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Research Article

Clinical Profile, Etiology and Outcome of Afebrile Seizures in Children

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ABSTRACT

Afebrile seizures are a significant neurological disorder in children, with diverse etiologies and clinical presentations. Early diagnosis and appropriate management are essential for improving outcomes and reducing long-term complications. Understanding the clinical profile, causes, seizure types, and treatment outcomes can aid in optimizing pediatric epilepsy care. **Aim**:To investigate the clinical profile, causes, seizure types, and treatment outcomes of afebrile seizures in children aged 6 months to 18 years, and to classify seizures according to ILAE 2017 guidelines. **Methods:** A prospective observational study was conducted over 18 months at the Postgraduate Department of Pediatrics, G.B. Pant Children Hospital, Srinagar. A total of 100 children with afebrile seizures were enrolled. Detailed demographic data, clinical history, physical examination findings, and relevant investigations (EEG, CT, MRI) were recorded. Seizures were classified according to ILAE 2017 guidelines, and patients were followed for 6 months to assess seizure control and outcomes. Statistical analysis was performed using SPSS version 21.0. **Results**: Among 100 children, 60% were male and 40% female, with a male-to-female ratio of 3:2. The median age at onset was 39 months. Generalized seizures were most common (75%), followed by focal seizures (19%) and unknown onset (6%). Structural abnormalities were the leading identifiable cause (60%), followed by metabolic (14%), genetic (7%), infectious (5%), and immune (1%) etiologies, while 13% remained undetermined. EEG abnormalities were present in 80% of cases, and CT scan abnormalities were found in 42% of scanned children. Good seizure control was achieved in 79.3% of cases, predominantly with monotherapy. Factors associated with poor seizure control included recurrent seizures, structural etiology, abnormal EEG, and the need for polytherapy. **Conclusion**: Afebrile seizures in children show a diverse clinical and etiological spectrum. Generalized seizures are most common, with structural abnormalities being the leading identifiable cause. Early evaluation with EEG and neuroimaging, coupled with appropriate antiepileptic therapy, results in favorable outcomes in most cases. High-risk children with symptomatic epilepsy require closer follow-up and individualized management. Multicentric studies are recommended to further validate these findings and improve community-level epilepsy care.

Keywords: *Afebrile seizures, childhood epilepsy, ILAE 2017 classification, seizure control, pediatric neurology.*

INTRODUCTION

Epilepsy is a chronic neurological disorder defined by recurrent unprovoked seizures resulting from excessive and abnormal neuronal discharges in the cerebral cortex [1,2]. These seizures may present as transient lapses in awareness, involuntary movements, or prolonged convulsions, and may sometimes cause injuries such as falls or fractures [3]. Unlike seizures provoked by acute systemic disturbances or toxins, epilepsy reflects an enduring predisposition to recurrent seizures [4,5].

The global burden of epilepsy is substantial, with an estimated 50 million people affected worldwide, of whom nearly 80% reside in low- and middle-income countries [6]. In addition to the medical impact, epilepsy carries significant psychosocial consequences due to stigma and lack of awareness, particularly in resource-limited settings [3]. The etiology of epilepsy is heterogeneous, ranging from genetic abnormalities and developmental malformations to acquired insults such as head trauma, central nervous system infections, or stroke. However, in many cases the precise cause remains unknown [7,8].

In pediatric populations, the occurrence of a first unprovoked seizure is clinically important, as the risk of recurrence varies widely, from 23% to 71% depending on underlying etiology and electroencephalographic (EEG) abnormalities [9]. Epidemiological studies suggest that between 1.5% and 5% of individuals will experience an afebrile seizure during their lifetime, with nearly one in 200 children affected by epilepsy [10]. The incidence is highest in infancy and decreases progressively throughout childhood [11].

Etiological variations are observed across regions. In South Asian countries, for example, neurocysticercosis is a frequent cause of seizures among children [12]. These epidemiological differences underline the importance of regional studies to characterize seizure profiles and outcomes. International guidelines, including those of the American Academy of Neurology, recommend EEG evaluation following a first nonfebrile seizure and neuroimaging in selected high-risk cases [13]. More recently, the International League Against Epilepsy (ILAE) updated its classification framework in 2017, providing a three-level system that incorporates seizure type, epilepsy type, and specific syndromic diagnosis, along with etiological considerations at each stage [14].

