



Approach To Thrombocytopenia – A Clinicopathological Study

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ABSTRACT

Introduction:

Platelets are described as anucleate blood cells which are synthesized in bone marrow from polyploid cells termed as megakaryocytes. Thrombocytopenia can be due to several causes such as deficient platelet production, accelerated platelet destruction, abnormal distribution or pooling of the platelets within the body and artifactual thrombocytopenia. The aim is to study the etiology of thrombocytopenia and its correlation with clinicopathological parameters among different age groups.

Materials and methods:

This is a prospective study involving 200 patients who presented to our hospital with thrombocytopenia. All the patients with platelet count less than 1,50,000 were included in our study. The study was done in the Central Diagnostic Laboratory of Meenakshi Medical College and Research Institute from July 2019 to November 2019.

Results:

Out of 200 cases studied 124 were males and 76 were females. The most common age group affected was between 26-45 years. The most common cause of thrombocytopenia was Dengue 24%, followed by sepsis 15%, liver diseases 14%, enteric fever 10%, viral fever 10%, anemia 7.5%, kidney diseases 6%, pregnancy 5%, malaria 5%, leukemia 2.5% and pseudothrombocytopenia 1%. Mild thrombocytopenia ($70-149 \times 10^9/L$) 77.5% was the most common type followed by moderate thrombocytopenia ($20-70 \times 10^9/L$) 21.5% and severe thrombocytopenia ($<20 \times 10^9/L$) 1%.

Conclusion:

In our study dengue was the common infectious cause of thrombocytopenia and chronic liver disease was the most common noninfectious cause of thrombocytopenia.

Keywords: Dengue, Fever, Thrombocytopenia.

INTRODUCTION

Platelets are anucleate cells which are synthesized in bone marrow from polyploid cells called as megakaryocytes. The life span of human platelets in circulation is about 7–10 days. Normal platelet count in adult ranges from 1,50,000 to 4,00,000 cells/ μL .

Thrombocytopenia is classified as mild ($70-149 \times 10^9/L$), moderate (platelet count 20 to $70 \times 10^9/L$) and severe (platelet count less than $20 \times 10^9/L$) [1]. The factors responsible for thrombocytopenia are deficient platelet production, accelerated platelet

destruction, abnormal distribution or pooling of the platelets within the body and artifactual thrombocytopenia [2]. Thrombocytopenia can be due to both infectious and noninfectious causes. The methods used for measuring parameters in the analyzer are Electrical impedance methods for determining the RBC, WBC, Platelet data, colorimetric method for determining hemoglobin and flow cytometry for determining the WBC data. The aim of the study is to evaluate etiology of thrombocytopenia and correlate with the clinicopathological features.

MATERIALS AND METHODS:

The present study was done in the central diagnostic laboratory of Meenakshi Medical College and Research Institute from July 2019 to November 2019. A total of 200 cases were taken for the study. Platelet count is obtained from Mindray BC-5300 auto hematology analyzer using blood samples collected in the EDTA tube. Routine investigations like complete blood count, random blood sugar, renal function test and liver function test were done. Blood culture for typhoid, chest x-ray, ultrasound abdomen and investigation for other infectious diseases were done. The data was collected using Microsoft excel and analyzed.

INCLUSION CRITERIA:

Patients with platelet count less than 1,50,000/ μ L irrespective of age group were included in the study.

EXCLUSION CRITERIA:

Patients on antiplatelet drugs and other drugs causing thrombocytopenia are excluded from the study.

RESULTS:

A total of 200 cases were included in the study between July 2019 to November 2019. The cases are categorized according to age, sex and clinical history. The most common age group affected is 26-45 years (Chart 1). Total number of males was 124 and females was 76. Males were affected more commonly than females (Chart 2). Mild thrombocytopenia ($70-149 \times 10^9/L$) 77.5% was the most common type followed by moderate thrombocytopenia ($20-70 \times 10^9/L$) 21.5% and severe thrombocytopenia ($<20 \times 10^9/L$) 1% (Chart 3). Commonest symptom was fever 70% followed by bodyache 15%, hepatosplenomegaly 5%, jaundice 2.5%, ascites 2.5%, breathlessness 2.5% and bleeding manifestations 2.5% (Chart 4). Dengue was the most common infection 24% followed by sepsis 15%, liver diseases 14%, enteric fever 10%, viral fever 10%, anemia 7.5%, kidney diseases 6%, pregnancy 5%, malaria 5%, leukemia 2.5% and pseudothrombocytopenia 1%. (Table 1).

