



Profile of Febrile Seizures in Pediatric Patients at Dr. Adnaan WD Payakumbuh Hospital 2019

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Abstrak

Tujuan: Mengetahui profil kejang demam pada pasien anak di RSUD Dr.Adnaan WD Payakumbuh Tahun 2019. **Metode:** Penelitian ini bersifat deskriptif retrospektif dengan pendekatan cross sectional. Sampel adalah seluruh pasien anak yang mengalami kejang pada tahun 2019 sebanyak 91 sampel. Data dianalisis secara univariat dan disajikan dalam distribusi frekuensi dan persentase. **Hasil:** Berdasarkan hasil penelitian, pada anak yang mengalami kejang demam terbanyak adalah lakilaki, dengan usia 12 bulan. Kejang demam terbanyak terjadi pada suhu 39,1°C. Rata-rata kadar leukosit darah anak kejang demam adalah 13.997,80 mm³. **Kesimpulan:** Usia terbanyak 12 bulan, jenis kelamin terbanyak berjenis kelamin laki-laki, suhu tubuh rata-rata anak yang mengalami kejang demam 39,1 °C, dan kadar leukosit darah menengah anak yang mengalami kejang demam 13.886,60 mm³.

Kata kunci: kejang demam; demam; kadar leukosit; infeksi

Abstract

Purpose: Know the profile of fever seizures of pediatric patients at <u>Dr.Adnaan</u> WD Payakumbuh Hospital in 2019. **Method:** This research is retrospective descriptive with a cross-sectional approach. The sample is all pediatric patients who had seizures in 2019 with 91 samples. Data were analyzed univariately and presented in frequency distribution and percentage. **Result:** Based on the study results, in children who have seizures fever, most are men, with the age of 12 months. Most febrile seizures occurred at a temperature of 39.1 °C. The average blood leukocyte level of a child with a fever seizure is 13,997.80 mm³. **Conclusion:** The most age is 12 months, the most sex is male, the average body temperature of children who have febrile seizures is 39.1 °C, and the intermediate blood leukocyte level of children who have febrile seizures is 13,886.60 mm³. **Keywords:** febrile seizure; fever; leukocyte level; infection

INTRODUCTION

Febrile seizures are seizures that can occur between the ages of 6 to 60 months with a temperature of 38°C, are not caused by a central nervous system infection or metabolic imbalance, and do not have a history of seizures without prior fever. Febrile seizures can be in the form of simple febrile seizures and complex febrile seizures. Simple febrile seizures occur in a short time of < 15 minutes and will stop on their own. This febrile seizure is a common form of tonic and, or clonic seizures, without focal movement, not recurring in one episode of febrile within 24 hours. Complex febrile seizure > 15 minutes, usually preceded by partial seizures, may recur more than one episode in 24 hours.¹⁻ 3

The prevalence of febrile seizures in the world is 77%. The incidence of febrile seizures in Indonesia in 2012-2013 was 3-4% in children aged six months - 5 years. There is no recent data on febrile seizures in Indonesia. The final Riskesdas report (2018) contains information on the prevalence of ARI incidence in Indonesia as a trigger for febrile seizures, which is 4.4%, pneumonia is 2.0%. The most common triggers for febrile seizures in children under five in West Sumatra, based on Riskesdas 2018 data, are acute respiratory infections with 3,493 cases and pneumonia in 3,493 cases.⁴

Febrile seizures have complications, namely recurrent seizures, epilepsy, hemiparesis, mental disorders, affecting brain intelligence, death, mental retardation, and disrupting motor development. Epilepsy has the main symptom, namely seizures. This condition can cause a decrease in quality of life. The results showed that as many as 30-40% of ODE (people with epilepsy) became unaffected by drugs. The first febrile seizure experienced by a child can cause one recurrence of 33%, recurrence of 3 times or more by 9%. Febrile seizures experienced by children for one month to one year later will have harmful consequences in the future in a decrease in cognitive, motor, and adaptive behavior[.]. Seizures for a long time (> 15 minutes) can cause damage to the brain and even cause death. Improper and slow handling can cause complications, neurotransmitter damage; brain anatomy has abnormalities that can cause death.^{5,6}

Research states that boys are more at risk than girls. The most common cause is an acute respiratory infection in children without a family history.⁷ Temperature of 39°C in children will be at risk of seizures than a temperature of less than 39°C. Children aged < 2 years are more at risk than those aged > 2 years. The Payakumbuh City Health Office in 2020 stated that febrile seizures were the fifth most common disease in under-five patients hospitalized at Dr. Hospital. Adnaan WD Payakumbuh in 2019 totaled 242 cases. The high risk of children having seizures made febrile researchers interested in knowing "Profile of Fever Seizures in Children Patients at Dr. Adnaan WD Payakumbuh Hospital in 2019".

