Print ISSN: 2321-6379
Online ISSN: 2321-595X
DOI: 10.17354/ijss/2018/243

Original Article

A Clinical Profile and Diagnostic Management of First-time Seizures in Children Aged 1–12 Years - A Tertiary Hospital-based Study in Kerala

Damodaran Alakkodan

Associate Professor, Department of Paediatrics, Kannur Medical College, Anjarakandy, Kannur, Kerala, India

Abstract

Background: First-time seizures in children present a complex situation in the family that may have profound emotional, social, and vocational consequences. The seizures are unlikely to recur if the first seizure is provoked an acute disturbance of brain function (acute symptomatic or provoked); however, if it is unprovoked meta-analyses suggest that 30–50% will recur. Among the second unprovoked seizures, 70–80% will recur, justifying the diagnosis of epilepsy (a tendency for recurrent seizures). Seizures can be either generalized or focal. Types of seizures such as absence or complex partial seizures typically occur several times before the person or family become concerned.

Aim of the Study: The study aimed to study the prevalence and clinico-demographic profile of children with first-time seizures and its diagnosis in a tertiary care hospital of Kerala.

Materials and Methods: A thorough clinical history taking was done to include the information of age (from 1 year to 12 years), gender, type of seizure, loss of consciousness, with or without status epilepticus, associated symptoms (fever, headache, vomiting, and altered sensorium), developmental history, and family history of seizure or epilepsy. Preliminary investigations such as complete blood count, blood glucose, serum electrolytes, cerebrospinal fluid (CSF) analysis, Malaria parasite test, Chest X-ray, Montoux test, and neuroimaging including computed tomography scan head or cranial magnetic resonance imaging, electroencephalography (EEG), and other tests were undertaken depending the urgency, availability, and necessity being taken into account. Initial treatment given, recurrence of seizures, time taken for disappearance of total seizures, and status at the time of discharge were recorded and analyzed. Classification of seizures including generalized tonic-clonic (GTC), absence, myoclonic, focal, and other seizures types was based on the Commission on Epidemiology and Prognosis, 2010 International League against Epilepsy.

Results and Observations: A total of 218 children with first - time seizures included 112 (51.37%) children were male and 106 (48.62%) were females. The male to female ratio was 1.05:1. The overall mean age was 5.28 ± 1.18 years. 94/218 (43.11%) children were of 1–4 years, 65/218 (29.81%) of 5–8 years, and 59 (27.06%) of 9–12 years. Loss of consciousness observed in 49/218 (22.47%) children, status epilepticus history among 27/218 (12.38%), associated symptoms in 86/218 (39.44%) children, and development history in 34/218 (15.59%) children, and family history of seizure or epilepsy in 55/218 (25.22%) children. Generalised convulsions in 118/218 children (54.12%) and focal seizures in 100/218 (45.87%) was obsererved. Among 218 children, 151 (69.26%) had GTC seizures, 46 (21.10%) had tonic seizures, 17 (07.79%) had myoclonic type, and 4 (01.83%) had other types.

Conclusions: First - time seizures in children have the reasons for physical, mental, and financial stress for the parents. Both the genders are equally affected. Generalized seizures were the far most common type of all seizures. Central nervous system infections, febrile convulsions, seizure disorders, head injuries, and space-occupying lesions were the main etiological factors in that order. Investigations to rule out metabolic diseases are equally important in the diagnosis. CSF analysis, neuroimaging, and EEG are accepted as investigative procedures by the parents for early diagnosis and remain essential. A continuation of the study is required to detect and follow-up children with recurrences.

Key words: Childhood fits, Epilepsy, Febrile seizures, Neuroimaging, Seizures, Status epilepticus

Access this article online

www.ijss-sn.com

Month of Submission : 07-2018
Month of Peer Review : 08-2018
Month of Acceptance : 09-2018
Month of Publishing : 09-2018

INTRODUCTION

Seizures are defined as a transient occurrence of signs and/or symptoms resulting from abnormal excessive or synchronous neuronal activity in the brain. Seizures are an importantcause for hospital admissions in children from developing countries with increased prevalence