Chart 1: Age wise distribution of cases

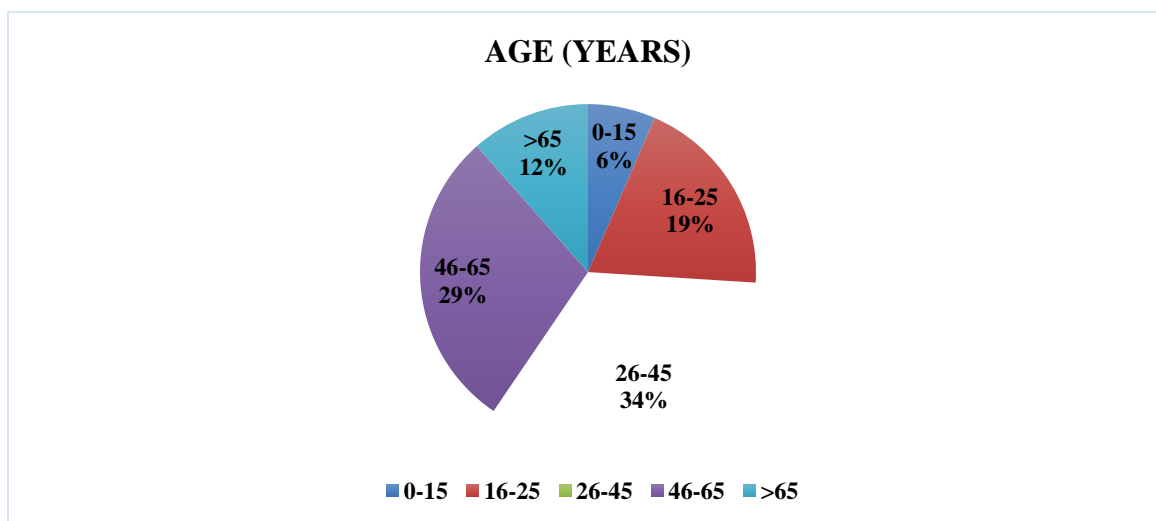


Chart 2: Sex predisposition

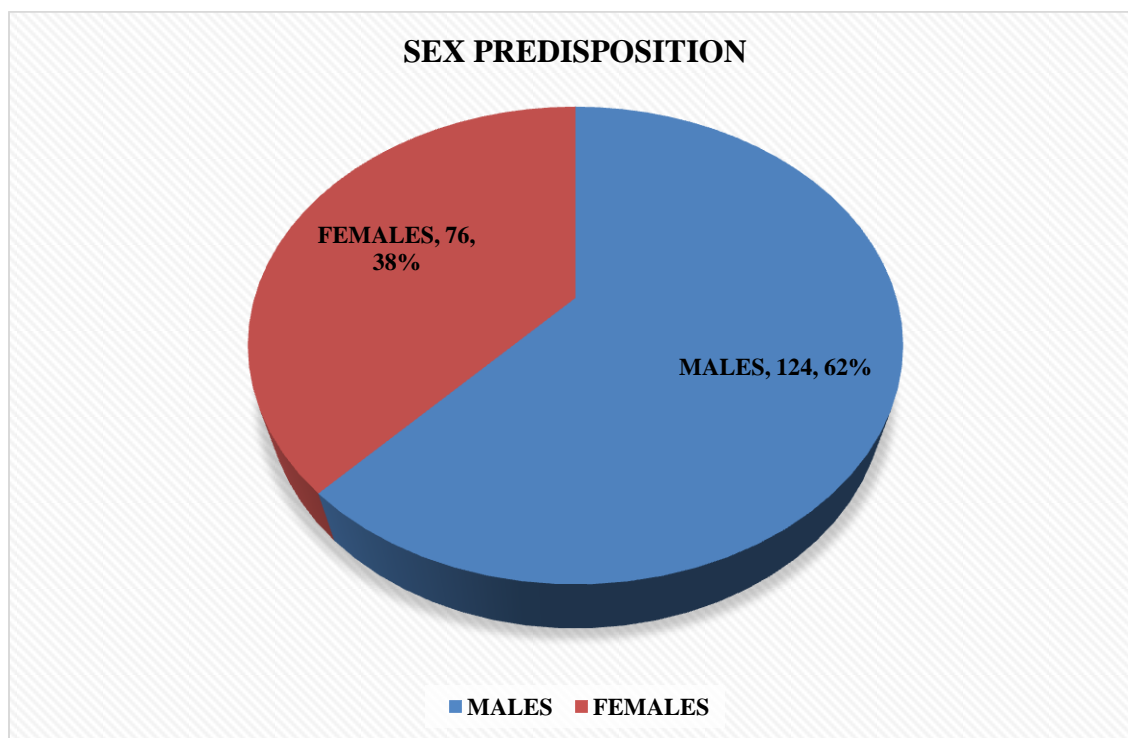


