ANAEMIA AND MALARIA: A STUDY FROM MADHYA PRADESH

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ABSTRACT   **Background:** Malaria is common despite interventions directed to mosquito vector control and treatment of symptomatic cases. In areas where malaria is hyperendemic, such as the study area, a high percentage of the population may harbor the Plasmodium parasite in their blood. The current study was planned to assess the prevalence of malaria and anemia. **Methods:** A total number of 150 cases were studied for a period of 2 years from Aug 2013 to Sept 2015. Haematological parameters of 150 patients, including 100 malaria-infected and 50 non-malaria infected, who were admitted at the rural tertiary care centre with history of fever were analysed. Patients who were diagnosed as malaria were included in the study. Cases were selected from the the rural health centre of Index Medical College. **Results:** The median of Hb in patients with falciparum malaria (11.5 g/dL) was significantly lower than those with vivax malaria (11.9 g/dL) and non-malaria (13.8 g/dL) groups (P value = < 0.0001). Thirty Five (35%) of patients with falciparum malaria; Thirty Two (32%) of patients with vivax malaria; and Thirteen (26%) of patients with non-malaria groups had anaemia. **Conclusion:** Malaria is common in patients of anaemia. The prevalence of both are positively correlated and both are associated with increased morbidity and mortality.

INTRODUCTION:

Anemia has frequently been associated with malaria. Two common causes of anemia are increases hemolysis and decreases rate of erythrocytes production from bone marrow Malaria is the most prevalent mosquito-borne disease throughout tropical and subtropical regions of the world with huge medical, economic, and social impact. [1-3] It is caused by protozoan parasites of the genus *Plasmodium*. Among *Plasmodium* species that infect various species of vertebrates, five are known to infect humans, namely, *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium ovale*, *Plasmodium malariae*, and *Plasmodium knowlesi*. [4]According to the 2016 World Health Organization (WHO) report, about 3.2 billion people remain at risk of malaria, and there were 212 million malaria cases worldwide, accounting for nearly 4,29,000 deaths, of which 92% were in WHO African region, 6% were in WHO South-East Asian region, and 2% were in WHO Eastern Mediterranean region. Malaria burden is higher in populations that are poor and malnourished.

Migrant laborers traveling to endemic areas, children <5 years old, and pregnant women are high-risk groups that are affected by the high burden of malaria. The clinical diagnosis of malaria is challenging because of the non-specific nature of the signs and symptoms, which overlap considerably with other diseases present in with fever common in tropical regions.[5,6] This leads to indiscriminate use of anti-malarial, thereby compromising the quality of care for patients with non-malarial fevers in endemic areas. The aim of the study is to evaluate the association of malaria with anaemia. The changes will be assessed by evaluation of hematological parameters.

METHODS:

A total number of 100 cases were studied for a period of 2 years from Aug 2013 to Sept 2015. Patients who were diagnosed as malaria were included in the study. Haematological parameters of 150 patients, including 100 malaria-infected and 50 non-malaria infected, who were admitted at the rural tertiary care centre with history of fever were analysed. The morphological and quantitative changes in white blood cells (WBCs) & Platelets. The tests were carried out by automated cell counter, peripheral blood smear examination and using immunochromatography kit for malaria. The centre of study was Index Medical College and Hospital. Patients were enrolled from the rurak health centre associated with the Medical College. The data were analysed over Microsoft Xcel sheet and SPSS v 20.