Corresponding Author: Dr. Damodaran Alakkodan, Department of Paediatrics, Kannur Medical College, Anjarakandy, Kannur, Kerala, India. E-mail: damudch@gmail.com

in younger children.[1,2] Review of literature shows that 4–10% of children experience seizures before 16 years of age, whereas 1/5th of total children with unprovoked seizures may develop epilepsy.[3] Prevalence of epilepsy in Kerala according to a study shows a crude point prevalence ratio of 4.9 cases per 1000 people and an age-adjusted prevalence ratio of 4.7 cases per 1000 population.[4] The common causes of seizures in children are: Neonatal seizures (infections, birth asphyxia, and metabolic causes), febrile convulsions, meningitis, viral encephalitis, neurocysticercosis, cerebral malaria, and epilepsy (symptomatic, cryptogenic, and idiopathic).[5-10] Between 6 months and 5 years of age, febrile seizures account for 2–5% of all seizures in children experiencing the first episode. Infections remain the major cause of seizures in developing nations.[3,11] Epilepsy is defined by International League Against Epilepsy (ILAE; 1993) as a condition characterized by recurrent (two or more) epileptic seizures, unprovoked by any immediate identified cause.[12] According to the World Health Organization, of the 50 million people with epilepsy worldwide, 80% reside in developing countries.[13] Epilepsy was estimated to account for 0.5% of the global burden of disease, accounting for 7,307,975 disability-adjusted life years in 2005.[14] Seizures account for about 1% of all emergency department visits, and about 2% of visits of children's hospital emergency department visits.[14] In most of the studies, febrile seizures were reported to be the most common type seen in the pediatric population and account for the majority of seizures seen in children younger than 5 years of age.[15,16] Central nervous system (CNS) infections are the main cause of seizures and acquired epilepsy in the developing world.[6,11] Classification of seizures, including generalized tonic-clonic (GTC), absence, myoclonic, focal, and other seizures types was based on the Commission on Epidemiology and Prognosis, 2010 ILAE.[17] According to the ILAE, status epilepticus is a single epileptic seizure which lasts >30 min or a series of epileptic seizures in which function is not retrieved between ictal events for >30 min.[18] ILAE in 1993 defined febrile seizure as an epileptic seizure which occurs in childhood postneonatal age, associated with fever not caused CNS infection, with no history of seizures during neonatal period or previous unprovoked seizure, and not fulfilling criteria for other acute symptomatic seizure. Furthermore, febrile seizures were divided into simple and complex febrile seizures. A simple febrile seizure occurs not >15 min and is generalized initially, and occurs 1 time during a 24-h interval. In contrast, a complex febrile seizure occurs for >15 min can has focal features at any time, or there is recurrence within a 24-h interval.[19] Etiologies of seizures such as meningitis and encephalitis were analyzed on the basis of clinical presentation and laboratory investigation and verified with a standard reference. Moreover, the cases were classified into three age groups: 6 months−5 years, 6 months –10 years, and 11 months –18 years. Items such as age, sex, seizure type, related symptoms, family history of seizure or epilepsy, neurodevelopmental history, lab test results, neuroimaging findings, electroencephalography (EEG), hospital stay duration, medical diagnosis, and final outcome were analogized among children of different age groups. Analysis of data was made using descriptive statistics and hypothesis testing. Even though neuroimaging is not necessary for well-appearing children after a first, unprovoked nonfebrile seizure, it plays an important role in the etiological diagnosis of seizures neuroimaging helps in identifying the focal seizure or persistent seizure activity, focal neurologic deficit, neurocutaneous disorder, signs of elevated intracranial pressure, VP shunting, trauma, or traveling to cysticercosis endemic countries.[12-14] According to the ILAE, status epilepticus is a single epileptic seizure which lasts >30 min or a series of epileptic seizures in which function is not retrieved between ictal events for >30 min.[16] ILAE in 1993 defined febrile seizure as an epileptic seizure which occurs in childhood postneonatal age, associated with fever not caused by CNS infection, with no history of seizures during neonatal period or previous unprovoked seizures and not fulfilling criteria for other acute symptomatic seizure. Furthermore, febrile seizures were divided into simple and complex febrile seizures. A simple febrile seizure occurs not >15 min and is generalized initially, and occurs 1 time during a 24-h interval. In contrast, a complex febrile seizure occurs for >15 min can has focal features at any time, or there is recurrence within a 24-h interval.[17]

Type of Study

This was a prospective, cross-sectional analytical study.

Institute of Study

This study was conducted at Kannur Medical College Hospital, Anjarakandy, Kannur, Kerala, India.

Period of Study

This study was from February 2016 to January 2018.

MATERIALS AND METHODS

A prospective, clinical and demographic study of first - time seizures was conducted in a tertiary teaching hospital in Kerala including 218 consecutive children attending the department of paediatrics. An Ethical Committee Clearance was obtained from the Institutional Ethical Committee, and committee approved consent form was used for the study.

