v. 3, n. 59, 2023

International Journal of Health Science

# ETIOLOGY AND EPIDEMIOLOGY OF FEBRILE SEIZURE - LITERATURE REVIEW

***André Costa Correia***
Doctor by: Universidade Estadual de Ciências da Saúde de Alagoas, Maceió, AL, Brazil

***Luiz Gustavo Vieira Gonçalves***
Biomedical by: Centro Universitário União de Negócios e Administração, Catalão, GO, Brazil

***Priscila Ariede Petinuci Bardal***
PhD in Sciences - Programa de Saúde Pública, pela Faculdade de Saúde Pública, Universidade de São Paulo, São Paulo, SP, Brazil

***Samanttha Cristina da Silva Chaves***
Medical course student- Universidade Federal de Catalão, Catalão, GO, Brazil

***Noelle Freire Santana***
Doctor by: Universidade do Estado do Pará, Belém, PA, Brazil

***Rafael Pacheco Monteiro Ribeiro***
Medical course student- Faculdade Multivix, Cachoeiro de Itapemirim, ES, Brazil

***Andre Luis Paz Rodriguez***
Doctor by: Faculdade San Francisco Xavier de Chuquisaca, Sucre, Bolívia

***Ana Laura Vefago***
Medical course student- Faculdade UniCesumar, Maringá, PR, Brazil

***Ingrid Peres Siqueira***
Medical course student- Faculdade Multivix, Cachoeiro de Itapemirim, ES, Brazil

***Bernardo Augusto Tostes De Azevedo***
Medical course student- Universidade Estácio De Sá, Angra Dos Reis, RJ, Brazil

***Luiz Henrique Villela Machado***
Medical course student- Faculdade UniCesumar, Maringá, PR, Brazil

***Palloma Assis Alves Januário***
Medical course student- Faculdade UniCesumar, Maringá, PR, Brazil

**Conflict of interests:** nothing to disclose.

**Abstract: Introduction**: The febrile convulsive crisis is the most common convulsive crisis in childhood, with an approximate incidence of 2 to 5% of infants and preschoolers, and may or may not present with neurological sequelae. [1]. **Goal**: Due to the importance of the epidemiology and etiology of this condition, this article aims to describe them. **Method:** The search was carried out in the PubMed, BVS and Scielo databases, and was limited to articles between the period 2019 to 2023 that met the criteria of being literature reviews and case reports. **Result**: It is essential to understand the difference between febrile seizures and epileptic seizures in the presence of fever. [2]. The risk of recurrence of the febrile crisis in other infectious processes is 30%, that is, children who had a seizure with fever may have a second episode [2]. The hyperthermia observed during infectious processes can reduce the seizure threshold and, in addition, the predominance of excitatory neurotransmitters, cytokines and the genetic pattern are all mechanisms that make the infant brain more vulnerable to triggering seizures in the presence of infection [7].
**Keywords**: Febrile Convulsions; Epidemiology; Causality.

## INTRODUCTION

Febrile seizures are the most common seizures of childhood, with an approximate incidence of 2 to 5% of infants and preschoolers. [1]. There are probably genetic causes for this fact, as a positive family history of febrile seizures in childhood is common, with an autosomal dominant pattern already demonstrated in some families. [1].

A febrile crisis or febrile convulsion is defined as any convulsion that occurs in the presence of a febrile infectious disease, excluding infections of the central nervous system, such as meningitis and encephalitis and hydroelectrolytic imbalances, with a

temperature greater than or equal to 38ºC (although the elevation of temperature may occur only after the crisis), usually due to acute otitis media, tonsillitis, laryngitis or sudden rash [1].

The risk of recurrence of the febrile crisis in other infectious processes is 30%, that is, children who had a seizure with fever may have a second episode [2].

It is essential to understand the difference between febrile seizures and epileptic seizures in the presence of fever. [2]. In the first scenario, we have a benign, self-limiting condition that does not evolve with neurological abnormalities and cognitive impairment over time. [2]. After five years, the child does not recur in seizures and does not turn into an epileptic individual in the future. [3].

Convulsive crises may occur more frequently during fever in children with epilepsy, which is a chronic disease, characterized by the recurrence of convulsive crises of afebrile nature, in most cases, manifesting twice or more in an interval of 24 hours [4].

The main clinical characteristics of a simple or typical febrile convulsive crisis are the age group between six and sixty months of age, with the average age of the first convulsive crisis being between fourteen and eighteen months, and being uncommon before three months; Generalized tonic-clonic seizure type; duration of less than 15 minutes; postictal period with brief drowsiness; single seizure within 24 hours [5].

It is important to note that a simple febrile seizure is benign and does not cause long-term neurological damage, even if the child has had several simple febrile seizures. [6]. Furthermore, the occurrence of simple febrile seizures in childhood does not increase the risk of epilepsy in the future. [6].

