Journal of Health and Rehabilitation Research 2791-156X JHRR

Original Article

Frequency of Thrombocytopenia in Patients Infected with Hepatitis C Virus Infection of a Tertiary Care Hospital

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Keywords: Hepatitis C Virus, HCV, thrombocytopenia, platelet count, hematologic abnormalities, RT-PCR, cross-sectional study, liver disease, bleeding risk, Pakistan.

Abstract

Background: Hepatitis C Virus (HCV) infection is a global health issue, particularly prevalent in Pakistan. HCV can cause significant liver damage and various hematologic abnormalities, including thrombocytopenia, which increases the risk of bleeding and bruising.

Objective: This study aimed to determine the frequency of thrombocytopenia in patients infected with HCV at a tertiary care hospital and to explore the associations with demographic and clinical characteristics.

Methods: A cross-sectional study was conducted over six months, enrolling 200 HCV-reactive patients aged 18-65 years, excluding those with liver cirrhosis, chronic liver disease, liver cancer, end-stage renal disease, coexisting viral infections, and pregnant females. Venous blood samples were collected to confirm HCV through real-time polymerase chain reaction (RT-PCR) and to perform a complete blood count (CBC) for platelet (PLT) count. Data were analyzed using SPSS version 25.0, with quantitative variables summarized as mean and standard deviation, and qualitative variables expressed as frequencies and percentages. Associations between thrombocytopenia and various factors were evaluated using the chi-square test.

Results: Of the 200 patients, 72 (36.00%) were males and 128 (64.00%) females, with a mean age of 42.71 ± 13.164 years. Thrombocytopenia (PLT count <150 x 10^9/L) was present in 47 (23.50%) patients. No statistically significant associations were found between thrombocytopenia and demographic or clinical characteristics, except for a weak association with the history of previous surgery (p=0.048). The mean PLT count was 213.53 ± 79.546 x 10^9/L.

Conclusion: A significant proportion of HCV-infected patients had thrombocytopenia, with a higher prevalence observed among females. The findings underscore the need for regular monitoring of platelet counts in HCV patients to prevent and manage complications.

1 Introduction

Hepatitis, an inflammation of the liver, often presents as a silent disease, with symptoms and signs becoming apparent only after the liver has sustained significant damage. This latency period, which can span decades, results in many individuals being unaware of their condition and, consequently, not seeking timely treatment (1). Among the various types of viral hepatitis, Hepatitis C Virus (HCV) is the most prevalent, posing a serious global health threat that affects millions of people worldwide, with a particularly high burden in Pakistan (2). HCV infection can lead to both acute and chronic hepatitis, potentially culminating in severe liver damage and hepatocellular carcinoma (3).

Thrombocytopenia, characterized by a platelet (PLT) count lower than normal, is one of the hematologic abnormalities frequently associated with HCV infection. Platelets are essential for blood clotting, and their deficiency increases the risk of bleeding and bruising. The causes of thrombocytopenia include ineffective platelet production in the bone marrow, accelerated platelet destruction, or splenic sequestration (4). Clinically, thrombocytopenia is identified by a PLT count below 150 × 10^3/mL, though it usually does not lead to significant clinical issues until the count drops below 50 × 10^3/L, unless accompanied by platelet dysfunction (5). Patients with PLT counts below 30 × 10^3/mL often present with spontaneous bruising, purpura, or prolonged bleeding from injuries (6). Severe spontaneous bleeding typically does not occur until PLT counts fall below 10 × 10^3/mL (5).

HCV infection can suppress bone marrow activity, reducing platelet production, either through direct viral effects on hematopoietic stem cells or disruption of the bone marrow microenvironment (7). Moreover, HCV can induce immune-mediated platelet destruction by triggering the production of autoantibodies against platelets, akin to immune thrombocytopenic purpura (ITP) (8, 9). Liver dysfunction from HCV-related fibrosis and cirrhosis can further impair thrombopoietin synthesis, a hormone crucial for platelet production, thus contributing to thrombocytopenia (8). Additionally, advanced liver disease from chronic HCV can lead to portal hypertension, causing platelet sequestration in the spleen and reducing circulating platelet counts (10). Certain HCV treatments, particularly interferon-based therapies and direct-acting antiviral agents, also pose a risk of thrombocytopenia as a side effect, with interferon-based therapies known to suppress bone marrow function (11, 12).