Inclusion Criteria

1. Children of both genders above the age of 1 year and below 12 years were included.

2. Children attending with first - time seizures alone were included.
3. Children with a history of fever were included.
4. Children with a history of head injury were included.
5. Children with acute symptoms and signs of seizures with altered sensorium were included in the pediatric intensive care unit were included.

Exclusion Criteria

1. Children <1 year and >12 years were excluded.
2. Children with the previous history of seizures or treatment of seizures were excluded.
3. Children with severe head injuries requiring surgical interventions were excluded.
4. Children with head injuries but associated with other body injuries were excluded.

A thorough clinical history taking was done to include the information of age (from 1 year to 12 years), gender, type of seizure, loss of consciousness, with or without status epilepticus, associated symptoms (fever, headache, vomiting, and altered sensorium), developmental history, and family history of seizure or epilepsy. Preliminary investigations such as complete blood count, blood glucose, serum electrolytes, cerebrospinal fluid (CSF) analysis, Malaria parasite test, Chest X-ray, Montoux test, and neuroimaging including computed tomography (CT) scan head or cranial magnetic resonance imaging (MRI), EEG, and other tests were undertaken depending the urgency, availability, and necessity being taken into account. Classification of seizures, including GTC, absence, myoclonic, focal, and other seizures types was based on the Commission on Epidemiology and Prognosis, 2010 ILAE.[19] Etiologies of seizures such as meningitis and encephalitis were analyzed on the basis of clinical presentation and laboratory investigation and verified with standard reference. The children were classified into three age groups: 1 year–4 years, 5–8 years, and 9–12 years. Items such as age, sex, seizure type, related symptoms, family history of seizure or epilepsy, neurodevelopmental history, lab test results, neuroimaging findings, EEG, hospital stay duration, medical diagnosis, and final outcome were analogized among children of different age groups. Analysis of data was made using descriptive statistics and hypothesis testing. The Chi-square test and Fisher test were used to examine the association between different variables and strength of the relationship. $P < 0.05$ was considered as statistically significant.

RESULTS AND OBSERVATIONS

A total of 218 consecutive children attending the department of paediatrics with first - time seizures with different causes were included in this study. Among them, 112 (51.37%) children were male and 106 (48.62%) were females. The male to female ratio was 1.05:1. The overall mean age was 5.28 ± 1.18 years; in males, the mean was 5.76 ± 1.52 and 5.13 ± 1.47 in females. The youngest child was 1 year 1 month old, and the eldest child was 12 years old. 94/218 (43.11%) children belonged to the age group of 1–4 years, 65/218 (29.81%) belonged to the age group of 5–8 years, and 59 (27.06%) belonged to the age group of 9–12 years [Table 1].

Generalized convulsions were observed in 118/218 children (54.12%) and focal seizures in 100/218 (45.87%). Among 218 children, 151 (69.26%) had GTC seizures (GTCS), 46 (21.10%) had tonic seizures, 17 (7.79%) had myoclonic type, and 4 (1.83%) had other types [Table 2].

Clinical history of children in this study showed loss of consciousness in 49/218 (22.47%) children, status epilepticus history in the family among 27/218 (12.38%) children, associated symptoms in 86/218 (39.44%) children, and development history in 34/218 (15.59%) children, and family history of seizure or epilepsy in 55/218 (25.22%) children. Their distribution among the gender was tabulated in Table 3.

Preliminary laboratory investigations showed abnormal complete blood counts in 61/218 (27.98%) children, abnormal blood glucose levels in 30/218 (13.76%) children, abnormal serum electrolytes values in 44/218 (20.18%) children, abnormal CSF analysis results in 138/218 (63.30%) children, positive Malaria parasite test in 59/218 (27.06%) children, abnormal Chest X-ray was seen in 91/218 (41.74%) children, positive Montoux test in 46/218 (21.10%) children, abnormal neuroimaging including CT scan head, or cranial MRI was seen in 111/218 (50.91%) children. Abnormal neuroradioimaging findings were gliosis in 46 - (21.10%), dysmyelination in

Table 1: Age incidence (*n* - 218)

Age groups	Male - 112 (%)	Female - 106 (%)	Percentage
1–4 years - 94	48 (22.01)	46 (21.10)	43.11
5–8 years - 65	34 (15.59)	31 (14.22)	29.81
9–12 years - 59	30 (13.76)	29 (13.30)	27.06

