Original Article

Peripheral Blood Counts Abnormalities in Malaria Patients

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ABSTRACT

Objective: To evaluate Peripheral Blood counts abnormalities and hematological changes in Patients with malaria.

Study Design: Observational / analytical Study.

Place and Duration of Study: This study was conducted at the Pathology Department of Bacha Khan Medical College Mardan and Deportment of Medicine Mardan Medical Complex (MMC) Teaching Hospital Mardan from June 2016 to April 2017.

Materials and Methods: This study included a total of 100 patients, 50 as a control group and 50 as malaria diagnosed by thin and thick films under microscopy. Complete blood counts (CBC) were performed by Hematology Analyzer (an automated Mandray Machine.)

Results: 45 out 50 patients (90%) of the malaria had anemia, Hb level was 8.95 g/dl and 40 out 50 patients (80%) had thrombocytopenia. Platelets count was 110/cmm in 10 out of 50 patients. 20% had leucopenia and the rest (80%) had normal white cell counts but Anemia and thrombocytopenia were present in more patients than control group. p-value were 0.002 and 0.003 respectively.

Conclusion: Hematological changes and peripheral blood counts abnormalities are significant findings in malaria patients and so keeping these changes in mind, any patient presenting with anemia, thrombocytopenia, bicytopenia or pancytopenia should be properly examined for malaria before advising other diagnostic procedures especially bone-marrow aspiration and provide prompt treatment.

Key Words: Malaria, Anemia, Thrombocytopenia

INTRODUCTION

Malaria is a major cause of death among children and adults in tropical and subtropical parts of the world like in Pakistan.[1]

Malaria is responsible for significant number of deaths in countries where malaria is endemic.[2]

Despite full eradication efforts about 40% of the world population is at risk of malaria particularly South East Asian region.[3]

Pakistan also has high incidence of malaria, being a part of this endemic region.[4]

Few studies report that about 5 millions persons are affected in Pakistan anually.[5]

Upto 500 millions cases are estimated to occur and 1.6 million malaria related deaths occur each year in the world. All deaths are caused by plasmodium falciparum, plasmodium vivax, plasmodium ovale and plasmodium malariae. P.vivax and P.falciprum are the most common species in Pakistan.[6]

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Peripheral blood abnormalities are associated with malaria, effecting all cell-lines but anemia and thrombocytopenia are the commonist findings.[7]

Hematological abnormalities show direct correlation with malaria infection and is a hallmark of malaria and these hematological abnormalities may lead to high clinical suspicion of malaria.[8]

These hematological changes in malaria include anemia, thrombocytopenia, atypical lymphocytosis, and disseminated intravascular coagulation (DIC). These changes improve with prompt diagnosis and treatment.[9]

Malaria is an important cause of death and illness in developing countries specially the falciprum Malaria.[10]

Plasmodium falciprum and P.vivax are the most common causes of anemia and thrombocytopenia.

The aim of the study is to properly evaluate patients presenting with anemia or thrombocytopenia for malaria infection as prompt diagnosis and immediate treatment can reduce morbidity and morality from malaria.As these patients are mostly referred for bone marrow aspiration because of bicytopenia or pancytopenia, therefore proper diagnosis reduces the unnecessary use of bone marrow aspiration..

MATERIALS AND METHODS

This Study was conducted in the medicine and pathology departments of Bacha Khan Medical College MMC teaching hospital Mardan from June 2016 to April 2017. A total of hundred patients included in

study. They were divided in two groups. Group A healthy individuals and group B malaria patients. 50 patients in each group. Malaria was diagnosed by the goldstandard method of peripheral smear examination. All the smears of patients in group B were positive for malaria parasites. Majority of cases were of plasmodium vivax and few were plasmodium falciparum. The complete blood Counts for both groups were performed by hematology analyzer (Mandrav company) for which blood sample of 5 ml was collected in EDTA Tube containing 1.8 ml EDTA. Statistical analysis included descriptive statistics bivariate analysis i.e. t- test, chi square and analysis of variances. Level of significance was set at < 0.05.

RESULTS

There were a total of 100 patients divided into two groups A and B containing 50 patients each. Group A has 50 Normal healthy individuals as a control group while group B has 50 Malaria patients diagnosed on peripheral smear examination. Complete blood counts were performed on both the groups. Most of the patients in malaria group had hematological abnormalities as compared to the control group, (Table I). In group B 40 out of the 50 parasitemic patients had anemia, Hb level of 8.9 G/dl, 45 out of 50 Patients had thrombocytopenia, platelet count was 110/cmm and 25 out of 50 patients had leucopenia, while rest of the patients had normal TLC count, (Table 2). In the present study Hemoglobin in parasitemic patiens was significantly lower than the control group, Platelet are also lower as compared to control group. Leucopenia was also noted but not significantly lower than the control.

