



RELATIONSHIP BETWEEN DOSAGE ACCURACY AND THE SUCCESS OF DENGUE FEVER THERAPY IN CHILDREN

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ABSTRACT

Dengue Hemorrhagic Fever (DHF) is a disease transmitted through the bite of the *Aedes aegypti* mosquito. In 2024, DHF cases in Indonesia reached 1,010 cases, most of which occurred in children, with a mortality rate of 34 cases. DHF therapy generally uses electrolyte fluids and antipyretics. Accurate dosage is crucial for achieving successful therapy and maintaining normal temperature and hematocrit. This study aims to determine patient characteristics, the accuracy of antipyretic and fluid therapy dosages, and the relationship between the accuracy of antipyretic drug dosages and fluid therapy with therapeutic success in pediatric DHF patients at the Inpatient Unit of DKT Slamet Riyadi Hospital, Surakarta. This study is non-experimental with a cross-sectional observational approach. Data were collected and analyzed by reviewing the medical records of DHF patients during the 2021-2023 period, resulting in a total sample of 30 pediatric patients. The data collected was then processed to analyze drug therapy given to pediatric DHF patients, with a focus on evaluating drug rationality based on appropriate dosage categories. The results of the analysis are presented in a table to show the percentage of dengue fever medication use in pediatric patients at DKT Slamet Riyadi Surakarta Hospital, along with relevant analysis. The results show that all patients (100%) were aged 1-5 years, with 56.67% male and 43.33% female. The accuracy of antipyretic (paracetamol) and fluid therapy (RL) dosages was 86.66% accurate. The Chi-Square statistical test showed a p-value (<0.05), indicating a relationship between dosage accuracy and the success of dengue fever therapy in pediatric patients.

Keywords: antipyretic; dengue fever; dosage accuracy; electrolyte therapy

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INTRODUCTION

Dengue Hemorrhagic Fever (DHF) is an endemic disease that is still And continues to be a public health problem in Indonesia, especially in tropical areas that support the development of the *Aedes aegypti* mosquito as the main vector. (Lestari et al., 2023). Various factor can related with DHF incidents include nutritional status, groups age, condition environment And place stay as well as implementation behavior prevention such as 3M (Podung et al., 2021). Symptoms include sudden high fever, often accompanied by bleeding, thrombocytopenia and can potentially cause shock and death (Lesar et al., 2020) (Melly & Anggraini, 2022). Children are the most vulnerable group to this disease, with higher prevalence and complications. (Rizky, Primadimanti, & Hidayaturahmah, 2024). Approximately 90% of cases occur in children under 15 years of age (Aryu, 2016). In early 2024, Central Java Province recorded more than 1,010 cases of dengue fever with 34 deaths, while Surakarta City recorded 45 cases with 2 child deaths (Dinkes, 2024). The high incidence, especially in children, requires serious attention to the effectiveness of therapeutic management, including the appropriate dosage of antipyretics and fluid therapy. (Meriska et al., 2019).

Inappropriate dosage in the management of dengue fever, especially in children, can negatively impact the success of therapy. Administering too low a dose carries the risk of ineffectiveness. to therapy, while excessive doses can cause serious complications such as hypovolemic shock due to plasma leakage (Putri et al., 2022). Therefore, the accuracy of administering antipyretic drugs such

as paracetamol and fluid therapy such as Ringer's Lactate needs further investigation as factors influencing therapeutic outcomes. Based on these problems, this study aims to determine the relationship between the accuracy of antipyretic doses and fluid therapy with the success of therapy in pediatric patients with DHF. This study specifically aims to describe patient characteristics, assess the level of dosage accuracy, and analyze its relationship with therapeutic success as measured by clinical parameters such as body temperature and hematocrit levels.

METHOD

This study used a quantitative approach with observational methods and a *cross-sectional design*. The primary objective was to determine the relationship between the appropriateness of antipyretic drug dosages and fluid therapy and the success of dengue fever treatment in pediatric patients. Data were collected retrospectively from patient medical records at the Inpatient Unit of DKT Slamet Riyadi Hospital, Surakarta, during the period 2021-2023. The subjects of this study were pediatric patients aged 1-16 years diagnosed with dengue fever and treated at the Slamet Riyadi Surakarta Hospital. A sample of 30 patients was selected using *purposive sampling* based on inclusion criteria: complete medical records containing patient characteristics and details of antipyretic and fluid therapy. Patients with concomitant infectious diseases were excluded from the study. Data were collected through medical records, including age, gender, medication type and dosage, and treatment outcomes such as temperature and hematocrit levels. Data analysis was performed by calculating the percentage of dose accuracy and treatment success, and examining the relationship between variables using the *Chi-Square test* with a significance level of <0.05 . Results are presented in tables and statistical interpretation.

RESULT

Table 1.
Distribution Characteristics of Dengue Fever Based on Age

Age (years)	f	%
Infants (0-11 months)	0	0
Toddlers (1-5 years)	30	100
Child pre school (5-6 years)	0	0
Child age school (6-18 years)	0	0

A total of 30 child patients who were the research sample were all in the age range of 1-5 years . age This show that toddler is group the most vulnerable age against dengue fever by Because That need supervision and protection to mosquito.