Given the significant impact of thrombocytopenia on the clinical management and prognosis of HCV patients, it is imperative to understand its prevalence and associated factors in this population. Therefore, this study aimed to determine the frequency of thrombocytopenia among HCV-infected patients. Understanding these associations can provide insights into better management strategies for HCV patients, particularly those at risk of hematologic complications.

2 Material and Methods

The study was a cross-sectional investigation conducted over six months to determine the frequency of thrombocytopenia in patients infected with Hepatitis C Virus (HCV) at a tertiary care hospital. A non-probability purposive sampling technique was utilized to enroll HCV-reactive patients aged between 18 and 65 years, encompassing both males and females, who did not present with liver cirrhosis. Exclusion criteria included patients with chronic liver disease, liver cancer, end-stage renal disease, coexisting viral infections such as hepatitis B, and pregnant females. Additionally, individuals with conditions known to cause

thrombocytopenia, such as malaria, viral infections, bacterial infections, and megaloblastic anemia, were excluded to ensure a focused analysis on HCV-related thrombocytopenia.

Informed consent was obtained from all participants before data collection. The study adhered to the ethical principles outlined in the Declaration of Helsinki, ensuring that all procedures involving human subjects were conducted with respect for the participants' rights and welfare. Data collection involved the administration of a structured questionnaire designed to gather comprehensive information about the patients' demographic and clinical characteristics.

Venous blood samples were collected from each participant to confirm HCV infection and to perform a complete blood count (CBC). Approximately 5 ml of venous blood was drawn into clotted vacutainers, which were centrifuged at 3000 revolutions per minute for ten minutes to separate the serum. The serum was then stored at -20°C until further analysis. HCV confirmation was carried out using real-time polymerase chain reaction (RT-PCR) with the ZEESAN kit, following a meticulous protocol involving the preparation of a master mix and the addition of the extracted nucleic acid. The RT-PCR process included denaturation at 95°C, annealing at 50°C, and extension at 60°C, with results considered positive for HCV when the cycler threshold (CT) value ranged from 12 to 19.

For the CBC, approximately 3 ml of venous blood was collected in ethylenediaminetetraacetic acid (EDTA) vacutainers. Platelet counts were determined using the MINDRAY BC-5000, a five-part differential hematology analyzer that operates on the impedance method.

The data collected were analyzed using the Statistical Package for the Social Sciences (SPSS) version 25.0. Quantitative variables were summarized as mean and standard deviation, while qualitative variables were expressed as frequencies and percentages. The association between thrombocytopenia and various demographic and clinical characteristics was evaluated using the chi-square test.

The study maintained strict ethical standards, ensuring participant confidentiality and the integrity of the data collected. All procedures were conducted with the utmost care to minimize any risk to the participants, adhering to established ethical guidelines and regulatory requirements. The comprehensive data collection and rigorous analytical methods employed in this study provided a robust framework for understanding the prevalence and implications of thrombocytopenia in HCV-infected patients.

3 Results

Of the 200 HCV-reactive patients included in the study, 72 (36.00%) were males, and 128 (64.00%) were females, with ages ranging from 18 to 65 years. The mean age of the participants was 42.71 ± 13.164 years. Most participants did not have a family history of HCV (n=164, 82.00%), a history of blood transfusion (n=176, 88.00%), or a history of previous surgery (n=189, 94.50%).

The platelet (PLT) counts of the study participants ranged from 150 to 450 x 10^9/L, with a mean PLT count of 213.53 ± 79.546 x 10^9/L. Among the HCV-reactive patients, 47 (23.50%) had thrombocytopenia, defined as a PLT count of less than 150 x 10^9/L, while 153 (76.50%) had PLT counts above this threshold. The chi-square test revealed no statistically significant association between HCV reactivity and thrombocytopenia (p=0.201).

Furthermore, there was no significant association with age (p=0.185), gender (p=0.201), family history of HCV (p=0.960), or history of blood transfusion (p=0.288). The results indicate a higher prevalence of HCV among females compared to males.

