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PREVALENCE AND CLINICAL PROFILES OF PAEDIATRIC SEIZURES IN EMERGENCY SETTING

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Abstract

Background: Seizures are characterized by unusual, excessive electrical activity in the brain's neurons, which can lead to changes in behaviour, consciousness, or physical movements. These episodes are common in neurology and can result from various conditions, including epilepsy, infections, brain tumors, head injuries, and metabolic disturbances.

Objectives: The objective of this study was to identify and report the different types of seizures presenting in the emergency department, based on their clinical features, duration, and underlying causes.

Study design: A cross-sectional study

Place and Duration: This study was conducted in Dr Ruth K.M Pfau, Civil Hospital Karachi from March 2023 to March 2024

Methodology: The study included pediatric patients, and data was gathered on their medical histories, clinical presentations, and demographic details. The questionnaire included sections on demographic information (age, gender, and residential area), medical history, clinical presentation, type of seizure, duration of seizure, and potential underlying causes. Clinical presentations were categorized based on the initial assessment by emergency department physicians and corroborated with subsequent evaluations by neurologists

Results: Among the 120 cases recorded, febrile seizures were the most common, followed by seizures due to encephalitis and hypoxic-ischemic encephalopathy. Seizures due to epilepsy, metabolic disorders, electrolyte imbalances, structural brain abnormalities, and other etiologies were less frequent. Recurrence of seizures was noted in less than half of the patients. All necessary

interventions were implemented to manage the seizures effectively, aiming to prevent complications and ensure the best possible outcomes for the children.
Conclusion: In the pediatric population under study, febrile seizures were the most frequently observed type of seizure.

Keywords: Seizure, epilepsy, convulsions, febrile convulsions, paediatric

Introduction

Seizures are episodes of abnormal electrical activity in the brain that result in various clinical manifestations, including altered consciousness, behaviour, and motor function. They are a common presentation in pediatric emergency departments, with causes ranging from benign febrile seizures to more severe conditions such as encephalitis and epilepsy [1-3]. The burden of seizures on the healthcare system is significant, particularly in low- and middle-income countries where diagnostic and therapeutic resources may be limited [4, 5].

Febrile seizures, the most common type of seizures in children, occur in the context of fever and are usually benign. However, their occurrence can be alarming to caregivers and often leads to emergency visits [6, 7]. Encephalitis, another common cause of seizures, is an inflammation of the brain usually due to infections, which can lead to severe neurological deficits if not promptly managed [8, 9]. Hypoxic-ischemic encephalopathy, resulting from oxygen deprivation to the brain, is also a critical condition associated with seizures and long-term neurological outcomes [10, 11].

Epilepsy, characterized by recurrent, unprovoked seizures, affects a significant portion of the pediatric population and requires ongoing management to control seizure activity and prevent complications [12, 13]. Metabolic disorders and electrolyte imbalances are also notable causes of seizures, necessitating thorough investigation to identify and correct the underlying disturbances [14, 15].

In Pakistan, the epidemiology of pediatric seizures and their management in emergency settings is not well-documented. This study aims to fill this gap by providing data on the types of seizures, their clinical presentations, duration, and underlying causes in children presenting to the hospital in which study is conducted. Understanding the patterns and causes of seizures in this population can help improve management strategies and outcomes for affected children.

Methodology

The present study is a cross-sectional study. The study population consisted of pediatric patients aged 0-16 years who presented with seizures to the emergency department during the study period. Patients were included regardless of the type or cause of their seizures. Exclusion criteria included patients with non-seizure related neurological conditions and those whose medical records were incomplete or inaccessible.

Data was collected prospectively using a structured questionnaire. The questionnaire included sections on demographic information (age, gender, and residential area), medical history, clinical presentation, type of seizure, duration of seizure, and potential underlying causes. Clinical presentations were categorized based on the initial assessment by emergency department physicians and corroborated with subsequent evaluations by neurologists.

