ISSN (Print): 2617-0817 ISSN (Online): 2789-5912

Original Article

Association of Different Clinical Events in Febrile Seizure Patients

DOI: dx.doi.org

Md. Nurul Absar[1], Sahedul Islam Bhuiyan[2], Farhana Akhter Faruque[3], Md. Abu Talha[4]

Received: 28 Dec 2021
Accepted: 30 Dec 2021
Published: 03 Jan 2022

Published by:
Sher-E-Bangla Medical College, Barishal

ABSTRACT

Introduction: *Febrile seizure is the most common seizure disorder encountered in pediatric practice. It is always accompanied by fever, but any other clinical information has not been established regarding this.Clinical profile is important for diagnosis, management and parent counseling about this illness of extremely favorable prognosis.Febrile seizures are classified as either simple or complex. Simple febrile seizures consist of a brief tonic-clonic convulsion lasting <10 minutes which occurs only once within a 24-hour period. Conversely, complex febrile seizures last more than 10-15 minutes, focal and can occur more than once over a 24-hour period.* ***Aim of the study:*** *The aim of the study was to observe the effects of different clinical events on the onset of febrile seizure.* ***Methods:*** *This was a cross-sectional study conducted at the Uttara Adhunic Medical college Hospital, Uttara, Dhaka during a 6-month period of November 2010 to April 2011. The study included 100 patients of febrile seizure according to inclusion and exclusion criteria. Detailed history, through clinical examination, and occasionally appropriate investigations were done to support or to exclude other diagnosis and also for associated illness.* ***Result:*** *Out of 100 patients, 56 were female and 44 were male, with male female ratio of 1:1.27. As a whole 39% of children had first febrile convulsions below 12 months of age and 61% above 12 months of age. Majority of febrile convulsions occurred in first two years of life. The cause of febrile illness was respiratory tract infection in 62%, Acute gastroenteritis in 18% and urinary tract infection in 6% cases, in 14% cases no specific systemic cause found. Complex seizure occurred in 14% cases, and remaining 86% had simple seizures.* ***Conclusion:*** *Incidence of febrile seizure was slightly more in girls compared to boys, and girls tend to suffer at a bit earlier age. The disease poses risk of recurrence. Acute respiratory tract infection had significant relation with severity of seizure, and the prevalence of complex seizure was much higher in acute gastroenteritis patients compared to other illnesses. No significant association was found between this disease and*

1. *Medical officer (Paediatrics), FeniSadar Hospital, Chattogram, Bangladesh*
2. *Professor (Respiratory Medicine), Brahmanbaria Medical College, Chattogram, Bangladesh*
3. *Junior consultant (Paediatrics), NaogaonSadar Hospital, Rajshahi, Bangladesh*
4. *Specialist (Pediatrics), Department .of paediatric and Neonatology, Bangladesh Specialized Hospital Ltd, Dhaka, Bangladesh*

any antenatal, natal, post-natal or childhood adverse events.

Keywords: *Seizure, febrile, Fever, Respiratory.*

(The Planet 2021; 5(2): 115-122)