METHODS

This research has a scope in pediatrics. This type of research is a retrospective descriptive with a crosssectional design with medical record data sources. This research is in the medical record section of Dr. Adnaan WD Payakumbuh. Time of study July 2020-April 2021. The study population was pediatric patients at RSUD Dr. Adnaan WD

Payakumbuh recorded in the medical record. All pediatric patients registered in the medical records at the Dr. Adnaan WD Payakumbuh Hospital in 2019 experienced febrile seizures. The research sample was children with febrile seizures at Dr. Adnaan WD Payakumbuh Hospital in 2019 in outpatient and inpatient settings and met the criteria for 91 children.

Secondary data were obtained from the patient's medical record at RSUD Dr. Adnaan WD Payakumbuh 2019. The material used in this study is medical records. This type of data uses secondary data, namely medical records of pediatric patients with febrile seizures at Dr. Adnaan WD Payakumbuh 2019. The analysis of this study is a univariate analysis of descriptive data displayed in the form of a frequency distribution table.

RESULTS AND DISCUSSION

 A. Description of the age of children experiencing febrile seizures at Dr. Adnaan WD Payakumbuh Hospital in 2019

Based on table 1. it is found that from 91 respondents, the average age of children who experience febrile seizures is 9-35 months. Most at the age of 12 months at Dr. Adnaan WD Payakumbuh Hospital in 2019. Previous research was conducted by Kakalang (2016) regarding the profile of febrile seizures in the Pediatrics Department of Prof. RSUP. Dr. R. D. Kandou Manado period January 2014 – June 2016 obtained the highest age of children aged one year to less than two years (27.3%).8 Research conducted by Yunita (2016) about the description of factors associated with the incidence of recurrent febrile seizures in patients seeking treatment at the Children's Polyclinic RS. DR. M. Djamil Padang period January 2010–December

2012, most children were 11-20 months old (47.5%).⁹

Table 1. Frequency Distribution of Age of Children
who Have Fever Sequels in RSUD Dr. Adnaan WD
Payakumbuh 2019

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Variable	Descriptive	Point	Count
		(Month)	
Age	Mean	22.00	3
	Median	19.00	3
	Mode	12	15
	Deviation	12.83	15
	Standard		
	Minimum	07.00	4
	Point		
	Maximun	57.00	1
	Point		
	Totally sample	91.00	

Several other studies also mention that most febrile seizures come from the age group under two years. Most febrile seizures occur at the age of fewer than two years. This is due to the immaturity of the brain and thermoregulator. In the immature brain state, receptors for glutamic acid have active excitatory properties; on the other hand GABA receptors have less active inhibitory properties. This results in the excitation being more dominant than the inhibitory. In addition, the level of Corticotropin-Releasing Hormone (CRH) in the hippocampus is also high, so it has the potential to trigger seizures when triggered by fever. CRH is an excitatory neuropeptide that has proconvulsant properties.¹⁰ Brain development in children under the age of one year is susceptible to febrile seizures because, at this age, the child's brain is very susceptible to sudden increases in body temperature. Most febrile seizures occur at the age of fewer than two years. This is due to the of the brain immaturity and thermoregulator. In the immature brain

state, receptors for glutamic acid have active excitatory properties, whereas GABA receptors have less active inhibitory properties. This results in the excitation being more dominant than the inhibitory. In addition, the level of Corticotropin-Releasing Hormone (CRH) in the hippocampus is also high, so it has the potential to trigger seizures when triggered by fever. CRH is an excitatory neuropeptide that has proconvulsant properties.¹¹

