

The Relationship Between Duration of Valproic Acid Use and Body Weight in Children with Epilepsy at Haji Hospital, Medan

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ABSTRACT

Epilepsy is a neurological disorder that is often experienced by children and requires long-term treatment, one of which is valproic acid. Although effective in controlling seizures, this drug often causes weight gain, which can affect patient compliance. The purpose of this study was to determine the factors of epilepsy and the relationship between the duration of valproic acid use with body weight and body mass index (BMI) in children with epilepsy at RSU Haji Medan. This quantitative study used a descriptive analytical design. This study aimed to analyze the relationship between the independent variable (duration of valproic acid use) and the dependent variable (body weight in children with epilepsy). This study was observational because the data were obtained through observation and measurement. The study sample consisted of 33 respondents. The results showed that of the 33 children with epilepsy at RSU Haji Medan, the majority were female (57.6%) and aged 1-5 years (45.45%). All respondents had been taking valproic acid for 6 months, with 93.9% experiencing an increase in body weight and body mass index (BMI). The most dominant risk factors for epilepsy were head injury (21.21%) and complications at birth (21.21%). A comparison of data before and after valproic acid consumption showed significant changes in children's weight, height, and BMI. The conclusion is that there is a relationship between the duration of valproic acid use and increased weight and BMI in children with epilepsy, with the main risk factors being head injury and birth complications. Routine monitoring by medical personnel and parents, as well as further research with larger samples and additional variables, is recommended.

Keywords: Valproic Acid, Body Weight and Children with Epilepsy

INTRODUCTION

Epilepsy is a neurological disease that affects many people worldwide. Globally, an estimated 2.4 million new cases occur each year, making it a public health problem that requires urgent attention. More than half of these cases occur in childhood or adolescence. The incidence of epilepsy peaks in childhood, then tends to decline between the ages of 15 and 65. (1)

Epilepsy is a brain dysfunction caused by abnormal electrical activity within the brain's nervous system. This condition can be caused by various factors (etiologies) and is characterized by the

characteristic symptom of recurrent seizures. These seizures are caused by sudden, excessive electrical discharges (paroxysms) from neurons in the brain. This disorder can affect anyone, both children and adults, and often impacts the sufferer's quality of life. There are two categories of epileptic seizures: focal (partial) seizures, which occur due to abnormal electrical activity originating in a specific area of the brain, namely the cerebral cortex. Focal seizures can cause a variety of symptoms depending on the part of the brain affected. Generalized seizures occur when the abnormal electrical activity encompasses a large area of the cerebral cortex and affects both cerebral hemispheres (the right and left hemispheres) simultaneously. These seizures often cause a complete loss of consciousness and are accompanied by striking physical symptoms, such as full-body (tonic-clonic) convulsions, muscle strength, or sudden loss of muscle control. Because they involve both hemispheres, their impact is more widespread than focal seizures. (2)

A health problem that is a medical problem as well as a social problem is epilepsy because this disease is a disease that requires strict handling and supervision in its treatment. The psychosocial problems faced by epilepsy are greater than the medical problems experienced where epilepsy patients are afraid that they will suffer from epilepsy all their lives, they are afraid to drive, afraid to swim, and the most frightening thing is having a seizure in public. (3)

A seizure is a disorder of the nervous system characterized by convulsions. These seizures can occur at any time, thus increasing the risk of injury to children, especially if the seizures appear suddenly without a clear cause. Seizures are an early indicator of epilepsy and can be dangerous for children at any time, especially if the seizures develop without a clear reason, which can cause other health problems in children. Sudden Unexpected Death in epilepsy is a type of death that may occur in people with epilepsy. (4)

Epilepsy, also known as 'sawan' or 'ayan' in Indonesia, is still often misunderstood by the public. Many people mistakenly consider epilepsy to be a curse, possession, or the result of magic, when in fact it is a disorder of the nervous system. Seizures that can occur at any time and anywhere often give rise to various incorrect assumptions about this disease. The public is also often hesitant to help because of false myths, such as the idea that epilepsy can be transmitted through saliva. As a result, epilepsy sufferers often have difficulty getting the right help or treatment, so their condition tends to worsen. Therefore, it is important to increase public awareness about epilepsy so that they better understand the real facts and no longer believe misleading myths. (4)

The main cause of health problems in children is in the field of neurology. This condition can cause various problems, such as learning difficulties, developmental disorders, and decreased quality of life for children. Children with epilepsy may face challenges in learning, physical and emotional development, as well as their daily activities. (2) Data obtained from the (World Health Organization, WHO) in 2019, around 50 million people live with epilepsy worldwide. Every year an estimated 2.4 million children are diagnosed with epilepsy. The incidence of epilepsy in developed countries ranges from 40-70 cases per 100,000 children per year. Meanwhile, in developing countries, it ranges from 100-190 cases per 100,000 children per year. In Indonesia, the number of epilepsy cases reaches around 700,000-1,400,000 cases with an increase of 70,000 new cases every year and around 40%-50% and this prevalence occurs in children. (5)