INTRODUCTION

During the pediatric period, one of the common problems faced by many pediatricians is seizures associated with fever among the newborns. Febrile seizure is one of the morecommon neurological problems encountered in young infants during pediatric practices.[1] Even in many developed countries like the USA, febrile seizure affects 2%-5% of children.[2]Although febrile seizure has been around in medical literature since the time of Hippocrates, it was recognized as a type of epilepsy even until the middle of present century.[3]Febrile seizures are acommon cause of convulsions in young infants. There are many debates going on regarding this issue due to its variety of definition, classification, diagnostic interventions and management method.[4] Febrile Seizure occurs at infancy or early childhood, and is associated with fever but without evidence of Intracranial infection or a defined cause.[5] Although the degree of fever has not been determined as a cause of febrile seizure, Yukio Fukuyama associated febrile seizure in infants with a fever of 38°Cwithout any definitive cause.[6]Febrile seizures are classified as either simple or complex. Simple febrile seizures consist of a brief tonic-clonic convulsion lasting <10 minutes which occurs only once within a 24-hour period.Conversely, complex febrile seizures last more than 10-15 minutes, focal and can occur more than once over a 24-hour period. While the majority of febrile seizures (70-75%), are simple, 9-35%of febrile seizures are complex.[7]Due to the accelerated brain developments of girls, febrile seizure occurs earlier in girls compared to boys, but contrastingly, the incidence of febrile seizure is generally higher in boys in the end.[8],[9]Seizures can occur at the time of highest temperature or during defervescence. Seizure may be the first sign of illness and may occur even before the fever is noticed.[6]Febrile seizure is one of the leading causes of doctor consultation on emergency basis and hospital admission in the pediatric age group.Parents become greatly panicked by the expression of the disease and also remains anxious about the prognosis of this benign disease. Febrile seizure is often accompanied by tooth grinding, so much so that initial etiology discussed tooth grinding as the cause of febrile seizure. Many medical advancements have been made since then, and it is now understood that febrile seizure is an age dependent response febrile of the immature brain to a febrile illness.[10] Febrile seizures result from a combination of genetic and environmental factors.[11]Mutations in sodium channel and γ-aminobutyric acid receptor genes have been identified in children with febrile seizures, which suggests that genes coding for ion channels are most likely the underlying cause of the syndrome.[12]

OBJECTIVE

To observe the effects of different clinical events on the onset of febrile seizure

METHODS AND MATERIALS

This was a cross-sectional study carried out in Uttara Adhunic Medical college Hospital (UAMC), Uttara, Dhaka, for a 6-month period, from November 2010 to April 2011. The sample size was determined to be 100 by using a proportional formula, and a convenient sampling method was used to select the participants. The first 100 patients

fulfilling inclusion and exclusion criteria were selected for study.Seizure was diagnosed by sudden alteration of behavior with abnormal movement of limbs, trunk, and face that might be associated with abnormal or fixed eye gaze with or without incontinence of urine or stool.After enrollment in the study a through history taken to have a clue to the diagnosis and associated illness.Careful physical examination was done for each patient and investigation was advised according to suspicion of differential diagnosis, associated illness or complication; all findings were recorded in a predesigned questionnaire. Informed written consent was taken from the legal guardians of the patients, and ethical approval was obtained from the institutes ethical review committee.

Inclusion Criteria

- Age more than 5 months and less than 6 years.
- Fever with convulsion.

Exclusion Criteria

- Age less than 5 months and more than 6 years.
- Previous afebrile seizure.
- Children with neurologic deficit with febrile seizure.
- Meningitis or encephalitis.
- Hyponatremia and Hypernatremia and hypocalcaemia.(measured if suspected)
- Hypoglycemia (measured instantly by glucometer strip, then confirmed by lab. Blood sugar test, if necessary.)

RESULTS

In the present study, 39% of febrile seizure cases were aged between 0.5-1 years, 43% were aged between 1-2 years, and 18% were aged 2-6 years (Fig.1).

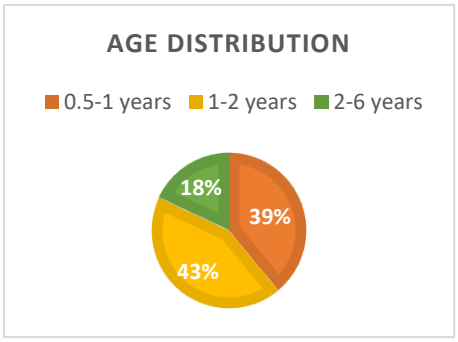

Figure I: Age distribution of the study participants (n=100)

Female predominance was observed among the study participants. 44% were male and 56% were female in the present study (Fig.2). The male: female ratio was 1:1.27

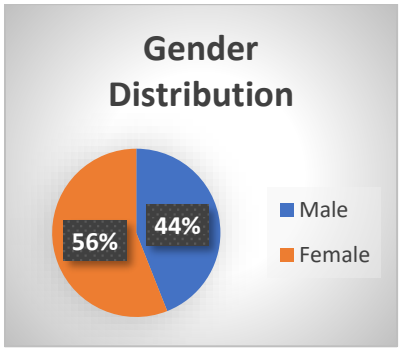

Figure 2: Gender distribution of the participants (n=100)

Among the male population, 32% had their first seizure attack at the age of 5 months to 1 year. 48% had their first seizure attack at 1-2 years of age, and the remaining 20% had their first attack at 2-6 years of age (Table I).