Table 2: Type of seizures (*n* - 218)

Type of seizures (%)	Male - 112 (%)	Female - 106 (%)	Percentage
Generalized - 118 (54.12)	67 (30.73)	52 (23.85)	54.12
Focal - 100 (45.87)	46 (21.10)	54 (24.77)	45.87
GTCS - 151 (69.26)	78 (35.77)	73 (33.48)	69.26
Tonic - 46 (21.10)	22 (10.09)	24 (11.00)	21.10
Myoclonic - 17 - (07.79)	8 (03.66)	9 (04.12)	07.79
Others - 4 - (01.83)	3 (01.37)	1 (0.45)	1.83

GTCS: Generalized tonic-clonic seizures

Table 3: The history of seizures in the study (*n* - 218)

History details	Male - 112	Female - 106	Percentage
Loss of consciousness - 49	27	22	22.47
Status epilepticus - 27	16	11	12.38
Associated symptoms (fever, headache, vomiting, and altered sensorium) - 86	45	41	39.44
Developmental history - 34	16	18	15.59
Family history of seizure or epilepsy - 55	30	25	25.22

22 - (10.09%), hemorrhage in 20 (09.17%), brain atrophy in 8 - (3.66%), dysgenesis in 6 - (2.75%), infarction in 5 - (2.29%), and encephalomalacia in 4 (1.83%) children, abnormal EEG in 67/218 (30.73%) children [Table 4]. The abnormal recordings in EEG noted in this study were temporal shortwave discharges in 34 (15.59%), centerotemporal spikes in 19 (8.71%), occipital spikes/spike-waves in 17 (7.78%), generalized slowing in 17 (7.78%), focal slowing in 9 - (4.12%), frontal sharp wave discharge in 5 (2.29%), central epileptic discharge in 4 (1.83%), and generalized high spikes in 2 (0.91%) children [Table 4].

The diagnosis in the present study was based on the investigation, clinical symptomatology, and history from the parents. It was observed that CNS infections were diagnosed in 58/218 (26.60%) of the children, febrile convulsions were observed in 45/218 (20.64%) of the children, seizure disorder in 35/218 (16.05%), head injuries in 27/218 (12.38%), space-occupying lesions of the brain were noted in 25 (11.46%) of the children, metabolic disorders such as diabetes mellitus was seen 18/218 (8.25%) children, and hypertensive encephalopathy in 12/218 (4.58%). Their incidences in different age groups and gender-wise distribution were tabulated in Table 5. CNS infections were the most common etiology observed in 58/218 (26.60%) children; 32/218 (14.67%) in males and 26/218 (11.92%) in females; 27/218 (12.38%) in 1–4 years group, 19/218 (8.71%) in 5–8 years group, and 12/218 (5.50%) in 9–12 years group. Febrile convulsions were seen in 45 (20.64%) of the children; 24/218 (11.00%) male children and 22/218 (10.09%) female children; among these 24/218 (11.00%) in 1–4 years age group, 13/218 (5.96%) in 5–8 years group, and 8/218 (3.66%) in 9–12 years age group. Seizure disorders were observed in 35/218 (16.05%) children; males were 17/218 (07.79%) and females were 18/218 (08.25%). Among these, 14/218 (06.42%) were in 1–4 years group, 9/218 (4.12%) were in 5–8 years group, and 12/218 (5.50%) were in 9–12 years group. Head injuries were seen in 27/218 (12.38%) children; 13/218 (5.96%) male and 14/218 (6.42%) female children. Among these, 11/218 (5.04%) were in 1–4 years group, 8/218 (3.66%) were in 5–8 years group, and 8/218 (3.66%) were in 9–12 years group. Space-occupying lesions were observed in 25/218 (11.46%) children; males were 12/218 (5.50%) and females were 13/218 (5.96%). Among these, 9/218 (4.12%) were in 1–4 years group,/218 (3.66%) were in 5–8 years group, and 8/218 (3.66%) were in 9–12 years group. Metabolic disorders were observed in 18/218 (12.38%) children; males were 9/218 (4.12%) and females were 9/218 (4.12%). Among these, 7/218 (3.21%) were in 1–4 years group, 4/218 (5.50%) were in 5–8 years group, and 7/218 (3.21%) were in 9–12 years group. Hypertensive encephalopathy was observed in 10/218 (4.58%) children; males were 6/218 (02.75%) and females were 4/218 (01.83%). Among these, 2/218 (3.21%) were in 1–4 years group, 4/218 (1.83%) were in 5–8 years group, and 4/218 (1.83%) were in 9–12 years group [Table 5].