Chart 3: Patients distribution on the basis of platelet count

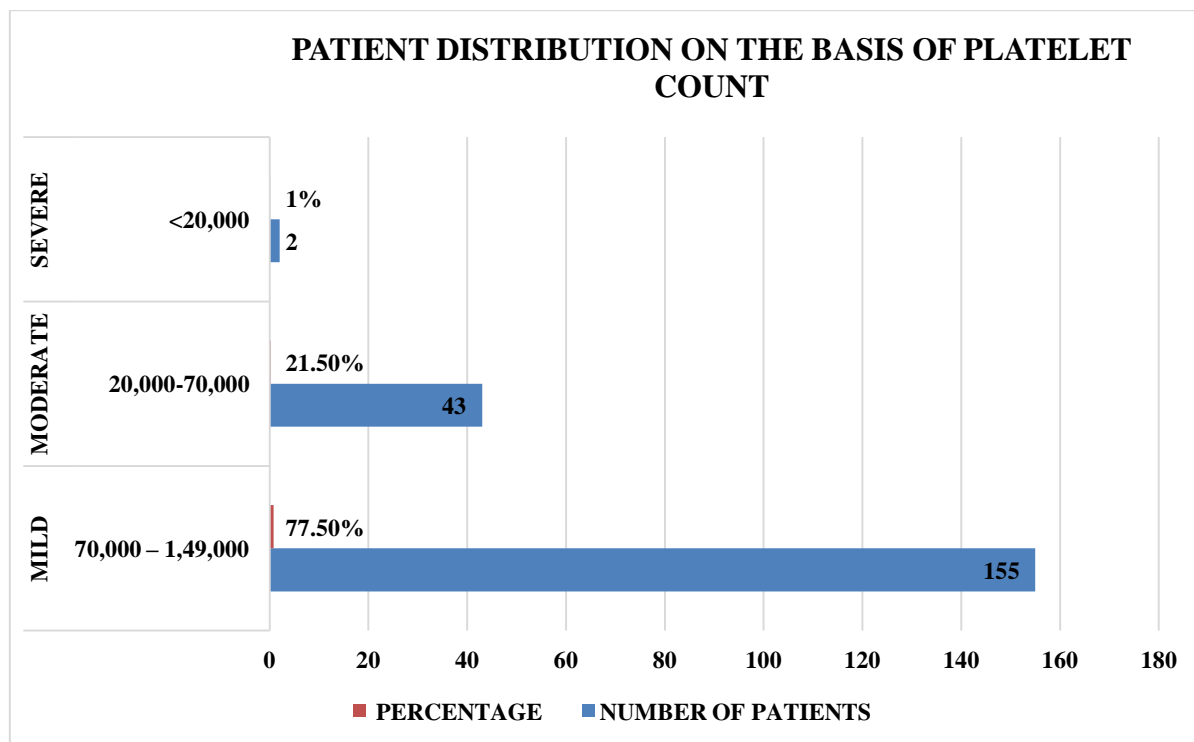
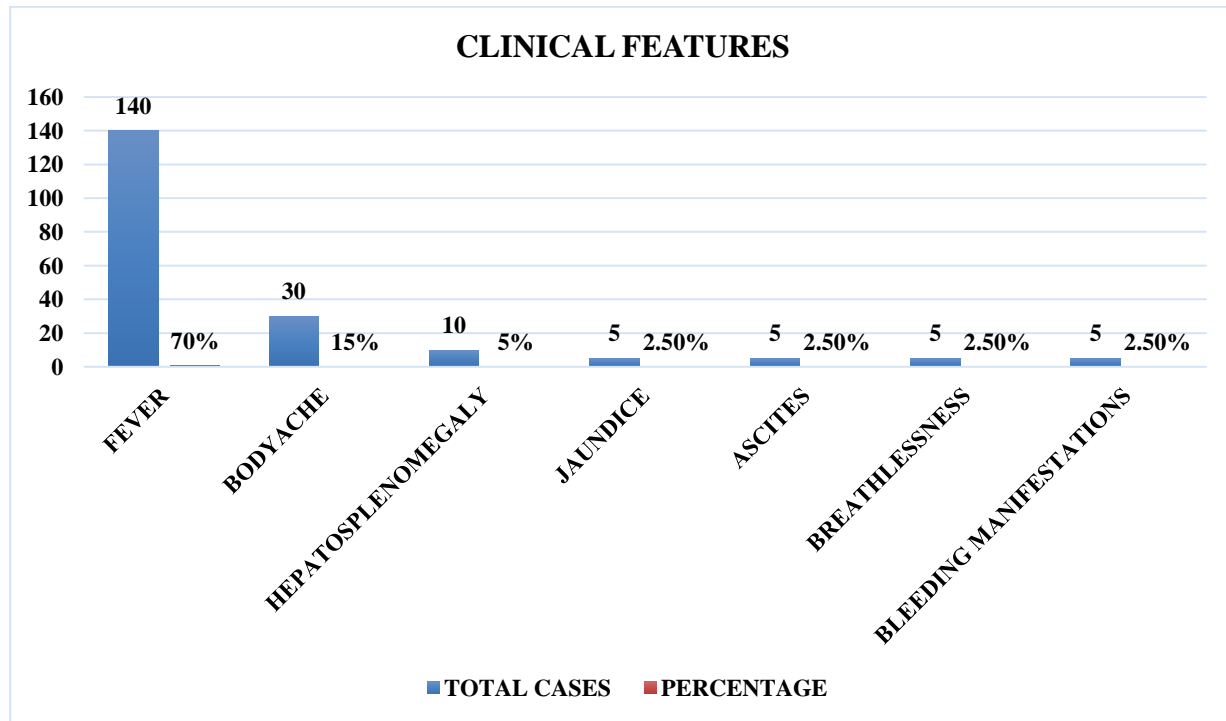


