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The Relationship Between Nutritional Status and The Incidence of Simple Febrile Seizure in Children

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ABSTRACT

Simple febrile seizures are brief, generalized seizures lasting less than 15 minutes without recurrence within 24 hours. Nutritional status has been proposed to influence immune function and susceptibility to infection, which may trigger fever. However, evidence regarding its association with simple febrile seizures remains inconsistent. This study aimed to assess the relationship between nutritional status and simple febrile seizures in children. This study was an observational analytic study with a cross-sectional approach conducted at dr. Bratanata level III Hospital Jambi, Indonesia from January to November 2025. A total of 160 children who met the inclusion criteria were recruited through consecutive non-random sampling, with data on nutritional status assessed using anthropometric measurements based on WHO growth standard and the incidence of simple febrile seizures obtained from medical records. Data were analyzed using the Chi-square test to evaluate the association between nutritional status and simple febrile seizures, with $p < 0.05$ considered statistically significant. The prevalence of simple febrile seizures among the study population was 85 (53.1%) of the children, whereas 75 (46.9%) of the children had fever without seizures. There is no association between the nutrition status and occurrence of simple febrile seizures ($p = 0,242$). Further longitudinal studies incorporating micronutrient assessment are recommended to explore the potential role of hidden hunger.

Keywords: children; simple febrile seizures; nutritional status; fever.

INTRODUCTION

A simple febrile seizure is a seizure phenomenon that encompasses a duration of less than 15 minutes, occurs as a generalized tonic and/or clonic seizure, and does not repeat within a 24 hour period (Ismael et al, 2016). A febrile seizure occurs in association with and because of a fever which is defined as a body temperature exceeding 38°C , and where there is no central nervous system infection, electrolyte imbalance or other metabolic derangements. Children aged 6 months to 5 years are the most vulnerable group, with the highest incidence

reported at approximately 18 months of age.(Handryastuti, 2021) According to the World Health Organization (WHO), more than 21.65 million cases of febrile seizures occur worldwide, with over 216,000 associated deaths reported annually.(Gultom & Siregar, 2021) In Indonesia, data from Ikatan Dokter Anak Indonesia (IDAI) indicate that febrile seizures affect approximately 2–5% of children aged 6 months to 5 years, with simple febrile seizures accounting for nearly 80% of all cases.(Ismael et al., 2016) In addition to its acute clinical manifestation, simple febrile seizures also carry significant psychosocial and healthcare implications. Febrile seizures are one of the most common neurological emergencies in children and frequently lead to emergency department visits and hospital admissions.(Putri Dwi Riyani & Heri Wibowo, 2025) Although simple febrile seizures are generally self-limiting, the event often causes considerable anxiety among parents and caregivers, which may result in repeated healthcare utilization and unnecessary diagnostic procedures. This anxiety driven utilization contributes to increased healthcare costs and places additional burdens on healthcare systems, particularly in resource-limited settings.(Marangoni et al., 2024)

Peak body temperature during the fever, family history, history of neonatal complications, and nutritional status have all been reported as contributing factors to febrile seizures in children(Masriwati & Jefri, 2016). Increased susceptibility to infections and consequent increased risk of undernutrition, may be linked to impaired immune function. Infections activate microglial cells and cyclooxygenase-2 (COX-2) via the release of cytokines such as interleukin-1 beta (IL-1 β), interleukin-6 (IL-6), and tumor necrosis factor-alpha (TNF- α). COX-2 then elevates the production of prostaglandin E2 (PGE2), and microglia secrete IL-1 β and interleukin-1 receptor antagonist (IL-1Ra), which modulates glutamatergic signaling via the alpha-amino-3-hydroxy-5-methyl-4-isoxazole propionate (AMPA) receptors. This imbalance of excitatory glutamate and inhibitory gamma-aminobutyric acid (GABA) neurotransmission may contribute to the lowering of the seizure threshold involved in the development of febrile seizures. (Wibowo et al., 2024)

There are quite a few studies on the relation of nutritional state and febrile seizures, and the results are conflicting. (Wibowo et al., 2024) nutritional status was found to be significantly associated with simple febrile seizures where they studied children between 6 months and 5 years ($p = 0.008$). In their study, 84% of children with simple febrile seizures were undernourished as opposed to 16% of febrile children without seizures. (Gosal et al., 2024) on the other hand, did not find any significant relation between status of nutrition and febrile seizures ($p = 0.116$) and where the most frequent status of nutrition in both groups was in the normal nutritional status

The variability of results among previous studies indicates a research gap regarding the role of nutritional status in the occurrence of simple febrile seizures in children. Differences in study design, population characteristics, and regional settings may contribute to these inconsistent findings. To date, evidence on

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whether nutritional status constitutes a significant risk factor for simple febrile seizures remains inconclusive.

