.

Conflict of interest: None

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