European Journal of Molecular & Clinical Medicine

ISSN 2515-8260 Volume 09, Issue 03, 2022

ORIGINAL RESEARCH

DIAGNOSTIC SIGNIFICANCE OF THROMBOCYTOPENIA IN MALARIA AND ITS CORRELATION WITH TYPE AND SEVERITY OF MALARIA

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ABSTRACT

Introduction: Malaria remains today one of the major health hazards in the tropics having increased morbidity and mortality. It is one of the most common hematological parasites in tropical and subtropical countries particularly in the continents of Africa and Asia. More than 40% of the world population reside in malaria-endemic area and it is accountable than 300-500 million cases and 1.5-2.7 million deaths will occur in each approaching year.Among these manifestations, thrombocytopenia is the most common complication presented in both the species of malaria, viz-P. falciparum and P.vivax. The clinical diagnosis of malaria is always challenging as signs and symptoms overlap with other febrile illnesses. The gold standard technique for diagnosis is smear positivity. Among the hematological abnormality thrombocytopenia is the most common but its correlation with the type of malaria and its prognostic implications have not been evaluated in many of the studies.

Materials and Methodology: A total of 250 patients were included in the study that was presented with the history of acute febrile illness, either hospitalized or out-patients presented within the period 2 years in our Department of General Medicine. Inclusion criterion include all patients irrespective of ages were included after taking a detailed case history, physical examination. Those patients who were presented with localizing signs indicating some specific disorders were excluded from the study. Blood examinations to be carried out using peripheral blood smear stained with Leischman's stain were studied to confirm the diagnosis. Blood was collected in an ethylene diamine tetra acetic acid (EDTA) tube and complete blood count was studied using an automated cell count analyzer. A platelet count of less than $150x10^9$/L was considered to the indicator for thrombocytopenia.

Results: Out of all the 250 patients, 200 were identified positive for malaria. One hundred and two were suffering from P.vivax infection. Ninety two acquired P.falciparumwhere as 6 had mixed infections. And the most important finding is that 75% of the patients observed

with thrombocytopenia. The median platelet count in patients with falciparum malaria (72.5 × 103 /μL) and vivax malaria (89 × 103 /μL) were significantly lower than those with non-malaria (282 × 103 /μL) group (P value<0.0001).

Conclusion: As concluded in this study that hematological changes such as anemia, thrombocytopenia and leucopenia showed a statistically significant correlation with malarial infection. We observed that routinely performed laboratory findings such as hemoglobin levels, leukocyte and platelet count and even red cell distribution width values can provide a spark to the diagnosis in a patient with acute febrile illness in endemic areas, thus having a greater probability of accurately diagnosing malaria and enhancing prompt initiation of treatment. The limitation of resources and trained health personnel in many malaria infested areas, presumptive clinical diagnosis seems a relevant option to start the anti-malarial regime at the earliest.

Keywords: Malaria parasite, Thrombocytopenia, vivax, falciparum

INTRODUCTION

Malaria remains today one of the major health hazards in the tropics having increased morbidity and mortality. It is one of the most common hematological parasites in tropical and subtropical countries particularly in the continents of Africa and Asia. More than 40% of the world population reside in malaria-endemic area and it is accountable than 300-500 million cases and 1.5-2.7 million deaths will occur in each approaching year.[1] Clinical presentations of malaria include fever chills, sweating, vomiting, headache, abdominal pain, hepatomegaly and splenomegaly.[2] Various hematological abnormalities have been reported in malaria like neutrophilia, lymphopenia and thrombocytopenia. Among these manifestations, thrombocytopenia is the most common complication presented in both the species of malaria, viz-P. Falciparum and P.vivax.[3,4] The clinical diagnosis of malaria is always challenging as signs and symptoms overlap with other febrile illnesses. The gold standard technique for diagnosis is smear positivity. Among the hematological abnormality thrombocytopenia is the most common but its correlation with the type of malaria and its prognostic implications have not been evaluated in many of the studies.

MATERIALS AND METHODOLOGY

A total of 250 patients were included in the studies that were presented with the history of acute febrile illness, either hospitalized or out-patients presented within the period 2 years in our Department of General Medicine. Inclusion criterion include all patients irrespective of ages were included after taking a detailed case history, physical examination. Those patients who were presented with localizing signs indicating some specific disorders were excluded from the study.

Blood examinations to be carried out using peripheral blood smear stained with Leishman's stain were studied to confirm the diagnosis. Blood was collected in an ethylene diamine tetra acetic acid(EDTA) tube and complete blood count was studied using an automated cell count analyzer. A platelet count of less than $150x10^9$/L was considered to the indicator for thrombocytopenia.

