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# Comparison of Effect on Hemoglobin, Hematocrit & Platelet Count in Patients of P.Falciparum and P.Vivax Malaria in a Tertiary Care Hospital in Gujarat

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**Abstract**
**Background:** *Hematological parameters are measurable indices of blood that serve as a marker for disease diagnosis RBCs destruction is an inevitable part of malaria, severe anemia may arise from acute haemolysis.*
**Aim:** *Comparison of effect on Hemoglobin, Hematocrit & platelet count in patients of P.falciparum and P.Vivax malaria.*
**Method and Material**: *This study of hematological changes in malaria is carried out in Shree Krishna Hospital, Karamsad from the period of January 2012 to January 2013. All positive malaria cases are taken and various hematological parameters are studied.*
**Results:** *Out of 216 cases 16 of them are positive for P.vivax and 47 of them are positive for P.falciparum are seen. 3 cases of mixed infection are also seen. Incidence of P.vivax 76.9% and P.falciparum 21.8%. majority of the patients has normal concentration of Heamoglobin and mild degree (31.9%) of anaemia. Haematocrit values of less than 20 were seen more commonly in falciparum infection. Decreased platelet count is a constant feature of both types of malaria with 83.33% cases showing platelets less than 1.5 lacs. However platelet counts severely depleted in 30 cases of P. Falcipharum.*
**Conclusion:** *This study highlights fall in Hb and hematocrit more in P. Falcipharum malaria. The decrease in platelet count were also more severe in patients affected by P. Falcipharum. P. vivax was the predominant species detected in the patients of malaria.*

## Introduction

Malaria is defined as a "typical blood disease" characterized by fever, anemia & spleenomegaly. Malaria is a mosquito-borne infectious disease of humans and other animals caused by protists (a type of microorganism) of the genus Plasmodium. [1]Malaria is a serious risk to pregnant women and infants and is a common cause of miscarriage. In areas of high transmission, malaria is responsible for underweight infants at birth and anemia in the mother (first pregnancies are particularly at risk).[2] [3]. Infection is caused by a parasite of genus Plasmodia which is transmitted to human beings by a pre infected female anophelene

mosquito[4]. Lack of knowledge about malaria, poverty and chronic disease together form a vicious circle, which is difficult to break. Hematological parameters are measurable indices of blood that serve as a marker for disease diagnosis. The key feature of the biology of the Plasmodium falciparum, the predominant malaria species, is the ability of the infected red blood cells to adhere to the lining of the small blood vessels. Such sequestered parasites provide considerable obstruction to tissue perfusion. In addition, it is becoming clear that in severe malaria there may be marked reductions in the deformability of uninfected RBCs. RBCs destruction is an inevitable part of malaria, anemia further compromises oxygen delivery. Severe anemia may arise from multiple poorly understood processes including acute haemolysis of uninfected RBCs and dyserythropoeisis, as well as through the interaction of malaria infection with other parasites infection and with nutritional deficiency

In spite of worldwide efforts to reduce malaria transmission, it is still the major cause of morbidity and mortality, with overall fatality rate of 10-30 % [5] was seen. The main areas where disease predominates are the rural and remote areas, where prompt treatment is not available or not detected in time [6]. Malarial parasite affects multiple organs of the body like liver, spleen, brain, gastro intestinal tract (G.I.T), gall bladder, pancreas, blood vessels and placenta. So, the clinical picture could bewide spectrum ranging from simple malaise to life threatening CNS symptoms like coma. Different organs get involved in various ways like parasitic sequestration in the internal organs, intravascular and immune mediated destruction of RBCs and platelets and cytokine mediated injury [7].

## Materials and Methods

This study of hematological changes in malaria is carried out in Shree Krishna Hospital, Karamsad from the period of January 2012 to January 2013.

**Source of data:** This is a prospective study conducted at Shree Krishna Hospital, attached to Shree Krishna Hospital, Karamsad. All smear positive for mal-aria cases detected at Pathology Laboratory were selected and study for hematological changes.

**Collection of data:** The history regarding age, sex, nature and duration of illness were taken. Clinical examination findings were noted. Blood sample for hematological study was taken before starting anti-malarial drugs. Venous blood was collected in EDTA Vacutainer. Hemoglobin (Hb), Haematocrit (HCT), Platelet count were measured using EDTA blood sample in automated KX 21 hematology analyzer. Thin blood smears were prepared using fresh blood on different slides by method described by Dacie and Lewis [8] & stained with Giemsa stain and studied for blood picture, species identification and for estimation of parasitaemia. Thin and thick films were made .Percentage of parasitaemia in thin blood smears was estimated by counting the number of infected RBC's per 1000 RBC's. On a thick smear a rough estimate of parasite concentration count was obtained by observing average number of parasites per thick blood field. The results were separated for P.Falcipharum and P. Vivax.

