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EVALUATION OF PATIENTS WITH THROMBOCYTOPENIA: A CROSS-SECTIONAL STUDY

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ABSTRACT

Objective: This study aimed to evaluate the clinical characteristics, etiologies, laboratory findings, and management of patients diagnosed with thrombocytopenia in a tertiary care setting.

Methods: A cross-sectional, hospital-based study was conducted in the Department of Medicine at a tertiary care institute over two years. The study included 80 patients aged 14 years and above with platelet counts below 100,000 per cubic millimetre. Patients with thrombocytopenia secondary to cirrhosis, malignancy, chemotherapy, or congenital disorders were excluded. Clinical history, physical examination, and laboratory investigations were performed. Treatment included platelet transfusions and disease-specific therapies based on clinical presentations. Data were analyzed using descriptive statistics.

Results: Most patients were aged 21-30 (27.5%), and 57.5% were male. Hemorrhagic manifestations were observed in 60% of patients, while fever and joint pain were present in 50% and 37%, respectively. Splenomegaly was noted in 26.25% of patients, hepatomegaly in 11.25%, and hepatosplenomegaly in 10%. Dengue (33.75%) and malaria (26.25%) were the leading causes of thrombocytopenia, followed by megaloblastic anaemia (15%) and cirrhosis (13.75%). Bleeding manifestations were present in 22.5% of patients, with mucosal bleeding being the most common (61.11%). Platelet transfusions were given to 21 patients: 7 with platelet counts below 10,000/mm³ and 14 with counts above 10,000/mm³. Disease-specific treatment was required for 73.75% of patients, with most having platelet counts above 10,000/mm³.

Conclusion: Infectious causes, particularly dengue and malaria, were the most common etiologies of thrombocytopenia. Bleeding was more prevalent in patients with lower platelet counts. Early cause identification and appropriate management, including transfusions and disease-specific treatments, were crucial in improving outcomes.

Keywords: Thrombocytopenia, platelet transfusion, bleeding, dengue, malaria, disease management.

INTRODUCTION

Thrombocytopenia is a "decrease in platelet count, with normal levels ranging from 150,000 to 450,000 platelets per mm³ of blood". Many patients with thrombocytopenia are asymptomatic and

diagnosed incidentally through routine complete blood counts. However, symptomatic patients may present with bruising, purpura, petechiae, nosebleeds, or gum bleeding. In severe cases where platelet counts drop below 5,000/mm³, life-threatening bleeding can occur in critical areas such as the brain, gastrointestinal tract, or urinary system. Early cause identification and proper management are essential to prevent fatal complications.[1,2]

Platelets play a key role in haemostasis, primarily by adhering to the site of vascular injury, releasing granules to recruit additional platelets, and aggregating to form a stable clot.[3] Thrombocytopenia may result from three main mechanisms: decreased production in the bone marrow, increased sequestration (commonly in an enlarged spleen), or increased destruction of platelets.[4]. These conditions can be either inherited or acquired, with common causes including bone marrow disorders such as leukaemia or aplastic anaemia, infections like HIV or hepatitis, and autoimmune diseases like immune thrombocytopenic purpura.[5,6] Drug-induced reactions are another potential cause.[7] Furthermore, disseminated intravascular coagulation (DIC) and thrombotic thrombocytopenic purpura (TTP) are conditions associated with increased platelet destruction, often leading to life-threatening complications.[8,9]

Diagnosis begins with ruling out pseudo thrombocytopenia, an artefact caused by platelet clumping due to antibodies when EDTA chelates calcium in blood samples.[10] A blood smear and platelet count should be reassessed using sodium citrate or heparin anticoagulated blood to confirm true thrombocytopenia.[11,12] Laboratory findings in thrombocytopenia often include prolonged bleeding time, but prothrombin time (PT) and partial thromboplastin time (PTT) typically remain normal unless coagulation disorders are present.[8]

Management of thrombocytopenia depends on its underlying cause and severity. In mild cases, observation may suffice, while more severe cases with active bleeding or the need for surgery may require platelet transfusions.[13] For autoimmune-related thrombocytopenia, treatments may include corticosteroids or immunosuppressants.[14] In cases of TTP or DIC, interventions such as plasma exchange or treatment of the underlying condition (e.g., infection or malignancy) are critical.[8,9] Drug-induced thrombocytopenia usually resolves once the offending medication is discontinued.[7] The primary goal in management is to prevent life-threatening hemorrhagic events.[15] The present study sought to assess the clinical features, causes, laboratory findings, and treatment approaches for patients diagnosed with thrombocytopenia in a tertiary care setting.

