



A STUDY OF HEMATOLOGICAL LABORATORY PARAMETER IN THROMBOCYTOPENIA.

Pathology

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ABSTRACT

AIMS: A study of 150 cases was conducted to evaluate the association of different hematological parameters with thrombocytopenia according to the etiologies at civil hospital, Ahmedabad during a period from April 2020 to September 2020.

MATERIAL AND METHODS: A complete hemogram and laboratory profile of a total case of 150 patients with a relevant history was carried out in each case of thrombocytopenia.

RESULT: The study showed that the most common cause of thrombocytopenia was Malaria followed by Megaloblastic anemia.

CONCLUSION: Henceforth, an evaluation algorithm and a listing of common cause would help in clinicians diagnose thrombocytopenia and be able to triage threatening from less serious causes.

KEYWORDS

Thrombocytopenia, hematological parameters, Malaria, Megaloblastic anemia, Pancytopenia.

INTRODUCTION

Thrombocytopenia is defined as a decrease in the number of platelets in the peripheral blood. Thrombocytopenia is not a disease but is a diagnosis. The normal platelet count ranges between 150000 – 450000 /microL. When the platelet count decreases below the lower reference range, it is called thrombocytopenia and it may lead to petechial, purpura and ecchymosis. Platelets can have a role both in primary and in secondary hemostasis. Platelets are essential for maintaining the integrity of the vascular endothelium and controlling hemorrhage from small-vessel injury through the formation of platelet plugs. More extensive injury and involvement of larger blood vessels requires, in addition to platelets, the participation of the coagulation system to provide a firm, stable, fibrin clot. Transfusion of platelet may not need in all thrombocytopenia. Treatment of the underlying disease may be sufficient. In this review we emphasize common etiologies seen in adult patients with thrombocytopenia.

When the platelet count falls below 20,000/microL, it may lead to serious internal bleeding. When areas of hemorrhage greater than >2 mm but less than 1 cm are seen, it is called purpura.^(1,2,3) There can be bleeding after mild trauma at patients with thrombocytopenia. The deficiency of platelets or functional out of order causes some symptoms. There are three major pathophysiological mechanisms in thrombocytopenia: reduced producing, rapid demolishing and sequestration. Rapid demolishing is the reason thrombocytopenia which is often seen. There has been existed when the rate of demolishing platelet passed the rate of producing. Demolishing of platelet depends on intra corpuscular or extra corpuscular reasons. Not only as syndrome of Wiskott-Aldrich but in some of the hereditary disease also can be seen thrombocytopenia which depends on intra corpuscular defects.

The pathophysiology of thrombocytopenia is based on four process namely artefactual thrombocytopenia, deficient platelet production, accelerated platelet destruction and abnormal distribution or pooling of the platelet within the body.^(1,2,3)

Thrombocytopenia can also be seen in patients with severe iron deficiency anemia especially when hemoglobin level is <7 g/dl and MCV <60 fl.^(4,5)

AIMS AND OBJECTIVES

To study the association of thrombocytopenia with different hematological parameters according to etiologies and its prevalence in different age groups.

MATERIAL AND METHODS

A complete hemogram and laboratory profile of total patients with relevant history was carried out in each case of thrombocytopenia. The study was carried out from and the cases were taken from Civil Hospital, Ahmedabad, Gujarat.

The EDTA samples were analyzed after proper mixing in automated cell counters Horiba pentra XLR to obtain complete hemogram. For statistical analysis all 150 cases of thrombocytopenia were included (irrespective of number of pseudo thrombocytopenia cases). Samples were stained by Geimsa stain / Leishman stain and then microscopy was carried out to confirm the platelet count. The smears were also examined for important findings such as the presence of parasite like schizonts and trophozoites of Plasmodium vivax, trophozoites and gametocytes of plasmodium falciparum, activated lymphocytes, blast cells, neutrophilic leucocytosis, schistocytes, target cells, band cells, nucleated red blood cells and platelet clumps. Platelets were counted by optical method.

OBSERVATION AND RESULTS

Total 150 cases of thrombocytopenia (platelet count < 100000/microL) were Studied from 1st April 2020 to 30th September 2020 in civil hospital Ahmedabad.

1) ETIOLOGICAL DISTRIBUTION:

- **Table 1, Etiological distribution of thrombocytopenia and the no. Of cases recorded**

ETIOLOGY	NO OF CASES	% OF CASES
MALARIA	32	21.3
MEGALOBlastic ANEMIA	23	15.3
DENGUE	18	12
GESTATIONAL THROMBOCYTOPENIA	10	6.6
SEPSIS	16	10.6
DIC	10	6.6
PSEUDOTHROMBOCYTOPENIA	10	6.6
CIRRHOSIS	12	8
ITP	6	4
HIV	6	4
SLE	4	2.6
AIHA	1	0.6
HELLP SYNDROME	1	0.6
AML	1	0.6
TOTAL	150	100

DIC - Disseminated intravascular coagulation,
 ITP- Immune thrombocytopenic purpura
 HIV- Human immunodeficiency virus
 SLE - Systemic Lupus erythematosus
 AIHA- Autoimmune hemolytic anemia
 HELLP- Hemolysis, elevated liver enzymes, low platelets,
 AML - Acute Myeloid leukemia

Out of total 150 cases the most common cause was Malaria (21.3%) followed by Megaloblastic Anemia (15.3%) and Dengue (12%).

