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Original Research Article

Study Article on Various Etiologies of Thrombocytopenia in Adults in a Tertiary Care Centre in South Gujarat

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Abstract

Introduction: Thrombocytopenia is a common hematological abnormality observed in hospitalized patients. It is defined as platelet count of less than 150 × 103 per µL. There are various mechanisms like: due to deficient production of platelets, destruction of platelets-both immune or non-immune mediated or due to combination of both. *Aims and objective:* This study was carried out to find various etiologies of thrombocytopenia. *Methods:* The prospective study was carried out on 100 patients admitted at SMIMER Hospital in the month of April–June, 2019 and on the basis of their data, platelet count, age distribution, gender and etiology of thrombocytopenia have been studied. *Result:* Thrombocytopenia is more common in younger age group of patients that is between 21 and 30 years (34/100 patients) with the maximum patients having platelet count between 50,000 and 1,00,000 per µL (48/100 patients). It is more common amongst the male patients (65/100 patients). The most common infective etiology is *Plasmodium vivax* infection (52%) and non-infective etiology is Megaloblastic Anemia (27%). *Conclusion:* Thrombocytopenia is usually associated with various etiologies but most common amongst them is infective etiology. Hence, for proper management of the patient, the specific cause should be found out.

Keywords: Thrombocytopenia; *P.vivax*; Megaloblastic anemia.

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Introduction

Normal platelet count ranges from 150–450 x 10^3 per µL.

Platelets are derived from fragmentation of megakaryocytes, hematopoietic cells in bone marrow. A main regulator of thrombopoiesis is thrombopoietin (TPO), a hormone produced by the liver. And there are various cytokines such as interleukin-3 (IL-3), interleukin-6 (IL-6), interleukin-11 (IL-11) and stem cell factor have synergistic effects.

The main function of platelet is control of bleeding in small vessels by the formation of primary platelet

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plugs and also in secondary hemostasis platelets are essential.[1] However coagulation system is required to form a stable fibrin clot if injury occurs to a large blood vessel.[2]

Bleeding episodes like gum bleeding, epistaxis, petechiae or bruising are common in patients who have low platelet counts.

In some cases bleeding occurs even with mild trauma.

There is a direct correlation between platelet count and risk of bleeding. The risk of hemorrhage is affected by many factors, such as associated coagulation defects, trauma, and surgery.[3]

Thrombocytopenia can result from:

- Decreased platelet production,
- Increased platelet destruction or
- Combination of both.

EDTA sampling also causes pseudothrombocytopenia. In that condition for correct estimation of platelet count, it should be done from the sample collected in sodium citrate vacuettee.

This study was done to determine the etiology and clinical presentation of thrombocytopenia among Indian adult patients attending a tertiary care hospital.

Materials and Methods

The prospective descriptive study was conducted in the Department of Pathology, SMIMER Medical college and Hospital from April to June in the year 2019.

Beckman Coulter DxH800 hematology analyzer was used to determine CBC and was confirmed by peripheral blood film examination.

Inclusion criteria

All male and female adults with platelet less than or equal to 150 x 10^3 per µL have been included in this study.

Exclusion criteria

1. Neonates and children have been excluded from the study.
2. All male and female adults with platelet more than 150x10^3 per µL have been excluded from the study.

Results

A total of 100 admitted patients were included in this study.

The demographic data on the basis of gender,age and etiology of thrombocytopenia is studied.

Table 1: Sex distribution of patients of Thrombocytopenia

Total number of adult patients included in the study	100
Number of male patients	65
Number of female patients	35

According to this study, thrombocytopenia is more commonly prevalent in male patients (Table 1).

Table 2: Age distribution of patients of Thrombocytopenia

Age group (In years)	Number of Thrombocytopenia patients
12–20	2
21–30	34
31–40	22
41–50	20
51–60	17
61–70	4
71–80	1
81–90	0
91–100	0

Thrombocytopenia have been commonly found amongst the age group of 21–30 years (Table 2).

