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Assessment of Risk Factors among Children with Febrile Seizure at Mosul Pediatric Teaching Hospitals

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Abstract: Febrile seizures are the most common type of seizures in infancy, affecting 2–5% of children under five years of age. Understanding the risk factors associated with febrile seizures is vital for early diagnosis, prevention, and management. To identify and assess the risk factors related to febrile seizures among children admitted to Mosul Pediatric Teaching Hospitals. A descriptive cross-sectional study was conducted on 100 children aged between 6 months and 5 years who presented with febrile seizures at Mosul Pediatric Teaching Hospitals from January to December 2024. Data were collected through structured caregiver interviews and hospital records. Variables included age, gender, family history of febrile seizures or epilepsy, degree and duration of fever, birth history, and immunization status. Most cases (62%) were males. Most children (78%) were aged between 12 and 36 months. A positive family history of febrile seizures was found in 46% of cases, and 35% had a history of neonatal complications. The mean peak temperature recorded was 39.5°C. Simple febrile seizures were more common (74%) than complex ones. A statistically significant association was observed between family history and recurrence of febrile seizures ($p<0.05$).

Conclusions: Febrile seizures are more prevalent in males and in children aged 1–3 years. Family history, higher fever, and neonatal complications are significant risk factors. Awareness and early intervention can reduce anxiety and recurrence.

Keywords: Risk Factors, Febrile, Seizure, Pediatric.

1. Introduction

Febrile-seizures are described as seizures associated with elevated body temperature in children with ages of 6 months and 5 years (1), without evidence of intracranial infection or a defined cause such as electrolyte imbalance (2). They are one of the most frequent neurological disorders in children, often leading to hospital visits and parental concern (3). The prevalence varies worldwide, with reports ranging from 2% to 5% in Western countries and higher in Asian populations (4).

Several risk factors have been implicated in the development of febrile seizures (5), including genetic predisposition, particularly a positive family linked to epilepsy or febrile seizures, high body temperature, rapid rise in temperature, and perinatal factors such as low birth weight or complications during delivery Worth noting, prematurity, short duration of breastfeeding and artificial milk formula feeding, anemia, cesarean section, passive smoking during pregnancy, high fever are suggestive risk factors for the first febrile seizure. While complicated febrile seizures may be prolonged, focused, or recurrent within the same feverish episode, simple Febrile-seizures are generalized, last less than 15 minutes, and do not return within 24 hours (6).

mostly brought on by fever, with little harm to the central nervous system (CNS). The occurrence of febrile seizures is influenced by a number of factors, including genetic predisposition and the inflammatory response (7).

Emergent management should focus on stabilizing the child, and the child needs emergent stabilization using the approach of ABCD (airway, breathing, circulation, and disability, or deformity), maintain a patent airway, aspirate mouth secretions, maintain adequate ventilation, administer oxygen if necessary and monitored with pulse oximetry, and ensure perfusion, Intravenous access should be established. Protect the child from injury by placing it in a semi-prone position and removing any excess or loose clothing (8).

2. Methods

This descriptive cross-sectional study was directed at Mosul Pediatric Teaching Hospitals, including Ibn Al-Atheer and Al-Khansaa hospitals, from January to December 2024. The study participants involved children aged 6 months to more than 5 years who were admitted with febrile seizures. A total of 100 patients were selected using a convenient sampling technique. Informed consent was obtained from parents. This study aims to assess the risk factors among children presenting with febrile seizures at Mosul Pediatric Teaching Hospitals to inform preventive strategies and improve clinical management.

Data collection was carried out through structured interviews with caregivers and review of medical documents. Variables included demographic data (age, sex), degree and time of feverishness, immunization status, birth and developmental history, and seizure characteristics (type, duration, frequency). Children with central nervous system infections, electrolyte disturbances, or pre-existing neurological disorders were excluded.

"Simple or complex" was the classification given to the type of febrile seizure. Generalized seizures lasting less than 15 minutes and occurring once in a 24-hour period were classified as the first category of seizures. Within a 24-hour period, complex febrile seizures were classified as focal, persistent (lasting longer than 15 minutes), or recurring.

Data were analyzed using SPSS version 26. Descriptive statistics included mean, standard deviation, and percentages. Chi-square tests were used to assess associations between categorical variables. A p-value of less than 0.05 was considered statistically significant.