Chart 4: Clinical features



DISCUSSION

Thrombocytopenia is a common condition which is caused by both infectious and noninfectious etiology. Out of 200 cases the most common people affected were in the age group of 26-45 years with males (62%) being affected more commonly than females (38%). A similar incidence of thrombocytopenia was reported by Kumar et al in which males affected were 66.3% and females affected were 33.7%. The most common symptom was fever (70%) and similar observation is seen in the study done by Kumar et al 100% [3].

Dengue was the commonest cause which constitutes 24% and similar results were observed in the study done by Gandhi et al 26.79% and Dash et al 20% [4,5]. In dengue fever, dengue hemorrhagic fever and dengue shock syndrome, platelet count is used as a predictive and recovery parameter [6]. Dengue virus leads to decreased platelet synthesis, bone marrow suppression and increased platelet destruction caused by immune mechanism [7]. The diagnosis of dengue was confirmed by NS 1 antigen and IgM/IgG ELISA.

Sepsis (15%) was the second most common cause of thrombocytopenia and similar observation is seen in the study done by Aman et al 12.6% [8]. Low platelet

count in sepsis is due to immunologically mediated destruction of platelets by nonspecific antibodies [9], hemophagocytosis [10,11], endothelial binding and splenic sequestration [12,13]. The common cause of sepsis in my study was diabetes followed by necrotizing fasciitis.

The most common noninfectious cause is Liver disease which was seen in 14% of patients and similar results were seen in the study done by Paramjit et al 7.7% [14]. In liver disease, thrombocytopenia is caused by platelet sequestration in enlarged spleen [15]. In our study the most common presentation was ascites followed by jaundice and splenomegaly.

Enteric fever is seen in 10% patients and the study was comparable to study done by Suresh et al 6% [16]. The diagnosis was confirmed by blood culture and WIDAL test. The cause of low platelet count in enteric fever is due to bone marrow changes such as decreased number of erythroblasts, myeloid maturation arrest leading to bicytopenia and subclinical disseminated intravascular coagulation [17].