MATERIALS AND METHODS

Study Design, study type and setting

This cross-sectional, hospital-based study was conducted in the Department of Medicine at a tertiary care institute for a 2-year duration.

Study Population

The study population was comprised of patients diagnosed with thrombocytopenia who fulfilled the inclusion criteria and were admitted to the department during the study period. The inclusion criteria involved patients aged 14 years and above, with platelet counts below 100,000/mm³, regardless of whether they presented with bleeding manifestations. Exclusion criteria included patients younger than 14 years of age, those with thrombocytopenia secondary to cirrhosis of the liver, malignancy, or chemotherapy, as well as patients with congenital thrombocytopenia or coagulopathies unrelated to thrombocytopenia, such as haemophilia.

Sample Size and Sampling Technique

Eighty patients meeting the above inclusion and exclusion criteria were enrolled purposively for the sake of the present study.

Clinical History and Demographic Data

Demographic data, including age, gender, occupation, and socioeconomic status, were collected for each patient, along with a detailed clinical history. This history covered the onset of

thrombocytopenia, any associated conditions, and the site of bleeding, if applicable. Bleeding symptoms, such as petechiae, purpura, mucosal bleeding, gastrointestinal bleeding, or intracranial haemorrhage, were recorded. A review of prior infections, medications, or autoimmune diseases that could contribute to thrombocytopenia was also performed. Each patient underwent a thorough physical examination to assess for signs of bleeding, including petechiae, ecchymosis, gum bleeding, and spleen enlargement, which may suggest sequestration-related thrombocytopenia. Other relevant findings, such as signs of systemic infection, were also noted.

Laboratory Investigations

Laboratory investigations included a complete blood count (CBC), which was performed to determine the degree of thrombocytopenia by assessing the platelet count. In addition, red and white blood cell counts were evaluated to identify any associated cytopenias, which could indicate underlying bone marrow disorders. A peripheral blood smear was examined to rule out pseudothrombocytopenia and assess the morphology of platelets and any abnormalities in red or white blood cells. A bone marrow examination was conducted to evaluate marrow function and platelet production for cases where bone marrow failure or malignancy was suspected. A coagulation profile, including prothrombin time (PT), partial thromboplastin time (PTT), and fibrinogen levels, were analyzed to exclude or confirm coexisting coagulation abnormalities, such as disseminated intravascular coagulation (DIC). Additional special investigations included serology tests for infections such as dengue, leptospirosis, HIV, and hepatitis. Autoimmune markers, such as ANA and anti-dsDNA, were assessed in patients with suspected autoimmune thrombocytopenia. In cases where hemolysis was suspected, tests like serum vitamin B12 levels, the Coombs test, and G6PD screening were performed. Blood smears were reviewed for patients with low platelet counts in EDTA-anticoagulated blood samples, and platelet counts were repeated using sodium citrate or heparinized samples to rule out pseudothrombocytopenia.

Assessment of Bleeding Manifestations

Bleeding events were classified according to severity and location, distinguishing between mucosal and non-mucosal, gastrointestinal, and intracranial haemorrhage. The severity of bleeding was graded based on platelet count thresholds and clinical presentation, ranging from mild bleeding, such as petechiae, to severe and potentially life-threatening bleeding.

Treatment Interventions

Management strategies included platelet transfusions, which were administered based on clinical signs of active bleeding, the need for preoperative preparation, or prophylactic use in cases where platelet counts fell below 10,000/mm³. Corticosteroids or immunosuppressants were utilized for patients diagnosed with autoimmune thrombocytopenia or immune thrombocytopenic purpura (ITP). Plasma exchange therapy was given to patients with thrombotic thrombocytopenic purpura (TTP) or severe disseminated intravascular coagulation (DIC), as clinically indicated. Additional treatments included intravenous immunoglobulin (IVIG) for cases of ITP and antibiotics or antiviral therapies for thrombocytopenia caused by infections.

Follow-up and Monitoring

Patients were closely monitored throughout their hospital stay, with regular assessments of platelet counts and bleeding manifestations. The outcomes of various interventions were systematically recorded, including platelet recovery and the resolution of bleeding episodes.

Outcome Measures

The primary outcomes focused on identifying the underlying causes of thrombocytopenia and determining the severity of bleeding manifestations. Secondary outcomes assessed the need for and effectiveness of platelet transfusions and the resolution of thrombocytopenia, whether treated or untreated.

Data Analysis

Continuous variables, such as platelet counts and laboratory parameters, were expressed as means ± standard deviation. Categorical variables, including bleeding manifestations and treatment responses, were presented as frequencies and percentages.

