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CASE REPORT Open Access

Correlation Between Hematocrit Levels and Length of Stay among Dengue Infection Patients at Wangaya General Hospital

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Abstract
Dengue infections, such as Dengue Fever (DF) and Dengue Hemorrhagic Fever (DHF), remain significant public health issues in Indonesia, including Bali Province. The high incidence and mortality rates due to DHF have substantial impacts, particularly concerning treatment costs and length of hospitalization. This study aims to analyze the correlation between hematocrit levels and hospital length of stay among DHF patients at RSUD Wangaya in 2023. The variable studied was hematocrit levels. This research employed an analytical observational method with a retrospective cross-sectional design, using medical record data from DHF patients at RSUD Wangaya from January 1, 2023, to December 31, 2023. Data analysis was conducted using Pearson's correlation test to assess the relationship between hematocrit levels and hospital length of stay. The study results showed that the majority of patients were male (58.3%) and that most were under 50 years old (66.7%). The most common clinical manifestation was fever (98.1%), and most patients had platelet counts below 100,000/µL (77.8%). The average hematocrit was 40.6% in the group with levels <50% and 52.1% in the group with levels ≥50%. Bivariate analysis using Spearman's correlation test showed no significant association between hematocrit levels and hospital length of stay among dengue patients (p = 0.835). This study concludes that although hematocrit levels are critical clinical indicators in DHF patients, no significant correlation was found between hematocrit levels and hospital length of stay.

Keywords: Correlation; dengue infection; hematocrit level; length of stay; severity

Introduction

Dengue infection, which causes Dengue Fever (DF) and Dengue Hemorrhagic Fever (DHF), is a global public health issue that continues to rise, with over 2.5-3 billion people at risk of infection, particularly in tropical and subtropical countries such as Indonesia. Over the past 30 years, the number of DHF cases in Indonesia has shown a significant increase, with approximately 3,000,000 cases each year and 500,000 requiring Hospitalization, alongside 12,000 deaths predominantly among children[1,2]. Bali Province is one of the regions experiencing a high incidence rate, with 61.3 cases per 100,000 population in 2021[3]. Research indicates that the length of hospital stay for DHF patients may be influenced by hematocrit levels, where this condition is associated with serious complications such as dengue shock syndrome[4] . Therefore, this study aims to analyze the correlation between hematocrit levels and hospital stay length for dengue patients at RSUD Wangaya in 2023, to provide clinicians with better insights for managing DHF cases.

Material and methods

The objective of this study is to analyze

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the relationship between hematocrit levels and length of hospital stay among patients with dengue infection admitted to RSUD Wangaya from January 1 to December 31, 2023. The research design is an analytical observational study with a retrospective cross-sectional approach, in which data are collected from patient medical records. The target population comprises all patients diagnosed with dengue, while the accessible population comprises those hospitalized during the specified period. Sampling was conducted using a consecutive sampling technique, with inclusion criteria for patients over 18 years old and exclusion criteria for patients who died or left against medical advice. The sample size was determined based on the formula N = $\frac{Z\alpha^2 PQ}{d^2}$ With an assumed dengue infection proportion of 50%, resulting in a total of 96 samples[5]. The independent variable in this study is hematocrit level, while the dependent variable is hospital length of stay. Data collection was performed through secondary data extraction from medical records, and analysis was conducted using Pearson correlation tests to determine relationships between variables [5].

Results and Discussion

The characteristics of the sample in this study indicate that among 108 patients with dengue infection admitted to RSUD Wangaya, the majority were under 50 years old (66.7%), with a slightly higher proportion of males (58.3%) than females (41.7%). Previous studies indicate that this phenomenon is attributed to higher levels of outdoor activities in this age group[6]. These findings align with those of Tirtadevi and Rini, who demonstrated that males are more susceptible to infections compared to females[7]. This susceptibility is thought to result from more efficient immunoglobulin and antibody production in females, influenced by genetic and hormonal factors. Additionally, males tend to engage in outdoor activities more frequently, thereby increasing their risk of exposure to infections. Conversely, females may have blood capillaries that are more prone to increased permeability, which can also affect their response to infections [6,8].