## Discussion & Results

This study of hematological changes in malaria is carried out in Shree Krishna Hospital, Karamsad from the period of January 2012 to January 2013 (one year). All positive malaria cases are taken and various hematological parameters are studied. Total prevalence of Malaria. (Table-1 and Fig-1.)

### Prevalence of malaria

**Table No.1-** Total Number of Cases with Different Infection

| Type of Parasites | No of Patients | Percentage (%) |
|---|---|---|
| P. vivax | 166 | 76.9 |
| P. falciparum | 47 | 21.8 |
| Mixed | 3 | 1.4 |
| Total | 216 | 100 |

Out of 216 cases 16 of them are positive for P.vivax and 47 of them are positive for

P.falciparum are seen. 3 cases of mixed infection are also seen. Incidence of P.vivax 76.9% and P.falciparum 21.8%.

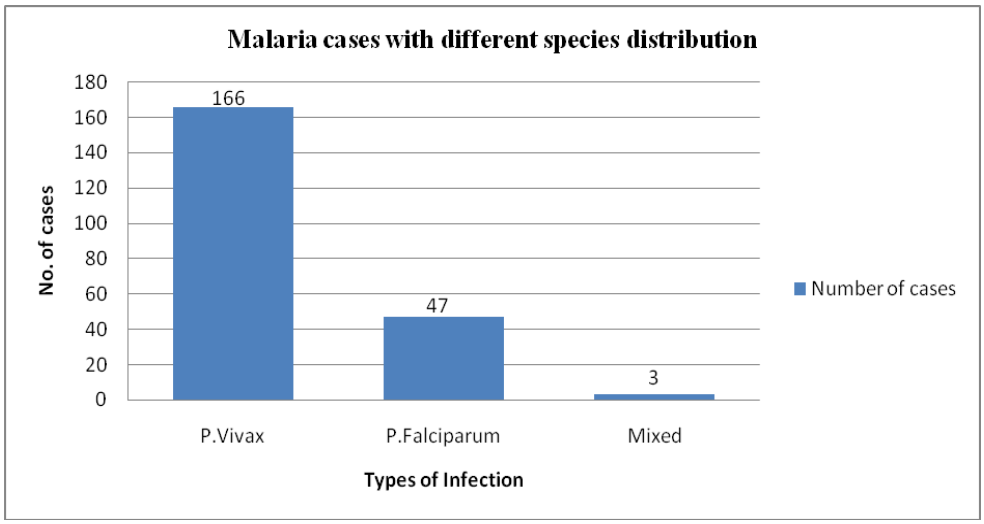


**Figure: 1** Malaria cases with species distribution

**Table No.2-** Sex Distribution of Cases in Malarial Infection

| sex | No. of cases | Percentage (%) |
|---|---|---|
| Male | 131 | 60.6 |
| Female | 85 | 39.4 |
| Total | 216 | 100.0 |

- The numbers of males affected in our study are more compared to Females.

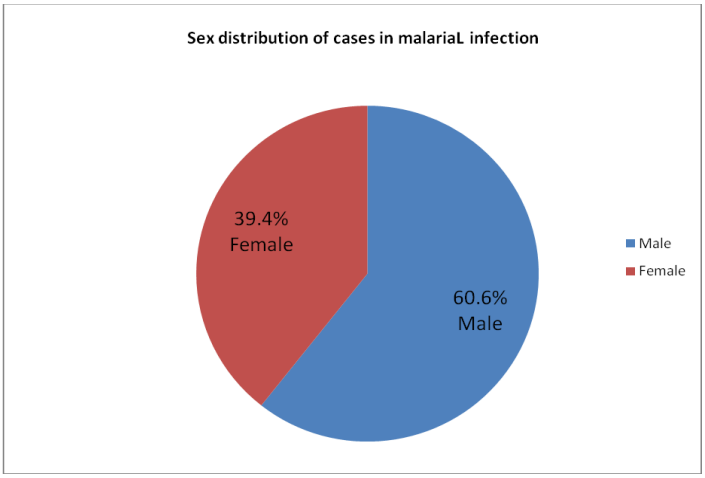


**Figure 2-** Sex distribution of cases in malarial infection

**Table No.3-**Age Wise Distribution of Malaria Patients

| Age Group (Years) | No of cases (n=216) | Percentage(%) |
|---|---|---|
| 0-10 | 12 | 5.6 |
| 11-20 | 43 | 19.9 |
| 21-30 | 51 | 23.6 |
| 31-40 | 31 | 14.4 |
| 41-50 | 35 | 16.2 |
| 51-60 | 23 | 10.6 |
| Above 60 | 21 | 9.7 |
| Total | 216 | 100.0 |

