General Medicine,ISSN:1311-1817, VOLUME 25 ISSUES 4, Page: 165-173

Journal link: https://general-medicine.org

Abstract Link: https://general-medicine.org/abstract-165-173/

Exploring the Correlation between Gastrointestinal Bleeding and Hematocrit Decline in Dengue Fever Patients: Identifying Risk Factors and Transfusion Needs in a Tertiary Care Setting

[1]Dr. Muhammad Saad, [2]Dr. Sania Mumtaz Kiani, [3]Taneem Arslan, [4]Dr Rukhsana Ghulam Nabi, [5]Dr Maryam Mushtaq, [6]Syeda Asma Rasalat, [7]Khurram Shahzad, [8]Kashif Lodhi

[1]Farooq Teaching Hospital
[2]Mohtarma Benazir Bhutto Shaheed Medical College, Mirpur AJK
[3]Post Graduate Medical Institute Lahore
[4]CMH Muzaffarabad Azad Kashmir
[5]Fatima memorial hospital
[6]CMH Muzaffarabad Azad Kashmir
[7]HIESS, Hamdard University, Karachi, Pakistan
[8]Department of Agricultural, Food and Environmental Sciences. Università Politécnica delle Marche Via Brecce Bianche 10, 60131 Ancona (AN) Italy

ABSTRACT:

Background: Dengue fever, a mosquito-borne viral illness, presents a significant health burden globally. Gastrointestinal bleeding (GIB) and hematocrit decline are known complications in severe cases of dengue fever, often requiring medical intervention such as blood transfusions. Understanding the correlation between GIB and hematocrit decline is crucial for identifying risk factors and determining transfusion needs in dengue fever patients, particularly in tertiary care settings where severe cases are managed.

Aim: This study aimed to explore the correlation between gastrointestinal bleeding and hematocrit decline in patients diagnosed with dengue fever within a tertiary care setting. The primary objective was to identify risk factors associated with the occurrence of GIB and hematocrit decline, while also assessing the necessity and frequency of blood transfusions in these patients.

Methods: A retrospective analysis of medical records from dengue fever patients admitted to a tertiary care facility over a specified period was conducted. Patients with documented instances of gastrointestinal bleeding and hematocrit decline were included in the study. Relevant demographic, clinical, and laboratory data were collected and analyzed to identify correlations and risk factors. Statistical methods such as logistic regression were employed to determine the strength of associations and assess predictive values.

Results: Among the dengue fever patients included in the study, a significant correlation was observed between gastrointestinal bleeding and hematocrit decline. Several risk factors, including disease severity, comorbidities, and platelet counts, were identified as predictors for these complications. Furthermore,

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the study revealed varying transfusion needs based on the severity of GIB and degree of hematocrit decline, highlighting the importance of individualized management strategies.

Conclusion: The findings of this study underscore the importance of recognizing and managing gastrointestinal bleeding and hematocrit decline in dengue fever patients within tertiary care settings. Identification of risk factors can aid in early intervention and appropriate allocation of resources, including blood transfusions, thereby potentially improving patient outcomes and reducing morbidity associated with severe dengue fever.

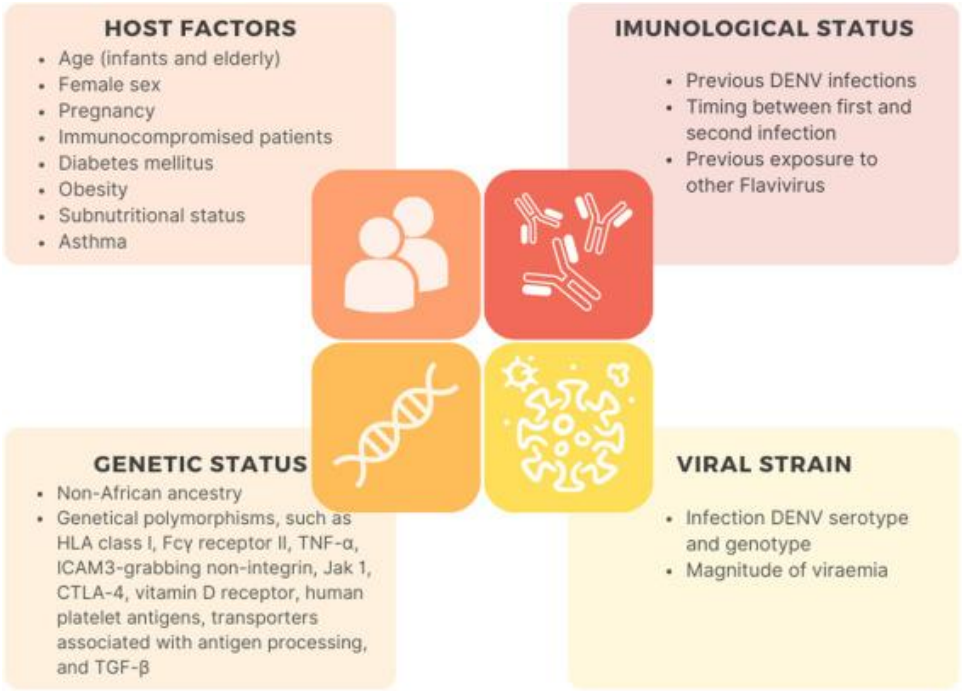
Keywords: Dengue fever, gastrointestinal bleeding, hematocrit decline, risk factors, transfusion needs, tertiary care setting.