2) Distribution by Age and Sex

• **Table 2 Gender and Age distribution of thrombocytopenia**

AGE	SEX				TOTAL	
	MALE		FEMALE		Total	
	NO	%	NO	%	NO	%
NEONATE	5	6	6	8	11	7
1-10	3	4	3	4	6	4
11-20	12	15	4	6	16	10
21-30	15	19	18	25	33	22
31-40	13	16	24	34	37	25
41-50	10	13	5	7	15	10
51-60	12	16	4	6	16	11
61-70	7	9	5	7	12	8
71-80	1	1	2	3	3	2
81-90	1	1	0	0	1	1
TOTAL	79	100	71	100	150	100

From above table it is evident that maximum number of cases was seen between age group of 21-40 years.

Isolated thrombocytopenia: When platelet count <100000/microL is associated with Hb >7gm/dl, WBC count >4000/microL and <11000/microL. It is considered as isolated thrombocytopenia.

• **Table -3 Etiological Distribution of isolated thrombocytopenia and No of cases recorded**

ETIOLOGY	CASES	% OF CASES
MALARIA	23	30
PSEUDOTHROMBOCYTOPENIA	11	15
GESTATIONAL THROMBOCYTOPENIA	11	15
ITP	8	10
DENGUE	5	6
CIHHOSIS	5	6
DIC	4	5
SLE	3	4
MEGALOBlastic ANEMIA	3	4
SEPSIS	1	1
HIV	1	1
AIHA	1	1
HELLP SYNDROME	1	1
AML	1	1
TOTAL	78	100

The most common cause of Isolated thrombocytopenia was malaria (30%) followed by pseudothrombocytopenia (15%).

Malaria infects mankind globally. According to world Health Organization assessment about 40% of the world population is at risk of developing malaria about 300-500 million people are infected with it. Every year about 2 million people died due to malaria and its complications.⁽⁶⁾

• **Table 4 - Etiological distribution of thrombocytopenia with anemia and no of cases recorded**

Etiology	Cases	%
Megaloblastic Anemia	7	39
Gestational thrombocytopenia	3	15
Cirrhosis	2	11
DIC	2	11
Malaria	1	6
Dengue	1	6
AIHA	1	6
SLE	1	6
TOTAL	18	100

When platelet count <1,00,000/microL is associated with Hb <7gm/dl, WBC count >4000/microL and <11000/microL. It is considered as thrombocytopenia with anemia.

The above data showed the most common cause of thrombocytopenia with anemia are **Megaloblastic anemia (39%)** followed by **Gestational thrombocytopenia (15%)**.

• **Table 5 - Thrombocytopenia with Leucopenia and No. Of Cases recorded**

Etiology	Cases	%
Dengue	9	39
Malaria	8	35
HIV	3	13
DIC	3	13
TOTAL	23	100

When platelet count <1,00,000/microL is associated with Hb >7gm/dl, WBC count <4000/microL is considered as thrombocytopenia with leucopenia.

The above table showed the most common cause of thrombocytopenia with leucopenia was **dengue (39%)** followed by **malaria (35%)**.

• **Table 6 Pancytopenia**

When platelet count <1,00,000/microL is associated with Hb <7gm/dl, WBC count <4000/microL is considered as pancytopenia.

Etiology	Cases	%
Megaloblastic Anemia	10	72
Dengue	2	14
DIC	2	14
TOTAL	14	100

The above table showed the most common cause of pancytopenia was **Megaloblastic anemia (72%)**

• **Table 7 Thrombocytopenia with leukocytosis**

When platelet count <1,00,000/microL is associated with, WBC count >11000/microL is considered as thrombocytopenia with leukocytosis.

Etiology	Cases	%
Sepsis	13	76
DIC	1	6
Cirrhosis	1	6
Leukemia	1	6
HELLP Syndrome	1	6
Total	17	100

The above table showed the most common cause of thrombocytopenia with leukocytosis was **Sepsis (76%)**.

Table 8 Thrombocytopenia with significant other peripheral smear findings

Etiology	P/S Findings	Total cases	Positivity	%
P. Vivax Malaria	Schizonts and Trophozoites of P. vivax	25	25	100
P. Falciparum Malaria	Ring form and or Gamatocytes of P. falciparum	7	7	100
Sepsis	Increased Band cells	16	6	37.5
DIC	Schistocytes	10	9	83
AIHA	Schistocytes	1	1	100
Dengue	Activated lymphocytes	18	10	55.5
Cirrhosis	Target cells	12	8	66.6
Megaloblastic Anemia	Macrocytic RBcs	23	23	100
Pseudothrombocytopenia	Platelets in clumps	10	10	100
AML	>20% Blast cells	1	1	100

All the cases of P. vivax malaria showed smear positivity for schizont and/or trophozoite form and all the cases of p. falciparum malaria showed smear positivity for ring form and/or gametocytes. Out of 16 cases of sepsis 6 cases (37.5%) showed increased band cells. All the cases of DIC showed smear positivity for schistocytes and cases of autoimmune hemolytic anemia also showed smear positivity for schistocytes.