Patients with epilepsy often require long-term antiepileptic drug (AED) therapy to help control their seizures. Consistent management of seizures is crucial because prolonged seizures can cause serious damage to brain cells. If left untreated, they can lead to permanent brain cell death, which in turn can affect various cognitive functions, including intelligence, memory, concentration, and even learning ability.(5)

Several types of antiepileptic drugs (AEDs), such as carbamazepine, topiramate, and lamotrigine, are generally used long-term to control epileptic seizures. Valproic acid is one of the most commonly used AEDs worldwide. However, one of the side effects that occurs quite often is weight gain, especially in children. It is estimated that around 40% of children who use valproic acid experience weight gain. This is often a reason for patients or parents to stop using the drug. (5)

In a study, Syari Afrianingsih (2023) and her friends It was found that 38% of patients taking valproic acid experienced a weight gain of 10% of their initial body weight, which was most likely related to increased appetite. This study aimed to investigate the relationship between valproic acid use and weight gain in children with epilepsy, in order to provide a better understanding of the long-term effects of this drug and find the best solution for patients.(5)

METHOD

This study used a survey design with a retrospective approach. The data used were secondary data obtained from the medical records of pediatric epilepsy patients at Haji Hospital, Medan. The study subjects were children who consumed valproic acid between January and June 2025.

Sample selection was based on inclusion criteria: children aged 0–13 years, diagnosed with epilepsy, taking valproic acid, having complete medical records, and being outpatients. Exclusion criteria included patients who refused to undergo weight and height measurements.

In addition, this study was also supplemented with interviews with patient families, to determine the factors related to the occurrence of epilepsy in children at the Haji Medan Hospital.

Population and Sample

The population in this study was all children with epilepsy who were taking valproic acid at Medan Haji General Hospital. From this population, 33 patients were recruited from January to June 2025 and met the study criteria. Factors that can increase the risk of epilepsy in children at Medan Haji General Hospital include a family history of epilepsy, a history of recurrent febrile seizures in infancy, head injury or brain trauma, impaired brain development during pregnancy, central nervous system infections such as meningitis and encephalitis, and certain metabolic or congenital disorders that can affect brain function.

RESEARCH RESULT

1. Respondent Characteristics

Table 1.Frequency Distribution of Age and Gender in Epilepsy Patients at Haji Hospital Medan 2025

No	Age	Frequency (F)	Percentage (%)
1	1-5 years	15	45.45%
2	6-9 years	18	24.24%
3	10-13 years	10	30.30%

No	Gender	F	%
1	Man	14	42.4
2	Woman	19	57.6
Amount		33	100

Based on frequency distribution data, it is known that the age group that suffers most from epilepsy is the 1-5 year age group with a total of 15 people (45.45%), respondents aged 6-9 years were 8 people (24.24%), respondents aged 10-13 years were 10 people (30.30%).

Based on frequency distribution data, research shows that the characteristics of epilepsy patients at Medan Haji Hospital are more common in female patients (19 people) (57.57%) than in male patients (14 people) (42.42%).

2 Frequency Distribution of Respondents Based on 6 Months After Taking Valproic Acid Medication

Table 2.Frequency Distribution of Respondents Based on Patients Who Have Consumed Valproic Acid for 6 Months at Haji Hospital Medan

No	Duration of Valproic Acid Use	Frequency (f)	Percentage (%)
1	6 months	33	100
	Amount	33	100

Based on the known frequency distribution data, the study shows that respondents based on the length of use of Valproic Acid at Medan Haji Hospital which is seen based on the length of use of Valproic Acid for 6 months 33 patients (100%).

3 Body Weight Distribution of Children with Epilepsy Before Taking Valproic Acid and After Taking Valproic Acid

Table 3Weight Distribution in Children with Epilepsy After Taking Valproic Acid for 6 Months

No	Weight	Frequency (f)	Percentage (%)
1	BB increases	31	93.9
2	BB does not increase	2	6.1

Amount	33	100
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Based on frequency distribution data, research shows that the administration of Valproic Acid to epilepsy patients at Medan Haji Hospital resulted in 31 (93.9%) gaining weight, while 2 (6.1%) did not gain weight.

4. Risk Factors for Epilepsy in Children at Haji Hospital, Medan

Table 4.Distribution. Risk Factors of Epilepsy in Children at Haji Hospital, Medan.

