Haematological And Other Laboratory Parameters In Thrombocytopenia: A Single Center Experience

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Abstract: Introduction: When the platelet count decreases below the lower reference range, it is called as thrombocytopenia and it may lead to petechie, purpura and ecchymosis. 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. Methods: A complete hemogram and laboratory profile of a total of 300 patients with a relevant history was carried out in each case of thrombocytopenia. Result and discussion: The study showed that the most common cause of thrombocytopenia was Malaria (30.4%) followed by Dengue (18.4%), Megaloblastic anemia (13.3%), gestational thrombocytopenia (9.4%) while rarely seen of AIHA and AML found in (0.3%) case each. majority number of the patients in our study were between the age group of 21-30 years i.e. 27.4% of total patients. Malaria, Megaloblastic anemia and Dengue comprised a total of 187 cases out of the (300%) cases forming nearly more than half of the study cases. Conclusion: Henceforth, an evaluation algorithm and a listing of common causes would help clinicians diagnose thrombocytopenia and be able to triage life-threatening from less serious causes. [Taherali V NJIRM 2017; 8(6):20-24]

Key Words: Thrombocytopenia, Hematological parameters, Malaria, Megaloblastic anemia, Pancytopenia.

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Introduction: Thrombocytopenia is defined by clinical characteristics and pathophysiological mechanisms as abnormalities of platelets in the peripheral blood. The normal platelet count ranges between 1,50,000 - 4,50,000 /microL. The platelet count decreases by the 2.5th lower percentile, of reference range, which is called as thrombocytopenia may leads to petechie, purpura and ecchymosis. After falls of platelet below 20,000/microL consequences to serious internal bleeding. The purpura occurs when areas of hemorrhage from > 2 mm to < 1 cm.[1,2,3] The patients with thrombocytopenia often presents with diagnostic and management challenges simultaneously. The differential diagnosis is broad because, the disorders leading to thrombocytopenia are diverse, with failed production at one extreme and accelerated destruction at the other.

The study is undertaken with a view to study the common etiologies and bleeding manifestations in adult patients of thrombocytopenia, keeping in mind the diversity of this syndrome in relation to its clinical presentation , etiological factors, methods of investigation and impact of various modes of management. Timely recognition and treatment of the underlying condition, are required to prevent fatal outcomes.

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

To determine the relative frequency of various diseases causing thrombocytopenia.

Methods: A complete hemogram and laboratory profile of total 300 patients with relevant history was carried out in each case of thrombocytopenia. The study was carried out in S.C.L. General Hospital, Ahmedabad, Gujarat from January 2016 to December 2016. The patients having platelet count < 1,00,000/ microL were included in the study.

The EDTA samples were analyzed after proper mixing in automated cell counters to obtain a complete hemogram. Although inaccurate counting may occur in the presence of giant platelets or with platelet satellitism, the most common cause of artifactual thrombocytopenia is platelet clumping (pseudothrombocytopenia)[4]. Samples were stained by Field Stain and Leishman Stain and then microscopy was carried out to confirm the platelet count, presence of parasites like schizonts and trophozoites of Plasmodium vivax, trophozoites and gametocytes of plasmodium falciparum, activated lymphocytes, blast cells, neutrophilic leucocytosis, macroovalocytes, schistocytes, target cells, band cells, nucleated red blood cells and platelet clumps. Platelets were counted by optical method.Invasive procedures like

bone marrow examination were carried out in a selected number of patients with their written consent. The other hematological tests included Prothombin Time, D-dimer, and Direct Coombs Test. The laboratory tests included CSF examination, Serum Bilirubin, Serum Vit. B_{12}, SGPT, Alkaline Phosphatase, Dengue, HIV and Blood Culture.

Observation And Results: In the present study, etiologically the most common cause of thrombocytopenia findings that was Malaria (30.7%) followed by Dengue (18.4%) and Megaloblastic anemia (13.3%) while rarely seen of AIHA and AML found in (0.3%) case each. (Table 1)

Table 1: Etiological distribution of thrombocytopenia and the no. of cases recorded

Etiology Parameters	No. of Cases (%)
Malaria	92 (30.7%)
Dengue	55 (18.4%)
Megaloblastic Anaemia	40 (13.3%)
Gestational thrombocytopenia	28 (09.4%)
Sepsis	27 (09.0%)
Cirrhosis	20 (06.6%)
Psuedothrombocytopenia	12 (04.0%)
Disseminated intravascular coagulation	10 (03.3%)
Immune Thrombocytopenic Purpura	09 (03.0%)
Human Immunodeficiency Virus	05 (01.7%)
Autoimmune Hemolytic Anemia	01 (0.3%)
Acute Myeloid Leukemia	01 (0.3%)
Total	300 (100%)