Table 2.
Distribution Characteristics of Dengue Fever Based on Type Sex

Type Sex	f	%
Man	17	56.67
Woman	13	43.33

Results against 30 patients children studied, based on distribution data type sex dominated by man as many as 17 patients (56.67%). The proportion This indicates that group man own amount case a little more tall compared to group woman in study this

Table 3.
Accuracy Ringer's Lactate Dosage and Paracetamol on Dengue fever patients

Information	f	%
Right Dose	26	86.66
Incorrect Dosage	4	13.33

Based on table 4, the results obtained show that dengue fever therapy at the Inpatient Installation of DKT Slamet Riyadi Surakarta Hospital shows that Ringer's lactate therapy or administration of electrolyte fluids and paracetamol to 4 patients is still not at the correct dose. The dose of Ringer Lactate given exceed or not enough from range recommended 2-7 mg/ kgBW And dose paracetamol Also found exceed limit This inaccuracy has the potential to impact the success of therapy, as doses that are too high can increase the risk of side effects, while doses that are too low can result in therapeutic ineffectiveness.

Table 4.

Accuracy Ringer's lactate dosage and Paracetamol on Dengue fever patients

Patient weight (kg)	Ringer's Lactate Dose (TPM) for Patient Day 2				RL literature dose		Patient Paracetamol Dose (mg)	Literature dose (mg)	Information
	1	2	3	4	2mg/kgBW	7mg/kgBW			
14	44	44	44	44	28	98	375	350	Paracetamol overdose
15	21	21	21	21	30	105	500	375	Paracetamol overdose, underdose Ringer lactate
17	28	28	28	28	34	119	500	425	Paracetamol overdose, underdose Ringer lactate
12	22	22	22	22	24	84	375	300	Paracetamol overdose, underdose Ringer lactate

Table 5.

Success Therapy Dengue fever patients

Information	f	%
Succeed	26	86.66
Not successful	4	13.33

Based on the total number of patients who received the correct dose, most showed signs of successful therapy in the form of body temperature returning to normal and stable hematocrit levels. Got it results that 86.66% was successful while 13.33% did not succeed.

Table 6.

Dengue Fever Patients on Therapy No Succeed

Patient Sequence No. Incorrect dosage	Hematocrit Day 4 (%)	Body Temperature (°C)		Information
		Day 3	Day 4	
1	38	38	37.6	Unstable temperature in 48 hours
3	40	37.9	37.7	Temperature is unstable within 48 hours and Hematocrit is not within normal limits.
13	39	37.8	37.9	Temperature is unstable within 48 hours and Hematocrit is not within normal limits.
23	40	38	37.8	Temperature is unstable within 48 hours and Hematocrit is not within normal limits.

Table 7.

The Relationship Between Dose Accuracy and Therapy Success

Therapy Success (Ringer Lactate and Paracetamol)	Frequency				p Value
	Appropriate f	Appropriate %	Not exactly f	Not exactly %	
Succeed	26	90	0	0	0.00
Not successful	0	0	4	10	

On table 6, fourth patients who receive doses that are not in accordance show failure in achievement results therapy reviewed from aspect temperature body and level hematocrit. Monitoring clinical on The third day And fourth show that temperature body patient Still megalammi instability in period time 48 hours. Hematocrit level on day fourth No return to normal range 33-38% which should be become an indicator of achievement success therapy treatment on dengue fever patients. Success therapy evaluated through two clinical parameters that is No fever for 48 hours and level stable hematocrit. Most big patients who received appropriate dosage show response optimal therapy . Analysis statistics with test *Chi-Square* show existence meaningful relationships between accuracy dose with success DHF therapy ($p < 0.05$) which indicates that accuracy in giving dose play a role important in support effectiveness dengue fever treatment in child.

DISCUSSION

A total of 30 patients The children who were the research samples were all in the age range of 1-5 years with the majority being male (56.67%) and female (43.33%). Age including to in Wrong One factor risk somebody caught disease fever bloody (Sumampouw, 2020) . This fact aligns with cases of dengue fever, which are commonly found in toddlers due to their immune systems not yet fully developed (Melissa *et al.*, 2021) . Gender does not affect whether or not a child is affected by

dengue fever; both genders can be affected by dengue fever. (Hartini *et al.*., 2024) . This Also supported by statement (Rizky *et al.*, (2024) which shows that type sex No become factor differentiator to dengue fever incidents so that Still there is opportunity affected by the same dengue fever between man and woman. Dose drug Also The dosage must be adjusted to the patient's condition, such as age, weight, and other specific health conditions. Administering the drug in the correct dosage, route, and duration significantly determines the therapeutic effect of the drug. Using too high a dose, especially for drugs with a narrow therapeutic range, can increase the risk of side effects. Conversely, using too low a dose No will ensure reach level desired therapy (Suryoputri *et al.* , 2020) . Accuracy dose This is something that must be considered in patient care. This is because drugs can have different pharmacokinetic and pharmacodynamic characteristics, which can affect blood levels. A dose is considered appropriate if the medication administered is within the patient's therapeutic range or limits (Yunilda *et al.*, 2019) . The doses to be analyzed include antipyretics: Oral paracetamol is given at a maximum dose of 75 mg/kg body weight per day. Therapy fluid : In the dose range of 2-7 ml/ kgBW /hour (Minister of Health of the Republic of Indonesia, 2021) .