The implications of this study lies in its contribution to strengthening the evidence regarding the role of nutritional status in simple febrile seizures, which may support the development of preventive strategies through nutritional improvement as a practical and accessible intervention. Therefore, this study aims to evaluate simple febrile seizures in children in relation to nutritional status

METHOD

In the 2025 study conducted at dr. Bratanata level III Hospital Jambi, Indonesia, the author carried out an observational analytic study using a cross-sectional design. The author conducted analysis of data collected from medical records of patients for the period of January to November 2025. The study population is children between 6 months and 5 years who present with fever, simple febrile seizures and who were not febrile. The author employed consecutive, non-random sampling to determine the study subjects, and the selected subjects had to meet the following requirements (inclusion): children from 6 months to 5 years with fever (body temperature exceeding 38 degrees centigrade) and have complete medical records that included age, body weight, and height or length. Exclusion criteria included intracranial infection, routine anticonvulsant use, family history of febrile seizures, epilepsy, cerebral palsy, developmental delay, and severe systemic infection.

A total of 160 subjects were included in this study. Nutritional status was assessed using anthropometric data obtained from medical records and classified according to WHO growth standards. For statistical analysis, nutritional status categories were regrouped into malnutrition, normal and overweight. Descriptive statistics were used to summarize subject characteristics and are presented as frequencies, percentages, and mean \pm standard deviation for normally distributed variables. Analyzing the impact of nutritional status on the occurrence of simple febrile seizures involved the application of the Chi-square test for the computation. A significance level of $p < 0.05$ was maintained. The Statistical Package for Social Sciences (SPSS) was used for data computation. This study received ethical approval from the Research Ethics Committee of the Faculty of Medicine, Universitas Trisakti (No. 015/KER/FK/08/2025).

RESULT AND DISCUSSION

Characteristics of Study Subjects

A total of 160 children aged 6 months to 5 years participated in the study and fulfilled the inclusion and exclusion criteria. The mean age of the subjects was 32.87 ± 16.22 months. Most subjects were aged ≥ 18 months (83.8%), while 16.2% were aged < 18 months. Male patients accounted for 57.5% of the study population, and female patients accounted for 42.5%. Based on nutritional status, most subjects had a normal nutritional status (55.6%). Simple febrile seizures were identified in 85 patients (53.1%), whereas 75 patients (46.9%) experienced

fever without seizures (Table 1).

Table 1
Characteristics of the study subjects

Variable	Frequency (n)	Percentage (%)
Age (months)		
<18	26	16,3
≥18	134	83,8
Sex		
Male	92	57,5
Female	68	42,5
Nutritional status		
Severe thinness	22	13,8
Thinness	16	10
Normal	89	55,6
Risk of overweight	18	11,3
Overweight	7	4,4
Obese	8	5
Simple febrile seizure		
Simple febrile seizure	85	53,1
Fever without seizure	75	46,9

In this research, the age group of the children most frequently represented was ≥18 months. This is in contrast to (Khasanah et al., 2023) & (Seid et al., 2021) which state that mothers of children < 12 months were most likely to utilize health services, compared to mothers of children > 36 months. This may be the study site's demographic characteristics and the use of services in the health care system. In the current study, children of 18 months and older were more often taken to health care facilities to manage illnesses, which increased the odds of being included as participants in this study.

Most subjects in this study were male. The predominance of male patients may be explained by findings from previous studies suggesting higher healthcare utilization among male children. (Yan & Ren, 2019) reported that families tend to provide greater medical attention to male children, including examinations and treatment during illness, leading to higher healthcare utilization compared to female children. This phenomenon has been associated with cultural preferences favoring male children, who are often perceived as having higher social and economic value and as future providers of family security. (Osarfo et al., 2025) However, contrasting findings were reported by Mohan et al. (Mohan et al., 2025) who found that females were more likely to seek healthcare services, with consistently higher visit rates than males. These differing results indicate that sex-based variations in healthcare utilization are not uniform and are strongly influenced by cultural, social, and regional factors.

In terms of nutritional status, the study population was predominantly composed of children with normal nutritional status. This finding is consistent

with national data from the 2024 Studi Status Gizi Indonesia (SSGI), which reported that the majority of Indonesian children under five have normal nutritional status, while the proportions of undernutrition and severe undernutrition remain relatively lower. (Kementerian Kesehatan Republik Indonesia, n.d.). This suggests that among children monitored through healthcare services, normal nutritional status remains the most common category. Therefore, the predominance of normal nutritional status observed in this study reflects the national nutritional profile of Indonesian children.

Relationship Between Nutritional Status and Simple Febrile Seizures

Most subjects in both the simple febrile seizure group and the fever without seizure group were in the normal nutritional status category. For data analysis, nutritional status was regrouped into three categories: malnutrition, normal, and overweight by combining the original nutritional status categories. This regrouping was performed because several cells had an expected count of less than five, which violated the assumptions of the Chi-square test. There was no statistically significant relationship between nutritional status and the occurrence of simple febrile seizures ($p = 0.242$). (Table 2).