Among the CNS infections (58/112) in this study, there were 19/218 (7.33%) children with Viral Infections (encephalitis), 17/218 (7.79%) with Pyogenic meningitis, 14/218 (6.40%) with tuberculosis meningitis, and 8/218 (3.66%) with cerebral malaria. Children with febrile convulsions with pyrexia of unknown origin were 45/218 (20.64%). Among the head injury children, extradural hematoma was 13/218 (5.96%), subdural hematoma was 7/218 (3.21%), and transient concussion was 7/218 (3.21%). Among the seizure disorders idiopathic were 21/218 (9.63%), cerebral palsy were 07/218 (03.21%), Sturge-Weber syndrome were 2/218 (0.91%), tuberous sclerosis were 2/218 (0.91%), dravet syndrome, infantile spasm, vein of galen malformation, Rasmussen's encephalitis, and others were one each (0.45%). Among the space-occupying lesions, inflammatory granuloma was seen in 11/218 (5.04%), gliomas in 9/218 (4.12%), and meningioma in 5/218 (2.29%) children. Metabolic disorders included diabetes mellitus 7/218 (3.21%), 5 (2.29%) were with hyponatremia, 3 (2.29%) were hypocalcemia, and 3 (2.29%) with acute liver failure were 3/218 (1.37%) each. There were 10 children with hypertensive encephalopathy - 10/218 (5.50%); among them, hypertensive crisis was in 5 (2.29%) and antihypertensive withdrawal in 5 (2.29%) [Table 6].

DISCUSSION

In the present tertiary hospital - based study, 218 consecutive children with first - time seizures were either admitted directly to the pediatric ICU or OPD were included depending on their symptoms. There were 112 males and

Table 4: Abnormal laboratory investigation (*n* - 218)

Lab investigations	Male - 112	Female - 106	Percentage
Complete blood counts - 61/218 - (27.98%)se			
Neutropenia - 22	12	10	10.09
Lymphocytosis - 39	22	17	17.88
Blood glucose levels - 30/178 - (13.76%)			
Hypoglycemia - 21	12	9	9.63
Hyperglycemia - 9	5	4	4.12
Serum electrolytes - 44/150 - (20.18%)			
Hypernatremia - 11 - (%)	6	5	5.04
Hypokalemia - 19 - (8.71%) hyponatremia - 14 - (%)	7 (8)	12 (6)	8.71 (6.42)
CSF analysis - 138/218 - (63.30%)			
White blood cells - 31 - (14.22%)	20	11	14.22
RBCs - 17 - (7.79%)	10	7	7.79
Low chloride levels - 15 - (6.88%)	9	6	6.88
Bacteria positive - 63 - (28.89%) high proteins - 55 - (25.22%)	39 (35)	24 (20)	28.89 (25.22)
Malaria parasite test - 166/218 - (76.14%)			
Positive - 59 - (27.06%)	38	21	27.06
Negative - 107 - (49.08%)	77	30	49.08
Montoux test - 175/218 - (80.27%)			
Positive - 46 - (21.10%)	24	22	21.10
Negative - 129 - (59.17%)	67	62	59.17
Chest X-ray - 91/218 - (41.74%)			
Pneumonitis - 20 - (09.17%)	13	7	9.17
Pleural effusion - 12 - (5.50%)	8	4	5.50
Consolidation - 10 - (4.58%)	5	5	4.58
Kohn's focus - 31 - (14.22%)	19	12	14.22
Emphysema - 18 - (8.25%)	8	10	8.25
Neuroimaging - 111/218 - (50.91%)			
Gliosis - 46 - (21.10%)	25	21	21.10
Dysmyelination - 22 - (10.09%)	11	11	10.09
Hemorrhage - 20 - (09.17%)	9	11	9.17
Atrophy - 08 - (03.66%)	5	3	3.66
Dysgenesis - 06 - (2.75%)	3	3	2.75
Infarction - 05 - (2.29%)	2	3	2.29
Encephalomalacia - 4 (1.83%)	2	2	1.83
EEG - 107/218 - (49.08%)			
Temporal short wave discharges - 34 - (15.59%)	24	10	15.59
Centrotemporal spikes - 19 - (08.71%)	12	7	8.71
Occipital spikes/spike - waves - 17 - (7.78%)	8	9	7.79
Generalized slowing - 17 - (7.78%)	12	5	7.79
Focal slowing - 9 - (4.12%)	4	5	4.12
Frontal sharp wave discharge - 05 - (02.29%)	3	2	2.29
Central epileptic discharge - 4 - (1.83%)	2	2	1.83
Generalized high spikes - 2 (0.91%)	1	1	0.91

