

**Original Research Article****Significance of Platelet Count and Platelet Indices in Malarial Infestation: A Case Control Study****Kishan Prasad H.L.<sup>1</sup>, Aashish Sharma Konamme<sup>2</sup>, Jayaprakash Shetty K.<sup>3</sup>, Padma Shetty K.<sup>4</sup>**<sup>1</sup>Additional professor, <sup>2</sup>Post graduate, <sup>3</sup>Professor & Head, <sup>4</sup>Professor, Department of Pathology, K.S. Hegde Medical Academy of Nitte (Deemed to be university), Mangalore, Karnataka 575018, India.**Abstract****Corresponding Author:****Kishan Prasad H.L.**,  
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**Background:** Malaria, caused by Plasmodium species carries significant mortality and morbidity. WHO estimates the disease burden in India to be up to 75% of all cases from South East Asia. Immune play in malarial infestation resulting in reduction of platelet count is common knowledge now. We undertook this study to evaluate the significance of alterations in platelet count and indices in malaria in comparison to a healthy control group.

**Methods:** A case control study conducted in a tertiary care hospital based in Dakshina Kannada district. 62 newly diagnosed cases of malaria confirmed by Peripheral smear method over a period of one year, and 50 healthy subjects were included. Cases of malaria with ongoing treatment and the cases which did not undergo malarial diagnostic tests in our institute were excluded. Following informed consent, platelet count and indices obtained from the five part automated haematology analyser (Mindray BC5380) were compiled and tested for significance in SPSS using unpaired t-test.

**Results:** 31 of the 62 cases showed pure *P. vivax* infestation, five cases showed pure *P. falciparum* infestation. 26 cases were mixed malarial infestation, having both *P. vivax*, and *P. falciparum*. Platelet count showed a mean value of 82,645/mm<sup>3</sup>, and 2,53,380/mm<sup>3</sup> in the case and control groups respectively. Statistical analysis showed p-values less than 0.001 in platelet count and indices between cases and controls.

**Conclusion:** This study demonstrated that platelet count is reduced in malaria with statistically significant alterations of the platelet indices as compared to the control group, raising the possible utility as contributory diagnostic markers of malaria. Replication of these results by studies with a great number of sample size would help validate these findings.

**Keywords:** Malaria; Blood Platelet; Plateletcrit.**Introduction**

Malaria, caused by Plasmodium species carries significant mortality and morbidity. World Health Organisation estimates the disease burden in India to be upto 75% of all cases from South East Asia. The 21st century has witnessed a progressive decline in the number of cases and malaria related deaths, due to primary prevention and better therapy [1]. The disease previously

causing high anticipation among the patients and the concerned, presently rouses no such attention owing to effective treatment options. But, for the treatment to be effective, diagnosis and species typing is of the essence. Immune play in malarial infestation resulting in reduction of platelet count is common knowledge now [2]. We undertook this study to evaluate the significance of alterations in platelet count and indices in malaria in comparison to a healthy control group.

## Subjects and Methods

This was a case control study conducted in a tertiary care hospital based in Dakshina Kannada district of Karnataka. All the cases over a period of one year, from January 2017 to January 2018, that were diagnosed by means of quantitative buffy coat (QBC) method and confirmed by peripheral smear constituted the case group, which summed up to 62 cases of malarial infestation. 50 healthy subjects were included in the control group.

### Inclusion Criteria

Cases of malaria (both uncomplicated and complicated) admitted in our hospital, diagnosed by peripheral smear.

### Exclusion Criteria

Cases of malaria with ongoing treatment at the time of admission, and the cases which did not undergo diagnostic tests for malaria in our institute were excluded. Most of the haemoglobinopathies were excluded by means of clinical details and peripheral smear examination.

Following informed consent from both cases and controls, the values of platelet count and platelet indices comprising mean platelet volume (MPV), platelet distribution width (PDW), and plateletcrit (PCT) in the result sheet generated by five part automated haematology analyser (Mindray BC5380) were compiled. This raw data was compared and tested for statistical significance in SPSS using unpaired t-test.

## Results

Gender distribution among cases and controls were as seen in Figure 1.

Mean age in cases of malarial infestation was 37 years (standard deviation of 17 years). Age distribution in cases was as seen in Figure 2.

Platelet count (normal range: 1,50,000 to 4,10,000/mm<sup>3</sup>), mean values (standard deviation) in cases and controls were found to be 82,645 (43,847) /mm<sup>3</sup>, and 2,53,380 (59,653) /mm<sup>3</sup> respectively. Test of significance (unpaired t-test), as expected, showed an extremely statistically significant difference between cases and controls (p-value of <0.0001, with 110 degrees of freedom), denoting that thrombocytopenia in cases of malaria is significant.