- As shown in table, most of the cases (74.1%) are in the young adults between 11 to 50 years age group with significant no. of cases in children (5.6%).
- People of all age group are seen.

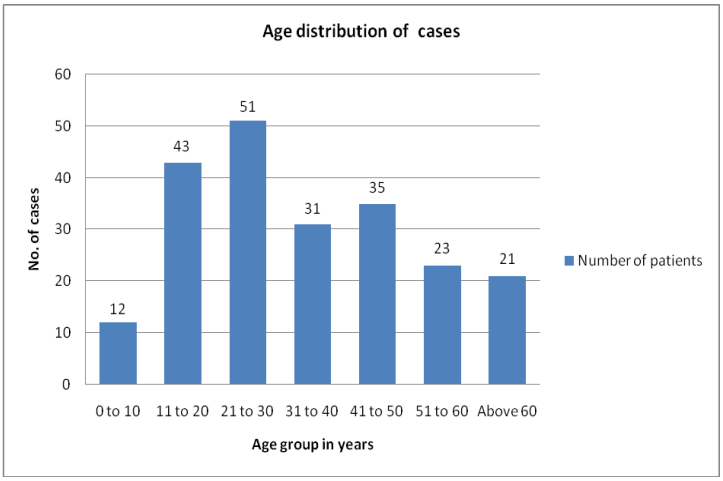


**Figure 3-** Age distribution of cases

**Table No. 4-**Hb (Haemoglobin) concentration

| Hb(gm/dl) | Falciparum | Vivax | Mixed | Percentage(%) |
|---|---|---|---|---|
| <5 | 1 | 1 | 1 | 1.4 |
| 5-7.9 | 7 | 5 | - | 5.6 |
| 8-11 | 12 | 55 | 2 | 31.9 |
| >11 | 27 | 105 | - | 61.1 |

- As shown in the table, majority of the patients has normal concentration of Heamoglobin and mild degree (31.9%) of anaemia.
- Hb concentration < 5gm% is seen in 1.4% of cases.

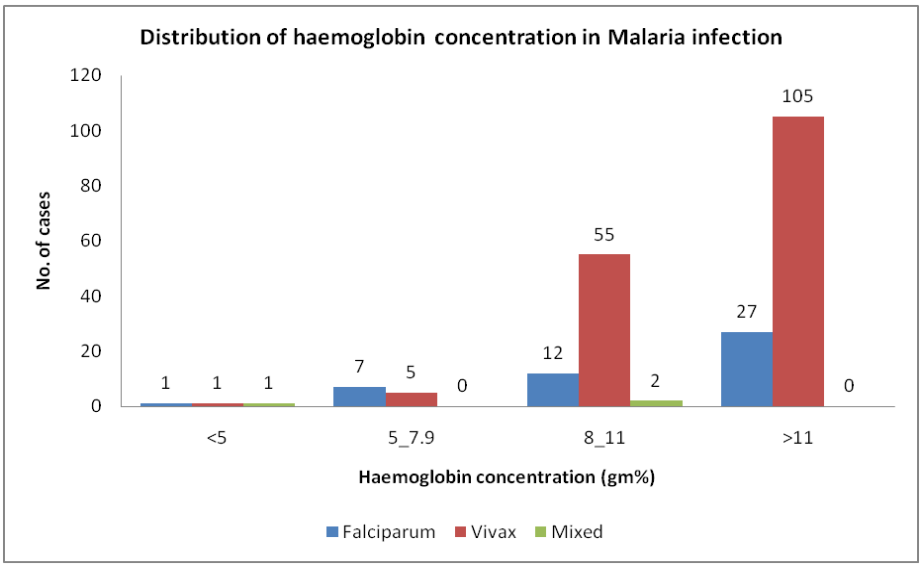


**Figure 4:** Distribution of hemoglobin concentration in malaria

**Table No. 5**-HCT (Haematocrit) (%)

| HCT % | Falciparum | Vivax | Mixed | Percentage(%) |
|---|---|---|---|---|
| <20 | 5 | 2 | 1 | 3.7 |
| 20-40 | 30 | 129 | 1 | 74.1 |
| >40 | 12 | 35 | 1 | 22.2 |