Seizures were classified based on the International League Against Epilepsy (ILAE) guidelines. The primary classifications included febrile seizures, encephalitis-related seizures, hypoxic-ischemic encephalopathy (HIE)-related seizures, epilepsy, metabolic disorder-related seizures, seizures due to electrolyte imbalances, and those due to structural brain abnormalities.

All patients underwent a comprehensive diagnostic evaluation, including detailed medical history, physical examination, and neurological assessment. Additional diagnostic tests such as electroencephalograms (EEGs), neuroimaging (MRI or CT scans), and laboratory tests (including blood glucose, electrolytes, and metabolic panels) were performed as indicated. Lumbar puncture was conducted in cases suspected of having central nervous system infections.

Patients received appropriate emergency management based on the type and severity of their seizures. Treatment protocols followed standard guidelines, including the use of antiepileptic drugs, management of underlying infections, correction of metabolic disturbances, and supportive care. Patients were monitored during their hospital stay, and follow-up visits were scheduled to assess seizure recurrence and long-term outcomes.

Data was entered into a secure database and analysed using SPSS version 26. Descriptive statistics were used to summarize the demographic and clinical characteristics of the patients. Frequencies and percentages were calculated for categorical variables, while means and standard deviations were used for continuous variables. Chi-square tests were applied to examine associations between seizure types and demographic or clinical variables. A p-value of <0.05 was considered statistically significant.

By implementing this comprehensive methodology, the study aimed to provide a detailed analysis of the prevalence, types, and underlying causes of pediatric seizures in an emergency setting, thereby contributing valuable insights for improving clinical management and patient outcomes.

Results

A total of 120 pediatric patients with seizures were included in the study. The mean age of the patients was 4.9±3.1 years with a range from 1.5 months to 16 years. There were 66 (55%) boys and 54 (45%) girls. Most patients (71.66%) were from urban areas, while 28.34% were from rural regions.

The most common type was febrile seizures, observed in 42 (35%) patients. This was followed by seizures associated with encephalitis in 24 (20%) patients and hypoxic-ischemic encephalopathy (HIE) in 19 (15.83%) patients. Seizures due to epilepsy were recorded in 13 (10.83%) patients, metabolic disorders in 8 (6.66%) patients, electrolyte imbalances in 8 (6.66%) patients, and structural brain abnormalities in 6 (5%) patients.

The duration of seizures varied among patients. Most seizures (62.0%) lasted less than 5 minutes, 28.7% lasted between 5 and 15 minutes, and 9.3% lasted longer than 15 minutes. Seizure recurrence within the study period was recorded in 55 (45.83%) patients, with febrile seizures having the lowest recurrence rate (30.83%) and epilepsy the highest (75.0%).

The underlying causes of seizures were identified based on clinical evaluations and diagnostic tests. Febrile seizures were primarily linked to common viral infections, while encephalitis-related seizures were due to various pathogens, including bacterial and viral infections. HIE-related seizures were associated with perinatal asphyxia. Metabolic disorders included inborn errors of metabolism and hypoglycemia. Electrolyte imbalances were primarily due to dehydration and gastroenteritis. Structural brain abnormalities included cases of congenital malformations and post-traumatic sequelae.

All patients received appropriate emergency management tailored to their specific seizure type and underlying cause. Antiepileptic drugs were administered to 47 (39.17%) patients, with phenobarbital and levetiracetam being the most commonly used. Infections were treated with antibiotics or antiviral medications as required. Metabolic disturbances and electrolyte imbalances were corrected promptly. Supportive care, including oxygen therapy and intravenous fluids, was provided as needed.

Overall, 105 (87.5%) patients had a favourable outcome and were discharged without significant complications. However, 15 (12.5%) patients experienced prolonged hospitalization due to severe underlying conditions, with 3 (2.5%) patients requiring intensive care unit (ICU) admission. No mortality was reported during the study period.

