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DISTRIBUTION OF THROMBOCYTOPENIA ETIOLOGIES IN ADULTS- A STUDY OF 500 CASES IN A TERTIARY CARE CENTER

Pathology

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ABSTRACT

Introduction: Thrombocytopenia is defined as decrease in platelet count in circulation less than 1,50,000 platelets per microliter of blood. Platelets are vital component of blood that is crucial in hemostasis. **Aim:** This study aimed to determine variations in etiologies that lead to thrombocytopenia in adult patients and to divide them according to their pathophysiological mechanisms. **Materials and Methods:** This was a 12-month cross-sectional prospective study conducted at tertiary care center from March 2022 to 2023 and included 500 cases of thrombocytopenia. Blood samples were collected into 5 ml EDTA anticoagulant tubes and analyzed using a Beckman Coulter DxH800. **Results:** In present study, the gender distribution in thrombocytopenia patients was noted as 294 (58.8%)males and 206 (41.2%) females. The present study viewed that most of the cases of thrombocytopenia was in the age group of 18-30 years (133- 26.6 %) followed by 31-40 years' age group (97-19.4%) and the least being in the age group of 81-90 year (11-2.2%) Most of the patients were of hypo productive category followed by hyper destructive category. **Conclusion:** It is here by concluded that majority patents were of hypo productive category including megaloblastic anemia, leukemia, Chronic kidney disease(CKD) and Decompensated chronic liver disease (DCLD)

KEYWORDS

Thrombocytopenia, Hyper destruction, Hypo production

INTRODUCTION

Thrombocytopenia is defined as decrease in platelet count in circulation less than 1,50,000 platelets per microliter of blood. Platelets are vital component of blood that is crucial in hemostasis. It is necessary to understand the pathophysiology, mechanisms, causes, and epidemiology of thrombocytopenia in order to properly diagnose and treat it.[1,4] Mechanisms that lead to thrombocytopenia are; **1) Hypo production** including bone marrow disorders (aplastic anemia, leukemia, and myelodysplastic syndromes), Nutritional deficiencies (megaloblastic anemia, iron deficiency anemia), decompensated chronic liver disease (DCLD), chronic kidney disease (CKD) **2) Hyper destruction** includes immune-mediated destruction like immune thrombocytopenic purpura (ITP), dengue, malaria and bacterial infections **3) Platelet Consumption** includes disseminated intravascular coagulation (DIC), sepsis and post-operative patients **4) Hemodilution** including large transfusions and pregnancy and **5) Platelet sequestration** splenomegaly.[2,3,7]

MATERIALS AND METHODS:

This study was a 12-month cross-sectional observational prospective study conducted at the Hematology Lab of Bharati Hospital in Pune, from March 2022 to March 2023 included 500 cases of thrombocytopenia.

Inclusion Criteria: Adult cases of both gender aged over 18 years with platelets < 150,000/microL.

Exclusion Criteria: Patients who were on antiplatelet drugs known to cause thrombocytopenia were excluded from the study.

Sample collection method: Tubes containing di-potassium EDTA were used to collect venous blood samples from patients. Complete blood count (CBC) test was conducted. Relevant clinical details of the patients were retrieved from medical records. The patients with thrombocytopenia were divided into five categories according to the etiologies; Hemodilution, Hyper destruction, Hypo production and Platelet consumption and Platelet sequestration. This classification was determined by the predominant mechanism underlying the thrombocytopenia in each patient. The clinico-pathological correlation was done and the findings were tabulated. The statistical analysis was done by SPSS and the data was expressed in excel sheet.

RESULTS

The study analyzed 500 patients diagnosed with thrombocytopenia, with respect to their demographic details and underlying causes.

Table 1 shows the age distribution of thrombocytopenia cases. The mean age of the patients was 45.96 ± 18.98 years (Range: 18 to 88 years). Out of 500 cases, 206 (41.2%) were female and 294 (58.8%) were male. (M: F ratio was 1.4: 1) (Table 1)

Table 1. Age and gender wise distribution in thrombocytopenia cases

Serial no.	Age group (in years)	Number of Females	Number of Males	Total number of cases	Percentage (%)
1	**18-30**	74	59	133	26.6
2	**31-40**	48	49	97	19.4
3	**41-50**	20	45	65	13
4	**51-60**	23	44	67	13.4
5	**61-70**	24	54	78	15.6
6	**71-80**	13	36	49	9.8
7	**81-90**	04	07	11	2.2
	Total	206	294	500	100%