Table 5: The incidence of different etiologies of seizures in the study (*n* - 218)

Etiology	Male - 112	Female - 106	1–4 years	5–8 years	9–12 years
Central nervous system infections - 58/218 (26.60%)	32	26	27	19	12
Febrile convulsions - 45/218 (20.64%)	23	22	24	13	08
Seizure disorder - 35/218 (16.05%)	17	18	14	9	12
Head injuries - 27/218 (12.84%)	13	14	11	8	8
Space occupying lesions - 25/218 (12.38%)	12	13	9	8	8
Metabolic disorders - 18/218 (08.25%)	9	9	7	4	7
Hypertensive encephalopathy - 10/218 (5.50%)	6	4	2	4	4

106 females with a ratio of 1.05:1 which reflects a higher national female population ratio in Kerala. Worldwide literature showed a ratio of 1.35:1.[19,20] The overall mean age was 5.28 ± 1.18 years, 94/218 (43.11%) children belonged to the age group of 1–4 years, 65/218 (29.81%) belonged to the age group of 5–8 years, and 59 (27.06%) belonged to the age group of 9–12 years. The incidence of first - time seizures was more common before 4 years in this study. The incidence of seizures was found decreasing with the increasing age of children. This may be due to more susceptibility and high incidence of febrile seizures as well these children are more prone to CNS infections and

Table 6: The final diagnosis in the study group (*n* - 218)

Etiology	Final diagnosis	Male	Female
Central nervous system infections - 58/218 (26.60%)	Viral Infections (encephalitis) - 19	10	9
	Pyogenic meningitis - 17	9	8
	Tuberculous meningitis - 14	7	7
	Cerebral malaria - 8	4	4
Febrile convulsions - 45/218 (20.64%)	PUO - 45	24	21
Head injuries - 27/218 (12.38%)	Extradural Hematoma - 13	7	6
	Subdural hematoma - 7	4	3
	Transient concussion - 7	3	4
Seizure disorder - 35/218 (16.05%)	Idiopathic - 21	12	9
	Cerebral palsy - 7	3	4
	Sturge-Weber syndrome - 2	2	0
	Tuberous sclerosis - 2	1	1
	Drave syndrome - 1	0	1
	Infantile spasm - 1	0	1
	Vein of Galen malformation - 1	1	0
	Rasmussen's encephalitis - 1	0	1
	Others - 1	1	0
Space - occupying lesions - 25/218 (11.46%)	Inflammatory granuloma - 11	6	5
	Glioma - 9	5	4
	Meningioma - 5	3	2
Metabolic disorders - 18/218 (8.25%)	Diabetes Mellitus - 7	4	3
	Hyponatremia - 5	3	2
	Hypocalcemia - 3	1	2
	Acute liver failure - 3	2	1
Hypertensive encephalopathy - 10/218 (5.50%)	Hypertensive crisis - 5	2	3
	Antihypertensive withdrawal - 5		2