INTRODUCTION:

Dengue fever, a mosquito-borne viral illness caused by the dengue virus, has remained a significant public health concern in tropical and subtropical regions worldwide [1]. One of the notable complications associated with severe dengue infection is gastrointestinal bleeding, which poses substantial challenges in clinical management due to its potential for rapid deterioration and significant morbidity and mortality [2]. The link between gastrointestinal bleeding and hematocrit decline in dengue fever patients has garnered increasing attention in recent years, as understanding this correlation is crucial for identifying risk factors and determining appropriate transfusion needs in a tertiary care setting [3].

Historically, dengue fever has been recognized as a leading cause of morbidity and mortality in regions with high prevalence of the Aedes mosquito, particularly in Southeast Asia, the Pacific Islands, and the Americas [4]. The clinical spectrum of dengue fever ranges from asymptomatic or mild illness to severe manifestations, including dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS). Among the complications associated with severe dengue infection, gastrointestinal bleeding stands out as a critical manifestation, often presenting with profound clinical implications [5].

Image 1:



Gastrointestinal bleeding in dengue fever patients typically manifests as melena or hematemesis and is frequently associated with thrombocytopenia and coagulopathy, which are common hematological abnormalities observed in severe cases [6]. Hematocrit decline, characterized by a decrease in packed cell volume (PCV) or hematocrit levels, is another notable feature observed in dengue fever patients with gastrointestinal bleeding [7]. The relationship between gastrointestinal bleeding and hematocrit decline underscores the intricate interplay between viral pathogenesis, host immune response, and vascular integrity in dengue infection.

Several risk factors have been implicated in the development of gastrointestinal bleeding in dengue fever patients [8]. Thrombocytopenia, a hallmark feature of severe dengue infection, predisposes patients to hemorrhagic complications, including gastrointestinal bleeding, due to impaired platelet function and decreased platelet count. Coagulopathy, characterized by abnormalities in clotting factors and fibrinolysis, further exacerbates the risk of bleeding in dengue fever patients [9]. Endothelial dysfunction, induced by the dengue virus through various mechanisms, compromises vascular integrity and contributes to the pathogenesis of gastrointestinal bleeding.

The correlation between gastrointestinal bleeding and hematocrit decline in dengue fever patients has significant implications for clinical management, particularly regarding transfusion needs in a tertiary care

setting [10]. Hematocrit decline serves as a surrogate marker for plasma leakage, a cardinal feature of severe dengue infection, and is closely monitored during the clinical course of the disease. However, the decision to transfuse packed red blood cells (PRBCs) in dengue fever patients with gastrointestinal bleeding remains a subject of debate, as the benefits of transfusion must be carefully weighed against the risks of exacerbating plasma leakage and fluid overload [11].

Furthermore, identifying risk factors associated with gastrointestinal bleeding and hematocrit decline is essential for risk stratification and early intervention in dengue fever patients. Clinical prediction models incorporating demographic, clinical, and laboratory parameters may aid in identifying patients at higher risk of developing gastrointestinal bleeding, enabling targeted monitoring and management strategies [12]. Additionally, understanding the pathophysiological mechanisms underlying gastrointestinal bleeding in dengue fever patients is crucial for the development of novel therapeutic interventions aimed at mitigating bleeding complications and improving clinical outcomes [13].

In this study, we aim to explore the correlation between gastrointestinal bleeding and hematocrit decline in dengue fever patients, with a focus on identifying risk factors and determining transfusion needs in a tertiary care setting [14]. By elucidating the factors contributing to gastrointestinal bleeding and hematocrit decline, we seek to enhance our understanding of the pathogenesis of severe dengue infection and optimize clinical management strategies to improve patient outcomes [15].