Table I: Relative incidence between gender and age at first attack

Age at first attack	Boys		Girls	
	Frequency	Percentage	Frequency	Percentage
5 months-1 year	14	32%	22	39%
1-2 years	21	48%	27	48%
2-6 years	9	20%	7	13%

Among the female participants of the study, 39% had their first seizure at the age of 5 months to 1 year, 48% had their first attack at 1-2 years of age, and the remaining 13% had their first seizure attack at 2-6 years of age.

Table II: Relation of Seizure with degree of fever

Seizure attack at degree fever	Frequency	Percentage	p value
Low grade(<103^{0}F)	7	7	>.005^{NS*}
High grade(103^0-107^{0}F)	9	9	>.005^{NS}
Very high grade(>107^{0}F)	1	1	>.005^{NS}
Not recorded	83	83	NA**

(NS= not significant) *, (NA= not Applicable) **

Among the study participants, no record was found about the degree of fever at the onset of seizure for 83% of the participants. 7% of the participants had low grade fever, 9% had a high fever with a body temperature between 103^0-107^0 Fahrenheit, and 1 participant had severe fever with above 107^0 Fahrenheit temperature at the onset of febrile seizure (Table II). No statistical significance was found among the severity of fever and the onset of febrile seizure based on the limited data.

Table III: History of any adverse antenatal, natal or immediate post-natal event (n=11)

Events	Frequency	Percentage	p value
Antenatal adverse event	5	45	>.005^{NS}
Natal adverse event	3	27	>.005 ^{NS}
Immediate post-nataladverse event	3	27	>.005 ^{NS}

11 participants had experienced some sort of adverse event prior to, during or after their birth. Among the 11 participants, 45% (n=5) had faced antenatal adverse event, 27% faced adverse event during birth, and another 27% faced adverse event

post birth (Table III). These were determined to be statistically insignificant.

Table IV: Presenting signs and symptoms among the participants (n=100)

Signs and Symptoms	Frequency	Percentage
Convulsion	21	21
Rhinorrhea.	19	19
Signs of respiratory	30	30
Inflamed throat/tonsil.	10	10
Purulent /serous /seropurulent Discharge	4	4
No systemic specific sign.	26	26

All the participants had fever as a common symptom. 30% had signs of respiratory distress, 21% had convulsion, 19% had rhinorrhea, 10% presented with inflamed throat, and 4% had discharge from ear. 26% showed no other symptoms beside fever (Table IV).

Table V: Relation of seizure types with associated illness (n=100)

Illness	No of patient (n=100)	Simple seizure(n=86)	complex seizure(n=14)	P value
Acute respiratory tract infection:	62	55(89%)	7(11%)	<0.005
Acute gastroenteritis:	18	12(67%)	6(33%)	>.005
Urinary tract infection:	6	5(84%)	1(16%)	>.005
Fever without specific systemic involvement:	14	13(93%)	1(7%)	n.a.

Majority of the participants (86%) had simple seizure, and the remaining 14% had complex seizure. There were 3 main types of illness associated with the fever among the participants. A total of 62 participant had acute respiratory tract infection, among them, 89% were simple cases and 11% were complex seizure cases. Acute gastroenteritis was found in 18 participants, among which, 67% had simple seizures and 33% had complex seizures. Urinary tract infection was present among 6 participants, and 84% of them were simple seizure cases, while 16% were complex seizure cases. 14 patients had no significant illness associated with the fever, and among them, 93% were simple seizures and 7% were complex seizures (Table V).