3. Results

Table 1: Demographic Characteristics of Participants

Characteristic	Category	Fr.	Percentage
Gender	Male	62	62%
	Female	38	38%
Age Group	6–12 months	12	12%
	13–24 months	78	78%
	25–36 months	5	5%
	More than 36 months	5	5%

This table shows that the most of children with febrile seizures were males (62%) and most were between 13 to 24 months old (78%). This age group is known to be more susceptible to febrile seizures, aligning with global trends that indicate a peak incidence between 1 and 2 years.

Table 2: Family History and Neonatal Complications

History Type	Fr.	Percentage
Family history of Febrile seizures	46	46%
Family history of Epilepsy	18	18%
Neonatal complications	28	28%
Delayed milestones	8	8%

Almost half of the children (46%) had a family linked of febrile seizures, and 18% had a family linked of seizures , supporting the genetic predisposition theory. Additionally, 28% had a history of neonatal complications and 8% experienced delayed milestones, indicating potential early neurological vulnerability.

Figure 1: Seizure duration

Among the 100 children with febrile seizures, the majority (58%) experienced seizures lasting less than 5 minutes, while 30% had seizures lasting between 5 and 15 minutes, and 12% had episodes exceeding 15 minutes.

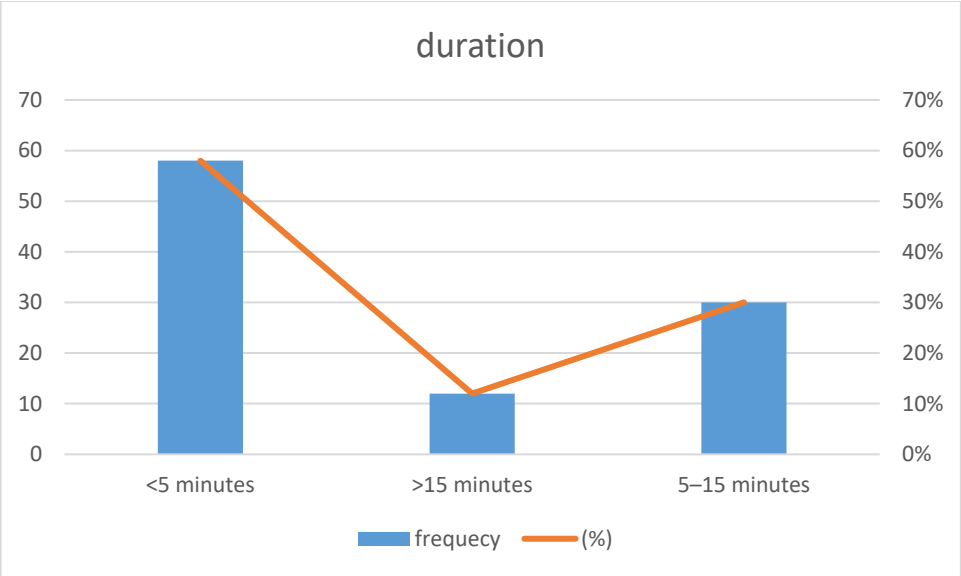

Figure 2: Seizure Types

Regarding seizure type, 74% of the cases were classified as simple febrile seizures, and the remaining 26% were complex febrile seizures.