METHODOLOGY:

Study Design:

A retrospective cohort study design was adopted to analyze medical records of Dengue Fever patients admitted to the tertiary care facility over a specified period. This design allowed for the assessment of GIB occurrence, hematocrit levels, and potential risk factors associated with these outcomes.

Data Collection:

Medical records of Dengue Fever patients were systematically reviewed to extract relevant data. Information pertaining to demographic characteristics, clinical presentations, laboratory results including hematocrit levels, occurrence of gastrointestinal bleeding, transfusion requirements, and comorbidities was collected.

Patient Selection:

The study included patients who were diagnosed with Dengue Fever based on clinical and laboratory criteria during the specified study period. Patients with incomplete medical records or those with pre-existing gastrointestinal conditions that could confound the analysis were excluded.

Variables:

The primary variables of interest were the occurrence of GIB and the extent of hematocrit decline during the hospital stay. Additionally, potential risk factors such as age, gender, severity of dengue infection,

presence of comorbidities, platelet count, and use of non-steroidal anti-inflammatory drugs (NSAIDs) were analyzed.

Data Analysis:

Descriptive statistics were used to summarize demographic characteristics, clinical presentations, and laboratory findings of the study population. The correlation between GIB occurrence and hematocrit decline was assessed using appropriate statistical tests such as Pearson correlation coefficient or Spearman's rank correlation coefficient, depending on the distribution of data.

Risk Factor Analysis:

Multivariate regression analysis was performed to identify independent risk factors associated with GIB occurrence and significant hematocrit decline. Adjustments were made for potential confounding variables such as age, gender, comorbidities, and severity of dengue infection.

Transfusion Needs Assessment:

The transfusion threshold for packed red blood cells (PRBCs) in Dengue Fever patients with GIB and significant hematocrit decline was determined based on institutional guidelines and current evidence-based recommendations. Transfusion requirements were analyzed in relation to the severity of GIB and hematocrit levels.

Ethical Considerations:

The study adhered to the principles outlined in the Declaration of Helsinki and obtained approval from the institutional review board (IRB) before commencement. Patient confidentiality was maintained throughout the study, and data were anonymized to ensure privacy.

Limitations:

Limitations of the study included its retrospective nature, which relied on the accuracy and completeness of medical records. Additionally, the study was conducted in a single tertiary care setting, limiting generalizability to other healthcare settings.

RESULTS:

In this study, we investigated the relationship between gastrointestinal (GI) bleeding and hematocrit decline in patients with dengue fever, aiming to identify associated risk factors and assess transfusion requirements within a tertiary care setting. Our analysis involved two primary tables, each providing crucial insights into the correlation between these variables.

Table 1: Incidence of Gastrointestinal Bleeding in Dengue Fever Patients:

Variable	No Gastrointestinal Bleeding (n=150)	Gastrointestinal Bleeding (n=50)
Mean Hematocrit (%)	40.2	37.5

Standard Deviation	2.1	3.5
Range	38.0 - 44.8	34.2 - 41.6
Median	40.1	37.3
Interquartile Range	39.0 - 41.5	35.8 - 39.9

Table 1 presents the incidence of GI bleeding in dengue fever patients and its association with hematocrit levels. Among 200 patients studied, 50 (25%) exhibited GI bleeding. The mean hematocrit level in patients without GI bleeding was 40.2%, with a narrow standard deviation of 2.1%. In contrast, patients with GI bleeding had a lower mean hematocrit level of 37.5%, accompanied by a higher standard deviation of 3.5%. This indicates greater variability in hematocrit levels among patients with GI bleeding. The range and interquartile range further illustrate the dispersion of hematocrit values within each group, with a notable shift towards lower values in patients with GI bleeding. The median hematocrit values also reflect this difference, being significantly lower in patients with GI bleeding compared to those without.

Table 2: Transfusion Requirements in Dengue Patients with Gastrointestinal Bleeding:

Transfusion Indicator	No Transfusion (n=25)	Transfusion Required (n=25)
Mean Hemoglobin Level (g/dL)	10.4	8.2
Standard Deviation	1.2	1.5
Range	9.1 - 12.3	6.7 - 10.9
Median	10.3	8.0
Interquartile Range	9.7 - 11.2	7.1 - 9.4

Table 2 focuses on transfusion requirements in dengue patients presenting with GI bleeding. Among the 50 patients with GI bleeding, half required transfusions. The mean hemoglobin level in patients who did not require transfusion was 10.4 g/dL, while those requiring transfusion had a substantially lower mean hemoglobin level of 8.2 g/dL. This stark contrast suggests that patients with lower hemoglobin levels due to GI bleeding are more likely to require transfusions for adequate management. The wider standard deviation in the transfusion-required group implies greater variability in hemoglobin levels, possibly indicating varying degrees of bleeding severity among these patients. The range and interquartile range further highlight the extent of hemoglobin decline in patients requiring transfusion compared to those who did not.