Table VI: Relation of seizure types with age of onset (n=100)

Age	Simple Seizure (n=86)	Complex Seizure (n=14)	Total	P Value
<1 Year	30 (77%)	9 (23%)	39	<0.005
>1 year	56 (92%)	5 (8%)	61	<0.005

Among the participants aged under 1 year, 77% had simple seizure and 23% had complex seizure. Relation between participants aged less than 1 year and type of seizure was significant. Among the participants aged older than 1 year,92% had simple seizure and 8% had complex seizure. The relation between participants aged older than 1 year and type of seizure was significant (Table VI).

DISCUSSION

Febrile seizure is a type of seizure occurring at the early childhood or right after birth among infants. The primary symptom of febrile seizure is fever, accompanied with spasms or fits. It is most common among children aged 6 months to 3 years, but it can occur in children up to 6 years of age.[13] Febrile seizure usually occurs within 24 hours of the onset of fever. A febrile seizure can often be benign and might not require further evaluation, and treating the underlying cause of the fever is advised.[14]Globally the incidence of febrile seizure is among 3-5%, but it can vary based on ethnicity. In the present study, 100 children aged between 6 months to 12 years were admitted. 39% of the participants were aged under 1 years, 43% were aged between 1-2 years. Only 18% were older than 2 years of age, and the remaining 82% were less than 2 years old. These findings are quite similar to other studies where largest portion of the participants were less than 1 years old.[15],[16]Female predominance was observed among the present study participants. It was observed that seizure attacks were more common among the female populations at an earlier age, and the prevalence decreased with older female participants. While among the male population, the decrease in prevalence with age was slightly lower. The female predominance observed in this study was different from multiple other studies.[17],[18] This difference in gender prevalence ratio might be explained by the difference of ethnicity. It is common knowledge that febrile seizure is accompanied by fever, but the specific degree of fever has not been decided till date. In the present study, no data regarding the exact degree of fever at the onset of seizure was found for 83% of cases. Low grade fever was observed in 7% participants, 9% had high fever, and 1% had extremely high fever, but due to the limited data available, no statistical significance was found among the severity of fever and the onset of febrile seizure. In the present study, 11 participants had adverse events during or after birth, but no statistical significance was found among febrile seizure onset and adverse natal, prenatal or postnatal events. This was similar to the findings of Sadleir, and there was also no significant association between any neurological events.[1]Alongside fever, 30% of the participants had respiratory distress, 21% had convulsions, 19% had rhinorrhea, 10% had inflamed throat, and 4% had discharge from ear. Fever was the only presenting symptom among 26% of the participants. Respiratory distress was the most common additional symptom among the participants. In the present study, 14%were complex seizure cases and 86% were simple seizure cases. Although in different ratio, another study found predominance

of simple seizure among the participants.[19]However, another study showed much higher prevalence of complex febrile seizures at 61.83%.[16]The higher prevalence of complex seizure cases might be due to the study being conducted with hospitalized patients who were extremely affected before the admission. The most common cause of fever in febrile seizure cases was upper respiratory tract infections, present in 62% of the participants. This was supported by another study where respiratory tract infection was common in 67% of the participant.[20] Among the 62 participant with respiratory tract infection in the present study, 89% were simple and 11% were complex seizure cases. Statistical significance was found among simple and complex seizure patients with respiratory tract infection. Acute gastroenteritiswas present in 12 simple seizure and 6 complex seizure cases, and urinary tract infection was present in 5 simple and 1 complex seizure participants. No statistical significance was found among them.

Limitations of The Study

The study was conducted in a single hospital with small sample size. So, the results may not represent the whole community**.**The study duration was 6 months, which was not enough to make any significant conclusion.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

CONCLUSION & RECOMMENDATION

Incidence of febrile seizure was slightly more in girlscompared to boys, and girls tend to suffer at a bit earlier age. The disease poses risk of recurrence. Acute respiratory tract infection had significant relation with severity of seizure, and the prevalence of complex seizure was much higher in acute gastroenteritis patients compared to other illnesses. No significant association was found between this disease and any antenatal, natal, post-natal or childhood adverse events. For better understanding of the disease, multiple studies with wider demographic and sample size needs to be conducted, and possible treatment methods need to be recorded for future studies.