The highest age found in this study was 57 months. According to the theory that a family history of attacks is a risk factor for febrile seizures, this could be due to having a family history of having febrile seizures. Children with a family history of seizures are almost four times more likely to have seizures.¹² The febrile regulation mechanism of ions in the body (Na+, K+, and Ca2+) is not yet perfect, causing postdepolarization repolarization disorders and increasing neuronal excitability. This period is referred to as the developmental window (the period of brain development in the organizational phase, when children are less than two years old). Children are susceptible to seizures because the excitatory component is more dominant than the inhibitory component.¹²

B. Description of the gender of children experiencing febrile seizures at Dr. Adnaan WD Payakumbuh Hospital in 2019

Based on the research, from 91 respondents, we find that most gender was male, namely 58 people (63.7%) at Dr. Adnaan WD Payakumbuh Hospital in 2019 (table 2). The previous research conducted by Rubiah (2018), the sex of most children with febrile seizures was male, namely (56.7%).¹³ The number of boys

experiencing seizures compared to women is because the cerebral maturation in girls is faster than boys, and the growth and development of girls is slightly quicker than boys, including the maturation of nerve cells.¹²

Table 2. Gender Frequency Distribution of Child	d
Patients That Have Even of Fever Seizures at RSUI	C
Dr. Adnaan WD Payakumbuh 2019	

Gender	F	%
Male	58	63,7
Female	33	36,3
Total	91	100,0

Children who have febrile seizures are associated with disorders of nerve cells. Homeostatic mechanisms in the immature brain are still weak, will change in line with brain development and age because, in the adolescent brain, the neural Na+/K+ATP ase is still lacking. In the immature brain, regulation of Na+, K+, and Ca++ ions are not perfect, resulting in impaired postdepolarization repolarization and increased excitability of neurons. Therefore, the adolescent brain has higher nervous excitability than the mature brain. This period is known as the developmental window and is prone to seizures. Exciters are more dominant than inhibitors, so there is no balance between excitatory and inhibitor.¹¹

C. Overview of temperature in children with febrile seizures at Dr. Adnaan WD Payakumbuh Hospital in 2019

Based on the research at table 3, as 91 respondents, febrile seizures occurred from a temperature of 38.3°C to 39.7°C, and most febrile seizures occurred at a temperature of 39.1°C at Dr. Adnaan WD Payakumbuh Hospital in 2019. In Rasyid's research (2019), the incidence of febrile

seizures in toddlers at the Budhi Mulia Mother and Child Hospital Pekanbaru occurred at body temperature >38°C, which is 72.2%.(14) In the Kakalang study (2016), the highest body temperature of children experiencing febrile seizures was above 38°C that is 50.7%.⁸

Table3.FrequencyDistributionofBodyTemperature of Child PatientsWho ExperiencedFever Seizures at Dr. AdnaanWD PayakumbuhHospital in 2019

Variable	Descriptive	Temperature (°C)	Count
Tempera -ture	Mean	39.13	39
	Median	39.00	11
	Mode	39.00	11
	Deviation Standard	0.767	0
	Minimum Point	38.00	6
	Maximun Point	41.40	1
	Totally sample	91.00	

High fever causes tissue hypoxia, including brain tissue. Metabolism in the normal Krebs cycle, one glucose molecule will produce 38 ATP. In hypoxic tissue, the metabolic processes are anaerobic; one glucose molecule will only produce 2 ATP. There is a lack of energy and disrupts the normal function of the Na+ pump and the reuptake glutamic acid by glial cells. Under normal conditions, the cell membrane that surrounds the cell consists of an inner surface of lipoids, and the ionic outer surface, so that the neuron cell membrane can be passed quickly by K+ ions and very difficult for Na+ ions and other electrolytes to passed except Cl ions, thus the concentration of K+ in the neuron is high, the concentration of Na+ is low. In contrast, outside the neuron, the opposite situation occurs. The balance of this

membrane potential can be continuously maintained by the presence of the enzyme Na+/K+/ATPase on the cell surface. However, at a specific increase in body temperature, these two things increase Na+ entry into cells and extracellular glutamic acid accumulation. The accumulation of extracellular glutamic acid will increase the permeability of the cell membrane to Na + ions so that Na + ions enter the cell more so that there can be changes in the balance of the neuron cell membrane. In a short time, potassium and sodium ions diffusion through the membrane, causing an electrical discharge. The release of this electric charge is so great that it can spread to all surrounding cells with the help of neurotransmitters, and seizures occur.^{3,6,15}

