ROLE OF HEMOGLOBIN AND PLATELETS AS BIOMARKERS FOR DIAGNOSIS OF MALARIA AT DHIRAJ HOSPITAL, VADODARA

[1*]SangitaVasava, [2]Sucheta Lakhani,[3]Jitendra Lakhani

[1]Assistant Professor, Department of Microbiology, SBKS MI & RC, Vadodara (GJ), India

[2]Professor, Department of Microbiology, SBKS MI & RC, Vadodara (GJ), India

[3]Professor, Department of Medicine, SBKS MI & RC, Vadodara (GJ), India

Corresponding Author:

[*]Ms. Sangita Vasava

Department of Microbiology, SBKS MI & RC, Piparia, Waghodia – 391760, Gujarat, India

Contact- 7874730958, Email- sangitavasava87@gmail.com

ABSTRACT

Background: Malaria is caused by Plasmodium species and a disease of human which it have an effect on high morbidity and mortality. Malaria perhaps related with complications that may be missed by early diagnosis, investigations and treatment. Microscopic examination for screening the presence of malarial parasites is considered necessary for confirmation that requires technical expertise. **Aims and objectives**: The present study to find the changes and role of hemoglobin as well as platelet count in *P. falciparum* and *P. vivax*. **Methodology:** A total of 100 positive samples which were 50 *P. falciparum* and 50 *P. vivax* included. All the samples were further subjected to the detection of Hb and platelet counts by standard method. **Results:** The significant decrease in hemoglobin and platelet count was noted in *P. falciparum* than *P. vivax*. Out of 100 cases, 50 were *P. falciparum* and 50 were *P. vivax* and 70were males and 30 were female. Out of 50 *P. falciparum,*48% showed Hb less than 9 mg/dl, however,20% *P. vivax* showed Hb less than 9 mg/dl. The *P. falciparum* and *P. vivax* showed a platelet count of less than 1 lakh in 52% and 48% patients respectively. **Conclusion:** Effects on both of the Hb and platelet has seen more in *P. falciparum* species infection compared to *P. vivax.* Two tests may use to detect malaria where the rapid tests are not available and tests should correlate with peripheral blood smear. Our study highlights the level of Hb and platelet count may useful for the diagnosis of malaria and prompt initiation of the therapy.

Keywords: Haemoglobin, Platelet, *Plasmodium,* Malaria, Diagnostic test

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INTRODUCTION

Malaria is a serious disease in human being. Malaria is caused by parasites which are *plasmodium species* that are transmitted to people by the bites of infected female Anopheles mosquitoes. *P. falciparum* is a species causing serious fatal infections. In the world, one of the severe infection in human beings caused by Malaria which is responsible for high mortality. Malaria is preventable and curable disease. An estimated 228 million cases of malaria worldwide and deaths were 405000 in 2018.Annually reported of malaria cases were 2.48 million from South Asia, out of which 75% cases were India. [1,2,3]

In malaria, a quick and accurate diagnosis is the key to effective treatment. Acute febrile illnesses like arboviral infection, leptospirosis, enteric fever, or viral fever are difficult to distinguish from malaria based on the clinical ground alone because the clinical presentation of malaria is very diverse. The standard method for diagnosis of malaria by Giemsa-stained blood smears from microscopic examination and also expert microscopy could gives information the parasite stage.[4]So it requires technical expertise and repeated smear examination. However, it may be inefficient if poorly executed.[5]

Blood is the most common and easy to collect for diagnostic and investigations. Any disease or infection condition leads to changes in hematological parameters. That at any level it affects the hemopoietic physiology are possible to be influenced of it. In malaria its probable to occur host homeostasis consequential in an more of clinical presentation. [6]

The changes in Hematological parameters and it play a major role in malaria pathology; they caused the most common complications in malaria. Due to changes main in such as RBCs, leucocytes (WBCs), and platelet count.

Because of *P. falciparum,* in the first two years of life, it was leading to major severe anemia syndrome region of Western Kenya.[7]

All the organ of the body mostly exaggerated with malaria however also representative hematological changes have been reported. [8]Malaria disease is severe hematological disease because the parasite is able to invade in RBCs and it cultivate in contradictory RBCs with essential grow of the parasite.[9]

The present study to find the changes and role of hemoglobin as well as platelet count in *P. falciparum* and *P. vivax*

MATERIALS AND METHODS

This study included was prospective at Clinical Microbiology laboratory , Central Diagnostic Laboratory, Dhiraj Hospital, SBKS Medical Institute and Research Center, Vadodara. A total of 100 malaria positive patient samples (50 samples for *P. falciparum* and 50 samples for *P. vivax*) from Central Clinical Laboratory were included in this study. All the samples were screened by peripheral blood smear and rapid Antigen detection methods to diagnose and speciation of different plasmodium species.

All the confirmed samples were further subjected to measurements of platelet count and hemoglobin by with Hematology analyzer system which was Sysmex KX 21. The experienced pathologists from pathology department cross-checked cell count through light microscopy, Dhiraj Hospital Vadodara. The data were analyzed using SPSS statistical software by using an appropriate statistical test.

RESULTS

This prospective study was carried out at the Microbiology laboratory and Pathology laboratory to find out the prevalence of malarial infection at the tertiary care hospital. A total of 100 positive cases were studied for hemoglobin and platelet count. Out of these 50 were *P. falciparum* and 50 were *P. vivax*. Out of 100 cases,70 were males and 30 were female.