PUO: Pyrexia of unknown origin

metabolic derangements.[19,21] Generalized convulsions were observed in 118/218 children (54.12%) and focal seizures in 100/218 (45.87%). Among 218 children 151 (69.26%) had GTCS, 46 (21.10%) had tonic seizures, 17 (7.79%) had myoclonic type, and 4 (1.83%) had other types [Table 2]. These findings were similar to other studies.[19,20,22] Children without seizures were reported in a few studies[11] which were higher. In the present study, there was no child without seizures as the sample was from admitted patients with first - time seizures. 27% of children in this study presented with status epilepticus. Certain studies showed an incidence of 10.9% and 7.3%.[23] Of status epilepticus which was low compared to our study which could be explained by the fact that in this study the CNS infections accounted for 58/218 (26.60%)of the study sample. The incidence of recurrence of seizures was negligible 10/218 (04.58%) in this study compared to other studies which recorded recurrence especially among the children with inflammatory granuloma with 18.23% or withdrawal (20%) seizures.[6] Some studies reported 19% of patients with recurrence (most were epilepsy followed by febrile seizures), while others reported higher recurrence (29–44%) with increasing age.[24] Etiological analysis of the showed CNS infections to be the most common cause of first - time seizure, followed by seizure disorders, head injury, and SOL and metabolic causes; least being hypertensive encephalopathy. In a study by Hirtz *et al.*[22] febrile seizures were most common cause followed by trauma, seizure disorder, and CNS infections. Among CNS infections, the most common cause of seizures in this study was viral encephalitis followed by pyogenic meningitis, tuberculosis meningitis, and cerebral malaria. Cerebral malaria was common in countries of tropical nature as evidenced by certain study.[25] 8.25% of the children had metabolic disturbances producing first - time seizures in this study. Similar studies by Huang *et al.*[9] reported 11% of cases with metabolic etiology for seizures only 3 years of age. Chen *et al.*[19] reported that only 3/319 as a metabolic etiology for seizures suggesting investigations to find the metabolic cause of seizures was unnecessary. However, the incidence of hypoglycemia, hypocalcemia, and hyponatremia is commonly encountered in a tropical country like India. Hence, the metabolic investigations should be undertaken. Neuroimaging studies were done in all the patients in this study, and 111/218 (50.91%) imaging studies showed abnormal reports. Gaillard *et al.* quoted in their study that not all MRI abnormalities cause seizures and not all seizures originate from identified structural cerebral abnormalities.[26] They also opined that it is necessary to establish with clinical and neurophysiologic data whether a given lesion is likely to cause the seizures. In the research field, MRI allows us to better understand the pathophysiology of epilepsy.[27] Mishra *et al.* observed from their study. In the present study, neuroradioimaging was useful in diagnosis in first - time seizures in children in nearly 50% of the sample. MRI investigation will detect most common lesions causing neocortical epilepsy,

which are: Low-grade tumors, malformations of cortical development, post-traumatic and post-ischemic lesions, inflammatory infectious scars, cavernous malformations, and arteriovenous malformations.[28] In patients with malformations of cortical development multimodal imaging techniques can be useful for localizing suspected lesions. Among the multimodal imaging, interictal fluorodeoxyglucose positron emission tomography (PET), ictal single-photon emission CT (SPECT), ictal/interictal subtraction of SPECT scans, PET/MRI coregistration, multiplanar reconstruction, and curvilinear reformatting represent non-invasive methods to evaluate patients with focal seizures.[27] Review of EEG abnormalities in the present study showed that most of the abnormalities were in the form of focal discharges confined to a specific brain lobe in 55/107 (70.09%) children. Focal slowing was reported in 20/107 (18.69%) children, whereas generalized non-specific slowing was observed in 19/107 (17.75%) children. These results are similar to the study by McHughe and Delanty[29] and Seneviratne *et al*.[30] Among these, there were classical centerotemporal spikes suggestive of benign epilepsy of childhood with centrotemporal spikes.

CONCLUSION

First - time seizures in children have the reasons of physical, mental, and financial stress for the parents. Both the genders are equally affected. Generalized seizures were the far most common type of all seizures. CNS infections, febrile convulsions, seizure disorders, head injuries, and space-occupying lesions were the main etiological factors in that order. Investigations to rule out metabolic diseases are equally important in the diagnosis. CSF analysis, neuroimaging, and EEG are accepted as investigative procedures by the parents for early diagnosis and remains essential. A continuation of the study is required to detect and follow-up children with recurrences.

