Hematological Changes in Malaria: A Comparative Study

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OBJECTIVES:
The hematological changes usually associated with malaria are well known. This study was conducted to estimate and compare the predominance & severity of hematological changes in common types of malaria.

METHODOLOGY:
This observational study included 400 suspected malarial patients attended in Out Patient Department (OPD) and In Patient Department (IPD) of civil hospital Rajkot during April 2011 to March 2013. The diagnosis of malaria was confirmed by thick and thin film stained with Leishman’s staining for malaria parasite and Antigen test (i.e. HRP2). Complete Blood Counts (CBCs) were performed using an automated SYSMEX machine.

RESULTS:
Among the samples of consenting participants tested, 70% of the patient had thrombocytopenia, 94% anaemia, 12% lymphopenia and 17% monocytosis. The incidence of thrombocytopenia was slightly more in P. Falciparum (58.69%) than P. Vivax (30.18%) cases, p value > 0.05, whereas there was no significant difference in the incidence of anaemia in two groups (34.68% vs 33.82%) with p value > 0.05. However, lymphopenia was observed in 33.33% cases of P. Vivax as compared to 11.11% in P. Falciparum cases, p value < 0.04. Eosinophilia was 12.16% for P. Falciparum as well as P. Vivax can cause significant hematological changes with high incidence of thrombocytopenia, anaemia, lymphopenia and monocytosis.

CONCLUSIONS:
P. Falciparum was commoner than P. Vivax having 39 cases (52.7%) versus 27 cases (36.48%) respectively, while Mixed infection represented only 8 cases (10.81%). Out of all the malaria positive cases, majority of cases i.e. 64 cases (86.48%) showed subnormal haemoglobin. However, significant difference in the incidence of anaemia in P. Falciparum 35(89.7%) and P. Vivax 23(85.18%) cases with p value > 0.05, whereas there was no significant difference in the incidence of anaemia in two groups (34.68% vs 33.82%) with p value > 0.05. However, lymphopenia was observed in 33.33% cases of P. Vivax as compared to 11.11% in P. Falciparum cases, p value < 0.04. Eosinophilia was 12.16%

Keywords:
Malaria, Hematological changes, P. Falciparum, P. Vivax, Thrombocytopenia, Anaemia, Lymphopenia, Monocytosis.

INTRODUCTION
Malaria is well-known to human being since centuries; it is a disease of tropical and subtropical countries particularly Africa and Asia. In spite of advances information, malaria continues to cause significant morbidity and mortality worldwide. Malaria is one of the most prevailing human infections in the world. More than 40% of the world population resides in malaria-endemic area and it is predictable that 300-500 million cases and 1.5-2.7 million deaths occur each year.1 Mortality rate is usually elevated (20%) in severe malaria (parasitemia >5%).2 Hematological changes, which are the most common complications, play a significant role in these serious complications. The hematological abnormalities that have been reported to consistently companion which comprise anemia, thrombocytopenia, atypical lymphocytosis and infrequently disseminated intravascular coagulation.3 Leucopenia, leucocytosis, Neutopenia, Neutrophilia, Eosinophilia and monocytosis also have been reported.2,4 The aim of this study was to assess the hematological changes which occur in different types of malaria. In tropical countries like India, malaria remains an essential health problem.

MATERIAL AND METHODS
The present comparative cross sectional study was conducted in civil hospital rajkot over two years period from April 2011 to March 2013. The clinically suspected cases of malaria were included in the study. The diagnosis of malaria was confirmed by thin and thick blood films stained with Leishman's stain for malaria parasite and Antigen Histadine Release Protein 2 (HRP2) test. The study was premeditated to include clinically suspected cases of malaria and patients were excluded on the basis of history and finding suggestive of Dengue, chronic liver disease, bleeding disorder, thrombocytopenia, drug intake or conditions which might have contributed in blood changes. Complete Blood Count was performed using an automated SYSMEX machine and WBC differential was also done for all patients. All malaria positive smears were studied for confirmation, identification of species and review of smear for platelets count and other hematological changes. Data was analyzed by Epi.Info Statistical Software. p value of < 0.05 was taken as significant for all statistical analysis.

RESULTS
This study included 400 patients, out of which 74 (18.5%) patients were found to harbor malaria parasite by either of the techniques (Table: I). P.falciparum malaria was commoner than P.vivax having 39 cases (52.7%) versus 27 cases (36.48%) respectively, while Mixed infection represented only 8 cases (10.81%). Out of all the malaria positive cases, majority of cases i.e. 64 cases (86.48%) showed subnormal haemoglobin. However, significant difference in the incidence of anaemia in P.falciparum 35(89.7%) and P. vivax 23(85.16%) cases with p value ( > 0.05) was found, which is in contrast to the observation by Murphy GS, Oldfield EC.

The total leukocytic count was normal in 60 (86%) whereas Differential leukocyte count showed normal neutrophil count in 63(85.1%), normal lymphocytes in 51(68.9%), normal monocytes in 58(78.4%), normal basophil in 73(98.99%) and normal eosinophils in 63(85.1%) patients. Monocyte as well as neutrophils were increased respectively in 14 (18.9%) and 9(12.6%) cases. However, lymphopenia was present in 18 (24.32%) cases. Commonly 53 (71.6%) had thrombocytopenia and 20 (27%) had normal platelets. Majority of the cases which showed thrombocytopenia, 31(79.48%) cases were P...
The Peripheral smear examination showed 35(47.3%) of the patients were anemic with normocytic normochromic except in 29 (39.2%), where it was Normocytic hypochromic (Table: III). It was observed that 3 cases (4.05%) had Macrocytic Microcytic peripheral smear. Nucleated Red Blood Corpuscles (NRBCs) /100 White Blood Corpuscles (WBCs) were seen in 32(43.2%) cases. Hypersegmented neutrophils in 2(2.7%) cases and toxic changes in 6(8.1%) cases were also seen. Atypical lymphocytes were observed in 4(5.4%) cases with their predominance in P.Falciparum 3(7.6%) and P.Vivax 1(3.7%) cases. Reticulocytes count was found to be raised in 31(41.9).

When hematological values were compared with malaria species, there was no significant difference in the incidence of anemia in P.Falciparum 35(89.7%) and P.Vivax 23 (85.18%) cases, with p value >0.05, but thrombocytopenia was slightly predominant in P.Falciparum 31(79.48%) than P.Vivax 16(59.25%) with p value >0.05 (Table-IV). However, there was significant difference in lymphocyte count in two groups and lymphopenia was observed in 3 (11.11%) in P.Vivax as compare to 13(33.33%) in P.Falciparum with p value <0.05. No significant difference in the incidence of thrombocytopenia, anemia and lymphopenia. The blood picture is characteristic of a haemolytic and possibly to infective process. In any of the cases, there was no significant difference in the incidence of thrombocytopenia, anemia of chronic disease and lymphopenia. The blood picture is characteristic of a haemolytic and possibly to infective process. 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