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# ASSESSMENT OF RADIOLOGICAL AND ELECTROPHYSIOLOGICAL ANOMALIES IN PEDIATRIC PATIENTS EXHIBITING AFEBRILE SEIZURES AT A TERTIARY CARE CENTER

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**ABSTRACT**
Our study investigates the radiological and electrophysiological abnormalities in children who present with afebrile seizures at a tertiary care center. The study employs a comprehensive approach, utilizing advanced imaging techniques such as MRI or CT scans, alongside electrophysiological assessments like EEG, to scrutinize the neurological landscape of pediatric patients experiencing afebrile seizures. By identifying and characterizing abnormalities within the central nervous system, the research aims to enhance the understanding of the intricate mechanisms contributing to afebrile seizures in this specific population. The outcomes of this study hold potential for refining diagnostic approaches, guiding effective management strategies, and laying the groundwork for future avenues of research in pediatric neurology.

**Key words:** Pediatric neurology, Radiological abnormalities, Electrophysiological assessments, Tertiary care center.

## INTRODUCTION

Afebrile seizures in pediatric patients pose a clinical challenge, demanding a nuanced understanding of their underlying etiology for accurate diagnosis and effective management. This original research article delves into the intricate web of radiological and electrophysiological anomalies among children experiencing afebrile seizures, employing a comprehensive assessment approach at a distinguished tertiary care center.

To unravel the complexities surrounding afebrile seizures, all enrolled children underwent an exhaustive evaluation, combining meticulous neurological and medical assessments [1-3]. The core diagnostic modalities employed in this study included electroencephalography (EEG) to elucidate electrophysiological activity and either computed tomography (CT) or magnetic resonance imaging (MRI), with or without contrast, to delineate structural abnormalities within the central nervous system [4].

The meticulous nature of the neurological and medical assessments ensured a thorough understanding of the patients' clinical history, presenting symptoms, and overall health status. The integration of EEG, a powerful tool for capturing real-time brain activity, aimed to unveil the dynamic electrical patterns underlying afebrile seizures [5-6]. Simultaneously, the utilization of advanced imaging techniques such as CT or MRI provided a detailed anatomical perspective, shedding light on potential structural aberrations that might contribute to the observed seizure activity [7].

The inclusion of both CT and MRI in our investigation allowed for a comprehensive exploration of radiological anomalies, ensuring that subtle nuances and diverse pathologies were captured within the pediatric cohort.

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Additionally, the administration of contrast agents in selected cases enhanced the sensitivity of these imaging studies, facilitating a more refined assessment of vascular, neoplastic, or inflammatory etiologies [8-10].

This study is uniquely positioned at a tertiary care center, where a diverse patient population and state-of-the-art diagnostic facilities converge. By combining neurological, medical, electrophysiological, and radiological assessments, we aspire to unveil not only commonalities but also distinctive patterns within the nexus of afebrile seizures in pediatric patients [11-12]. The findings from this research are anticipated to contribute significantly to our understanding of the multifaceted nature of afebrile seizures and pave the way for more tailored and effective therapeutic interventions for this vulnerable population.

**Material and Methods**

In a hospital based prospective study, 98 children presenting with afebrile seizures between the age groups of 5 months to 10 years admitted to PICU, Pediatric department of , Sri Lakshmi Narayana Institute of Medical sciences, Pondicherry, during the period of two years were included. Seizures were 1 classified based on latest terminology laid by ILAE Berg et al 2010. All the children were subjected to meticulous neurological, medical assessment, EEG and either CT/MRI (with or without contrast) or both [13-14].Institutional ethical clearance became from institution and informed consent form obtained from kid's (patient) parent.The subsequent findings helped in determining the cause of afebrile seizures. Data was compiled using SPSS software

**Inclusion criteria**

Children aged 2 months to 10 years admitted with afebrile seizures

**Exclusion criteria:**

1. Febrile seizures
2. Seizures with fever (Meningitis, encephalitis)

**Table 1: Gender Distribution of Study Group.**

| Sex | No of cases | Percentage |
|---|---|---|
| Male | 52 | 53% |
| Female | 46 | 47% |
| Total | 98 | 100 |

Gender distribution in the present study showed higher percentage of afebrile seizures in males (53%) than in females (47%).

**Table 2: Age Wise Distribution of Study Group**

| Age | No of cases | Percentage |
|---|---|---|
| 2months-6months | 2 | 2% |
| 6months -4yrs | 42 | 43% |
| 4yrs-6yrs | 27 | 28% |
| 6yrs-8yrs | 16 | 16% |
| 8yrs-10yrs | 11 | 11.2% |
| Total | 98 | 100 |

Children between the age groups 6months - 4 yrs showed higher incidence of afebrile seizures 43%

**Table 3: DistributionsOf Different Types Of Seizures Among Various Age Groups**

| Age | GTCS | Focal without impairment of consciousness(SPS) | Focal with Impairment of consciousness (CPS) | Focal seizure with secondary generalization | Total cases=98 Percentage (100%) |
|---|---|---|---|---|---|
| 2months-6months | 1 | | 1 | | 2(2.0) |
| 6months -4yrs | 28 | 1 | 10 | 3 | 42(42.8) |
| 4yrs-6yrs | 12 | 4 | 6 | 5 | 27(27.5) |
| 6yrs-8yrs | 7 | 2 | 5 | 1 | 15(55.5) |
| 8yrs-10yrs | 6 | 2 | 4 | | 16(16.3) |

Distribution of different types seizure based on age in the present study showed higher incidence of GTCS in the age groups 6months- 4yrs and 4-6yrs. whereas between 6-8yrs, and 8-10yrs Focal seizures were more common.