Etiological Distribution

Table 2 outlines division of thrombocytopenia cases according to pathophysiological mechanisms. There were 42.4% cases of hypo productive category followed by hyper destructive (26.2%), platelet consumption (21%), hemodilution (9.8%), and platelet sequestration (0.6%). (Table 2)

Table 2: Distribution of thrombocytopenia cases according to etiology

Serial no.	Categories	Number of patients	Percentage (%)
1	Hemodilution	49	9.8
2	Hyperdestructive	131	26.2
3	Hypoproductive	212	42.4
4	Platelet consumption	105	21
5	Platelet sequestration	3	0.6
	Total	500	100

Table 3 shows various etiologies within these categories. In hyperdestructive category, dengue infection accounted for 10.4%, while ITP coming with 2.2%. In the hypoproductive category, chronic kidney disease (CKD) were 12.2% and leukemia were 7.2%

Hemodilution cases were primarily in antenatal patients (10.4%). Platelet consumption was mainly observed in postoperative patients (14.6%), with sepsis accounting for 4.6%

Table 3: Etiological division of thrombocytopenia patients

Serial no.	Category	Etiologies	Number of patients	Percentage(%)
1	Hyperdestructive	Dengue	52	10.4
		ITP	11	2.2
2	Hypoproductive	Leukemia	35	7.2
		Megaloblastic anemia	9	1.8
		DCLD	39	7.8
		CKD	61	12.2
3	Hemodilution	ANC	52	10.4
4	Platelet consumption	Post-operative patients	73	14.6
		Sepsis	23	4.6
5	Platelet sequestration	Splenomegaly	1	0.2
		Lymphoma	1	0.2

DISCUSSION

Current study has classified the mechanisms of thrombocytopenia with their clinical presentations. This study can help us to correlate the clinical features and laboratory findings to come to a conclusion regarding the possible mechanisms that lead to thrombocytopenia.

Naikwadi et al[5] study included total of 500 patients of fever with thrombocytopenia in which 65.2% were male and 34.8% were female respectively.

This study including 500 cases of thrombocytopenia showed 294 (58.8%) were male and 206 (41.2%) were female (M: F ratio was 1.4:1) and was correlated with Naikwadi et al[5] study.

This study showed that most of the cases of thrombocytopenia belonged to the age group of 18- 30 years which were 133(26.6 %), followed by 97 patients of 31-40 years' age group (19.4%) and the least being 11 cases in the age group of 81-90 years (2%).

Among all causes, viral infections like dengue in hyper destructive category and chronic kidney disease in hypo productive category were common causes of thrombocytopenia that correlated with the study by Bhalara et al.[6] Platelet production can be directly hampered by viruses such as dengue that infect megakaryocytes or hematopoietic stem cells. Severe thrombocytopenia is caused by dengue fever, leads to bleeding due to viral toxin and immune-mediated platelet destruction and viral replication in megakaryocytes.[9]

Direct destruction of infected red blood cells and platelets and splenic sequestration of platelets due to malarial parasite infection which is caused by Plasmodium species, can result in thrombocytopenia. Our study included 4 cases of malaria.[10]

Immune-mediated peripheral platelet destruction leads to ITP. This can happen as a result of autoantibodies being produced, which attach to platelet surface antigens and mark them for hepatic and splenic macrophage destruction. ITP occurs 3–4 times per 100,000 adults annually with a peak incidence in the 20–40 age range. This study showed total 11 patients of ITP.

Mechanisms like widespread activation of the coagulation cascade results in excessive platelet consumption can cause thrombocytopenia. Causes like postoperative period involves various interventions, such as fluid administration, blood product transfusions, heparin infusions, multi- organ dysfunction in sepsis and disseminated intravascular coagulation (DIC).[11,12] Total 73 cases were identified as Post-operative with persistent thrombocytopenia. Malignant cells replace healthy bone marrow components, both acute and chronic leukemia can result in thrombocytopenia by preventing normal platelet production. Our study included 35 cases of leukemia patients. Eclampsia, HELLP (hemolysis, increased liver enzymes, reduced platelets), gestational thrombocytopenia are causes of hemodilution category.[13] Our study showed 52 cases of ANC patients. Decompensated Chronic liver disease was found in 39 patients, which causes persistent thrombocytopenia and manifests as cirrhosis, fibrosis, and portal hypertension. CKD patients were 61 that comes under hypo productive category.[14,15]

CONCLUSION

It can be concluded from our study that the most common causes for thrombocytopenia in hypo productive category are chronic kidney disease, decompensated chronic liver disease and Leukemia; While Hyper destructive category shows most common causes as dengue infection and ITP.

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