Table No.1: Percentage of patients having hematological abnormalities in Malaria patients.

S.No.	Hematological parameters	Percentage of patients
1	Anemia's	40/50 (80 %)
2	Thrombocytopenias	45/50 (90 %)
3	Total leucocyte count	20/50 (40 %)

Table No.2: Mean and standard values of Hb, platelets and TLC count of patients and control group.

S.No.	Mean values of Hb., platelets and TLC count in Malaria patients	Mean value of control group	P.value
Hb level	8.95± 0.86 g/dl	12.789 ±0.532 g/dl	<.002
Platelets	110 ±20.673 x $10^3/\mu L$	350±20253 x $10^3/\mu L$	.0032
TLC	3.65±.567 x $10^3/\mu L$	5.6±1.457 x $10^3/\mu L$	.0052

DISCUSSION

Peripheral blood count abnormalities are common in malaria infection. These complications are caused mainly by plasmodium vivax and plasmodium Falciparum and include anemia, thrombocytopenia and leucopenia. Plasmodium Vivax is the most common malaria in our region. In the present study all the malaria infected patients had hematological abnormalities either in the form of anemia, thrombocytopenia, Bicytopenia or pancytpenia. Many of these patients were reffered for bone Marrrow aspiration but they were diagnosed on proper smear examination. These patients had anemia, Hb level of 8 gm/dl.

Thrombcytopenia 110x103/cmm And white cell counts were 3.65±0.5x103/cmm in about half of patients while others had normal WBC count. A similar study had been conducted by abro at el on a total of 133 malaria patients out of which 64% had anemia, 83% had thrombocytopenia & 24% lymphopenia[12].

Patel et al also conducted a similar study on malaria patients and showed hematological abnormalities such as anemia, thrombocytopenia,atypical lymphocytosis and leucopenia[13].

Bashwari AM et al conducted a study on malaria patients and showed that 59% had anemia 55% had thromocypenia and 42% had lecopenia[14].

Malaria is one of the most prevalent infectious diseases and hematological complications are significant findings in these patients. Many studies are available. Peripheral blood count abnormalities are important manifestation in these patients. Akhtar,sect and bignegthu etc showed that anemia thrombocytopenia and leucopenia are significant hematological complications in malaria patients[15–16].

The pathogenesis of anemia is multifactorial, however it is thought to result from destruction of RBC infected with parasites, bone marrow failure and level of parasitemia[17].

Tumer Necrosis Factor (TNF) has also been implicated and may cause ineffective erythropoeisis, dyserythropoiesis and anemia of chronic disease[18-19].

Suggested mechanisms of thrombocytopenia are peripheral destruction, Splenic pooling of platelets, antibody mediated platelet destruction, adenosin release from hemolysed RBCs, dysmegakaryopoiesis, platelet aggregation, parasitic invasion of platelets, platelet phagocytosis, platelet addhesion to erythrocytes and oxidative stress[20–21].

Anemia and thrombocytopenia have also been reported in malaria in mostly of the patients but total leucocytic count was reported normal by Surve KM et in his study[22].

Some patients had leucopenia in the Present study. Some studies have different results regarding the total white blood cell counts in malaria patients. George et al reported lecopenia in their study while Adapo et al

reported leucocytosis in their study and Imoru et al reported no significant changes in total leucocytic count in malaria patients[23-25]. leucocytosis has also been reported in malaria by Mulla et al[26].

Actually malaria is a typical blood disorder and effects all the hematological cellular components severely.

CONCLUSION

Hematological changes and peripheral blood counts abnormalities are significant findings in malaria patients and so keeping these changes in mind, any patient presenting with anemia, thrombocytopenia, bicytopenia or pancytopenia should be properly examined for malaria before Advising other diagnostic procedures especially bone-marrow aspiration and provide prompt treatment.

Author's Contribution:

Concept & Design of Study:	Subhan ud Din
Drafting:	Amjad Ali
Data Analysis:	Naveed Khan
Revisiting Critically:	Amjad Ali
Final Approval of version:	Subhan ud Din

Conflict of Interest: The study has no conflict of interest to declare by any author.

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