Table 1. Demographic characteristics of the samples

Variable	Frequency (N)	Percentage (%)
Age, years		
< 50	72	66.7
≥ 50	36	33.3
Gender		
Man	63	58.3
Woman	45	41.7
Clinical Manifestations		
Fever	106	98.1
Headache	11	10.2
Heartburn	13	12
Body aches	12	11.1
Arthralgia	7	6.5
Myalgia	2	1.9
Retroorbital Pain	1	0.9
Bleeding	12	11.1
Vomit	45	41.7
Platelet count		
< 100.000/µL	84	77.8
≥ 100.000/µL	24	22.2
Leukocytes		
< 4.000/µL	51	47.2
≥ 4.000/µL	57	52.8
Haematocrit Values		
< 50%	102	94.4
≥ 50%	6	5.6

The most common clinical manifestation was fever, affecting 98.1% of patients. The results are consistent with prior research, which states that fever is the most common clinical manifestation, observed in 98.1% of patients, followed by muscle and joint pain (6). Blood examination results showed that 77.8% of patients had a platelet count below 100,000/µL, while 52.8% had a leukocyte count above 4,000/µL. Hematocrit levels also indicated that 94.4% of patients had hematocrits below 50%. Among the total subjects, 11.1% experienced bleeding, with the majority of bleeding sources coming from the gums. Laboratory examinations revealed that 77.8% of patients had a platelet count below 100,000/µL, consistent with previous studies that identified thrombocytopenia as an essential criterion for hospitalization in patients with dengue infection99. The

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leukocyte count for the majority of patients was ≥4,000/µL (52.8%), supporting Kristanti's findings, which also reported normal leukocyte counts in dengue infection patients10.

Table 2. Average Hematocrit Levels

Hematocrit level (%)	Mean ± SD	Min (%)	Max (%)
< 50%	40,6 ± 3,6	35,1	44,6
≥ 50%	52,1 ± 2,4	50,1	56,7

The average hematocrit level in the group with values less than 50% was 40.6 ± 3.6%, whereas in the group with values equal to or greater than 50%, it was 52.1 ± 2.4%. Most dengue infection patients have high hematocrit levels, reflecting hemoconcentration and indications of plasma leakage11. Additionally, factors such as fluid loss or bleeding can also affect hematocrit levels, which may appear normal if the patients have passed the critical phase of the infection6. The majority of patients in this study had hematocrit levels below 50% (94.4%, or 102 patients), with an average of 40.6 ± 3.6 SD, indicating that they did not experience shock despite dengue infection.

Table 3. Correlation of Hematocrit Values with Length of Hospitalization

		Length of stay
Hematocrit level	r	0,020
	p	0,835
	n	108

Correlation analysis between hematocrit levels and length of hospital stay did not show a significant relationship (p = 0.835), suggesting that hematocrit levels cannot be used as indicators to predict disease deterioration12. However, these results differ from those of Amini et al., who reported a significant relationship between hematocrit and length of stay, which may be attributed to variations in research methods and sample characteristics9.

Conclusion

Importantly, there was no statistically significant association between admission hematocrit and length of hospital stay, suggesting that admission hematocrit alone is not a reliable predictor of hospitalization duration or disease trajectory in this population. These results imply that hematocrit status at presentation has limited prognostic utility for dengue severity or resource utilization in this center during 2023, and emphasize the need to incorporate dynamic hematocrit trends and additional clinical and laboratory indicators into risk stratification. Caution is warranted when generalizing beyond this single-center, retrospective cohort, and further multicenter prospective studies are needed to clarify hematocrit's role across different dengue severities and settings.

Study limitation

This analysis is limited by its retrospective, single-center design, which may introduce selection and information bias. The sample was drawn by consecutive sampling from hospitalized patients and excluded those who died or left against medical advice, potentially biasing results toward milder disease. Data were collected from medical records without standardized timing for hematocrit measurements or control for potential confounders such as fluid management, comorbidities, or severity markers, limiting causal inferences. The findings pertain to a specific hospital and year and may not generalize to other settings or time periods.

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Conflict of Interest

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other interest or non-financial interest, such as personal or professional relation, affiliation, and knowledge of the research topic.

Authors contribution

Nyoman Adi Wirasatya: Data Collection, Analysis.

Sri Masyeni: Visualization, Supervision, Review the manuscript, and final touch.

Saraswati Laksmi Dewi: Methodology, Writing – Original Draft.

Data availability

"This statement does not apply to this article."

Informed consent statement

"This study did not involve human participants, and therefore, informed consent was not required."

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