Table 2: Distribution by Age and Sex

Age(In year)	Male	Female	Total
Neonate	11 (03.7%)	13 (04.3%)	24 (08.0%)
1-10	06 (02.0%)	05 (01.7%)	11 (03.7%)
11-20	25 (08.3%)	10 (03.4%)	35 (11.7%)
21-30	32 (10.7%)	50 (16.6%)	82 (27.4%)
31-40	22 (07.3%)	36 (12.0%)	58 (19.3%)
41-50	20 (06.7%)	11 (03.7%)	31 (10.3%)
51-60	23 (07.7%)	09 (03.0%)	32(10.7%)
61-70	12 (04.0%)	08 (02.7%)	20 (06.6%)
71-80	03 (01.0%)	03 (01.0%)	06 (02.0%)
81-90	01 (0.33%)	01 (0.33%)	02 (0.66%)
Total	155 (51.73%)	145 (48.33%)	300 (100%)

Table 3: Thombocytopenia with other CBC parameters:

Etiology	Thombocytopenia				
	Isolated	With Anemia	With Leucopenia	With Leucocytosis	With Pancytopenia
Malaria	62	8	22	-	-
Dengue	22	5	25	-	3
Megaloblastic Anaemia	6	20	-	-	14
Gestational thrombocytopenia	23	5	-	-	-
Sepsis	-	-	-	27	-
Cirrhosis	12	5	-	2	1
Psuedothrombocytopenia	12	-	-	-	-
Disseminated Intravascular Coagulation	5	2	1	1	1
Immune Thrombocytopenic Purpura	9	-	-	-	-
Human Immunodeficiency Virus	1	-	4	-	-
Autoimmune Hemolytic Anemia	-	1	-	-	-
Acute Myeloid Leukemia	-	-	-	1	-
Total	152	46	52	31	19

Table No. 2 shows that, majority number of the patients in our study were between the age group of 21-30 years i.e. 27.4% of total patients. There is no specific sex preponderance with malaria, dengue, H.I.V. etc. Diseases like cirrhosis show male predominance and Megaloblastic anemia, Gestational thrombocytopenia and I.T.P. are common etiologies in female.

Out of total 300 cases, the table -3 showed that Isolated thrombocytopenia was seen in 152 cases (50.6%), Pancytopenia in 19 cases (6.3%), Bicytopenia (Anemia with thrombocytopenia in 46 cases (15.3%); Leucopenia with thrombocytopenia in 52 cases (17.3%) and thrombocytopenia with leucocytosis in 31 (10.3%) cases.

Isolated Thrombocytopenia: (152 cases) When Thrombocytopenia (platelet count <100000/microL) is associated with Hb>7 gm/dL, WBC count > 4000/ microL and <11000/microL, it is considered as isolated thombocytopenia. From the table-3 it was shows that the most common cause of isolated thrombocytopenia was Malaria (40.8%) followed by Gestational thrombocytopenia (15.1%) and Dengue (14.5%) etc.

Thrombocytopenia with Anemia: (46 Cases) Thrombocytopenia (platelet count <100000/microL) associated with Hb<7 gm/dL, WBC count >4000/microLand <11000/microL is considered as thrombocytopenia with anemia. The table-3 showed most common cause of thrombocytopenia with anemia was Megaloblastic Anemia (44.4%) followed by Malaria(17.4%),dengue(10.9%) and (10.9%)cirrhosis.

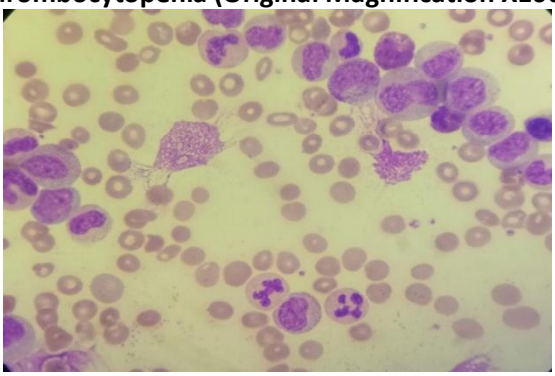
Thrombocytopenia with Leucopenia: (52 Cases) Thrombocytopenia (platelet count <100000/microL) with Hb>7 gm/dL, WBC count < 4000/microL is considered as thrombocytopenia with leucopenia. The table-3 showed that the most common cause of thrombocytopenia with leucopenia was Dengue (48%), followed by malaria (42.3%)