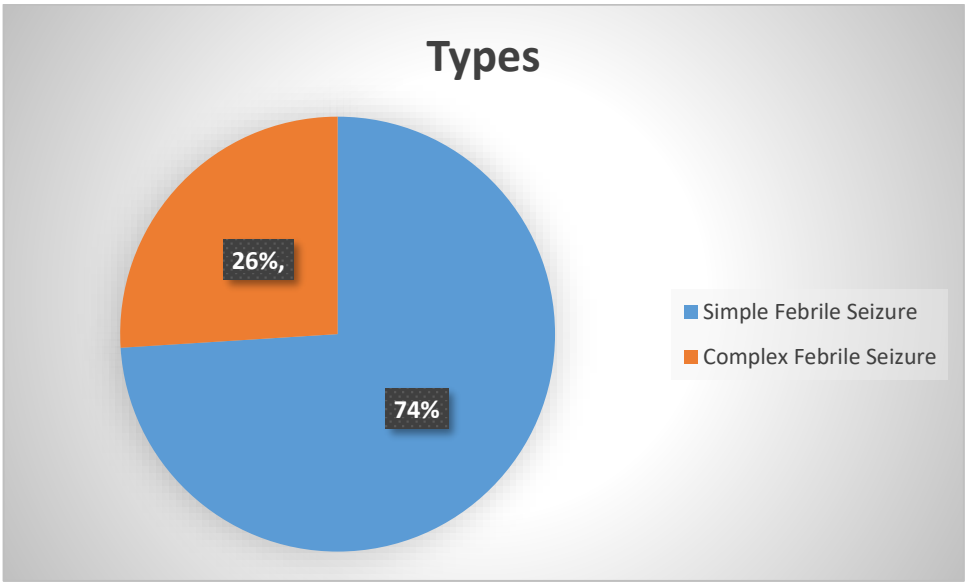

Table 4: Immunization and Temperature Details

Parameter	Details
Complete Immunization	82
Incomplete Immunization	18
Fever > 39°C	64
Mean Fever Temperature	39.5°C ± 0.7

The immunization status of most children (82%) was complete, reflecting good healthcare access. However, 64% experienced fevers above 39°C, which is consistent with the notion that higher temperatures are more likely to trigger febrile seizures in susceptible children.

Table 5: Significant Statistical Associations

Comparison	P-Value
Family history vs recurrence	p = 0.03
Neonatal complications vs complex seizures	p = 0.01
Gender vs seizure type	p = 0.64 (NS)

Significant associations were found between family history and seizure recurrence (p = 0.03), and between neonatal complications and complex febrile seizures (p = 0.01), suggesting these as major risk factors. No significant association was found between gender and seizure type (p = 0.64), indicating that seizure complexity is not influenced by sex.

4. Discussion

In our cohort, 62% of the children were male, and 38% were female, indicating a higher prevalence of febrile seizures among males. This male predominance aligns with previous studies that have reported a higher incidence of FS in boys compared to girls. The exact reason for this gender disparity remains unclear, but it is hypothesized that genetic and hormonal differences may play a role, A study by Vestergaard et al. (2002) found that boys had a higher risk of FS, suggesting a possible link to X-linked genetic factors (8). The age distribution revealed that 12% of the children were between 6–12 months, 78% were between 13–24 months, 5% were between 25–36 months, and another 5% were older than 36 months. The peak incidence in the 13–24 months age group is consistent with existing literature, which indicates that the majority of febrile seizures occur between 12 and 18 months of age. This peak may be attributed to the increased susceptibility of the developing brain to fever induced neuronal excitability during this critical period of rapid growth and development (9). A positive family history of febrile seizures was present in 46% of the cases, and 18% had a family history of epilepsy. The significant familial occurrence suggests a genetic predisposition to FS. Genetic studies have identified several loci associated with increased susceptibility to febrile seizures, including FEB1, FEB2, and FEB4. Moreover, the family history of epilepsy is a known risk factor for the development of FS and subsequent epilepsy, indicating a possible shared genetic etiology. A meta-analysis by Berg and colleagues reported that children with a family history of epilepsy have a higher risk of developing epilepsy after FS(10). Neonatal complications were reported in 28% of the children, and 8% had delayed developmental milestones. Perinatal factors such as preterm birth, low birth weight, and neonatal asphyxia have been associated with an increased risk of FS. These complications may lead to subtle brain injuries, lowering the seizure threshold. A study found that neonatal complications were significantly associated with an increased risk of febrile convulsions. Additionally, developmental delays may reflect underlying neurological abnormalities, further predisposing children to seizures (11).

Regarding seizure duration, 58% of the children experienced seizures lasting less than 5 minutes, 30% had seizures between 5–15 minutes, and 12% had seizures lasting more than 15 minutes. The majority (74%) had (SFS), characterized by generalized tonic-colonic activity lasting less than 15 minutes and not recurring within twenty-four hours. The remaining twenty-six percent experienced (CFS), which are focal, prolonged, or recurrent within twenty-four hours. These findings are consistent with existing data indicating that SFS are more common than CFS. The distinction between SFS and CFS is clinically significant, as CFS are associated with a higher risk of subsequent seizures (12).

5. Conclusion

This study highlights the significant of study variables among children admitted to Mosul Pediatric Teaching Hospitals. The findings demonstrate that febrile seizures are more prevalent among male children and predominantly occur between 13 and 24 months, which aligns with global epidemiological trends. A strong family history of febrile seizures or epilepsy, high-grade fever, and a history of neonatal complications were prominent contributing factors. Most seizures were simple in nature, while complex seizures were significantly associated with neonatal complications.

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