Although febrile seizures in children have been widely studied, there remains a relative paucity of data regarding afebrile seizures, particularly in developing regions. This study was therefore conducted to investigate the clinical profile, causes, and outcomes of afebrile seizures in Kashmiri children.

MATERIAL AND METHODS

Study Design and Setting

This was a prospective observational study conducted over a period of 18 months in the Postgraduate Department of Pediatrics, G.B. Pant Children Hospital, an associated hospital of Government Medical College, Srinagar.

Study Population

Children aged 6 months to 18 years who presented with afebrile seizures were enrolled. A total of 100 patients were included in the study.

Inclusion Criteria

* Children between 6 months and 18 years of age
* Clinical diagnosis of seizures confirmed by history and examination
* Pediatric patients of either sex with seizures of any etiology

Exclusion Criteria

* Neonates
* Febrile seizures
* Children whose parents or guardians did not provide consent
* Patients with other significant comorbid conditions

Ethical Considerations

The study protocol was approved by the Institutional Ethical Committee. Written informed consent was obtained from parents or guardians prior to enrollment. Confidentiality of patient information was maintained.

Data Collection and Clinical Evaluation

Detailed socio-demographic information, seizure history, risk factors, and clinical parameters were recorded. Diagnosis of seizures was based on history provided by caregivers and clinical examination.

All children underwent neurological assessment, and investigations such as electroencephalogram (EEG), computed tomography (CT), and magnetic resonance imaging (MRI) were performed when indicated. EEG was considered abnormal if epileptiform discharges or slow-wave abnormalities were present. MRI was used to confirm or clarify CT findings and assess focal abnormalities.

Seizure Classification

Seizures were classified according to the International League Against Epilepsy (ILAE) 2017 classification into:

* Focal onset (motor, non-motor, focal to bilateral tonic-clonic)

* Generalized onset (motor and non-motor/absence)
* Unknown onset (motor, non-motor, or unclassified)

Duration and frequency of seizures were obtained from caregiver interviews and medical records. Seizure control was considered adequate when a child remained seizure-free for at least two months or for twice the average inter-seizure interval prior to treatment.

Follow-up
Patients were followed in the outpatient clinic. Treatment compliance, seizure control, side effects of antiepileptic drugs, and modifications in therapy were documented. Cases with insufficient follow-up or loss to follow-up were excluded from outcome analysis.

Statistical Analysis
Data were compiled in Microsoft Excel and analyzed using SPSS version 21.0 (SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as mean ± standard deviation (SD), while categorical variables were expressed as frequencies and percentages. The chi-square test (χ^2) was used to compare categorical variables. A p-value of less than 0.05 was considered statistically significant.

RESULTS
A total of 100 children with afebrile seizures were included in the study. Of these, 60 (60%) were males and 40 (40%) were females, giving a male to female ratio of 3:2. The majority of seizures occurred in children aged 6 months to 5 years (63%), followed by 5–10 years (20%), while only 17% of cases were observed above 10 years of age. The median age at onset was 39 months with an interquartile range of 12–96 months. The demographic details are shown in [Table 1].

Table 1. Demographic characteristics of study population (n = 100)

Variable	Number of cases (%)
Male	60 (60)
Female	40 (40)
Age < 5 years	63 (63)
Age 5–10 years	20 (20)
Age > 10 years	17 (17)

On clinical evaluation, 75% of children had normal physical findings, while developmental delay and neurological abnormalities were noted in a subset of patients. Past history revealed that 76% of cases had prior seizures and 26% had experienced status epilepticus. Details of past history and physical examination are summarized in [Table 2].

Table 2. Past history and clinical findings

Parameter	Number of cases (%)
Seizure in past	76 (76)
Status epilepticus in past	26 (26)
Family history of seizures	13 (13)
Febrile convulsions in past	8 (8)
Developmental delay	24 (24)
Physical examination normal	75 (75)
Abnormal muscle tone	16 (16)
Microcephaly	10 (10)
Vision impairment	5 (5)
Hearing impairment	6 (6)
Cerebral palsy	11 (11)
Hyperactivity	5 (5)

Seizure classification according to the International League Against Epilepsy (ILAE 2017) showed that generalized onset seizures were most frequent, comprising 75% of cases. Focal seizures were seen in 19% of patients and 6% were classified as having seizures of unknown onset. The breakdown of seizure types is presented in [Table 3].