Viral fever constitutes around 10% and similar result was seen in the study done by Khan et al 8.30% [18].

Thrombocytopenia in viral infection occurs by two mechanisms namely increased platelet destruction or decreased platelet production [19].

Anemia constitutes around 7.5% and the results were compared with the study done by Alam et al 8.2% [20].

The Kidney diseases constitute around 6% and results were compared with the study done by Mittra et al 4.44% [21]. Reduced thrombopoietic activity is cause for thrombocytopenia in kidney disease [22].

Pregnancy accounts for 5% and similar result was obtained in the study done by Mittra et al 6.66% [21]. Gestational thrombocytopenia occurring during third trimester with postpartum resolution is the most important cause but other conditions such as preeclampsia, idiopathic thrombocytopenic purpura and HELLP syndrome is also associated with low platelet count [23].

Malaria account for 5% of cases and similar results were seen in the study done by Nair et al 9% [24]. The cause of low platelet count is increased oxidative stress during circulation [25] and plasmodium causes direct lysis of platelets [26]. Malaria is diagnosed by peripheral blood smears.

Leukemia accounts for 2.5% and results were compared with the study done by Gandhi et al 1.79% [4]. In our study three cases were Chronic myeloid leukemia and two cases were Acute myeloid leukemia – M3 and M6 type.

Pseudothrombocytopenia is due to EDTA which causes in vitro clumping at room temperature. The mechanism is due to natural auto antibodies which has antiplatelet activity. For accurate platelet count, the blood is collected in citrate and examined [27].

Conclusion:

In our study, the most common age group affected is 26-45 years and majority presented with mild thrombocytopenia ($70-1,49,000 \times 10^9/L$). Dengue was the most common infectious cause followed by septicemia. Liver diseases was the common noninfectious cause of thrombocytopenia. Most of the thrombocytopenic patients presented with fever followed by bodyache. The present study aims to identify the clinical features and cause of thrombocytopenia. Platelet transfusion is not required

in all cases of thrombocytopenia. Treatment of the underlying cause is sufficient.

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FIGURE LEGENDS:

1. Figure 1 – Thrombocytopenia (100x): Platelets are decreased on smear.
2. Figure 2 – Trophozoites of *Plasmodium vivax* (100x): Peripheral blood smear shows trophozoites of *Plasmodium vivax*.
3. Figure 3 – Chronic myeloid leukemia (100x): Peripheral blood smear shows a basophil and low platelet count.
4. Figure 4 – Pseudothrombocytopenia (100x): Peripheral blood smear shows platelet clumps.

Table 1: Causes of thrombocytopenia

NO	DIAGNOSIS	NUMBER OF CASES	PERCENTAGE
1.	DENGUE	48	24%
2.	SEPTICEMIA	30	15%
3.	LIVER DISEASES	28	14%
4.	ENTERIC FEVER	20	10%
5.	VIRAL FEVER	20	10%
6.	ANEMIA	15	7.5%
7.	KIDNEY DISEASES	12	6%
8.	PREGNANCY	10	5%
9.	MALARIA	10	5%
10.	LEUKEMIA	5	2.5%
11.	PSEUDOTHROMBOCYTOPENIA	2	1%