No	Risk Factors	Frequency (f)	Percentage (%)
1	Family History	5	15.15
2	Head injury	7	21.21
3	Premature	6	18.18
4	Febrile convulsion	5	15.15
5	Environmental factors (cigarette smoke)	3	9.09
6	Complications at birth	7	21.21
Amount		33	100

Based on the frequency distribution data, it is known that the research shows that the factors in epilepsy patients at Medan Haji Hospital are the risk factors for epilepsy. The most common factors are head injury in 7 patients (21.21%), complications at birth in 7 patients (21.21%), and premature in 6 patients (18.8%), and family history in 5 people (15.15%), and febrile seizures in 5 (15.15%), and environmental factors in 3 (9.09%).

DISCUSSION

Valproic acid is an antiepileptic drug (AED). This drug is often used to treat epilepsy, especially in children, because it is considered quite safe and has a wide mechanism of action in the body. Valproic acid works in the body in several ways. One of them is by increasing the levels of GABA (γ -aminobutyric acid) in the brain. GABA is a natural chemical in the brain that functions to calm the activity of nerve cells. When GABA levels increase, excessive electrical activity in the brain that can trigger seizures cannot be controlled. Therefore, valproic acid helps prevent and reduce

the frequency of seizures. In addition, valproic acid also works by blocking ion channels in nerve cells. These ion channels play a role in transmitting electrical signals from one cell to another. If these electrical signals are excessive or uncontrolled, they can trigger seizures. By blocking these channels, valproic acid helps maintain activity in the brain, making valproic acid a fairly effective choice for treating epilepsy, especially in children. (5)

Long-term use of valproic acid can cause significant weight gain. Weight gain typically begins after the first three months and continues through the sixth month. Research by Kanemura and colleagues found that most patients (53.3%) experienced weight gain after six months of treatment. Another study by Sidhu and colleagues also found that weight gain begins within the first three months and peaks in the sixth month. The results of this study are consistent, showing significant weight gain after six months of valproic acid use. The theory about the effects of valproic acid on weight gain is supported by research conducted by Verrotti and colleagues. The study explained that epilepsy patients who took valproic acid experienced increased appetite, felt more hungry, increased thirst, and tended to consume high-calorie foods and drinks. This certainly affected the patients' weight. Furthermore, valproic acid also affects the activity of the sympathetic nervous system in the body. This drug works by affecting the balance of neurons, or nerve cells, in the hypothalamus. The hypothalamus is a crucial part of the brain responsible for regulating hunger and thirst, as well as maintaining energy balance in the body. When this control function is disrupted by valproic acid use, the body becomes more difficult to regulate the amount of food consumed and burn energy properly.

However, Valproic Acid should not be given to normal children (who do not have epilepsy or other nervous disorders), the use of valproic acid is medically inappropriate and potentially dangerous.

Nervous System Balance Disorders

Valproic acid works by increasing GABA levels. In people with epilepsy, this is beneficial in suppressing excessive neuronal activity. However, in healthy children, GABA levels are already balanced. Forced increases can cause side effects such as drowsiness, decreased concentration, memory impairment, and behavioral changes. This condition has the potential to hinder a child's cognitive development.

Risk of Weight Gain

The most common side effect is weight gain due to increased appetite and changes in energy metabolism. In normal children, this effect is undesirable because it can lead to obesity, metabolic syndrome, and an increased risk of chronic diseases in the future.

Potential Organ Disorders

In addition to causing weight gain, the use of valproic acid can also cause serious side effects on other organs. One of the most dangerous risks is liver damage or hepatotoxicity, as this drug is metabolized in the liver. In normal children, unintentional use can overload liver function, potentially damaging liver cells and disrupting the body's detoxification and metabolic processes. Furthermore, digestive system disorders often occur, such as nausea, vomiting, abdominal pain, and diarrhea. These conditions can reduce appetite and inhibit the absorption of nutrients that are essential for children's growth. Furthermore, valproic acid can also affect the hormonal system, for example, causing menstrual irregularities in adolescent girls, increasing the risk of polycystic ovary syndrome (PCOS), and disrupting fat and sugar metabolism. All of these side effects are clearly outweighed by the benefits given to normal children, as healthy children do not require this therapy. Therefore, the use of valproic acid in normal children is not justified, as the benefits are negligible while the risks are real and endanger the child's development.

Medical Ethical Considerations

In medical ethics, there is a basic principle that every therapy or medication must have a clear indication, and the benefits must outweigh the risks. In other words, drugs should not be administered simply for trial or without a strong medical reason, as this could harm the patient. Regarding the use of valproic acid, administering it to normal children who do not have epilepsy or other neurological disorders clearly violates this principle. This is because in normal children, there is no benefit, while the risk of side effects is very real, ranging from weight gain, liver dysfunction, hormonal disruption, and potential cognitive developmental delays. Therefore, from a medical ethical perspective, the use of valproic acid in healthy children is unjustified and should be avoided entirely.