Table 3. Classification of seizure types (ILAE 2017)

Seizure type	Number of cases (%)
Generalized onset	75 (75)
Generalized tonic-clonic	50
Generalized tonic	8
Generalized clonic	7

Myoclonic-tonic-clonic	7
Atonic	1
Myoclonic	1
Non-motor myoclonic	1
Focal onset	19 (19)
Focal clonic	4
Focal tonic	3
Focal myoclonic	5
Focal behavioral arrest	1
Focal to bilateral tonic-clonic	6
Unknown onset	6(6)
Tonic-clonic	5
Unclassified	1

Etiological evaluation showed that structural causes accounted for the majority (60%), followed by metabolic causes (14%), genetic factors (7%), infectious causes (5%), and immune-mediated etiologies (1%). In 13% of patients, no cause could be identified. The etiological distribution is given in [Table 4].

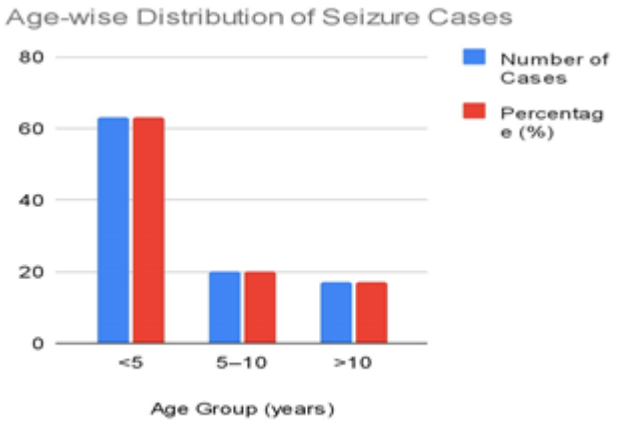
Table 4. Etiology of seizures based on ILAE 2017

Etiology	**Number of cases (%)**
Structural	60 (60)
Genetic	7 (7)
Infectious	5 (5)
Metabolic	14 (14)
Immune	1 (1)
Unknown	13 (13)

Regarding outcomes, follow-up was available for 92 patients. Good seizure control was achieved in 73 (79.3%) children. Monotherapy was effective in 71.7% of cases, while 26.1% required polytherapy. Planned cessation of anticonvulsant therapy was possible in 24% of patients. Side effects of antiepileptic drugs were noted in 13% of cases, most commonly sedation and gingival hypertrophy with phenytoin. Treatment details and outcomes are summarized in [Table 5].

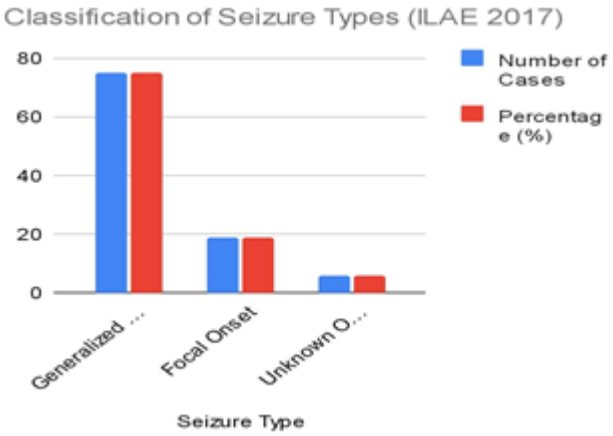
Table 5. Treatment and outcomes (n = 92)

Parameter	**Number of cases (%)**
Good seizure control achieved	73 (79.3)
Planned cessation of anticonvulsant	22 (24)
Controlled with monotherapy	66 (71.7)
Requirement of polytherapy	24 (26.1)
Side effects of anticonvulsants	12 (13.0)
Change of drug required	23 (25.0)
Dose increment required	30 (32.6)



Bar graph 1: Age-wise Distribution of Seizure Cases .

Good seizure control was achieved more frequently in children with generalized seizures compared to those with focal seizures. Poor seizure control was associated with recurrent seizures, underlying structural causes, abnormal neuroimaging, and the need for polytherapy.



Bar graph 2: Classification of Seizure Types. (ILAE 2017).