- Haematocrit values of less than 20 were seen more commonly in falciparum infection.
- One case of Mixed infection showed haematocrit of 9.9 %

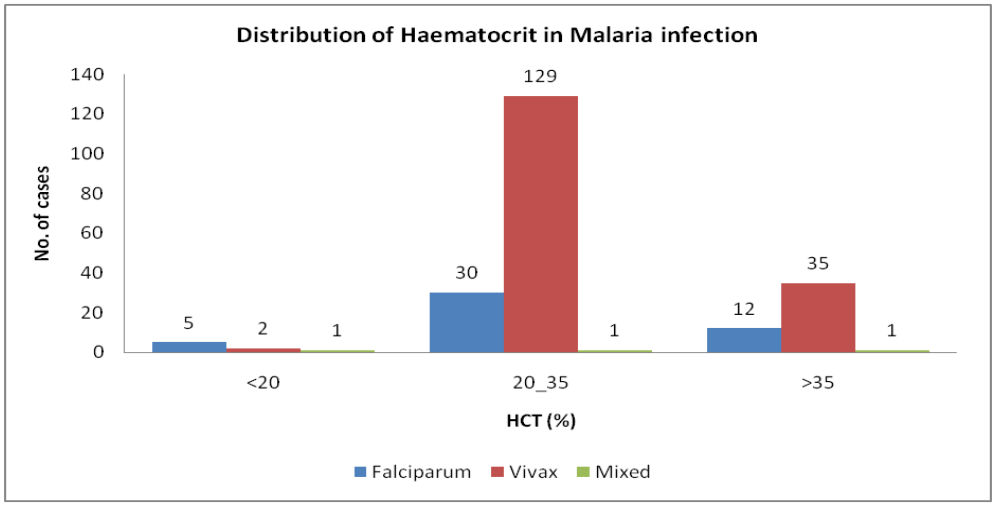


**Figure 5-** Distribution of hematocrit in malaria

**Table No.6-** Platelet Count

| Platelet count/mm$^3$ | Falciparum | Vivax | Mixed | Percentage(%) |
|---|---|---|---|---|
| <50,000 | 30 | 25 | 2 | 26.4 |
| 51,000-1.0 lacs | 9 | 59 | 1 | 31.9 |
| 1.01-1.50 lacs | 3 | 51 | 0 | 25.0 |
| >1.50 lacs | 5 | 31 | 0 | 16.7 |

- Decreased platelet count is a constant feature of both types of malaria with 83.33% cases showing platelets less than 1.5 lacs.
- Severs platelet reduction (<50,000) was seen in 57 cases comparable to study by Shah at al [9] [10]

