The Relationship between Platelet Count and Hematocrit with the Severity of Dengue Hemorrhagic Fever at Lendemoripa Christian Hospital – West Sumba – East Nusa Tenggara.

Asrina Rery Kahowi

Rumah Sakit Kristen Lendemoripa, Indonesia
Email: asrinarerykahowi@gmail.com

ABSTRACT

Dengue virus infection remains a significant public health problem in tropical and subtropical regions, including Indonesia. This study aims to evaluate the clinical severity and hematological findings among dengue patients at RSK Lende Moripa, West Sumba, NTT. This retrospective descriptive study collected medical record data of adult patients hospitalized during the study period. A total of 76 patients who met the inclusion criteria were analyzed, with data on gender, age, clinical manifestations, and hematological profiles (platelet count and hematocrit) being examined. Of the 76 patients, 45 (59%) were male, and the majority (63%) were between 18-40 years old. Clinical manifestations showed 41 cases (54%) of Dengue Hemorrhagic Fever (DHF) and 35 cases (46%) of Dengue Fever (DF). There were no cases of Dengue Shock Syndrome (DSS). Significant differences in platelet levels were found between DF and DHF cases (p=0.01), while no significant difference was observed in hematocrit levels (p=0.4). Thrombocytopenia was more severe in DHF patients. Platelet levels are critical in assessing dengue severity, with thrombocytopenia being more prevalent in DHF cases. Monitoring platelet levels is essential for early detection of severe dengue cases.

Keywords: Relationship Between Platelet Count; and Hematocrit; Dengue Fever

Introduction

Dengue virus infection is one of the significant public health problems in various tropical and subtropical regions, including Indonesia. Dengue is caused by one of four dengue virus serotypes (DENV-1 to DENV-4), which is transmitted through the bite of the *Aedes aegypti* and *Aedes albopictus* mosquitoes (Gubler, 1998). The disease can manifest in mild forms such as Dengue Fever (DF) to more severe forms such as Dengue Hemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS) (Gubler, 1998). Globally, the WHO estimates that there are around 390 million dengue infections per year, with more than 100 million cases showing clinical symptoms (World Health Organization [WHO], 2022).

In Indonesia, dengue is still a big challenge, especially in areas with a tropical climate such as East Nusa Tenggara (NTT). Environmental conditions that support the breeding of vector mosquitoes, limited access to health services, and changing patterns of the spread of the virus make it difficult to control this disease (Marina et al., 2023). In recent years, several regions in Indonesia, including NTT, have reported an increase in dengue cases, especially in the

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productive age (Ministry of Health of the Republic of Indonesia, 2022).

Lende Moripa Christian Hospital, West Sumba, NTT, is one of the health service centers that handles dengue cases in this region. The research conducted at this hospital aims to evaluate the clinical severity as well as hematological findings in treated dengue patients, especially in relation to platelet and hematocrit values (Tewari et al., 2018). Although most of the literature identifies thrombocytopenia as the main clinical sign in dengue infections, variations in thrombocytopenia patterns based on clinical severity still require further research (Gubler, 1998).

Based on the results of the study, most of the patients who met the inclusion criteria were young adult patients aged 18-40 years, with a higher proportion of males than females. These findings are in line with previous research suggesting that this age group is more susceptible to dengue infections due to high levels of mobility and outdoor activities, which increases the risk of exposure to vector mosquitoes (Morrison et al., 2008). However, there were no cases of DSS in this study, suggesting that patients may have received effective early treatment.

In addition, thrombocytopenia is found more often in patients with DHF, and there is a significant difference in platelet count between DF and DHF cases. This strengthens the hypothesis that thrombocytopenia can be used as an important indicator to assess the clinical severity of dengue infection (Martina et al., 2009). However, low hematocrit values were found in most DF and DHF cases, with no significant improvement in these cases. This may reflect that decreased hematocrit is not a major parameter in determining severity in this population (Zhang et al., 2014).

Given the important role of platelets in the clinical course of dengue infection, this study emphasizes the importance of close monitoring of platelet count in dengue patients, especially in DHF cases. A better understanding of the relationship between haematological changes and disease severity is essential for developing more effective treatment strategies. This study is expected to contribute to strengthening the evidence related to the clinical management of dengue infection in Indonesia, especially in high-risk areas such as NTT.

Research Methods

This study is an observational study with *a cross-sectional* design. The population in this study is all patients diagnosed with dengue at Lende Moripa Hospital, NTT during the period of January to March 2024. Samples were taken by *consecutive sampling*. Participants were included in the study if there was a diagnosis with the International Diagnostic Classification (ICD)-10 codes A90-A91 ("*Dengue fever [classical dengue]*" and "*Dengue hemorrhagic fever*" during hospitalization. In this study, we categorized the severity of dengue fever into three categories, Dengue Fever (DF), Dengue Hemorrhagic Fever (DHF), and *Dengue Shock Syndrome* (DSS). Data regarding platelet count and severity of Dengue Infection are obtained from medical records. *The Chi-square* or *Fisher's exact* test is used to analyze differences in hematological parameters at different levels of dengue infection. Statistical significance is determined if the value of p<0.05. All statistical analyses were conducted using *IBM SPSS Statistics software*, version 26.0 (IBM Corp., Armonk, N.Y., USA)

Results and Discussion

A total of 223 patients were treated at Lende Moripa Hospital, West Sumba, NTT during the study period. Only 76 patients met the inclusion and exclusion criteria, consisting of 45 males (59%) and 31 females (41%). The most age group is children aged 18-40 years, which is as many as 48 patients (63%). Regarding the clinical severity of dengue virus infection in these patients, the most common clinical manifestation was Dengue Hemorrhagic Fever (DHF) in 41 patients (54%), followed by Dengue Fever (DF) (46%) while the clinical manifestation of DSS was not obtained in this study.