**Table 4: Causes Of Radiological Abnormalities (Neuroimaging: CT/MRI)**

| Causes | No of cases | Percentage |
|---|---|---|
| Cerebral Palsy | 58 | 59.1 |
| Neurocysticercosis | 11 | 11.2 |
| Tuberculoma | 3 | 3.06 |
| Neurodegenerative Disorders | 2 | 2.0 |
| Porencephaly | 1 | 1.0 |
| Normal imaging | 23 | |

Most common cause of Radiological (Neuroimaging) Abnormalities in the present study was determined as Cerebral Palsy 59.1%, which was followed by Neurocysticercosis11.2%

**Table 5: Electrophysiological Abnormalities (EEG) Among Children With Different Types Of Seizures**

| Type Of seizure and total no of cases=98 | Abnormal EEG/% | Normal EEG/% |
|---|---|---|
| GTCS-50 | 36 – 73% | 13 – 27% |
| Focal without impairmentof consciousness(SPS) – 10 | 3 – 30% | 7 – 70% |
| Focal with impairment of Consciousness(CPS) – 30 | 11 – 38% | 18 – 62% |
| Focal with secondaryGeneralization – 8 | 1 – 12.5% | 7 – 87.5% |
| X2=18.3, p<0.001(S) | | |

EEG abnormalities was observed in 73% of the cases presented with GTCS showed followed by Focal seizure with impairment of consciousness 37% Here p<0.001 (S) indicating it to be sensitive modality in picking abnormality in seizures.

**Table 6: Causes of both radiological (neuroimaging CT/MRI) and electrophysiological (EEG) abnormalities**

| Causes | No of cases | Percentage |
|---|---|---|
| Cerebral Palsy | 32 | 82.0 |
| Neurocysticercosis | 5 | 12.8 |
| Tuberculoma | 1 | 2.5 |
| Porencephaly | 1 | 2.5 |
| Total | 39 | 100 |

Most common Cause of Radiological (Neuroimaging) and Electrophysiological Abnormalities was Cerebral Palsy (82.0%) and the 2nd most common was Neurocysticercosis(12.8%).

## DISCUSSION

The gender distribution in the study group revealed a slightly higher prevalence of afebrile seizures in males (53%) compared to females (47%). This finding aligns with existing literature, where male predominance in seizure disorders is commonly reported (Forsgren et al., 2005). The observed gender disparity prompts further exploration into potential biological or sociocultural factors contributing to the variability in seizure susceptibility [15-16].

The age-wise distribution highlighted a notable incidence of afebrile seizures in the age group of 6 months to 4 years, constituting 43% of the total cases. This pattern is consistent with the well-documented age-related occurrence of seizures in early childhood, with a peak incidence during the second year of life (Berg et al., 1999). The higher vulnerability in this age range underscores the need for heightened vigilance and targeted preventive strategies during early childhood [17-18].

The distribution of different seizure types across various age groups demonstrated variations in prevalence. Generalized tonic-clonic seizures (GTCS) were prominently observed in the 6 months to 4 years age group, while focal seizures with secondary generalization were more common in the 6 to 8 years age range. This age-specific variation in seizure types aligns with the evolving nature of epileptic disorders across pediatric development (Berg et al., 2017). The findings underscore the importance of tailoring diagnostic and management approaches to the specific age-related characteristics of afebrile seizures [19]. The analysis of radiological abnormalities, including CT/MRI findings, identified Cerebral Palsy as the most frequent cause, accounting for 59.1% of cases. This aligns with the understanding that neurological abnormalities, such as structural brain lesions, contribute significantly to the manifestation of seizures in children (Wirrell, 2017). Neurocysticercosis and tuberculoma were also identified as notable contributors, emphasizing the diverse etiologies of afebrile seizures in the pediatric population [20].

Electrophysiological assessments through EEG proved to be a sensitive modality for detecting abnormalities in afebrile seizures. The majority of patients with generalized tonic-clonic seizures (GTCS) exhibited abnormal EEG findings (73%). This emphasizes the crucial role of EEG in refining diagnostic precision and aiding in the classification of seizure types (Scheffer et al., 2017). The observed sensitivity of EEG underscores its significance in guiding therapeutic decisions and prognosis evaluation [21-22].

Combining radiological and electrophysiological abnormalities revealed that Cerebral Palsy remained the predominant cause (82%), affirming its central role in the complex interplay of factors contributing to afebrile seizures. This comprehensive approach provides a holistic understanding of the coexistence of structural and functional abnormalities in pediatric patients with afebrile seizures [23-25].

The multifaceted analysis of gender distribution, age-wise prevalence, seizure types, and the interplay of radiological and electrophysiological abnormalities contributes valuable insights into the diverse landscape of afebrile seizures in children. These findings hold implications for tailored diagnostic strategies, targeted

interventions, and avenues for further research in pediatric epilepsy.

## CONCLUSION

Our investigation combining radiological and electrophysiological abnormalities underscored Cerebral Palsy as the predominant cause, affirming its central role in the intricate web of factors contributing to afebrile seizures. This comprehensive approach provides a holistic understanding of the coexistence of structural and functional abnormalities in pediatric patients with afebrile seizures.

In essence, our multifaceted analysis of gender distribution, age-wise prevalence, seizure types, and the interplay of radiological and electrophysiological abnormalities offers a nuanced perspective on the diverse landscape of afebrile seizures in children. These findings hold significant implications for the development of tailored diagnostic strategies, targeted interventions, and pave the way for further research avenues in the realm of pediatric epilepsy.

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