Thrombocytopenia was present in a substantial proportion of HCV-reactive patients, with no significant associations found with most demographic and clinical characteristics, except for a history of previous surgery.

Table 1: Demographic and Clinical Characteristics of HCV-Reactive Patients

Characteristic	Frequency (%)
Mean Age (Years)	42.71 ± 13.164
Age Groups	
18-40 Years	93 (46.50%)
41-65 Years	107 (53.50%)
Gender	
Male	72 (36.00%)
Female	128 (64.00%)
Family History of HCV	
Yes	36 (18.00%)
No	164 (82.00%)
History of Blood Transfusion	
Yes	24 (12.00%)
No	176 (88.00%)
History of Previous Surgery	
Yes	11 (5.50%)
No	189 (94.50%)

However, a statistically significant association was found with a history of previous surgery (p=0.048).

Table 2: Association of Thrombocytopenia with Study Variables

Characteristic	Yes n (%)	No n (%)	Chi-square (p-value)
	Thrombocytopenia		
Gender			0.201
Male	14 (7.00%)	58 (29.00%)	
Female	33 (16.50%)	95 (47.50%)	
Family History of HCV			0.960
Yes	5 (2.50%)	31 (15.50%)	
No	42 (21.00%)	122 (61.00%)	
History of Blood Transfusion			0.288
Yes	4 (2.00%)	20 (10.00%)	
No	43 (21.50%)	133 (66.50%)	
History of Previous Surgery			0.048
Yes	0 (0.00%)	11 (5.50%)	
No	47 (23.50%)	142 (71.00%)	

These findings highlight the need for careful monitoring of platelet counts in HCV-infected patients, especially those with a history of surgical interventions.

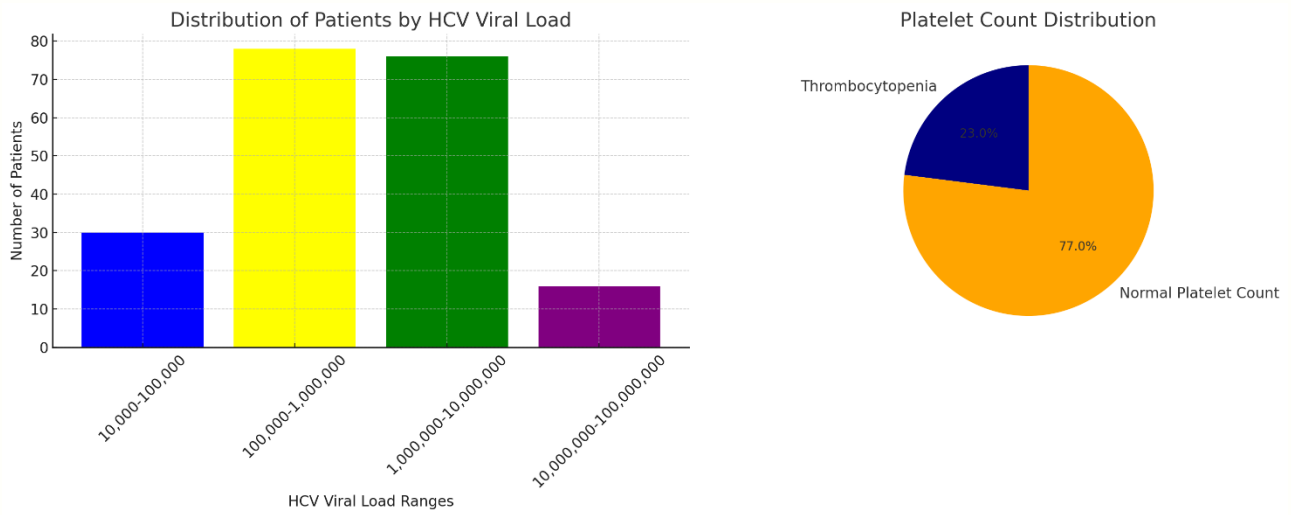

Figure 1 Viral Load HCV and Frequency of Thrombocytopenia in HCV-Reactive Patients

4 Discussion

The study revealed a notable prevalence of thrombocytopenia among HCV-infected patients, with 23.50% of the participants exhibiting a platelet count below 150 x 10^9/L. This finding aligns with previous research, such as the study by Muhammad Abdul Raziq et al., which reported a thrombocytopenia frequency of 32% in HCV patients (13). Similarly, Rahman et al. found a prevalence of 22%, while Cih-En Huang et al. reported an even lower rate of 11.86% (15, 16). These variations may be attributed to differences in study populations, sample sizes, and methodologies.