Table 3: Distribution of patients on the basis of platelet count

Platelets (cells/µl)	Number of cases
<20,000	12
20,000–50,000	30
50,000–1,00,000	48
1,00,000–1,50,000	10

Maximum number of patients have been found with platelet count between 50,000–1,00,000 cells/µl. (Table 3).

Table 4: Distribution of patients on the basis of various etiologies of Thrombocytopenia

Various common etiologies	Number of cases	Percentage
Plasmodium vivax infection	52	52
Plasmodium falciparum infection	3	3
Mixed infection (P.vivax and falciparum infection)	1	1
Dengue	1	1
Megaloblastic anemia	27	27
Septicemia	4	4
Drugs	4	4
Acute Leukemia	3	3
Tuberculosis	2	2
Other viral infection	3	3
Total	100	100

Parasitic infection is common cause of thrombocytopenia, amongst parasitic infection the most common cause is *Plasmodium vivax* (52%)followed by *Plasmodium falciparum* (3%) and Dengue (1%) (Table 4).

Amongst non-infective etiology, the main cause is Megaloblastic anemia (27%).

Discussion

Thrombocytopenia is defined as low platelet count and it is a common hematological abnormality in hospitalized patients.

Male patients and patients in young age group (21–30 years) are more prone to suffer from thrombocytopenia.

Malaria infection caused due to *P.vivax*, followed by *P.falciparum* infection is the most common cause of thrombocytopenia according to our study.

In fection may cause thrombocytopenia by direct bone marrow suppression or increased peripheral platelet consumption. There are various mechanisms causing thrombocytopenia in malaria patients such as:

Direct lysis of the plateletsis caused by direct entry of P.vivax into platelets.[4]

There is also a role of immune mechanism in the lysis of platelets[5] which involves the specific platelet associated IgG antibodies that bind directly to malarial antigen in the platelets.[6]

In malaria patients, there is low level of platelet superoxide dismutase and glutathione peroxidase activity and high platelet lipid peroxidation levels as compared to those of healthy individuals, which shows the oxidative stress damage of platelets.[7]

Platelet forming megakaryocytes in the marrow were usually found normal or increased which rules outdecreased thrombopoiesis. Platelet activation and an enhanced agreeability explains good tolerance of low platelet count in malaria.[8]

Despite significant thrombocytopenia bleeding episodes are very rare in acute malarial infections because of enhance hemostatic response by hyperactivation of platelets.[9]

Moreover, in South Gujarat Zone, the prevalence of malaria is much common because of the presence of favorable environment for the breeding of *Anopheles* mosquito.

The peripheral smear picture of Malaria infection is shown in figures 1-3

Megaloblastic anemia caused due to vitamin B_{12} and folic acid deficiency are the most common non-infective cause of thrombocytopenia.

Ineffective thrombopoiesis in the bone marrow due to deficiency of vitamin B_{12} and folic acid causes hypoproduction of platelets in megaloblastic anemia.

The peripheral smear findings of megaloblastic anemia due to vitamin B_{12} deficiency is shown in the figures 4-6.

Dengue virus can be found in monocyte/ macrophages, dendritic cells, more commonly in polymorphonuclear leukocytes, also seen in circulating platelets and megakaryocyte progenitors. The main mechanism involved in thrombocytopenia caused by dengue virus is