DISCUSSION

The main purpose of this study is to find our association of different hematology parameters in thrombocytopenia according to etiologies.

• ISOLATED THROMBOCYTOPENIA STUDY

HEMATOLOGY PARAMETER	MOST COMMON ETIOLOGY	
ISOLATED THROMBOCYTOPENIA	PRESENT STUDY	ERKURT ET AL
	MALARIA -23 (30%)	ITP - 151 (14.9%)

Isolated thrombocytopenia was seen in 78 out of 150 cases. Most common cause was malaria comprising 23 cases (30%). In the study conducted by Erkurt et al the most common cause was ITP comprising 151 cases (14.9%).⁽⁷⁾

• BICYTOPENIA STUDY

HEMATOLOGY PARAMETER	MOST COMMON ETIOLOGY		
	Present study		Naseem S et al
Bicytopenia	Anemia with thrombocytopenia	Leucopenia with thrombocytopenia	
	Megaloblastic Anemia – 7(39%)	Dengue – 9 (39%)	Acute Leukemia (66.9%)

Anemia with thrombocytopenia was present in 18 cases out of 150. Most common cause was Megaloblastic anemia consisting of 7 cases (39%).

Leucopenia with thrombocytopenia was observed in 23 cases out of 150. Most common cause was dengue consisting of 9 cases (39%). In one study conducted by Naseem S et al most common etiology of bicytopenia was Acute leukemia (66.9%).⁽⁸⁾

SUMMARY

- In the present study 150 cases of thrombocytopenia were taken into study. The most common cause of thrombocytopenia was Malaria (21.3%), followed by megaloblastic anemia (15.3 %)
- Maximum number of cases was seen in 31 – 40 years of age and the most common cause was megaloblastic anemia.
- The most common cause of isolated thrombocytopenia was malaria (30 %) followed by Pseudo thrombocytopenia (15%)
- Most common cause of thrombocytopenia with anemia was megaloblastic anemia (39%) followed by Gestational thrombocytopenia (15%).
- Most common cause of thrombocytopenia with leukopenia was dengue (39%) followed by malaria (35%).
- Most common cause of pancytopenia was megaloblastic anemia (72%)
- Most common cause of thrombocytopenia with leukocytosis was sepsis (76%)

CONCLUSION

In our setup, smear examination is very necessary in each case of thrombocytopenia as it virtually rule out Malaria, pseudo thrombocytopenia and leukemia. Malaria, megaloblastic anemia and dengue comprised a total of 73 cases (48.6%) out of 150 cases forming nearly half the study cases. Henceforth, an evaluation algorithm and listing of common causes are required to help us diagnose thrombocytopenia and be able to triage life – threatening from serious cause.^(9,10) Thrombocytopenia is not a disease but is a diagnosis. The detailed knowledge must be acquired from patients who have been suffering from the thrombocytopenia. Detailed examining and the test of laboratory should be done which are related to etiology.

REFERENCES:

- Kawthalkar. S (2006). Bleeding disorder caused by abnormalities in platelets. Essentials of Haematology : 1:p382-p383.
- Lee Richard G. Foerester. J et al (1999) Thrombocytopenia: Pathophysiology and classification. Wintrobe's Clinical Hematology; 10: p1579- p1582.
- Bain JB, Bates 1 et al (2012). Blood cell morphology in health and disease. Dacie & Lewis. Practical hematology; 11:p69-p97.
- Periman MK, Schwab JG, Nachman JB. Thrombocytopenia in children with severe iron deficiency. Pediatr. Hematol. Oncol. 2002; 24:p380-p384.
- Briggs C, Harrison P, Machine SJ. Continuing developments with the automated platelet counter. Int. J. lab Med. 2007; 29 p77-p91.
- K. Kuladeepa Ananda Vaidya, Pradeep Vernekar (2012). Thrombocytopenia in relation with plasmodium vivax malaria. Journal of Evolution of Medical and Dental Sciences; 1;4:p413- p417.
- Erkurt MA, Ilhami B et al. (2014). Etiological evaluation of 1012 patients admitted

thrombocytopenia. British Journal of Medical and Research; 4(1): p104-p113.

- Naseem S et al. (2011). Pediatric Patients with bicytopenia/ pancytopenia: review of etiologies and clinic-hematological profiles at -ptertiary center. Indian j Pathol Microbio; 54: p75-p80.
- Miller Jonathan, Rao Konetti. (2011). Blood platelets and von Willbrand Disease. Henry's clinical diagnosis and management by laboratory methods; 22: p801-822.
- Sudhir Sekhon et al (2006). Thrombocytopenia in Adults: A Practical Approach to evaluation and Management. Southern Medical Association; 99; 5: p492-p498.