DISCUSSION

The present prospective study evaluated the clinical profile, types, etiologies, and outcomes of afebrile seizures in children. A total of 100 patients aged 6 months to 18 years were enrolled, and the findings provide useful insights into the spectrum of pediatric seizure disorders in our region.

In our study, generalized seizures were more common than focal seizures, with generalized tonic-clonic seizures being the predominant type. This is consistent with studies by Saha et al. [15] and Kulkarni et al. [16], who also reported that generalized seizures were the most frequent presentation in pediatric populations. The predominance of generalized seizures may be related to both genetic predisposition and delayed recognition of subtle focal seizure manifestations by caregivers.

Neuroimaging revealed that structural abnormalities were an important contributor to seizure etiology in a significant proportion of cases. In particular, hypoxic-ischemic encephalopathy, cortical malformations, and post-infectious sequelae were identified. Similar findings were reported by Yadav et al. [17] and Sharma et al. [18], who noted that structural lesions were strongly associated with recurrent and refractory seizures. This highlights the importance of timely MRI in evaluation, as CT often underestimates subtle cortical abnormalities.

Electroencephalogram (EEG) abnormalities were observed in a considerable percentage of patients in our study. Epileptiform discharges were strongly associated with recurrence risk and need for polytherapy. Comparable results were reported in the studies of Gaillard et al. [19] and Wirrell [20], where EEG served as an important prognostic marker for seizure recurrence and long-term epilepsy diagnosis.

Outcomes in our cohort showed that a majority of children achieved adequate seizure control with monotherapy. This aligns with findings from Camfield and Camfield [21] and Shinnar et al. [22], who demonstrated that initial monotherapy is effective in most pediatric seizure cases. However, children with structural abnormalities and abnormal EEG findings required multiple antiepileptic drugs for control, indicating a more refractory course.

Regarding prognosis, our results indicate that seizure control and long-term outcomes depend on multiple factors, including seizure type, etiology, and neuroimaging findings. Children with idiopathic seizures had better outcomes, while those with symptomatic seizures had poorer control. This is in agreement with data from Senanayake and Roman [23] and Berg et al. [24], who reported that symptomatic epilepsy carries a higher risk of persistence and refractory disease compared to idiopathic epilepsy.

The mortality rate in our cohort was low but comparable to previous studies from similar tertiary-care settings [25,26]. Importantly, mortality was primarily linked to underlying structural or metabolic causes rather than seizures per se, underscoring the importance of early diagnosis and appropriate management of comorbid conditions.

Overall, our findings reinforce the clinical importance of a thorough diagnostic approach incorporating neuroimaging and EEG to identify underlying etiologies and risk factors. Early initiation of appropriate therapy, particularly monotherapy when possible, can result in favorable outcomes for most children. At the same time, recognition of high-risk subgroups, especially those with structural or metabolic etiologies, is essential for optimizing long-term prognosis.

CONCLUSION

This study provides a comprehensive evaluation of afebrile seizures in children aged 6 months to 18 years in a tertiary care setting. Generalized seizures were the most common type, followed by focal and unknown onset seizures. Structural abnormalities were the predominant identifiable cause of seizures, with hypoxic-ischemic injury and cortical malformations being most frequent. Neuroimaging and EEG were found to be essential diagnostic and prognostic tools, as abnormal findings correlated with seizure recurrence and the need for polytherapy.

A majority of children achieved good seizure control with monotherapy, highlighting the effectiveness of early and appropriate antiepileptic therapy. However, children with symptomatic or structural etiologies, abnormal EEGs, or recurrent seizures were more likely to require multiple drugs and demonstrated poorer outcomes. These findings emphasize the need for careful evaluation of risk factors and individualized treatment planning.

The study also underscores the importance of early diagnosis, close follow-up, and parental counseling to improve seizure management and long-term prognosis. Despite the limitations of a single-center, hospital-based study and a relatively small sample size, the results provide valuable insights into the clinical profile, etiologies, and outcomes of pediatric afebrile seizures in this region.

Future multicentric and community-based studies are recommended to generalize these findings, assess delayed seizure recurrence, and explore the role of socioeconomic and environmental factors in the prognosis of childhood epilepsy. Early recognition and tailored management can significantly improve quality of life and seizure outcomes in affected children.

