



TO EVALUATE THROMBOCYTOPENIA AS AN INDICATOR OF MALARIA IN PATIENTS WITH FEBRILE ILLNESS IN A PERIPHERAL HOSPITAL IN SUBURBAN MUMBAI.

Pathology

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ABSTRACT

Thrombocytopenia has a wide range of causes of which malaria is one of the common causes. The purpose of the study was to evaluate thrombocytopenia as an indicator of malaria in patients with febrile illness and was conducted from October 2023 to December 2023 in Department of Pathology at Pandit Madan Mohan Malviya Shatabdi Municipal General Hospital, Govandi, a 210 bedded hospital in suburban Mumbai. In the present study, out of total 204 outdoor patients coming with acute febrile illness, 102 (50 %) had thrombocytopenia on automated cell analyzer (RBC Semi-Automatic ADG 300 Hematology Analyzer). All the cases of thrombocytopenia were graded and classified into 4 categories according to the severity. Out of 102 cases of thrombocytopenia, 61 cases (59.8%) were reported to be positive for malarial parasite on peripheral smear and/or rapid antigen detection test. 52 cases (56.8 %) were positive for *Plasmodium vivax* and 09 cases (8.8 %) were positive for *Plasmodium falciparum*. Higher incidence of thrombocytopenia was seen in *Plasmodium vivax* as average mean platelet value for this malarial species was 77,670/mm³ in contrast to the average mean platelet value of *Plasmodium falciparum* being 92,1100/mm³. Also, *Plasmodium falciparum* was more associated with severe form of thrombocytopenia. Thrombocytopenia was found to be a good discriminatory parameter to detect the presence or absence of malaria along with clinical, microscopic and/or rapid antigen detection tests in patients with acute febrile illness.

KEYWORDS

Febrile illness, Thrombocytopenia, Malaria.

INTRODUCTION

Malaria is caused by *Plasmodium* species which is a blood parasite causing different haematological abnormalities. These abnormalities can be anaemia (decreased haemoglobin), thrombocytopenia (decreased platelet count), lymphopenia (decreased lymphocyte count), monocytosis (increased monocyte count), eosinopenia (decreased eosinophil count) and in rare cases disseminated intravascular coagulation. Of all these thrombocytopenia more than anaemia is commonly seen in the haematological complications of malaria.

Thrombocytopenia, which is defined as decreased platelet count less than 1,50,000/ mm³ is a common haematological anomaly during malaria infections. Mechanism of thrombocytopenia primarily seems by peripheral destruction of the platelets, bone marrow alterations due to malaria parasite, excessive removal of platelets by the spleen, platelet consumption by the disseminated intravascular coagulopathy and may be due to pseudo thrombocytopenia due to clumping of platelet factor-infected erythrocytes.

For the diagnosis of malaria, microscopic examination by identifying and confirming parasite species is considered gold standard. However recent diagnostic advances such as rapid malaria antigen testing, NAATs (nuclei acid amplification tests) and serological tests have gained more importance due to the technical simplicity, less complexity and rapid diagnostics as compared to microscopic examination. However, visualizing malarial parasite in the peripheral smear under microscope remains as the method of choice.

Despite making considerable progress in reducing malaria burden according to WHO malaria report 2020, the prevalence of malaria in Mumbai and suburban area has shown a recent surge. Factors influencing the endemicity as well as recent surge in the suburban possibly are climatic changes including heavy rainfall and relative humidity.

This study attempts to evaluate thrombocytopenia as an indicator of malarial in suburban area and thus aid in prompt diagnosis of malaria in this region.

Study Methodology

This was a retrospective observational study conducted at Department of Pathology at Pandit Madan Mohan Malviya Shatabdi Municipal General Hospital, Govandi, suburban Mumbai from October 2023 to December 2023, blood samples sent for routine investigation were included in the study. Blood samples were collected from febrile outpatients of all age group whose platelet counts were less than 1,50,000/mm³ on automated cell analyzer (RBC Semi-Automatic ADG 300 Hematology Analyzer). These samples were also subjected to rapid malaria antigen test (MALARIGEN, Bivalent Ag Rapid Diagnostic test kit). Peripheral blood smear (both thick and thin smears) of these patients were prepared, followed by Romanowsky stain. Microscopic examination was performed to confirm/ rule out malaria in these patients. Additional information if needed was gathered from medical records of the patient.

Observations

There were total 204 cases of acute febrile illness of which 102 patients had thrombocytopenia on automated cell analyzer. The cases of thrombocytopenia were graded and classified into 4 categories according to the severity. Platelet count < 1,50,000/mm³ to 75,000/mm³ defined as grade 1, grade 2 < 75,000/mm³ to 50,000/mm³, grade 3 < 50,000/mm³ to 25,000/mm³ and < 25,000/mm³ as grade 4.

Out of 102 cases of thrombocytopenia, 61 cases (59.8%) were reported as positive for malarial parasite on peripheral smear. Thrombocytopenia in these 61 cases of malaria was ranging from 25,000/mm³ to 1,50,000/mm³. 2 most common species were seen, *Plasmodium vivax* and *Plasmodium falciparum*. 52 cases (56.8 %) were positive for *Plasmodium vivax*. 09 cases (8.8 %) were positive for *Plasmodium falciparum*. 52 cases which were positive for *Plasmodium vivax*, platelet counts were ranging from 25,000/mm³ and 1,50,000/mm³ (Grade 3 to Grade 1 thrombocytopenia). 09 cases which were positive for *Plasmodium falciparum*, platelet counts were ranging from 26,000/mm³ and 1,34,000/mm³ (Grade 3 to Grade 1 thrombocytopenia).