RESULTS

Table 1: Socio-clinical characteristics of study participants

Variable	No. of Patients (%)
Age (years)	
• 14-20	13 (16.25%)
• 21-30	22 (27.5%)
• 31-40	20 (25%)
• 41-50	15 (18.75%)
• 51-60	4 (5%)
• >60	6 (7.5%)
Sex	
• Male	46 (57.5%)
• Female	34 (42.5%)
Clinical Manifestations	
• Hemorrhagic Manifestation	18 (22.5%)
• Fever	40 (50%)
• Joint Pain	30 (37%)
• Splenomegaly	21 (26.25%)
• Hepatomegaly	9 (11.25%)
• Hepatosplenomegaly	8 (10%)
• Lymphadenopathy	18 (22%)
• Jaundice	11 (14%)

As shown in Table 1, the majority were aged 21-30 (27.5%), with males comprising 57.5% of the population. Hemorrhagic manifestations (60%), fever (50%), and joint pain (37%) were the most common clinical features. Splenomegaly (26.25%), hepatomegaly (11.25%), and hepatosplenomegaly (10%) were also noted. Additionally, 22% of patients had lymphadenopathy, and 14% had jaundice.

Table 2: Etiology of Thrombocytopenia

Aetiology of Thrombocytopenia	No (%)
Dengue/Dengue-like Fever	27 (33.75%)
Malaria	21 (26.25%)
Megaloblastic Anemia	12 (15%)
Cirrhosis of Liver	11 (13.75%)
Enteric Fever	2 (2.5%)
Disseminated Intravascular Coagulation (DIC)	5 (6.25%)
Immune Thrombocytopenic Purpura (ITP)	1 (1.25%)
Others/Unknown	1 (1.25%)

Dengue or dengue-like fever was the most common cause (33.75%), followed by malaria (26.25%) and megaloblastic anaemia (15%). Cirrhosis of the liver accounted for 13.75% of cases, while disseminated intravascular coagulation (DIC) was seen in 6.25%. Enteric fever and immune thrombocytopenic purpura (ITP) were each identified in fewer cases, comprising 2.5% and 1.25%, respectively. Other or unknown causes also made up 1.25% of the cases. (Table 2)

Table 3: Bleeding manifestations (n=18)

Bleeding Manifestations	No (%)
Total Patients with Bleeding	18 (22.5%)
Mucosal bleeeding	11 (61.11%)
Gum Bleeding	3 (16.66%)
Epistaxis	3 (16.66%)
Hematemesis	1 (5.55%)
Malena	5 (27.77%)
Intracranial Hemorrhage	1 (5.55%)
Bleeding per Vagina	3 (16.66%)
Hematuria	1 (5.55%)
Subconjunctival Hemorrhage	1 (5.55%)

Bleeding manifestations were present among 18 patients (22.5% of the study population), as depicted in Table 3. The most common manifestation was bleeding from the mucous membranes (61.11%), followed by Malena (27.77%). Gum bleeding, epistaxis, and vaginal bleeding were each observed in 16.66% of patients. Hematemesis, intracranial haemorrhage, hematuria, and subconjunctival haemorrhage were less frequent, occurring in 5.55% of patients.

Table 4: Laboratory findings

Laboratory findings	No (%)
Platelet Count (mm^3)	
• <10,000	8 (10%)
• 10,000-20,000	14 (17.5%)
• 20,000-50,000	28 (35%)
• >50,000	30 (37.5%)
Pancytopenia	15 (18.75%)
Anemia with Thrombocytopenia	37 (46.25%)
Leukopenia with Thrombocytopenia	4 (5%)
Selective Thrombocytopenia	24 (30%)

As shown in Table 4, 37.5% of patients had platelet counts above 50,000/mm, followed by 20,000-50,000/mm^3 (35%), 10,000-20,000/mm^3 (17.5%), and less than 10,000/mm^3 (10%). In 18.75% of patients, Pancytopenia was observed, while anaemia with thrombocytopenia was seen in 46.25%. Leukopenia with thrombocytopenia was noted in 5%, and selective thrombocytopenia occurred in 30% of patients.

In our study, 21 patients received platelet transfusions. Of these, 7 had a platelet count below 10,000/mm^3, and 14 had a count above 10,000/mm^3. Among the eight patients with platelet counts under 10,000/mm^3, 7 exhibited bleeding, while 1 received transfusions prophylactically. One patient with immune thrombocytopenic purpura (ITP) and platelet counts below 10,000/mm^3 had mild menorrhagia and was treated with intravenous steroids without significant haemoglobin drop. Of the 14 patients with platelet counts above 10,000/mm^3, 11 had bleeding manifestations, while 3 received prophylactic transfusions. Patients with platelet counts over 10,000/mm^3 and no significant bleeding were treated with disease-specific therapies, including intravenous steroids, antibiotics, vitamins, and immune modulators. Overall, disease-specific treatment was administered to 59 patients (73.75%), with one patient having a platelet count below 10,000/mm^3 and 58 patients above 10,000/mm^3.