This study showed that epilepsy patients who took valproic acid for six months experienced weight gain. Thirty-one patients experienced weight gain after regularly taking valproic acid. This is due

to the side effects of valproic acid, which can increase appetite and affect metabolism, leading to weight gain.

However, two patients did not experience weight gain. This was because they were not taking valproic acid regularly according to the recommended schedule and dosage. Furthermore, other factors such as diet, physical activity, and individual health conditions can also influence weight changes.

This weight gain is generally caused by several factors. One is that valproic acid can affect the appetite-regulating system, causing patients to feel hungry more often and eat more than usual. This condition is quite important to pay attention to, because if left uncontrolled, excessive weight gain can trigger various other health problems, such as the risk of obesity, metabolic disorders, and hormonal imbalances.(5)

Risk Factors for Epilepsy in Children at Haji Hospital Medan

Head injury is a major risk factor for epilepsy, especially if the trauma is severe enough to disrupt brain structure or function. Head injuries can cause damage to brain tissue, bleeding, and scar tissue formation, which then becomes a focus of abnormal electrical activity in the brain. Previous research has shown that individuals who experience severe head trauma have a higher risk of developing post-traumatic epilepsy, especially if accompanied by loss of consciousness, skull fracture, or intracranial bleeding. In children, head injuries often result from accidents during play, falls from heights, or traffic accidents. Therefore, preventing head injuries is crucial, including the use of protective headgear when driving and supervision of children during activities.

Birth complications also have a similarly high incidence as head injuries. These complications can include neonatal asphyxia (lack of oxygen during labor), perinatal infection, or trauma during delivery. Asphyxia and infection can damage developing brain tissue, increasing the risk of seizures or epilepsy later in life. Research shows that children who experience severe birth asphyxia are at greater risk of developing neurological disorders, including epilepsy. This highlights the importance of quality prenatal care and a safe delivery to prevent complications that can have long-term impacts on a child's brain development.

Babies born prematurely, that is, before 37 weeks of gestation, have a higher risk of various health problems, one of which is neurological disorders such as epilepsy. This is due to the immaturity of the central nervous system in premature babies, making them more susceptible to disorders,

including seizures. Furthermore, premature babies often experience complications such as intraventricular hemorrhage, hypoxia, and infection, all of which can contribute to brain damage. Studies show that the younger the gestational age at birth, the greater the risk of the baby developing neurological disorders later in life. Therefore, preventing premature birth and closely monitoring premature babies are important steps to reduce the risk of epilepsy.

Family history is also a contributing factor to the development of epilepsy. In this study, five patients (15.15%) had family members with epilepsy. This indicates a genetic predisposition. Genes related to the regulation of electrical activity in the brain can be inherited, so children of parents or relatives with epilepsy are at higher risk.

Febrile seizures are convulsions caused by an increase in body temperature (fever), especially in children aged 6 months to 5 years. In some cases, febrile seizures that last a long time, recur frequently, or are accompanied by focal seizures can be a risk factor for developing epilepsy. In this study, five patients were found to have a history of febrile seizures. Recurrent febrile seizures without proper treatment can cause damage to the central nervous system. Therefore, it is important for parents to understand how to manage febrile seizures quickly and appropriately to prevent them from developing into epileptic seizures.

Environmental factors such as exposure to cigarette smoke, air pollution, and unhealthy living conditions can also affect a child's brain development and trigger neurological disorders, including epilepsy. In this study, three patients (9.09%) were found to have been exposed to unfavorable environmental factors. Although environmental factors contributed relatively little to this data, it remains important to pay attention to the cleanliness and safety of the environment in which children live. Parenting, nutrition, and a healthy home environment also influence a child's growth and development, including brain and nerve function.

Based on the discussion above, it can be concluded that epilepsy in patients at Medan Hajj Hospital is associated with various risk factors, both biological (such as family history, birth complications, prematurity) and environmental (head injury, cigarette smoke, infection). Knowledge of these risk factors is crucial as a basis for primary and secondary prevention, particularly in vulnerable children.

CONCLUSION

The Effect of Valproic Acid on Body Weight at the Hajj Hospital in Medan

Most of the epileptic children who took valproic acid for 6 months experienced weight gain, as many as 31 people (93.9%). And as many as 2 people (6.1%) of the patients did not experience weight gain, according to medical records at Medan Haji Hospital.

The most common risk factors for epilepsy in children at the Hajj Hospital in Medan

are head injuries and complications at birth, followed by prematurity, family history, febrile seizures, and environmental factors (such as cigarette smoke).

SUGGESTION

Further researchers are advised to conduct research with a larger sample size so that the results obtained are more reliable.

more representative and generalizable. Furthermore, it is recommended to consider other factors that can influence body weight, such as physical activity level, daily calorie intake, and family history of weight gain (genetic history). By considering these variables, future research is expected to provide a more comprehensive picture of the factors that influence body weight.

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