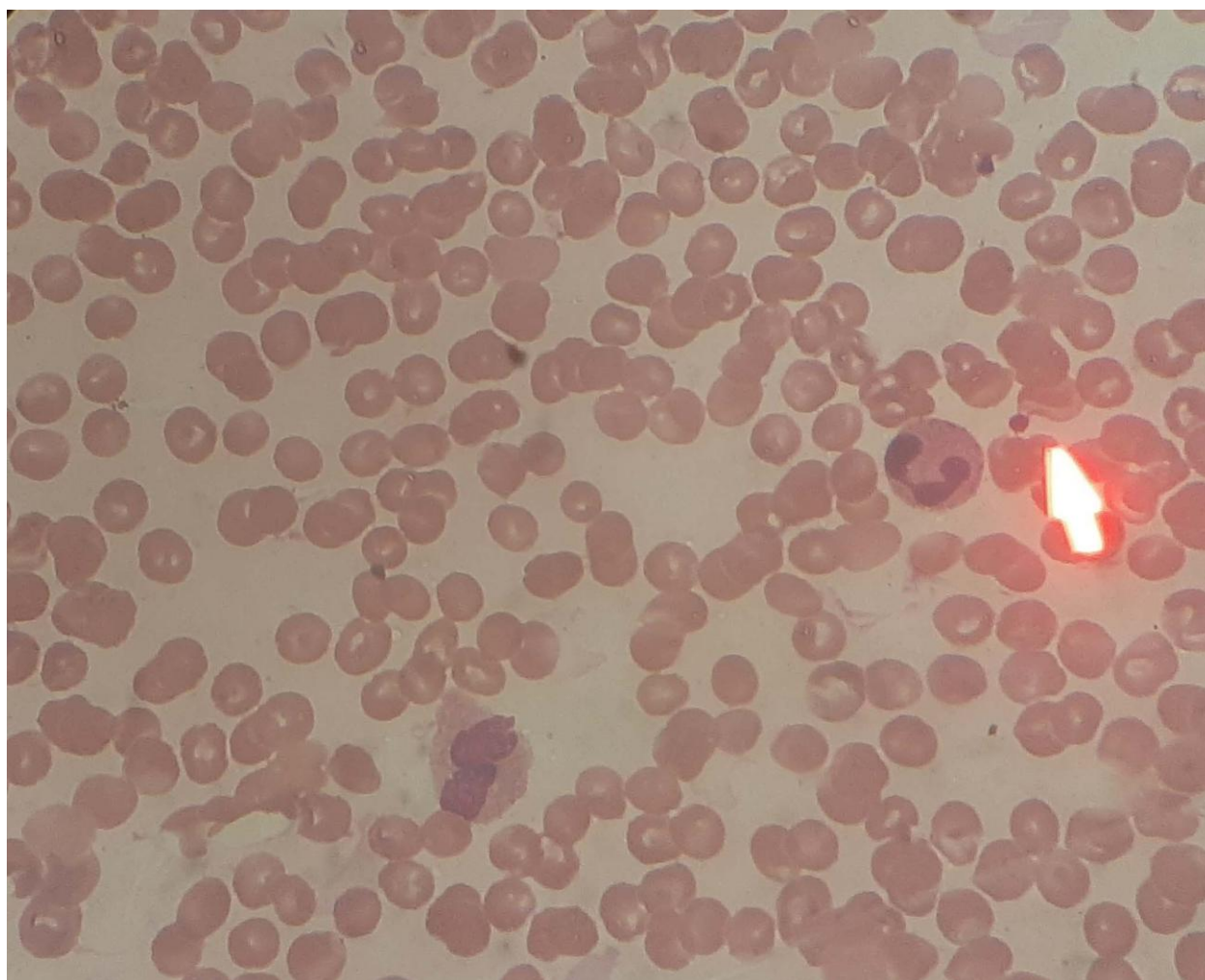


Figure 1 – Peripheral blood smear showing Thrombocytopenia (100x)