DISCUSSION

Our study's analysis of age distribution revealed that most patients (27.5%) were in the 21-30 age group. This finding is consistent with other studies, where similar age group predominance was

observed.[16-19]. For instance, one study reported 30% in the 21-30 age group, closely aligning with our results[16] However, another study reported a higher percentage in the 14-20 age group (22%), compared to 16.25% in our study, possibly due to regional demographic differences or variations in healthcare access.[20]

In our study, males comprised 57.5% of the participants, which aligns with findings from other research where male predominance was also noted.[16,18,21,22] The slight variation in percentages across studies may reflect differences in the population's exposure to risk factors, such as infections or occupational hazards, particularly in certain regions.

Dengue fever was our study's most common cause of thrombocytopenia (33.75%), followed by malaria (26.25%). This trend is similar to that reported in several other studies, where dengue was also the leading cause.[23,24] However, some studies found malaria to be the most frequent cause, reflecting regional differences in disease prevalence.[16, 18] Despite these variations, infectious diseases, particularly dengue and malaria, were consistently identified as the primary causes of thrombocytopenia. Megaloblastic anaemia was the second most common cause after infections in our study, which aligns with other findings.[17,18]

Regarding platelet count, 37.5% of patients in our study had counts above 50,000/mm³, followed by 35% with counts between 20,000 and 50,000/mm³. This is comparable to other research where most patients had platelet counts greater than 50,000/mm³.[19,20]. However, some studies reported even higher proportions of patients with platelet counts above 50,000/mm³, likely due to differences in the patient populations or the severity of thrombocytopenia.[21,25]

Bleeding manifestations were seen in 22.5% of our patients, with skin and mucous membrane bleeding being the most common (61.11%). This finding aligns with other research, where these sites were also the most frequently affected.[16,20]. Similar to other studies, significant proportions of malena (27.77%) and gum bleeding (16.66%) were observed.[17,19] Severe bleeding, such as intracranial haemorrhage, was less frequent, indicating moderate disease severity in our population.

Splenomegaly was present in 26.25% of our patients, which closely mirrors findings from other studies reporting similar prevalence.[16]Hepatomegaly was observed in 11.25%, slightly higher than in other research.[16] This discrepancy may result from differences in the underlying causes, such as cirrhosis and malaria, which are common in patients with hepatosplenomegaly. In our study, the most common cause of splenomegaly was P. vivax malaria (28.57%), followed by P. falciparum malaria and cirrhosis, in agreement with other studies where these conditions were the leading causes.[16] The higher prevalence of malaria in our study may reflect the endemic nature of the disease in our region.

Pancytopenia was observed in 18.75% of patients, consistent with other research reporting similar findings.[25]. Bicytopenia (51.25%) was the most common finding, as seen in other studies[16], while selective thrombocytopenia was noted in 30% of patients, aligning with previous reports.[25]

Platelet transfusions were required in 26.25% of our patients, similar to findings in other research where 34% received transfusions.[16] Most patients with platelet counts above 10,000/mm³ were treated with disease-specific therapies, reflecting the importance of targeted treatment in managing thrombocytopenia without significant bleeding.[16]

CONCLUSION

In conclusion, this study highlights the predominance of infectious causes, particularly dengue and malaria, as leading etiologies of thrombocytopenia. Most patients presented with mild to moderate thrombocytopenia, with a significant portion requiring platelet transfusions and disease-specific treatments. The findings indicate a male predominance and a higher prevalence in the 21-30 age group. Effective management, including transfusions and targeted therapies, improves outcomes. Early diagnosis and appropriate treatment are key to preventing severe complications and enhancing patient recovery in thrombocytopenia cases.

LIMITATIONS

One notable limitation of this study is the relatively small sample size of 80 patients, which may not comprehensively represent the broader thrombocytopenia population, potentially affecting the generalizability of the results. The single-centre setting at a tertiary care institution may introduce referral bias, as more severe cases are likely to be seen, and the exclusion of patients from other departments further limits the scope. The absence of long-term follow-up data hinders the evaluation of chronic outcomes or recurrence. While infectious causes were well-studied, other etiologies, such as drug-induced thrombocytopenia, were not thoroughly explored, potentially underestimating non-infectious causes. Additionally, the reliance on clinical and laboratory data, without advanced diagnostic tools like bone marrow biopsies for all patients, may have restricted the ability to investigate underlying causes fully. Larger, community-based studies are needed to understand better the incidence and prevalence of thrombocytopenia across different etiologies.

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