Characteristic	
Age	
18-40	48 (63.15%)
41-65	22 (28.94%)
>65	6 (7.89%)
Gender	
Man	45 (59%)
Woman	31 (41%)
Severity	
DF	35 (46%)
DHF	41 (54%)
DSS	0

Based on platelet count, normal platelet values and mild platelet openia were most commonly found in Dengue Fever (DF) cases (17 cases [48.57%]). Moderate thrombocytopenia is most commonly found in Dengue Hemorrhagic Fever (DHF) cases (23 cases [56.09%]). Severe thrombocytopenia was only found in DHF cases (6 cases [14.63%])). There was a significant difference in platelet levels (p=0.01) at different levels of dengue fever severity.

Platelet count			
	DF	DHF	P value
Usual	17 (48.57%)	4 (9.75%)	
Mild Thrombocytopenia	17 (48.57%)	8 (19.51%)	$P < 0.0001$
Moderate Thrombocytopenia	1 (2.85%)	23 (56.09%)	
Severe Thrombocytopenia	0	6 (14.63%)	
Total	35	41	

There was no significant difference in hematorchic values in the severity of dengue fever (p=0.4). Low hematocrit values were obtained in most cases of both DF and DHF (51% and 61%, respectively). There was no increase in hematocrit values in DF and DHF cases, and there was a

decrease in hematocrit values in DF and DHF cases.

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	Hematocrit		
	DF	DHF	P value
Low	18 (51%)	25 (61%)	
Usual	17 (49%)	16 (39%)	P = 0.4057
Tall	0	0	
Total	35	41	

DISCUSSION

This study provides an overview of the clinical and hematological profile of patients with dengue virus infection at Lende Moripa Hospital, West Sumba, NTT, during the study period. The findings of this study are relevant to the existing literature, which highlights the demographic distribution, clinical severity, and association between platelet and hematocrit values and clinical manifestations of dengue infection.

Demographic Distribution

The majority of patients in this study were male (59%), in line with several previous studies that showed that dengue infections were more common in men than women (Morrison et al., 2008). However, the exact mechanism of these differences in incidence by sex is not yet fully understood, although there are theories linking hormonal factors and more susceptible behaviors in men (Torres & Fernández, 2021).

The age group most affected by the infection is 18-40 years old (63%). This is consistent with research showing that the younger age group of adults is more frequently involved in outdoor activities, which increases the risk of exposure to the Aedes mosquito, the main vector of the dengue virus (Gubler, 1998). In NTT, with a tropical climate and an environment that supports mosquito breeding, these findings support the hypothesis that environmental factors also affect dengue epidemiology (Focks et al., 1995).

Clinical Manifestations

As many as 54% of the patients in this study were diagnosed with Dengue Hemorrhagic Fever (DHF), while the rest (46%) had Dengue Fever (DF). The absence of Dengue Shock Syndrome (DSS) cases in this study may reflect that most patients get treatment before the disease progresses to a more severe phase. Several studies suggest that timely medical intervention can reduce the risk of progression to DSS (Halstead et al., 1970). Other studies have also indicated that DSS is more common in children, who are not included in the main demographic in this study (Lee, 2020).

Thrombocytopenia and Dengue Severity

The findings of this study show that moderate and severe thrombocytopenia is more common in DHF cases than DF. Severe thrombocytopenia was found in 14.63% of DHF cases, while moderate thrombocytopenia was found in 56.09% of DHF cases. These results support research showing that a decrease in platelet count is one of the important parameters in determining the severity of dengue infection (Gubler, 1998). A significant difference in platelet levels between groups of patients with different severities (p=0.01) suggests a relationship between platelet decline and disease severity. Thrombocytopenia in dengue is caused by increased platelet destruction and decreased production due to the direct effects of the virus

on the bone marrow (Yuan et al., 2022).

Hematocrit and Dengue

In this study, no significant increase in hematocrit values was found, either in patients with DF or DHF (p=0.4). In contrast, most patients experienced a decrease in hematocrit values, which was 51% in DF and 61% in DHF. This decrease in hematocrit values can be explained by the presence of a less significant plasma leakage, or proper fluid treatment that prevents hemoconcentration (Martina et al., 2009). Previous research has shown that increased hematocrit is frequent in the critical phase of dengue, especially in cases of DSS, but not always in milder DFs and DHFs (Martina et al., 2009).

Clinical Implications

The study emphasizes the importance of close monitoring of platelets in dengue patients, especially for those diagnosed with DHF. Although the decrease in hematocrit was not significant in this study, a significant decrease in platelet values could be an important indicator in determining the severity and risk of complications (Zhang et al., 2014). Therefore, regular monitoring of platelets and adequate fluid administration are important parts of the management of patients with dengue infection.

Overall, the results of this study provide important insights related to the epidemiology and clinical characteristics of dengue patients in NTT, especially regarding the relationship between platelet levels and clinical severity. However, further research with a larger population and inclusion of DSS cases is needed to reinforce these findings

Conclusion

1. There was no significant difference in hematorchic values in the severity of dengue fever (p=0.4).
2. There was a significant difference in platelet levels (p=0.01) at different levels of dengue fever severity.

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