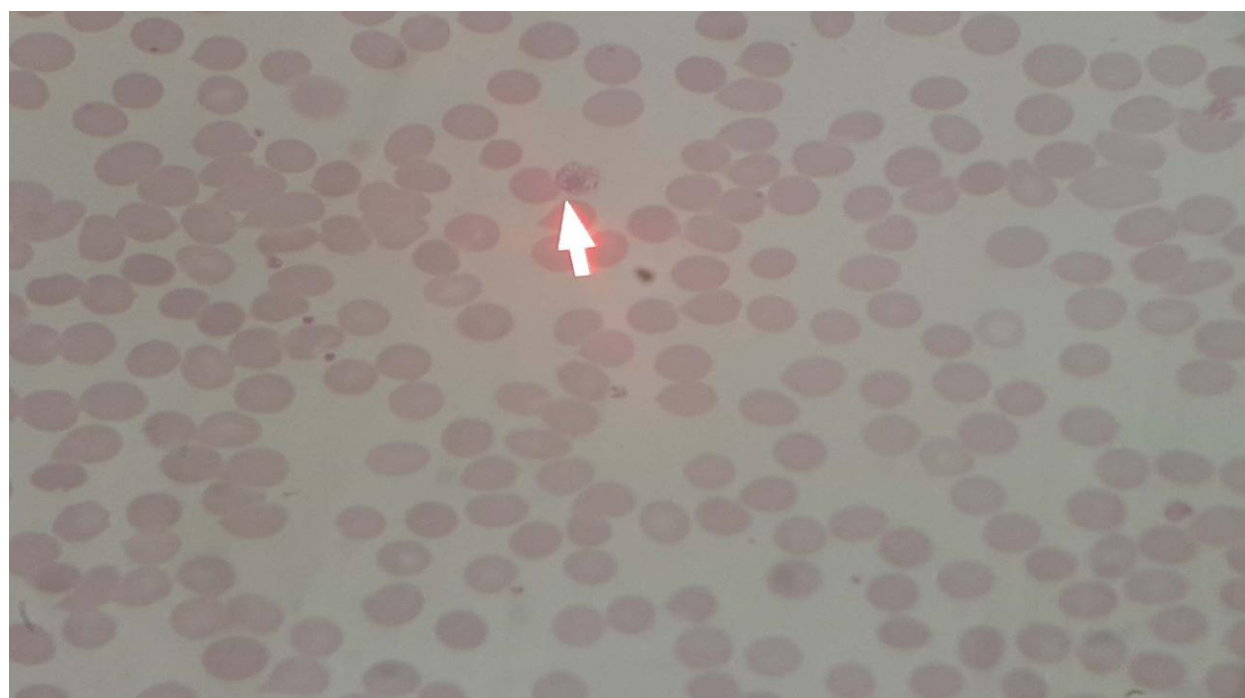


Figure 2 – Peripheral blood smear showing Trophozoite form of Plasmodium vivax (100x)