REFERENCES

1. *Sadleir LG, Scheffer IE. Febrile seizures. Bmj. 2007 Feb 8; 334(7588):307-11.*
2. *Shinnar S, Glauser TA. Febrile seizures. Journal of child neurology. 2002 Jan;17(1_suppl):S44-52.*
3. *Hirtz DG. Febrile seizures. Pediatrics in review. 1997 Jan 1; 18:5-9.*
4. *Rahman MM, Karim AS, Rahman SA. Febrile Seizures: An Update. Bangladesh J Child health. 2002; 26(3/4):71-9.*
5. *American Academy of Pediatrics. Febrile Seizures: Long-Term Management of Children with Fever-Associated Seizures. Pediatrics. 1980 Dec 1; 66(6):1009-12.*
6. *Fukuyama Y, Seki T, Ohtsuka C, Miura H, Hara M. Practical guidelines for physicians in the management of febrile seizures. Brain and Development. 1996 Nov 1;18(6):479-84.*
7. *Jones T, Jacobsen SJ. Childhood febrile seizures: overview and implications. International journal of medical sciences. 2007; 4(2):110.*
8. *Lee WL, Low PS, Belinda, Ranjan U. Epidemiology of febrile seizure in Singapore children. Neurol J South east Asia 1996;1:53 - 55*
9. *Brown JK, Minns RA. Disorders of the central nervous system. Forfar and Arneil's Textbook of Paediatrics, London: Churchill Livingstone. 1998; 738.*
10. *American Academy of Pediatrics. Provisional Committee on Quality Improvement, Subcommittee on Febrile Seizures. Practice parameter: the neurodiagnostic evaluation of the child with a first simple febrile seizure. Pediatrics. 1996 May;97(5):769-72.*
11. *Kjeldsen MJ, Kyvik KO, Friis ML, Christensen K. Genetic and environmental factors in febrile seizures: a Danish population-based twin study. Epilepsy research. 2002 Sep 1; 51(1-2):167-77.*
12. *Audenaert D, Van Broeckhoven C, De Jonghe P. Genes and loci involved in febrile seizures and related epilepsy syndromes. Human mutation. 2006 May; 27(5):391-401.*

13. *Leung AK, Robson WL. Febrile seizures. Journal of pediatric health care. 2007 Jul 1; 21(4):250-5.*
14. *Chung S. Febrile seizures. Korean journal of pediatrics. 2014 Sep; 57(9):384.*
15. *Saidul Haque. Febrile Convulsions. Pakistan Pediatric Journal 1981; 5(3):15-55.*
16. *Wallace SJ. Factors predisposing to a complicated initial febrile convulsion. Archives of disease in childhood. 1975 Dec 1;50(12):943-7.*
17. *Lee WL, Low PS, Belinda, Ranjan U. Epidemiology of febrile seizure in Singapore children. Neurol J South east Asia 1996;1:53 - 55*
18. *Brown JK, Minns RA. Disorders of the Central Nervous System. In : Campbell AGM, McIntosh N (eds). Forfar and Arneil's Textbook of Pediatrics, 4th Ed, Churchill Living stone, Longman Group UK Ltd 1998 : 682-684.*
19. *Al-Eissa YA, Al-Omair AO, Al-Herbish AS, Al-Jarallah AA, Familusi JB. Antecedents and outcome of simple and complex febrile convulsions among Saudi children. Developmental Medicine & Child Neurology. 1992 Dec;34(12):1085-90.*
20. *Rantala H, Uhari M, Hietala J. Factors triggering the first febrile seizure. ActaPaediatrica. 1995 Apr;84(4):407-10.*