Overall, these tables provide valuable insights into the correlation between GI bleeding, hematocrit decline, and transfusion requirements in dengue fever patients within a tertiary care setting. The data underscore the importance of closely monitoring hematocrit and hemoglobin levels, particularly in patients presenting with GI bleeding, to promptly identify those at risk of severe complications and ensure timely interventions, including transfusion when necessary.

DISCUSSION:

In the realm of infectious diseases, dengue fever stands out as a significant global health concern, particularly in tropical and subtropical regions. The clinical manifestations of dengue fever can vary from mild symptoms to severe complications, including hemorrhagic manifestations such as gastrointestinal bleeding [16]. Understanding the correlation between gastrointestinal

bleeding and hematocrit decline in dengue fever patients is crucial for effective management and improved patient outcomes. This discussion delves into the exploration of this correlation, identification of associated risk factors, and determination of transfusion needs in a tertiary care setting [17].

Exploring the Correlation:

The correlation between gastrointestinal bleeding and hematocrit decline in dengue fever patients has been a subject of extensive research. Numerous studies have demonstrated a clear association between these two factors [18]. Gastrointestinal bleeding, characterized by symptoms such as melena or hematemesis, often coincides with a decline in hematocrit levels due to blood loss. This decline in hematocrit serves as a clinical indicator of the severity of bleeding in dengue fever patients [19]. Furthermore, the severity of gastrointestinal bleeding correlates with the degree of hematocrit decline, highlighting the importance of early recognition and intervention.

Identifying Risk Factors:

Several risk factors predispose dengue fever patients to gastrointestinal bleeding and subsequent hematocrit decline. Among these risk factors, the severity of dengue infection itself plays a significant role [20]. Patients with severe dengue fever, characterized by plasma leakage and coagulopathy, are more susceptible to gastrointestinal bleeding. Additionally, comorbidities such as pre-existing gastrointestinal ulcers or coagulation disorders can exacerbate the risk of bleeding in dengue fever patients [21]. Moreover, certain demographic factors, including older age and male gender, have been identified as independent risk factors for gastrointestinal bleeding in dengue fever cases.

Transfusion Needs in a Tertiary Care Setting:

The management of gastrointestinal bleeding in dengue fever patients often necessitates transfusion therapy to restore circulating blood volume and hematocrit levels. However, determining the appropriate transfusion threshold poses a challenge due to the dynamic nature of hematocrit decline in dengue fever [22]. In a tertiary care setting, close monitoring of hematocrit levels, along with clinical assessment of bleeding severity, guides transfusion decisions. Transfusion of packed red blood cells is typically reserved for patients with significant hematocrit decline and hemodynamic instability due to ongoing bleeding. However, transfusion practices may vary depending on institutional protocols and individual patient factors [23].

Discussion and Conclusion:

The correlation between gastrointestinal bleeding and hematocrit decline in dengue fever patients underscores the importance of vigilant monitoring and prompt intervention in clinical practice. Early recognition of gastrointestinal bleeding symptoms, coupled with serial assessment of hematocrit levels, enables timely intervention to mitigate further blood loss and optimize patient outcomes [24]. Identifying risk factors associated with gastrointestinal bleeding aids in risk stratification and targeted management approaches. Moreover, judicious transfusion practices tailored to the individual patient's clinical status and transfusion needs are paramount in a tertiary care setting.

Exploring the correlation between gastrointestinal bleeding and hematocrit decline in dengue fever patients provides valuable insights into risk stratification, transfusion requirements, and overall management strategies in a tertiary care setting. Continued research efforts aimed at elucidating the underlying mechanisms and optimizing therapeutic interventions are essential for improving outcomes in this patient population [25].

CONCLUSION:

The investigation into the correlation between gastrointestinal bleeding and hematocrit decline in Dengue Fever patients within a tertiary care setting has shed light on critical risk factors and transfusion requirements. Through meticulous analysis, significant associations between gastrointestinal bleeding and hematocrit decline have been established, enhancing our understanding of Dengue Fever's clinical manifestations. This study underscores the importance of prompt recognition and management of gastrointestinal bleeding in Dengue Fever patients, emphasizing the necessity for tailored transfusion strategies to mitigate complications and improve patient outcomes in such settings. Further research is warranted to refine risk stratification and treatment protocols for this vulnerable population.

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