Mean value of platelets for both the malarial species was observed and

calculated using the formula Mean \bar{x} of a data set, which is the sum of all the data values divided by the count or size n . For *Plasmodium vivax* it was 77,670/mm³ (n=52) and for *Plasmodium falciparum* it was 92,1100/mm³ (n=09). From the mean value of platelet count, Grade 1 thrombocytopenia was seen in both the species of malaria observed in the present study.

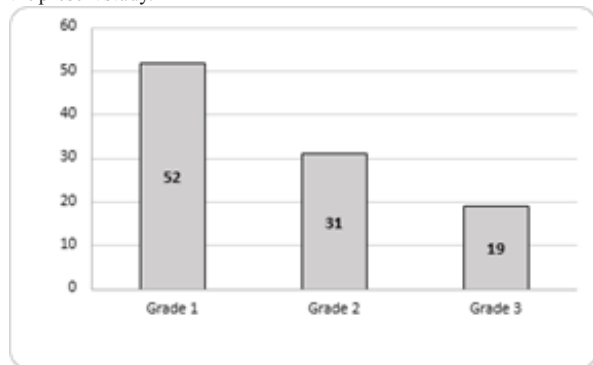


Figure 1
Grading of thrombocytopenia

Note: Figure number 1 shows number of cases in different grades of thrombocytopenia

Table 1
Grading and distribution of thrombocytopenia

Grading of thrombocytopenia	Platelet count	Total Number of cases (%)	Malaria Positive cases (%)	Plasmodium vivax positive cases (%)	Plasmodium falciparum positive cases (%)	Cases negative for Malaria parasite
Grade I	1,50,000 /mm ³ to 75,000 /mm ³	52 (50.9%)	33 (50%)	29 (55.76%)	04 (44.4%)	19 (50%)
Grade II	75,000 /mm ³ to 50,000 /mm ³	31 (30.3%)	19 (28.78%)	15 (28.8%)	04 (44.4%)	12 (50%)
Grade III	50,000 /mm ³ to 25,000 /mm ³	19 (18.6%)	09 (13.63%)	08 (15.3%)	01 (11.1%)	10 (50%)
Grade IV	Less than 25,000 /mm ³	00	00	00	00	00
Total		102 (100%)	61 (59.8%)	52 (56.8%)	09 (8.8%)	41 (40.1%)

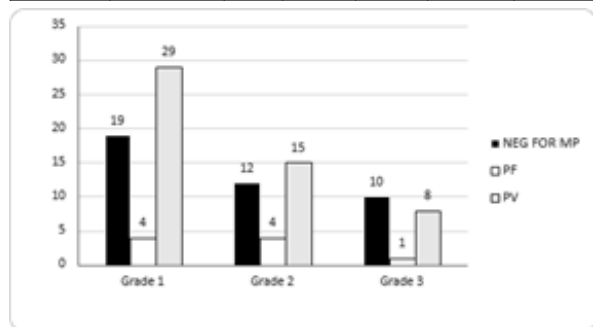


Figure 2
Malaria patients with respect to Grading of thrombocytopenia

Note: Figure number 2 shows occurrence and non-occurrence of malaria in various grades of thrombocytopenia

DISCUSSION

Thrombocytopenia has a wide range of causes of which malaria is one of the common causes. In the present study of total 204 patients coming with acute febrile illness, 102 patients (50 %) had thrombocytopenia. 61 patients (59.8 %) who had thrombocytopenia came out to be

positive for malarial parasite on microscopy and rapid malarial antigen test. Similar finding was observed in study conducted Shiraz Jamal Khan et al and Yasir Abbass (Khan SJ, 2012)

Malarial species observed in the present study were *Plasmodium vivax* and *Plasmodium falciparum*. Severity of these malarial species was assessed by grading the thrombocytopenia. Higher incidence of thrombocytopenia was seen in *Plasmodium vivax* as average mean platelet value for this malarial species was 77,670/mm³ in contrast to the average mean platelet value of *Plasmodium falciparum* being 92,1100/mm³.

Thrombocytopenia of grade 3 that is platelet count less than 25,000/mm³ was almost similar in both *Plasmodium vivax* (15.3 %) and *Plasmodium falciparum* (11.1 %) cases. No cases were reported in grade 4 of thrombocytopenia in this study.

In contrast to present study, Patel et al. showed significantly higher incidence of thrombocytopenia in *P. falciparum* than *P. vivax* (P. Patel, M. Patel, 2013) and study conducted by Shaikh et al. showed significantly higher incidence of thrombocytopenia in *P. vivax* infected patients which was similar to present study. (Q. H. Shaikh, 2009).

Thus, severity of malaria can be assessed by studying the grading of thrombocytopenia as low platelet count may have severe manifestations which can be life threatening to patients, and mortality can be prevented if managed successfully. Hence patients with acute febrile illness with or without localizing signs and having thrombocytopenia should alert the clinician about the possibility of malaria infection which can be confirmed with specific tests (Anabire, N.G, 2008).

As the present study did not have any case of mixed infestations by both *P. vivax* and *P. falciparum*, effect of mixed infestation on platelet counts could not be assessed.

CONCLUSION

Higher frequency of mild to moderate thrombocytopenia (1,50,000/ mm³ to 50,000/ mm³) was observed in patients coming with acute febrile illness and of the patients suffering from malaria, *Plasmodium vivax* was found to be common species in these cases. Also, *Plasmodium falciparum* was more associated with severe form of thrombocytopenia (<50,000/ mm³). Thrombocytopenia is a good discriminatory parameter to detect the presence or absence of malaria along with clinical, microscopic and/or rapid antigen detection tests. Thus, after excluding malaria all the patients with low platelet counts can be further evaluated for other causes of thrombocytopenia.

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