We call complex, atypical or complicated febrile seizures the seizures in the presence of fever that present one or more of the following characteristics: Focal-type seizure; Duration greater than 15 minutes; Post-ictal period with presence of neurological sign or lasting drowsiness; Recurrence of seizure within 24 hours [6].

The hyperthermia observed during infectious processes can reduce the convulsive threshold, and these children may then present epileptic seizures in the presence of fever due to an intercurrent infection [7].

The febrile convulsive crisis occurs between six months and five years of age, which is a period of brain development characterized by great neuronal excitability and formation of neural networks, a fundamental process for learning. [7]. The predominance of excitatory neurotransmitters, hyperthermia, cytokines and the genetic pattern are all mechanisms that make the infant brain more vulnerable to triggering seizures in the presence of infection [7].

The risk of recurrence increases when any of the following factors are present: Age at first febrile attack less than 12 months; Duration of fever for less than 24 hours before the attack; Fever between 38 and 39ºC. The following characteristics are minor risk factors: Positive family history of febrile seizures; Family history of epilepsy; Complex febrile seizure; Male; Low serum sodium at seizure onset [8].

If there is no risk factor, the chance of recurrence is 12%. Already in the presence of a risk factor from 25 to 50%; two risk factors, between 50 and 59%; and three or more risk factors, recurrence is 73 to 100%8. In addition, the risk of future epilepsy in children with febrile seizures is similar to that found in the general population, i.e. around 1%[8].

However, some risk factors, when associated with febrile seizures, may increase the likelihood of epilepsy, such as: neurodevelopmental delay: 33% risk of epilepsy in the future; Complex focal febrile

seizure: 29% risk of future epilepsy; Family history of epilepsy: 18% risk of epilepsy in the future; Duration of fever less than one hour before the seizure: 11% risk of future epilepsy; Complex febrile seizure, ie lasting more than 15 minutes or recurrent within 24 hours: 6% risk of future epilepsy; Recurrent febrile seizures: 4% risk of future epilepsy [9].

## MATERIAL AND METHODS

The search was carried out in the PubMed, BVS and Scielo databases, and was limited to articles between the period 2019 to 2023 that met the criteria of being literature reviews and case reports.

Then, the keywords of the titles of the articles were analyzed and those whose theme best fits our objective were selected.

Nine articles were selected for full reading.

## DISCUSSION

It is essential to understand the difference between febrile seizures and epileptic seizures in the presence of fever. In the first scenario, we have a benign, self-limiting condition that does not evolve with neurological abnormalities and cognitive impairment over time. [2]. In the second, the probability of a complex crisis and permanent neurological damage exists and, if not treated properly, can harm the child's quality of life[9].

## CONCLUSION

It is essential to understand the difference between febrile seizures and epileptic seizures in the presence of fever2. The risk of recurrence of the febrile crisis in other infectious processes is 30%, that is, children who had a seizure with fever may have a second episode [2].

The hyperthermia observed during infectious processes can reduce the seizure threshold and, in addition, the predominance of excitatory neurotransmitters, cytokines and the genetic pattern are all mechanisms that make the infant brain more vulnerable to triggering seizures in the presence of infection [7].

## REFERENCES


1. Kliegman RM, Stanton BMD, St Geme J, Schor NP, Behrman RE. Nelson Textbook of Pediatrics. 20th ed. Philadelphia: Elsevier; 2016.

2. Diament A, Cypel S. Neurologia Infantil. 4th ed. São Paulo: Atheneu; 2017.

3. Swaiman KF, Ashwal S, Ferriero DM, Schor NF. Pediatric Neurology: Principles & Practice. 5th ed. Philadelphia: Elsevier; 2012.

4. Costa da Costa J, Palmini A, Yacubian EMT, Cavalheiro E. Fundamentos Neurobiológicos das Epilepsias – Aspectos Clínicos e Cirúrgicos. Rio de Janeiro: Guanabara Koogan; 2015.

5. Forastieri ML, Vargas NCM. Etiologia da Epilepsia em Pacientes do Ambulatório Pediátrico do Hospital Universitário Maria Aparecida Pedrossian (HUMAP)–UFMS. Perspectivas Experimentais e Clínicas, Inovações Biomédicas e Educação em Saúde (PECIBES). 2019;5(1):3-11.

6. Gutierrez CH, et al. O ABC no manejo da epilepsia em Pediatria Princípios do manejo da epilepsia em Pediatria.

7. Nolasco MN, Ferreira WM, Rivero JRL. Epidemiologia dos casos de internação hospitalar por epilepsia no estado do Tocantins em 2018. Brazilian Journal of Health Review. 2020;3(6):17268-17280.

8. Rodrigues WMA, Reisdörfer G. GENÉTICA DOS TRANSTORNOS DE NEURODESENVOLVIMENTO: AUTISMO, TDAH E EPILEPSIA. CPAH Science Journal of Health. 2021;4(2):1-12.

9. Schettino CE. Bases da Pediatria. 2nd ed. Rio de Janeiro: Guanabara Koogan; 2013.