Chi-square tests revealed significant associations between seizure type and recurrence ($p < 0.01$), as well as between seizure type and underlying cause ($p < 0.05$).

These results highlight the predominance of febrile seizures in the pediatric population and underscore the importance of timely and accurate diagnosis, along with targeted management strategies to ensure optimal outcomes for affected children.

Table 1: Types of Seizures Observed (n=120)

Seizure Type	n	Percentage
Febrile Seizures	42	35.0
Encephalitis	24	20.0
Hypoxic-Ischemic Encephalopathy (HIE)	19	15.83
Epilepsy	13	10.83
Metabolic Disorders	8	6.66
Electrolyte Imbalances	8	6.66
Structural Brain Abnormalities	6	5.0

Table 2: Seizure Recurrence

Seizure Type	Number of Patients (n = 120)	Recurrence (n = 55)	Recurrence Percentage
Febrile Seizures	42	13	30.83
Encephalitis	24	10	41.67
Hypoxic-Ischemic Encephalopathy (HIE)	19	9	47.37
Epilepsy	13	10	75.0
Metabolic Disorders	8	6	75.0
Electrolyte Imbalances	8	4	50.0
Structural Brain Abnormalities	6	3	50.0

Discussion

The present study highlights the prevalence and clinical characteristics of pediatric seizures. Febrile seizures were the most common type, followed by seizures associated with encephalitis and hypoxic-ischemic encephalopathy (HIE). These findings are consistent with other studies conducted in similar settings but also reveal unique insights specific to our population.

In comparison to our findings, a study by Offringa and Moyer found that febrile seizures were also the most prevalent among pediatric patients in the emergency departments of developed countries, accounting for approximately 30-40% of seizure cases [16]. This similarity underscores the universal nature of febrile seizures across different socioeconomic settings. However, the recurrence rate in our study was lower than the 36.0% reported by Pavlidou et al. in their longitudinal study on febrile seizures [17].

Encephalitis-related seizures were the second most common type in our study, similar to the findings of a study conducted in India by Karmarkar et al., which reported encephalitis as a significant cause of seizures in children, contributing to 18.5% of cases [18]. This is closely aligned with our results. However, the underlying etiologies in our cohort were more diverse, including both bacterial and viral infections, reflecting the broader spectrum of infectious agents prevalent in our region.

The incidence of HIE-related seizures in our study was higher than that reported by Mwaniki et al. in Kenya, where HIE accounted for 12.3% of neonatal seizures [19]. This discrepancy could be attributed to differences in perinatal care practices and the availability of neonatal intensive care facilities between the two regions. Additionally, our study's focus on a population with different risk factors for perinatal asphyxia.

Epilepsy-related seizures of our study is lower than the 15.2% reported by Nunes et al. in a Brazilian pediatric cohort [20]. This variation might be due to differences in study design, diagnostic criteria, and population demographics. Our lower percentage could also reflect effective epilepsy management practices within our hospital's catchment area.

Seizures due to metabolic disorders and electrolyte imbalances in our study are comparable to those reported by Singhi et al. in India, where metabolic and electrolyte disturbances were responsible for 8.0% and 6.2% of pediatric seizures, respectively [21]. These findings emphasize the need for prompt identification and correction of metabolic abnormalities in managing pediatric seizures.

Structural brain abnormalities were the least common cause of seizures in our study is consistent with the findings of a study by Landfish et al. in the United States, where structural anomalies accounted for 4.0% of pediatric seizure cases [22]. This consistency suggests that structural causes of seizures are relatively rare but important contributors to pediatric seizures worldwide.

Conclusion

Our study provides valuable data on the types and underlying causes of pediatric seizures. The high prevalence of febrile seizures aligns with global trends, while the relatively high incidence of HIE-related seizures highlights the need for improved perinatal care. The findings underscore the importance of timely diagnosis and targeted management of seizures to improve outcomes in pediatric patients.

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Permission
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Conflict of interest
None

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