RESULTS

Out of all the 250 patients, 200 were identified positive for malaria. One hundred and two were suffering from P.vivax infection. Ninety two acquired P.falciparum where as 6 had mixed infections. And the most important finding is that 75% of the patients observed with thrombocytopenia. The median platelet count in patients with falciparum malaria (72.5 × 103 /μL) and vivax malaria (89 × 103 /μL) were significantly lower than those with non-malaria (282 × 103 /μL) group (P value<0.0001)

Table: Distribution of platelet count in malaria

Platelet counts/mm^3	**Mixed**	**P.falciparum**	**P.vivax**	**Malaria cases (n=200)**	**Normal cases (n=50)**	
					No	**%**
<50000/mm^3	4	**56**	**18**	**78**	**0**	**0.0**
50000 – 1.5L/mm^3	-	**24**	**48**	**72**	**0**	**0.0**
1.5 – 4L/mm^3	2	**10**	**34**	**46**	**50**	**100.0**
>4L/mm^3	-	**2**	**2**	**4**	**0**	**0.0**
Total	**6**	**92**	**102**	**200**	**50**	**100.0**

DISCUSSION

Even though there are numerous advances in diagnostic methods and treatment modalities, the global incidence of malaria is still contributing about 300-500 million cases annually reported with 1.1 to 2.7 million deaths. Almost around 40% of the world-wide population who are at risk of malaria resides in the South-East Asian Region. In the Indian subcontinent, the distribution of malaria is heterogeneous and determined by various climatic and physiological risk factors. However, Plasmodium vivax is the most prevalent malaria parasite in India, contributing towards the majority of cases reported annually.[5]

The noticeable hematological changes are some of the most common complications in malaria and they play a major role in malarial pathogenesis. These changes involve the major cell types such as RBCs, leucocytes and thrombocytes.[6,7,8]Also, malaria infected patients tend to have significantly lower platelets level, WBCs, lymphocytes, eosinophils, RBCs and Hb level, while monocyte and neutrophil counts are significantly higher in comparison to non-malaria infected patients or normal people.[9,10,11,12] Malaria can affect any age group. However, most studies show predilection towards adults when compared to children. The present study had 140 adult patients and 60 children which is comparable to study conducted by *Potkaret al*.[6]

The adult age group between 30-45 is more affected due to their greater mobility and their greater risk of exposure due to more outdoor activities. Present study had 52% males as compared to females 48%. Other studies with favorable results include *Erhartet al*[8] with 69% males and *Bashwari et al*[5] with 75.9% males. The females are usually at lower risk to exposure due to their lesser mobility in male chauvinistic society and apathy towards treating illness in females may contribute towards a greater number of reported male cases. The most common species of malaria in the present study was reported to be vivax (51%) closely followed by falciparum (46%). Studies conducted by *Erhartet al*[13], *Jadhav et al*[14]P.vivax was the most common species while *Rojansthein et al*[15] and *Bashwari et al*[5] reported higher falciparum prevalence in their respective studies.

The clinical diagnosis of malaria is challenging because of its non-specific nature of the signs and symptoms which usually overlap considerably with other diseases presenting with fever in tropical and sub-tropical regions. This leads to inadvertent usage of anti-malarial regime, thereby compromising the quality of care for patients with non-malarial fevers in endemic areas.[11] The gold standard for laboratory diagnosis of malaria is the demonstration of the malarial parasite on microscopy which requires technical expertise and a tedious procedure

that needs repeated peripheral smear examinations. Hematological abnormalities which are considered as a hallmark of malarial infections and statistical analyses have shown that many of these hematological values may lead to an increased clinical suspicion for malaria thus making an initiative to specific therapy even in the absence of a positive smear report for malaria. Various hematological alterations like progressively increasing anemia, thrombocytopenia, leucocytosis or leukopenia have been reported in cases of malarial infecton.[16]The suggested mechanism of thrombocytopenia in malaria may be attributed to a peripheral destruction, excessive removal of platelets by splenic pooling as well as platelet consumption by the process of disseminated intravascular coagulation (DIC).[17] In this study, we found that130 patients with Thrombocytopenia (65%) in the malaria-infected group. The median of platelet count in patients affected with falciparum malaria (72.5 × 103 /μL) and vivax malaria (89 × 103 /μL) were significantly lower than those with non-malaria (282 × 103 /μL) group (P value<0.0001). Thrombocytopenia was also associated with anaemia in the malaria group (r=-0.107, P value=0.004) and also related to age (r=- 0.235, p – value<0.0001).

Thrombocytopenia is the most common findings, irrespective of the type of malaria seen in patients. Presence of thrombocytopenia in a patient of acute febrile illness in the tropics increases the probability of malaria and can be a helpful clinical indicator for the beginning of anti-malarial regime. However, thrombocytopenia is not a distinguishing feature between the two types of malaria. The mechanism of thrombocytopenia in malaria is uncertain. Immune-mediated lysis, sequestration in the spleen and a dyspoietic process in the marrow with diminished platelet production have all been correlated with the available literature. Abnormalities in platelet structure and function have been described as a consequence of malaria and in some rare instances; platelets can be invaded by malarial parasites themselves.

Studies conducted by *Bashwari et al*[5] and *Jhadav et al*[14] shows thrombocytopenia which is reported more in vivax as in the present study while in studies conducted by *Horstmann et al*[17] and *Erhart et al*[13], thrombocytopenia is more in cases of falciparum malaria in their respective studies.

CONCLUSION

As concluded in this study that hematological changes such as anemia, thrombocytopenia and leucopenia showed a statistically significant correlation with malarial infection. We observed that routinely performed laboratory findings such as hemoglobin levels, leukocyte and platelet count and even red cell distribution width values can provide a spark to the diagnosis in a patient with acute febrile illness in endemic areas, thus having a greater probability of accurately diagnosing malaria and enhancing prompt initiation of treatment. The limitation of resources and trained health personnel in many malaria infested areas, presumptive clinical diagnosis seems a relevant option to start the anti-malarial regime at the earliest.

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