Out of 50 *P. falciparum,* 48% showed hemoglobin less than 9 mg/dl, however,20% *P. vivax* showed hemoglobin (Hb) less than 9 mg/dl. The *P. falciparum* and *P. vivax* showed a platelet count of less than 1 lakh in 52% and 48%

patients respectively. Malarial infection decreases the level of Hb was found more consistently in *P. falciparum* than *P. vivax*. The platelet count showed more thrombocytopenia with *P. falciparum* than *P. vivax*.

Table and chart-1: Distribution of malarial parasite species

Sex	***P. falciparum***	***P. vivax***	**Total**
Male	36	34	70
Female	14	16	30
Total	50	50	100

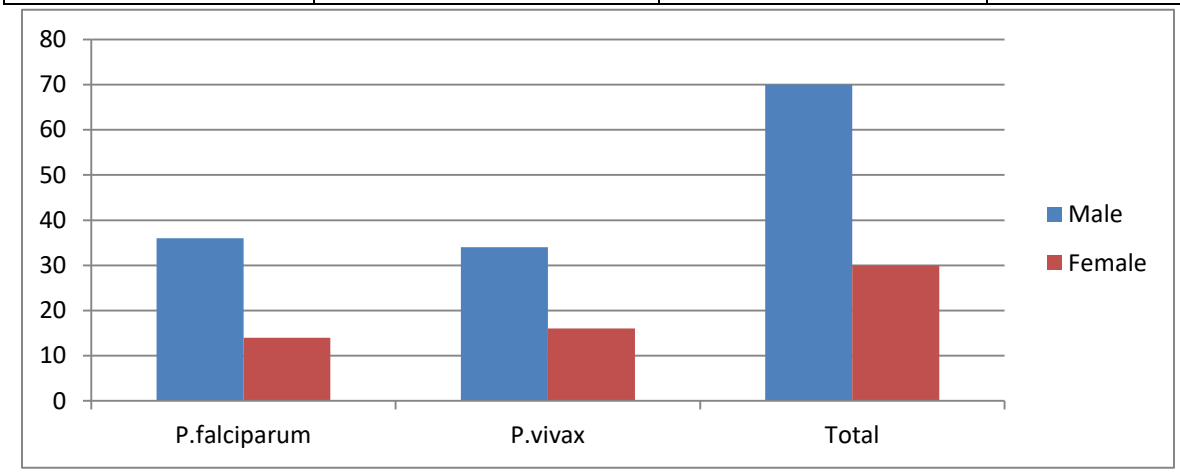

Table-2: Hemoglobin level variations in different malarial infection.

Hemoglobin gm %	***P. falciparum*****(n=50)** **N(%)**	***P. vivax*****(n=50)** **N(%)**
<9	24(48%)	10(20%)
9.1-10	11(22%)	09(18%)
10.1-11	01(2%)	08(16%)
11.1- 12	04(8%)	05(10%)
12.1-13	04(8%)	05(10%)
13.1-14	05(10%)	05(10%)
14.1-15	00	05(10%)

15.1-16	01(2%)	02(4%)
16.1-17	00	01(2%)
Total	**50(100%)**	**50(100%)**

Table-3: Platelets count variations in different malarial infection.

Platelet count lac/cmm	***P. falciparum*(n=50) N(%)**	***P.vivax*(n=50) N(%)**
<1	26(52%)	24(48%)
1.1-2	17(34%)	19(38%)
2.1-3	00	05(10%)
3.1-4	01(2%)	01(2%)
4.1-5	01(2%)	00
Clumps on smear	05(10%)	01(2%)
Total	**50(100%)**	**50(100%)**

DISCUSSION

Haemoglobin levels found on *Plasmodium falciparum* malaria cases were consistently low when in *Plasmodium vivax* compared to this species its high. Hb levels in the range of <9 gm/dl to 12 gm/dl were occurred more number in *P. falciparum* and in after 12.1 gm/dl Hb values in the P. vivax cases more than *P. falciparum*. The study found that in *P. falciparum* infection, the effect of malarial infection on platelet counts were low less than 1 lac/cmm, which was 52% and 34% found on 1.1-2 lac/cmm whereas in *Plasmodium vivax* infection was 48 % and 38%

respectively.In study of 2012 by Christopher reported the values of total cell counts for patients with mixed *Plasmodium spp*. were significantly lower than the single plasmodium spp infection like those for patients with infected with *P. falciparum* only or *P. malariae* only. The represent parasite density of infection was high in mixed *Plasmodium spp.* and low in any one species of *Plasmodium*. [10] In the febrile patients the reported of thrombocytopenia is the marker to identification for malaria.[11]There was 49% children infected with malaria with presented with thrombocytopaenia. That was with high parasitemia levels, Hb levels was low ,low age patients ,MPV was higher and clot platelet. In malaria-infected children have more regular diagnosed clot platelet and then it was connected and reported with thrombocytopenia relatively than condition of malaria. [12] Abnormally low levels of thrombocytes was present in 84.9% of malaria-infected patients and was in depends of age, gender, and nationality .Out of the 202 malaria-infected patients, 129 (63.9%) were males and 73 (36.1%) were females. [13]

CONCLUSION

Effect of malarial infection on Hemoglobin levels and platelet counts were found consistently more in *P. falciparum* relatively with *P. vivax*. The present study is diagnosed that effects on both of the hemoglobin and platelet has seen more in *P. falciparum* species infection compared to *P. vivax.* These two tests may use to detect malaria where the rapid tests (antigen-based) are not available also these tests should correlate with peripheral blood thick and thin smear.In the tropical region possibility of more malaria infection which indicate the patient having acute febrile illness because of thrombocytopenia was diagnosed. Our study highlights the level of hemoglobin and platelet count may useful for the diagnosis of malaria and prompt initiation of the therapy

Conflict of interest: None

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