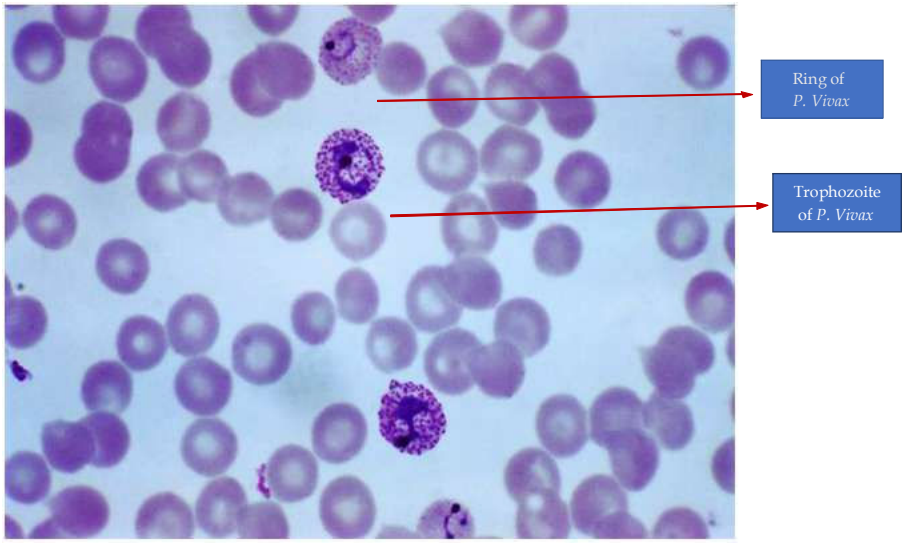

Fig. 1: Picture showing ring and trophozoite of *P.vivax*

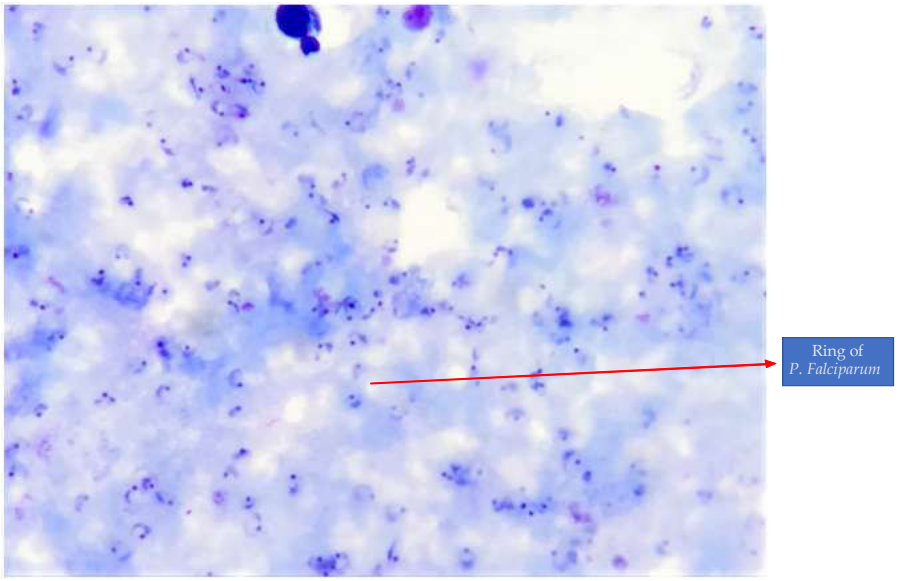

Fig. 2: Picture showing ring of *P.falciparum*.

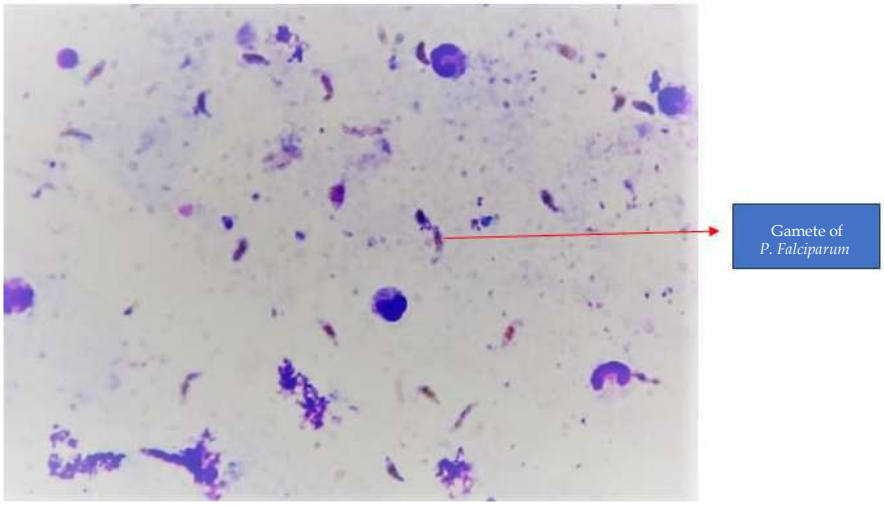

Fig. 3: Picture showing gamete of *P.falciparum*.