The present study did not find a statistically significant association between thrombocytopenia and demographic factors such as age and gender. This was consistent with the findings of Muhammad Abdul Raziq et al., but contrary to the study by Muhammad Usama ur Rehman et al., which identified a significant association with age groups (13, 17). Furthermore, the study by Kanwal Sarwar et al. reported a significant association with gender, indicating a higher prevalence of thrombocytopenia among males, while the present study observed a higher prevalence among females (18). These discrepancies highlight the complexity of factors influencing thrombocytopenia in HCV patients and underscore the need for further research to clarify these relationships.

The study identified no significant association between thrombocytopenia and other clinical characteristics such as family history of HCV, history of blood transfusion, or a history of previous surgery, except for a weak association with the latter. This finding contrasts with the study by Zara Mehmood et al., which reported that thrombocytopenia was more common in males and associated with various clinical factors (19). The differences in results may be due to the varying criteria used for patient selection and the specific population demographics of each study.

One of the strengths of this study was its focus on a well-defined cohort of HCV-reactive patients, which provided a clear understanding of the prevalence of thrombocytopenia within this group. The use of stringent exclusion criteria helped minimize confounding factors, ensuring the reliability of the results. However, the study had limitations, including its single-center design and relatively small sample size, which may limit the

generalizability of the findings. Additionally, the cross-sectional nature of the study precluded the establishment of causality between HCV infection and thrombocytopenia.

Future studies should aim to include larger, multi-center cohorts to enhance the external validity of the findings. Longitudinal studies would be particularly valuable in elucidating the temporal relationship between HCV infection and the development of thrombocytopenia. Moreover, it would be beneficial to explore the underlying mechanisms of thrombocytopenia in HCV patients, including the role of viral load, immune response, and liver function.

In conclusion, the study highlighted a significant burden of thrombocytopenia among HCV-infected patients, with a higher prevalence observed among females. The findings underscore the importance of regular monitoring of platelet counts in this population to prevent and manage potential complications. Despite its limitations, the study provides valuable insights that can inform clinical practice and guide future research aimed at improving the management of HCV-associated thrombocytopenia.

5 Conclusion

In conclusion, this study revealed that a significant proportion of HCV-infected patients exhibited thrombocytopenia, with a notably higher prevalence observed among female patients. These findings underscore the critical need for regular and systematic monitoring of platelet counts in individuals diagnosed with HCV. Regular surveillance is essential to promptly identify and manage thrombocytopenia and mitigate its associated risks, such as increased bleeding and bruising. Implementing routine platelet count assessments in clinical practice can enable healthcare providers to intervene early and adopt appropriate management strategies, thereby preventing severe complications. Ultimately, such proactive measures can significantly improve patient outcomes, enhance their quality of life, and reduce the burden of HCV-related hematologic abnormalities on healthcare systems. This study emphasizes the importance of comprehensive care for HCV-infected patients, particularly for those at higher risk of developing thrombocytopenia.

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Disclaimers	
Author Contributions	Material preparation, data collection, and analysis were performed by Eesha Tariq Bhatty, Sania Ahmed, Minahil Rathor, Sheeza Nighat, Maria Anwar, Saba Idrees, and Zainab Yousaf. The first draft of the manuscript was written by Eesha Tariq Bhatty, and all authors commented on earlier versions of the manuscript. All authors read and approved the final manuscript.
Conflict of Interest	The authors declare that there are no conflicts of interest.
Data Availability	Data and supplements available on request to the corresponding author.
Funding	NA
Ethical Approval	Institutional Review Board (IRB) by respective placement of conduct.
Trial Registration	NA
Acknowledgments	NA

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~ JHRR, ISSN: 2791-156X ~