Pancytopenia: (19 Cases) Thrombocytopenia (platelet count <100000/microL) associated with Hb<7gm/dL and WBC count <4000/ microL is considered as pancytopenia.The table-3showed that the most common cause of pancytopenia was Megaloblastic Anemia (73.6%).

Thrombocytopenia with Leucocytosis: (31 Cases) Thrombocytopenia (platelet count <100000/microL) associated with WBC count >11000/microL is considered thrombocytopenia with leucocytosis.The table-3 showed that the most common cause of thrombocytopenia with leukocytosis was sepsis(87%).

Thrombocytopenia and Significant Peripheral Smear Findings: All 67 cases of P. vivax malaria showed smear positivity (100%) for schizonts and/or trophozoite form and all 25 cases of P. falciparum malaria showed smear positivity (100%) for ring form and/or gametocytes. Out of the 27 cases of sepsis, 8 cases (29.7%) showed increased band cells. All 10 cases of DIC showed smear positivity (100%) for schistocytes and a case of AIHA also showed smear positivity (100%) for schistocytes.Out of all the 55 cases of dengue, 29 cases (52.7%) showed activated lymphocytes in the smears and out of the 20 cases of cirrhosis, 9 cases (45%) showed target cells in the smears.All 40 cases of megaloblastic anemia showed smear positivity (100%) for macrocytic RBCs. All 12 cases of pseudothrombocytopenia showed platelets in clumps in smear (100%). A case of AML showed > 20% blast cells in smear. (Figure-1)

Figure 1: Peripheral smear showing myeloblasts with thrombocytopenia (Original Magnification X100)



Thrombocytopenia and Bone Marrow Findings: out of 40 cases of megaloblasticanaemia bone marrow was done in 2 cases show megaloblastic erythropoiesis (Figure -2) and Out of 9 Clinically diagnosed case of ITP Bone marrow was done in 4 cases show increased megakeryocytes (Figure 3).

Figure – 2: Bone marrow shows megaloblasts (Original magnification x 100)

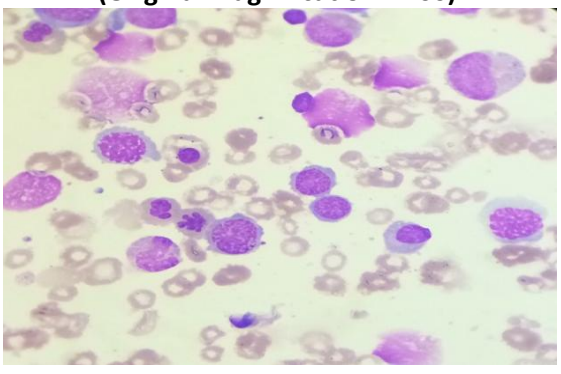
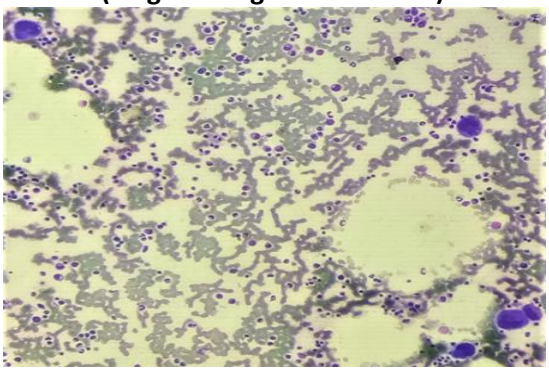


Figure -3: Bone marrow shows megakeryotes (Original magnification x 10)



Thrombocytopenia and other Hematology Tests: All 10 cases of DIC showed D-dimer positivity (100%) and increased Prothombin time (100%) whereas all 20 cases of cirrhosis showed increased prothombin time (100%) only. Out of 27 cases of septicemia, 2 cases (7.4%) showed increased CSF cell count signifying meningitis. A case of AIHA showed positive DCT (100%) (Direct Coomb's test).