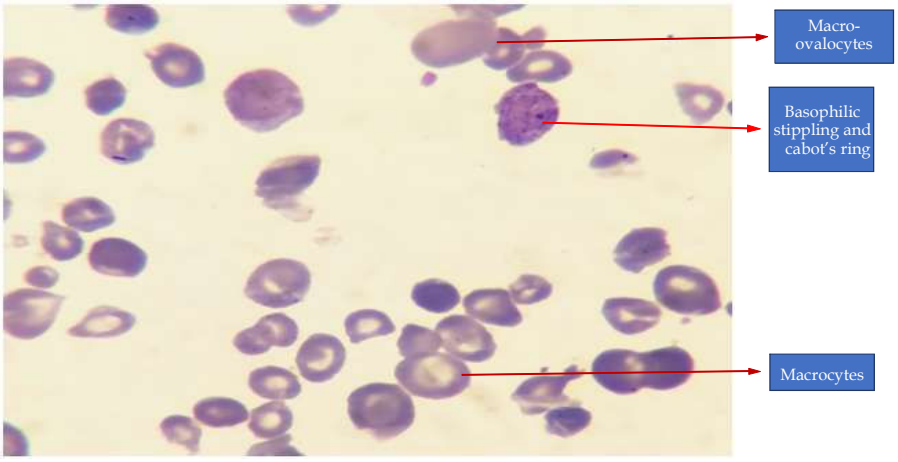

Fig. 4: Pictures showing various changes of vitamin B_{12} deficiency.

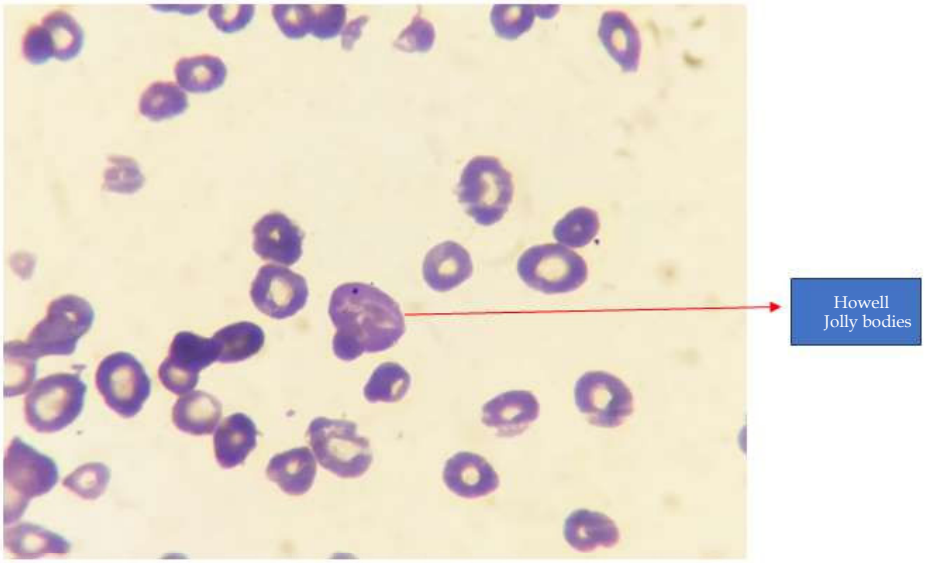

Fig. 5: Pictures showing various changes of vitamin B_{12} deficiency.