MPV (normal value: 6.5 to 12 fL) in cases and controls had mean values (and standard deviation) of 9.50 fL (1.15) and 8.46 fL (0.95) respectively, with a p-value of <0.0001, which is significant.

PDW (normal value: 9 to 17%) mean values (and standard deviations) were 16.33% (0.52), and 14.90% (1.11) in cases and in controls respectively, with statistically significant difference (p-value of <0.0001).

PCT (normal value: 0.108 to 0.282%) mean values (and standard deviations) were 0.092% (0.080), and 0.194% (0.039) in cases and in controls respectively, again with statistical significance (p-value of <0.0001). The histograms of PCT values in cases and controls is depicted in Figure 3.

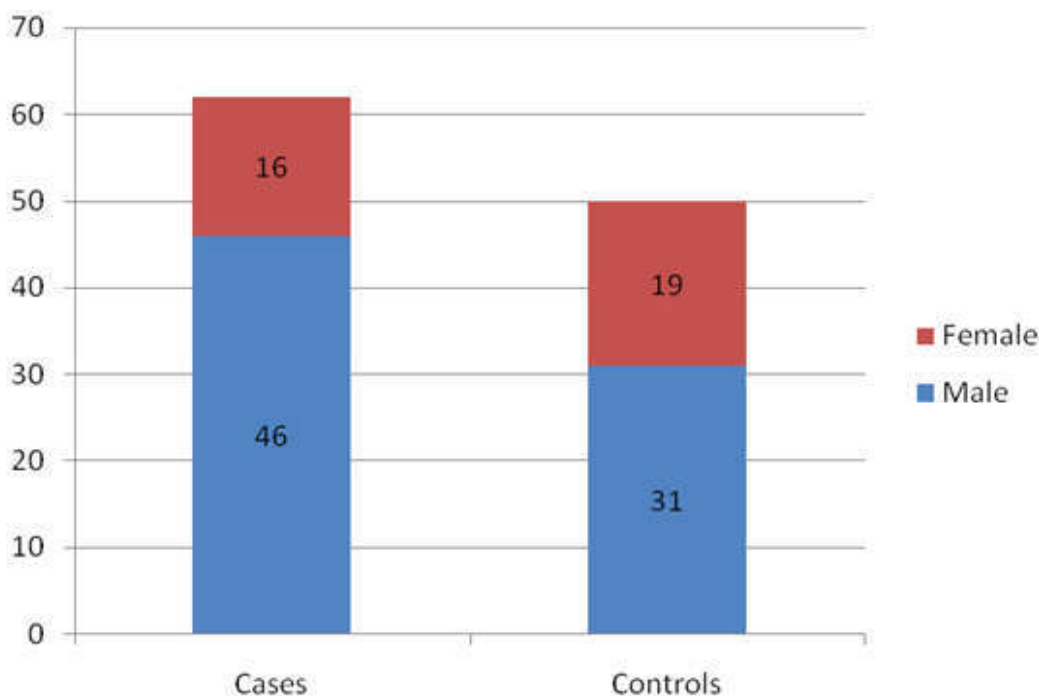


Fig. 1: Gender distribution among cases and controls

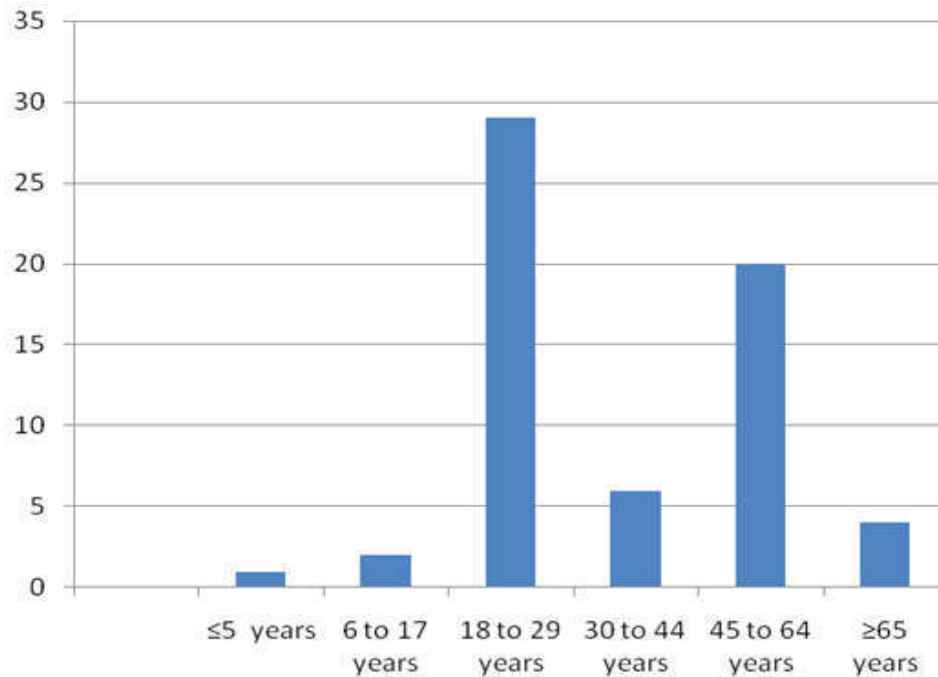


Fig. 2: Age distribution in the observed sample of patients with malaria

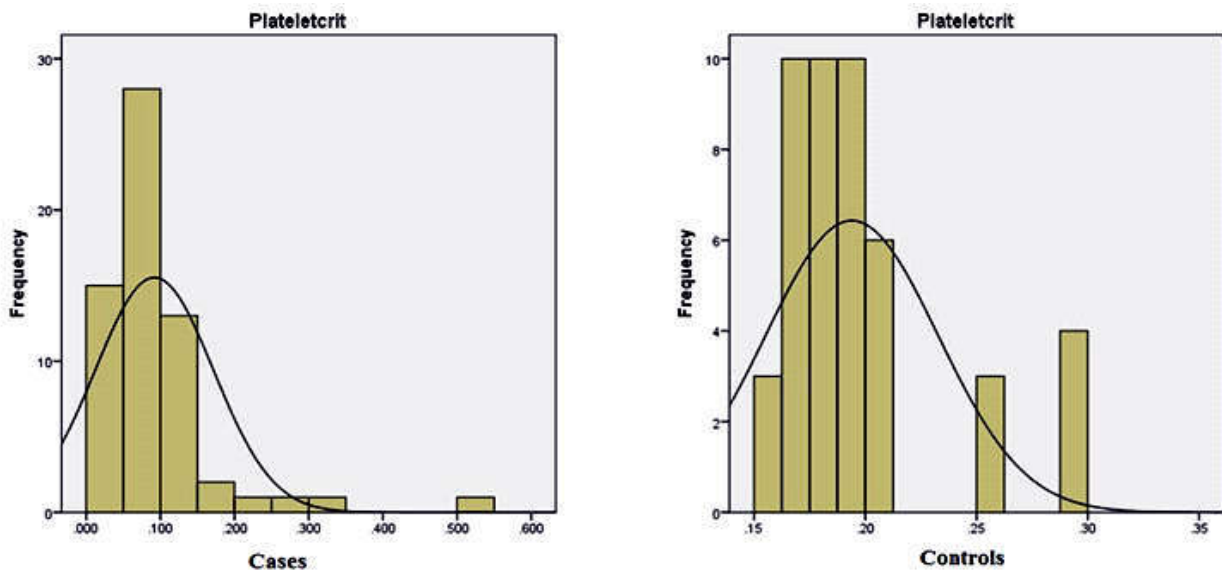


Fig. 3: Histograms of Plateletcrit values in cases and in controls

### Discussion

Malaria is a disease associated with significant morbidity and mortality, especially in subtropical countries such as India which are endemic [1].

Platelet count and indices are inexpensive parameters available in the report sheets of many automated haematology analysers. Literature has shown studies utilising platelet count and indices in various situations such as infections, juvenile immune arthritis, inflammatory

bowel disease, essential hypertension, myocardial infarction etc [3-7].

Malaria causing thrombocytopenia has been documented in many studies, and has been widely known. The mechanism held accountable for this is the antiphospholipid antibody induced destruction [2].

Studies have been conducted using these parameters in malarial infestations as well, most of them showing thrombocytopenia and alterations in platelet indices [2,8-12].