Thrombocytopenia and other Laboratory Parameters: In cases of sepsis, out of 27 cases 8(29.6%)cases showed blood culture positive. All cases of dengue were positive for dengue Ig M antibody, all cases of HIV were positive for HIV 1 antibody. All cases of cirrhosis showed increased Serum bilirubin level, all cases of megaloblastic anemia showed decreased serum vitamin B12 level.

Table: 4 Thrombocytopenia and other lab parameters

Etiology	Tests	Results	Total	Positivity
Sepsis	Blood Culture	Positive	27	8 (29.6%)
Dengue	Dengue IgM	Positive	55	55 (100%)
HIV	HIV I antibody	Positive	5	5 (100%)
Cirrhosis	Serum Bilirubin	Increased (>1.2mg/dl)	20	20 (100%)
Megaloblastic Anaemia	Serum Vit B12	Decreased (<211 mg/dl)	40	40 (100%)

Discussion: The main aim of this study is to determine relative frequency of various diseases causing thrombocytopenia by etiological distribution and find out association of different hematological and other laboratory parameters in patients of thrombocytopenia.

In the present study, the largest group studied were patients with malaria (30.7%.) the second major group was dengue (18.4%) followed by Megaloblastic anemia (13.3%), Gestational thrombocytopenia (9.4%) and sepsis (9%).

Malaria is also most common cause of isolated thrombocytopenia seen in 62 cases (40.8%) out of 152 cases of isolated thrombocytopenia.

In the study conducted by Erkurt et al, the most common cause of thrombocytopenia was leukaemias consisting of 170 cases (16.8%) followed by infections 163 cases (16.1%) and most common cause of isolated thrombocytopenia was ITP comprising 151 cases (14.9%).[6]

Megaloblastic anemia is most common cause of thrombocytopenia with anemia seen in 20 cases (44.4%) out of total 46 cases of thrombocytopenia with anemia. It is also most common cause of pancytopenia consisting of 14 cases (73.7%) out of total 19 cases of thrombocytopenia with pan cytopenia. Similar findings were observed in study conducted by B N Gayathri et al (74%)[7] and Dr. Priyank Mody et al (48%)[8] which showed the most common cause of pancytopenia was Megaloblastic anemia.

Leucopenia with thrombocytopenia was observed in 52 cases out of 300. Most common cause was Dengue consisting of 25 cases (48%). In one study conducted by Naseem S et al most common etiology of bicytopenia was Acute Leukaemia (66.9%).[9]

Summary:

- 300 indoor patients of thrombocytopenia with platelet count <100000/cumm were included in the sample of the study. The most common cause of thrombocytopenia was Malaria (30.7%), followed by dengue (18.4%) and megaloblastic anaemia (13.3%).
- In the present study, the males are slightly predominated over female with a ratio of 1.1:1. Majority number of patients were between the age group of 21-30 years.

- The most common cause of isolated thrombocytopenia was malaria (40.8%) followed by gestational thrombocytopenia (15.1%) and dengue (14.5%).
- Most common cause of thrombocytopenia with anemia was Megaloblastic anemia (44.4%) followed by malaria (17.4) and Dengue (10.7%).
- Most common cause of pancytopenia was Megaloblastic anemia (73.6%).
- Most common cause of thrombocytopenia with leucopenia was Dengue (48%) followed by malaria (42.3%).
- Most common cause of thrombocytopenia with leucocytosis was sepsis (87%).
- PT was prolonged in all cases of DIC (100%) and cirrhosis (100%). D-dimer was positive in every cases of DIC (100%). A case of AIHA was DCT Positive. 2 out of 27 cases of sepsis (11.1%) showed increased cell count in CSF R/M.
- Bone marrow examination was only carried out in selected patients of ITP and Megaloblastic anemia.
- Blood culture was positive in 8 out of 27 cases of sepsis (29.6%). IgM was positive in Dengue (100%).

Conclusion: Peripheral blood smear has an important role in diagnosis of certain diseases associated with thrombocytopenia. It is diagnostic in malaria, pesudothrombocytopenia and leukemia which forms 105 cases out of 300 cases (35%) in present study. It is also an important tool in provision of differential diagnosis of Megaloblastic anemia and cirrhosis and indication of further necessary tests in dengue, DIC and AIHA, sepsis etc. Hematological and other laboratory tests differentiates common etiology of thrombocytopenia which is required to help us diagnose thrombocytopenia and be able to triage life-threatening from less serious causes.[11,12]

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