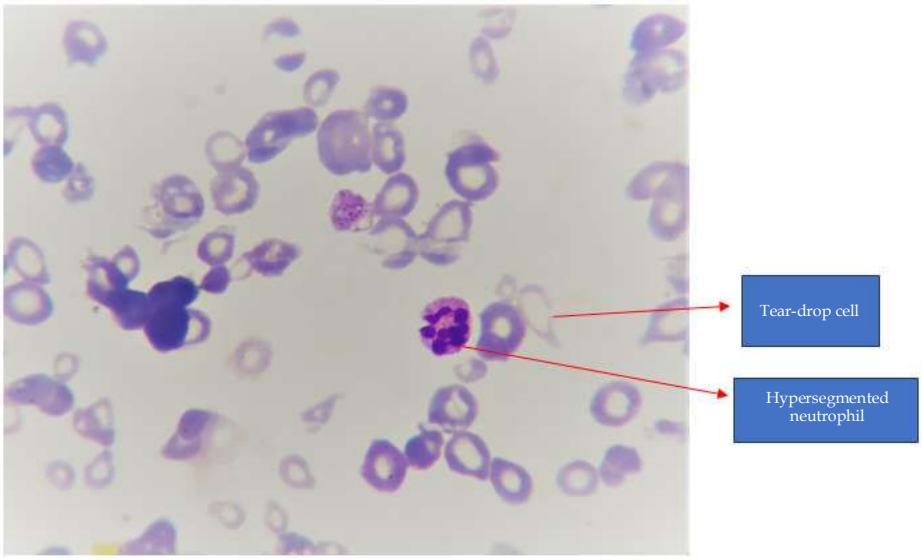

Fig. 6: Pictures showing various changes of vitamin B_{12} deficiency.

impaired thrombopoiesis and peripheral platelet destruction.

In leukemia, there are various factors leading to thrombocytopenia:

- Bone marrow infiltration by leukemia cells leading to decreased production of platelets
- Increased platelet destruction by hypersplenism
- Sepsis
- DIC
- Chemotherapy and radiotherapy
- Immune destruction of platelets
- Immune response to medications.

Other common viruses include Human immunodeficiency virus, Hepatitis B and C, Parvovirus B19, Epstein-Barr, cytomegalovirus, varicella-zoster, rubella, and mumps.

In case of drug-induced thrombocytopenia, the proper clinical history regarding any drug taken in the past, its dosage and duration has to be asked.

In our setup, the most common drug implicated is Heparin; anti-inflammatory drugs like-aspirin,

mefanimic acid; diazepam; ranitidine, etc.

Drugs causes thrombocytopenia by various mechanisms such as: by direct bone-marrow suppression or immune mediated by forming various antibodies against platelets.

In a similar study conducted at GMERS Sola in 2015 by Gandhi et al. in 112 patients aged >18 years, most common cause of thrombocytopenia was found to be Malaria – 42%, followed by dengue - 26% and other viral fever – 17%, septicemia – 4.5%, enteric fever – 4.45%.[10]

Whereas in an another study conducted at BJ Medical college in 2014 by Bhalara et al. in 412 patients aged >18 years; most common cause of thrombocytopenia was found to be dengue/ dengue like fever – 28.6% followed by malaria – 22.8% and chronic liver disease – 15.2%. other causes included hypersplenism, septicemia, DIC, ITP, PLHA, megaloblastic anemia.[11]

This study was carried out during the month of April–June, in which the prevalence of malaria infection is more in South Gujarat area and also mainly due to *P.vivax* infection. Hence, malaria infection is the main cause of thrombocytopenia in our study.

This study aims to know the various etiologies of thrombocytopenia and hence helps in proper management of the patient by avoiding unnecessary platelet transfusion to the patient.

Conclusion

Prevalence of thrombocytopenia in tertiary health care center is more in male and younger age group of patients with various etiologies. The most common infective etiology is parasitic infection and non-infective etiology is megaloblastic anemia. In South Gujarat area,there is high prevalence of parasite *Plasmodium vivax* and its vector *Anopheles* mosquito due to favorable breeding environment. Hence, thrombocytopenia in this area must heighten the suspicion of this disease for the prompt treatment of the patient.

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