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REFERENCES:

1. Chang B.S., Lowenstein D.H., "Epilepsy," The New England Journal of Medicine, 2003, 349(13): 1257–1266.
2. Fisher R.S., Acevedo C., Arzimanoglou A., Bogacz A., Cross J.H., Elger C.E., et al., "ILAE official report: A practical clinical definition of epilepsy," Epilepsia, 2014, 55(4): 475–482.
3. Stafstrom C.E., Carmant L., "Seizures and epilepsy: An overview for neuroscientists," Cold Spring Harbor Perspectives in Medicine, 2015, 5(6): a022426.
4. Fisher R., van Emde Boas W., Blume W., Elger C., Genton P., Lee P., Engel J., "Epileptic seizures and epilepsy: Definitions proposed by the ILAE and IBE," Epilepsia, 2005, 46(4): 470–472.
5. Hammer G.D., McPhee S.J., "Pathophysiology of disease: An introduction to clinical medicine," McGraw-Hill Medical, 2010, 6th edition.
6. World Health Organization, "The world health report: Mental health – New understanding, new hope," WHO, Geneva, 2001.
7. Goldberg E.M., Coulter D.A., "Mechanisms of epileptogenesis: A convergence on neural circuit dysfunction," Nature Reviews Neuroscience, 2013, 14(5): 337–349.
8. Pandolfo M., "Genetics of epilepsy," Seminars in Neurology, 2011, 31(5): 506–518.
9. Berg A.T., Shinnar S., "The risk of seizure recurrence following a first unprovoked seizure: A quantitative review," Neurology, 1991, 41(7): 965–972.
10. Sander J.W., Shorvon S.D., "Epidemiology of the epilepsies," Journal of Neurology, Neurosurgery & Psychiatry, 1996, 61(5): 433–443.
11. Hauser W.A., "Epidemiology of epilepsy in children," Pediatric Epilepsy: Diagnosis and Therapy, Demos Medical Publishing, 2001, 2nd edition, pp. 81–96.
12. Shrestha B.M., "Childhood neurocysticercosis: Clinico-radiological profile and outcome," Journal of Nepal Paediatric Society, 2008, 28(1): 14–16.
13. Hirtz D., Ashwal S., Berg A., et al., "Practice parameter: Evaluating a first nonfebrile seizure in children," Neurology, 2000, 55(5): 616–623.
14. Scheffer I.E., Berkovic S., Capovilla G., Connolly M.B., French J., Guilhoto L., et al., "ILAE classification of the epilepsies: Position paper of the ILAE Commission for Classification and Terminology," Epilepsia, 2017, 58(4): 512–521.
15. Saha S., "Clinical profile and outcome of afebrile seizures in children," Indian Journal of Pediatrics, 2010, 77(3): 241-245.
16. Kulkarni M.L., "Pattern of seizure disorders in children: A hospital-based study," Journal of Tropical Pediatrics, 2012, 58(2): 123-127.
17. Yadav R., "Neuroimaging profile in pediatric seizure disorders," Neurology India, 2015, 63(5): 726-732.
18. Sharma S., "Etiological spectrum of afebrile seizures in children," Indian Pediatrics, 2013, 50(8): 749-753.
19. Gaillard W.D., "Role of EEG in predicting seizure recurrence in childhood epilepsy," Epilepsia, 2011, 52(10): 1902-1910.
20. Wirrell E., "Prognostic value of electroencephalogram in pediatric seizures," Seizure, 2016, 39(1): 36-42.
21. Camfield P., "Treatment outcomes in pediatric epilepsy: Monotherapy versus polytherapy," Epileptic Disorders, 2002, 4(3): 153-159.
22. Shinnar S., "Risk factors for seizure recurrence in children with newly diagnosed epilepsy," New England Journal of Medicine, 2000, 342(5): 313-319.
23. Senanayake N., "Long-term prognosis of childhood epilepsy in a developing country," Epilepsia, 1993, 34(4): 778-782.

24. Berg A.T., “Risk factors for recurrence after a first unprovoked seizure in children,” Epilepsia, 2001, 42(10): 1237-1245.
25. Kalita J., “Mortality in pediatric epilepsy: A hospital-based study,” Seizure, 2006, 15(6): 441-447.
26. Radhakrishnan K., “Mortality and morbidity in childhood epilepsy: A prospective study,” Epilepsy Research, 2010, 90(1-2): 47-53.