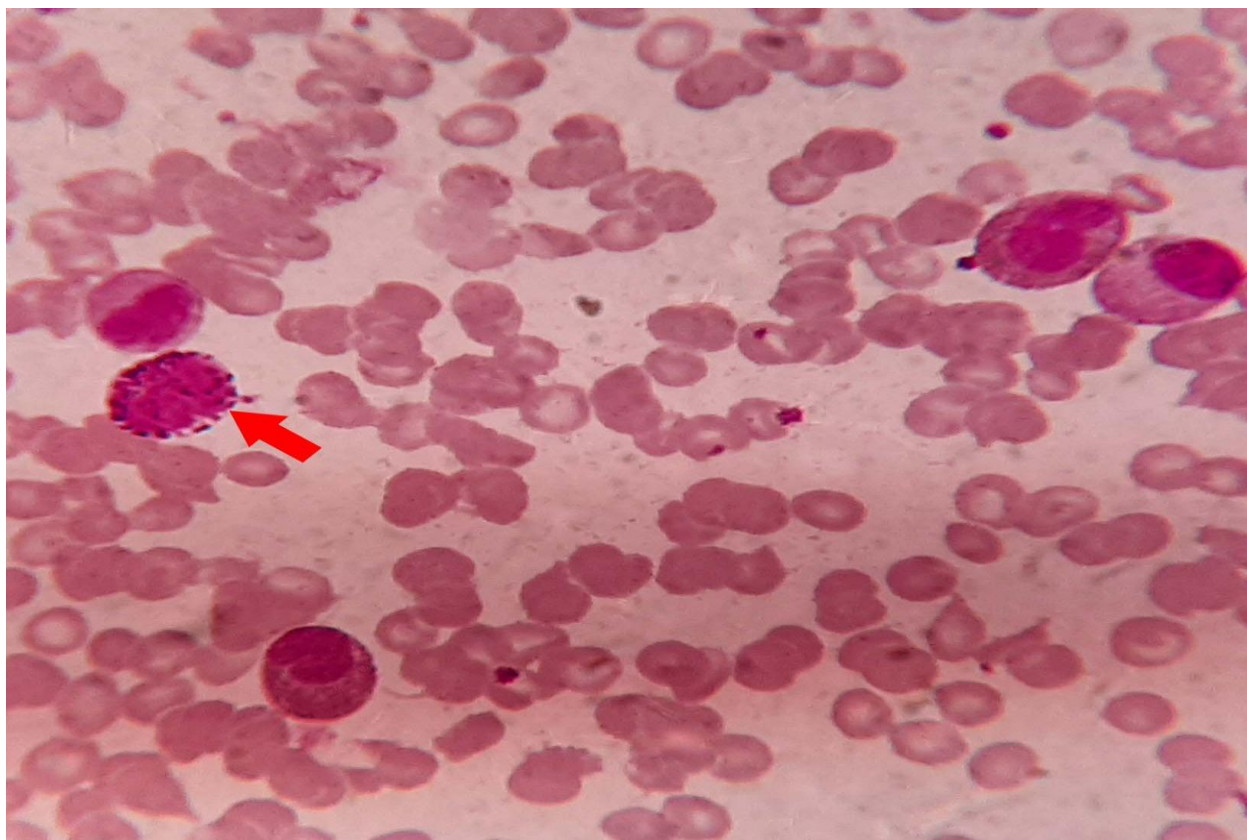


Figure 3 – Chronic myeloid leukemia (100x): Peripheral blood smear shows a basophil and low platelet count.

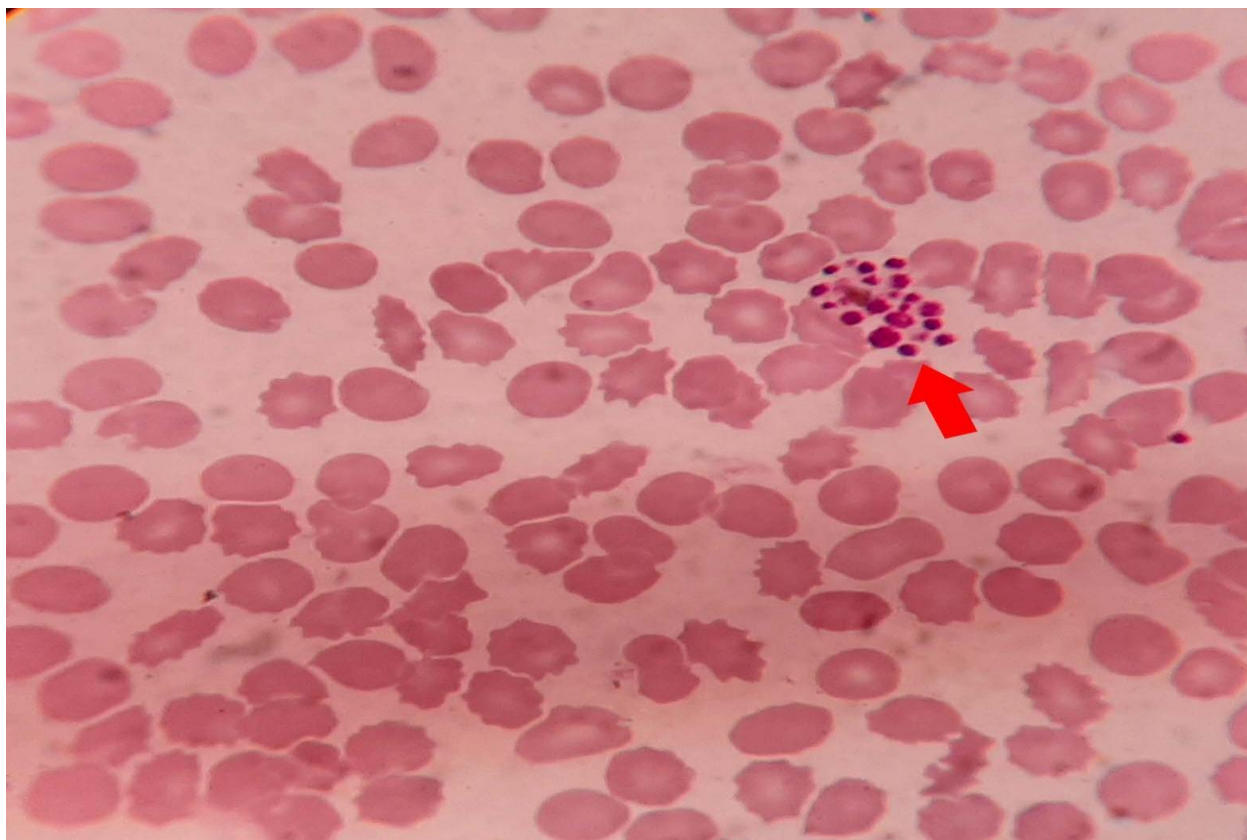


Figure 4 – Pseudothrombocytopenia (100x): Peripheral blood smear shows platelet clumps.