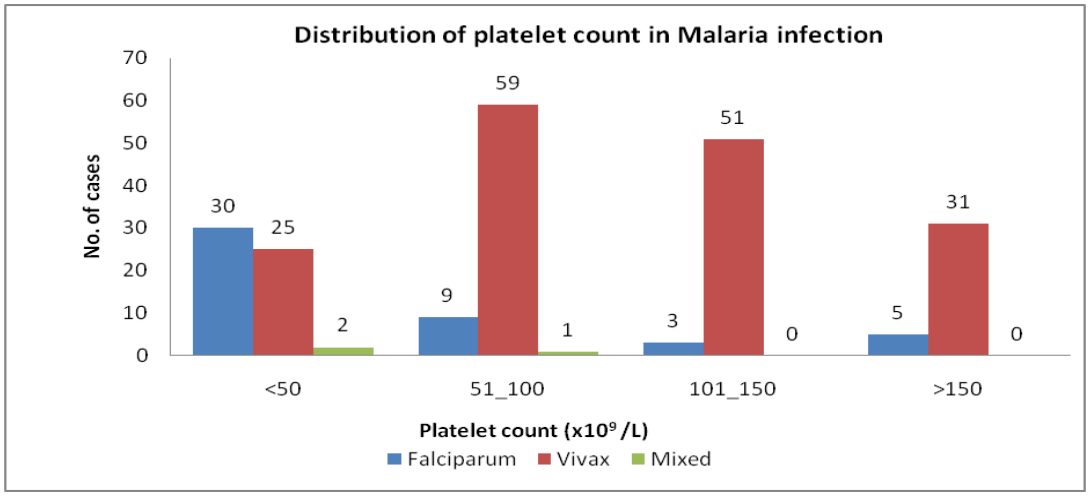


**Figure 6-** Distribution of platelets

**Table No. 7-** Month Wise Distribution

| Month | No. of Cases | Percentage |
|---|---|---|
| Jan | 1 | 0.46 |
| Feb | 6 | 2.78 |
| Mar | 10 | 4.63 |
| Apr | 11 | 5.09 |
| May | 30 | 13.89 |
| Jun | 19 | 8.80 |
| July | 26 | 12.04 |
| Aug | 42 | 19.44 |
| Sep | 26 | 12.04 |
| Oct | 29 | 13.43 |
| Nov | 12 | 5.56 |
| Dec | 4 | 1.85 |

• The distribution of cases during the period studied showed two peaks first in September-October and the second in May-August. These periods accounted for the maximum number of cases.

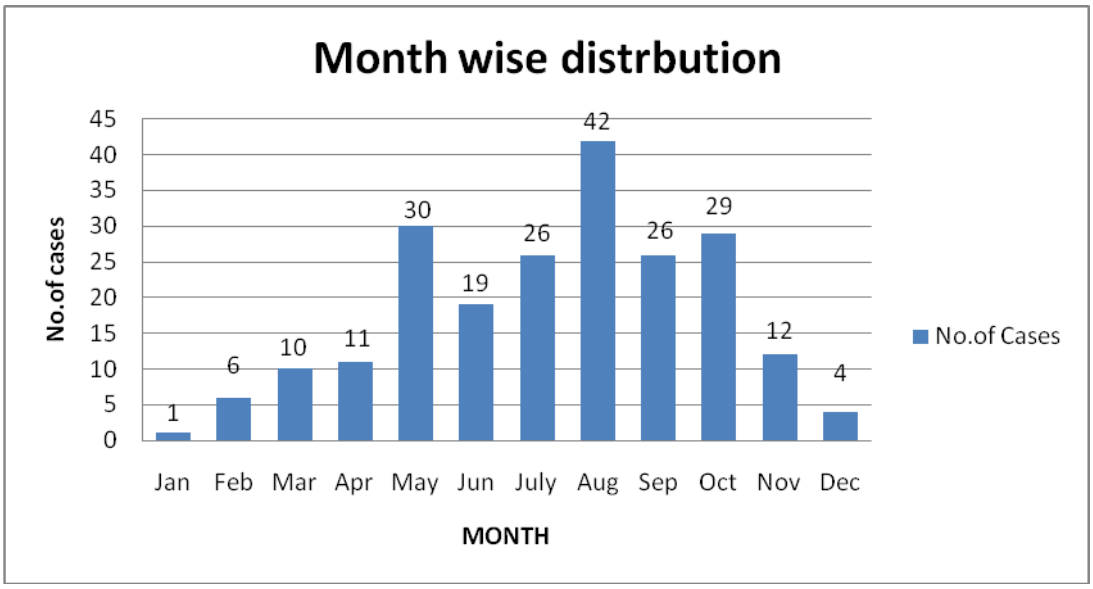


**Figure 7:-** Month wise distribution

**Statistical analysis**

| Parameter | Group | No.of cases | Mean | Mean Difference | P value | Interval of the difference | |
|---|---|---|---|---|---|---|---|
| | | | | | | Upper | Lower |
| Hb | Plasmodium Vivax | 166 | 11.60 | 0.55 | 0.147 | -0.195 | 1.29 |
| | Plasmodium Falciparum | 47 | 11.05 | | | | |
| Platelet Count | Plasmodium Vivax | 166 | 109.7 | 46.41 | 0.00 | 25.35 | 65.47 |
| | Plasmodium Falciparum | 47 | 63.36 | | | | |
| Hct | Plasmodium Vivax | 166 | 35.56 | 2.27 | 0.03 | 0.190 | 4.36 |
| | Plasmodium Falciparum | 47 | 33.29 | | | | |

**Conclusion**

This study highlights fall in Hb and hematocrit more in P. Falcipharum malaria. The decrease in platelet count were also more severe in patients affected by P. Falcipharum. P. vivax was the predominant species detected in the patients of malaria.[11]

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