Symptom fever high ($>39^{\circ}\text{C}$) is Wrong One common symptoms found on dengue fever patients so that need giving antipyretic For prevent occurrence seizures as well as help lower temperature body. Paracetamol become recommended options Because own profile more security Good compared to potential salicylates trigger effect side such as gastritis, bleeding and acidosis. Administration fluid replacement especially Ringer's Lactate must consider characteristics plasma leakage in dengue fever (Dwi A *et al.*, 2025) . Giving fluid in amount excessive or with too long duration is risky cause excess fluid volume that can make things worse condition patient (Sari, 2020). From the analyzed data, it was found that 86.66% of patients received antipyretic doses (Paracetamol) and fluid therapy (Ringer Lactate) according to the recommended dosage standards based on body weight and age. This accuracy indicates compliance with DHF therapy guidelines in the majority of patients, which is an important indicator in the implementation of rational treatment. There were inaccurate doses of 13.34% of patients, this indicates that it can reduce the effectiveness of therapy or increase the risk of complications such as shock due to excess or lack of fluids. The use of paracetamol requires monitoring of dosage accuracy to prevent toxicity (Sari, 2020) . In addition to paracetamol, DHF patients are also given electrolyte treatment with the aim of optimizing organ perfusion and restoring lost plasma volume. In addition, the use of Ringer Lactate fluid can prevent hypovolemic shock and hemorrhagic shock in DHF patients. (Dwi Arymbhi Sanjaya *et al.*, 2025) . Giving therapy the right fluid since beginning on dengue fever patients can prevent And overcome occurrence shock which is condition emergency, so that can lower number death (Ardlianti *et al.*, 2022).

In this study, the evaluation of the appropriateness of the paracetamol dosage was carried out by monitoring the decrease in the patient's body temperature on the 3rd to 4th day of treatment. The effectiveness of therapy is considered achieved if the patient's body temperature shows a decrease towards the normal body temperature range, namely $36.5\text{-}37.5^{\circ}\text{C}$ (Nusi *et al.*., 2013) . The patient's temperature decreased and stabilized within this range, this indicates that paracetamol was given in the appropriate dose and worked optimally in treating fever. This assessment is important to prevent the patient from experiencing prolonged fever. The clinical diagnosis of DHF is established based on thrombocytopenia and an increase in hematocrit as indicators of hemoconcentration (Indriyani & Gustawan, 2020) . Evaluation of the accuracy of the dose of Ringer Lactate (RL) fluid was carried out by observing the stable hematocrit decrease parameter on day 4. The comparison measurement of hematocrit values was taken on day 4 because the hematocrit value was stable and day 4 was the last day the patient was declared allowed to go home. An increase in hematocrit $\geq 20\%$ indicates an increase in blood vessel permeability as evidence of suspected plasma leakage from the blood vessels which can cause shock, so it is necessary to conduct regular hematocrit checks. (Pipin Supenah *et al.*, 2021) . Hematocrit is an important parameter for assessing body fluid balance because it indicates the percentage of red blood cells in total blood volume, with normal hematocrit

values in children being 33-38% (Rita *et al.*, 2021) . The majority of patients receiving antipyretic and fluid doses according to guidelines showed a positive clinical response. This indicates that accurate dosing plays a critical role in the effectiveness of therapy (Sholihah *et al.*, 2022)

This study used the *Chi-Square test* because it aimed to analyze the relationship between two categorical variables. This test was chosen based on the characteristics of the data, where dosage accuracy and therapeutic success were classified into categories. If the resulting *p-value* is <0.05 , this indicates a statistically significant relationship. between these variables (Heryana, 2020) . *Chi-square* analysis showed a significant relationship between dosage accuracy and the success of dengue fever therapy ($p<0.05$). The success of therapy was measured based on a decrease in temperature over 48 hours and stable hematocrit levels. Patients who received the correct dosage showed a faster and more stable therapeutic response compared to patients who received the incorrect dosage. These results were found in previous studies by (Meriska *et al.*, 2019) and (Rosa Dwi Wahyuni, 2017). which states the importance of standard dose emphasis in the treatment of pediatric patients with DHF.

CONCLUSION

This study shows a significant relationship between the appropriateness of antipyretic and fluid therapy dosages and the success of therapy in pediatric patients with dengue fever at Slamet Riyadi Specialist Hospital, Surakarta. Children who received therapy according to the prescribed dosage showed a better clinical response compared to those who did not. These findings provide answers to the research problem and confirm that adherence to standard dosage guidelines plays a crucial role in the effectiveness of dengue treatment. This study contributes to the improvement of clinical pharmacy services and encourages the implementation of routine evaluation of therapy accuracy. The limitations of this study lie in the limited sample size; therefore, further research is recommended to include a wider population and consider additional variables such as the rationale for dengue treatment.

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