In this study, malaria was found to be higher in the age group of 18 to 29 years, and more in males. However, this easily could be the product of a Berksonian bias in that, we have selected only the cases admitted in our tertiary care centre.

Amongst the platelet indices considered, MPV and PDW were found to be higher in cases. This was in concordance with the study by Hamid et. al., and Bhavani et. al. [13,14]. Although these parameters showed a statistically significant difference between cases and controls, the mean values of both MPV and PDW fell within the normal range. This finding would render their utility in aiding the diagnosis of malaria equivocal.

PCT on the other hand, which is nothing but the packed cell volume of platelets, was low in cases at the same time being below the normal range. This was in concordance with the study conducted by Bhavani et. al. [13]. There again was a statistically significant difference between cases and controls. Nutritional anemias, specifically iron deficiency anemias are seen to have effects on platelet maturation [15]. However, we have not considered their attribution in the present study.

### Conclusion

This study demonstrated that platelet count and PCT values are reduced in cases of malaria as compared to controls. This raises the possible utility as contributory diagnostic markers of malaria. If a patient with history of episodic fever has complete blood count (baseline investigation) showing low platelet count and low PCT, it thus would be worthwhile to evaluate him/her with specific tests for malaria such as QBC. Replication of these results by studies with a bigger sample size would help validate the above findings.

### Acknowledgement

Nil

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