REFERENCES

1. Vining EP. Pediatric seizures. Emerg Med Clin N Am 1994;12:973-88.
2. Singhi P, Singhi S. Neurocysticercosis in children. Indian J Pediatr 2009;76:537-45.
3. McAbee GN, WarkJE. A practical approach to uncomplicated seizures in children. Am Family Phys 2000;62:1109-16.
4. Radhakrishnan K, Pandian JD, Santhoshkumar T, Thomas SV, Deetha TD, Sarma PS, *et al.* Prevalence, knowledge, attitude, and practice of epilepsy in Kerala, South India. Epilepsia 2000;41:1027-35.
5. Stafstrom CE. Neonatal seizures. Pediatr Rev 1995;16:248-56.
6. Idro R, Gwer S, Kahindi M, Gatakaa H, Kazungu T, Ndiritu M, *et al*. The incidence, aetiology and outcome of acute seizures in children admitted to a rural Kenyan district hospital. BMC Pediatr 2008;8:5.
7. Murthy JM, Yangala R. Acute symptomatic seizures - Incidence and etiological spectrum: A hospital-based study from South India. Seizure 1999;8:162-5.
8. Rayamajhi A, Singh R, Prasad R, Khanal B, Singhi S. Study of Japanese encephalitis and other viral encephalitis in Nepali children. Pediatr Int Offic J Jpn Pediatr Soc 2007;49:978-84.
9. Huang CC, Chang YC, Wang ST. Acute symptomatic seizure disorders in young children – a population study in Southern Taiwan. Epilepsia 1998;39:960-4.
10. Basu S, Ramchandran U, Thapliyal A. Clinical profile and outcome of pediatric neurocysticercosis: A study from Western Nepal. J Pediatr Neurol 2007;5:45-52.
11. Hauser WA, Kurland LT. The epidemiology of epilepsy in Rochester, Minnesota, 1935 through 1967. Epilepsia 1975;16:1-66.
12. Sridharan R, Murthy BN. Prevalence and pattern of epilepsy in India. Epilepsia 1999;40:631-6.
13. Friedman MJ, Sharieff GQ. Seizures in children. Pediat Clin North Am 2006;53:257-77.
14. Martindale JL, Goldstein JN, Pallin DJ. Emergency department seizure epidemiology. Emerg Med Clin North Am 2011;29:15-27.
15. Hauser WA. The prevalence and incidence of convulsive disorders in children. Epilepsia 1994;35 Suppl 2:S1-6.
16. Provisional Committee on Quality Improvement, Subcommittee on Febrile Seizures. Practice Parameter. The neurodiagnostic evaluation of the child with a first simple febrile seizure. American academy of pediatrics. Pediatrics 1996;97:769-72.
17. Seizure Classification. Available from: https://www.epilepsydiagnosis.org/seizure/seizure-classification-groupoverview.html. [Last accessed on 2016 Mar 6].
18. Guidelines for Epidemiologic Studies on Epilepsy. Commission on epidemiology and prognosis, international league against epilepsy. Epilepsia 1993;34:592-6.
19. Chen CY, Chang YJ, Wu HP. New-onset seizures in pediatric emergency. Pediatr Neonatol 2010;51:103-11.
20. Adhikari S, Sathian B, Koirala DP, Rao KS. Profile of children admitted with seizures in a tertiary care hospital of Western Nepal. BMC Pediatr 2013;13:43.
21. Camfield PR, Camfield CS, Dooley JM, Tibbles JA, Fung T, Garner B, *et al.* Epilepsy after a first unprovoked seizure in childhood. Neurology 1985;35:1657-60.
22. Hirtz D, Ashwal S, Berg A, Bettis D, Camfield C, Camfield P, *et al*. Practice parameter: Evaluating a first nonfebrile seizure in children: Report of the quality standards subcommittee of the American academy of neurology, the child neurology society, and the American epilepsy society. Neurology 2000;55:616-23.
23. Sharma S, Riviello JJ, Harper MB, Baskin MN. The role of emergent neuroimaging in children with new-onset afebrile seizures. Pediatrics 2003;111:1-5.
24. Warden CR, Brownstein DR, Del Beccaro MA. Predictors of abnormal findings of computed tomography of the head in pediatric patients presenting with seizures. Ann Emerg Med 1997;29:518-23.
25. Saravanan S. Profile of children admitted with seizures in a tertiary care hospital in South India. IOSS J Dent Med Sci 2013;11;56-61, 15.
26. Gaillard WD, Weinstein S, Conry J, Pearl PL, Fazilat S, Fazilat S, *et al.* Prognosis of children with partial epilepsy: MRI and serial 18FDG-PET. Neurology 2007;68:655-9.
27. Mishra AM, Ellens DJ, Schridde U, Motelow JE, Purcaro MJ, DeSalvo MN, *et al.* Where fMRI and electrophysiology agree to disagree: Corticothalamic and striatal activity patterns in the WAG/Rij rat. J Neurosci 2011;31:15053-64.
28. Cascino GD. Advances in neuroimaging: Surgical localization. Epilepsia 2001;42:3-12.
29. McHugh JC, Delanty N. Epidemiology and classification of epilepsy: Gender comparisons. Int Rev Neurobiol 2008;83:11-26.
30. Seneviratne U, Cook M, D'Souza W. The electroencephalogram of idiopathic generalized epilepsy. Epilepsia 2012;53:234-48.

How to cite this article: Alakkodan D. A Clinical Profile and Diagnostic Management of First-time Seizures in Children Aged 1–12 Years - A Tertiary Hospital-based Study in Kerala. Int J Sci Stud 2018;6(6):24-30.

Source of Support: Nil, **Conflict of Interest:** None declared.