RESULTS:

Anaemia was defined as Hb level <11g/dl for both males and females based on the WHO cut off value. The median of Hb in patients with falciparum malaria (11.5 g/dL) was significantly lower than those with vivax malaria (11.9 g/dL) and non-malaria (13.8 g/dL) groups (P value = < 0.0001). Thirty Five (35%) of patients with falciparum malaria; Thirty Two (32%) of patients with vivax malaria; and Thirteen (26%) of patients with non-malaria groups had anaemia. There was no significant association between status of malaria infection and Hb cut-off (P value = 0.057). Patients with RBCs count of less than 4×10^6/ L was frequently seen in patients with falciparum malaria (50%) compared to those with vivax malaria (11.8%) and non-malaria (3.6%) groups (P value < 0.0001). The mean values of HCT, MCV, MCH, and MCHC in both patients with falciparum malaria and vivax malaria were significantly lower than those in non-malaria group (P value < 0.0001). There was no significant association between status of malaria infection when compared the higher values of MCV > 100fL, MCH > 32pg/cell, and MCHC >37g/dL with cut off value (P value > 0.05).

Table 1 Malaria diagnosis according to age group

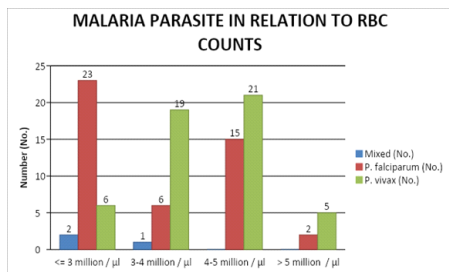| Diagnosis	Mixed	P. falciparum	P. vivax	Malaria Cases (n=100)	Normal Cases (n=50)	
					No.	%
<= 5 years	1	8	6	15	1	2.0
6-14 years	0	11	4	15	5	10.0
15-30 years	1	15	21	37	30	60.0
31-45 years	1	7	11	19	5	10.0
>45 years	0	5	9	14	9	18.0

MALARIA PARASITE IN RELATION TO RBC COUNTS

Table No. 2   Malaria diagnosis according to HCT

HCT counts	Mixed	P. falciparum	P. vivax	Malaria Cases (n=100)	Normal Cases (n=50)	
					No.	%
< 20%	1	18	3	22	0	0.0
20-35%	2	22	38	62	16	32.0
>35%	0	6	10	16	34	68.0
Total	3	46	51	100	50	100.0

The above table shows the distribution of malaria according to HCT counts.

DISCUSSION

The present study was undertaken to use the haematological changes as surrogate markers in patients who were clinically suspected to have malaria infection without laboratory confirmation and, their possible predictive values in malaria infection. Haematological parameters of 150 patients, including 100 malaria-infected and 50 non-malaria infected, who were admitted at the rural tertiary care centre with history of fever were analysed. We found 51 cases of P. vivax, 46 cases of P. falciparum and 3 cases of mixed infection. To elucidate the facts and confirm the haematological changes in infection with malaria, we included the haematological parameters such as WBCs, RBCs, platelets, red cell distribution width (RDW), MCV, MCH, MCHC, and Hb level patients infected with malaria and compared them with non-infected individuals. Malaria can affect any age group. However most studies show more of adults as compared to children. The present study had 70 adult patients and 30 children comparable to Potkar et al.[7] The adult age group 30-45 is more affected due to their greater mobility and greater risk of exposure due to more outdoor activity. In the present study anaemia (<11 gm%) was seen in 71% of the cases. In other studies carried out, by Sharma et al had anaemia in 86.7% of the cases while in a study conducted by Biswas et al 94.4% of the cases had anaemia.[8,9] The mean of RBCs count was significantly lower in patients with falciparum malaria (3.53×10^6/ L) than non-falciparum malaria (4.54×10^6/ L) and non-malaria (4.83×10^6/ L) groups (P value <0.0001).Present study had 52 % males as compared to females 48%. Other studies with comparable results include Erhart et al with 69% males and Bashwari et al with 75.9% males.[10,11] The female are at lower exposure risk due to lesser mobility in male dominated society, and apathy towards treating illness in females may all contribute towards more number of male cases.

CONCLUSION:

Lower mean values for hemoglobin, leukocyte count and platelet count in the malaria group compared to the control group were observed in our study. Anemia is a frequent finding in malaria cases, particularly in developing nations and is associated with increased morbidity and mortality.

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