Table 2

Relationship Between Nutritional Status and Simple Febrile Seizures

Variable	Simple febrile seizure		P value
	Simple febrile seizure n(%)	Fever without seizure n(%)	
Nutritional status			0,242
Malnutrition	23 (60,5%)	15 (39,5%)	
Normal	42 (47,2%)	47 (52,8%)	
Overweight	20 (60,6%)	13 (39,4%)	

The analysis exploring the connections between nutritional status and simple febrile seizures in children revealed an absence of significant connections between the two variables ($p = 0.242$). This agrees with the previous analysis where no relation between nutritional status and occurrence of febrile seizures was found ($p = 0.116$). (Gosal et al., 2024) On the other hand, this current analysis reports the nutritional status and febrile seizures relation ($p = 0.008$). (Wibowo et al., 2024) The differences between this analysis and other previous ones could be referred to the differences in nutritional status identified between the fever without seizure group and simple febrile seizure group. In (Wibowo et al., 2024) was an evident difference with the fever without seizure group being comprised mainly with children of normal nutritional status and the simple febrile seizure group being made up mostly of children with some level of undernutrition, including those severely undernourished. In the current research, the group of children with febrile seizures and the group of children with febrile episodes without seizures were almost equally divided with respect to nutritional status. The equal distribution may explain the lack of a statistically significant relationship between nutritional status and simple febrile seizures.

1 Although anthropometric nutritional status was not significantly associated with the occurrence of simple febrile seizures, children with normal nutritional status may still experience febrile seizures. One possible explanation that may be considered is the presence of hidden hunger, a condition characterized by deficiencies in various micronutrients, particularly iron, zinc, iodine, and vitamin A, which can occur even in the absence of inadequate energy intake. This condition is commonly associated with dietary patterns that are high in energy but low in micronutrient density. (Aisyah et al., 2024)

22 Micronutrient deficiencies, particularly iron deficiency, play an important role in nervous system function and may lower the seizure threshold. Iron is involved in neurotransmitter metabolism, myelin formation, and the balance between inhibitory and excitatory neurotransmission, including gamma-aminobutyric acid (GABA). Disruption of this balance may increase neuronal excitability and trigger seizures, especially during febrile episodes. (Melatina Putri et al., 2017) However, because this study assessed nutritional status solely based on anthropometric measurements without evaluating micronutrient levels, the contribution of hidden hunger to the occurrence of simple febrile seizures could not be determined. Further studies incorporating biochemical assessment of micronutrient status are therefore required to clarify this potential association. Given that micronutrient intake in children is strongly influenced by caregiving practices, parental knowledge and education play an important role in determining children's nutritional status, as they influence dietary practices, food selection, and feeding behaviors. Adequate parental education has been shown to contribute to better nutritional intake and nutritional status among children, highlighting the importance of nutrition education for parents as part of comprehensive child health strategies. (Liman et al., 2024)

5 In Indonesia, national health policies provide a relevant framework for interpreting the findings of this study. Permenkes No. 28 of 2019 emphasizes adequate intake of macro and micronutrients as an essential component of child health. (Menteri Kesehatan Republik Indonesia, 2019). In spite of the lack of relationship between febrile simple seizures and the anthropometric nutritional status, it would suggest that children with febrile episodes and seizures who were studied, the nutritional status assessed by anthropometric measures could show limited knowledge of nutritional status outline growth and development monitoring, as regulated in Permenkes No. 25 and 66 of 2014, provides a structured approach to nutritional assessment in primary healthcare settings. (Menteri Kesehatan Republik Indonesia, 2014a, 2014b) The results of this study can be framed within the prevailing nutritional monitoring systems in simple febrile seizure episodes.

This study has acknowledged some constraints. The cross-sectional approach used does not permit nutritional status and simple febrile seizures to be considered in a cause and effect relationship. The use of secondary medical record data may introduce information bias, and nutritional status assessment based solely on anthropometric measurements may not reflect underlying micronutrient deficiencies. To address these limitations, clearly defined inclusion

and exclusion criteria were applied, and standardized WHO based anthropometric classifications were used to ensure objective and consistent measurements.

Despite these limitations, this study has notable strengths. The relatively adequate sample size enhances the robustness of the analysis. Moreover, this study provides valuable local epidemiological data in the Jambi region. The inclusion of a comparison group of febrile children without seizures further strengthens the clinical interpretation of the findings.

CONCLUSION

No statistically significant association was found between simple febrile seizures and nutritional status. Future studies are recommended to focus on longitudinal designs with detailed micronutrient assessments to better elucidate the potential role of hidden hunger.

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