No average temperature causes febrile seizures. Febrile seizures should be febrile first. Fuadi suggested that fever is the main factor in the emergence of febrile seizures.¹² Toddlers are at risk of having febrile seizures with body temperature >38°C, which is related to the toddler's body resistance in controlling the increase in body temperature. Most toddlers with attacks have a body temperature >38°C due to toddler body unable to handle any increase in body temperature.^{3,16}

Febrile seizures occur at body temperature >38°C. High or low leukocyte levels but not with body temperature > 38°C, not yet declared febrile seizure. Every one degree Celsius increase in body temperature can increase the need for glucose and oxygen. Suppose there is an increase in carbohydrate metabolism due to the rise in body temperature. In that case, it will undoubtedly increase glucose needs, and if glucose needs are not met, it can disrupt metabolism in the Krebs cycle. The need for oxygen will also increase if the body cannot compensate, resulting in

tissue hypoxia, including tissue in the brain.¹⁴

D. Overview of blood leukocyte levels in children with febrile seizures at Dr. Adnaan WD Payakumbuh Hospital in 2019

Based on research from 91 respondents (table 4), patients who experienced febrile seizures had an average leukocyte level of 13,997 mm³ at Dr. Adnaan WD Payakumbuh Hospital in 2019. Nurindah (2015) conducted previous research that obtained that the average leukocyte level in children experiencing febrile seizures was 9,200 mm³.¹⁷ The study conducted by Rasyid (2019) found that the highest leukocyte level in toddlers experiencing febrile seizures was high (>34,000 mm) namely (50.7%).¹⁴

Table 4. Frequency Distribution of Blood LeucocyteLevel in Child Patients Who Have Fever Seizures inRSUD Dr. Adnaan WD Pavakumbuh 2019

Variable	Descriptive	Leucocyte	Count
		Level (mm ³)	
Blood	Mean	13.997.8	15
Leucocyte			
Level			
	Median	13.500	2
	Mode	11.600	4
	Deviation	6.372,19	2
	Standard		
	Minimum	2.100	1
	Point		
	Maximun	35.600	1
	Point		
	Totally	91	
	sample		

High leukocyte levels characterize infectious diseases. Infectious diseases can manifest into seizures because the condition has clinical manifestations of fever. Basal metabolism increases by 10-15%, and oxygen demand rises by 20% for every 1°C increase in body temperature. Both of these things make changes in Na ions which are generally outside the cell to enter the cell more, resulting in cell depolarization, which will result in the release of electrical charges in the brain, causing seizures.^{1,16}

Leukocyte levels are associated with febrile seizures in toddlers. High leukocytes in the body indicate increased production of cells to fight infection in the body. At the time of disease, leukocytes will automatically perform phagocytosis or destroy organisms that cause infection. The presence of immune system disorders will cause an increase in the number of white blood cells (leukocytes). It is the increase in leukocytes that will cause febrile seizures in toddlers.^{3,14}

This leukocyte level is not only due to bacterial infection but also due to viral infection. Types of leukocytes consist of monocytes, eosinophils, neutrophils, lymphocytes, and basophils, which of the five types of leukocytes have their respective functions. If there is an increase in monocytes and neutrophils, it indicates an infection caused by bacteria. In contrast, if there is an increase in lymphocytes, it can indicate an infection caused by a virus. To provide allergic reactions and antigens by releasing chemical histamine that can cause inflammation. Toddlers are verv susceptible to infectious diseases caused by improper personal hygiene and the consumption of nutritious food.^{5,14,16}

Normal leukocyte levels and leukopenia in children with febrile seizures are caused by viral infections and upper respiratory tract infections commonly found in patients with febrile seizures. Examination of the leukocyte count is done to look for causes of hyperthermia such as infection in children. There is leukopenia in febrile seizures, although in small

numbers, as research conducted by Nugroho showed as many as 76.6% of patients with leukocytosis, 15.3% of patients with average leukocyte counts, and 8.1% of patients with leukopenia.

CONCLUSION

The results of research on the profile of febrile seizures in pediatric patients at Dr. Adnaan WD Payakumbuh Hospital in 2019, it can be concluded that the most

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characteristic of febrile seizure at children are children with 12 months age, male, 39,1°C body temperature and leukocytosis.

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CONFLICT OF INETEREST

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