

HAEMATOLOGICAL ABNORMALITIES IN COMPLICATED FALCIPARUM MALARIA CASES*Bidyut Prava Das¹, Ratnadeep Ganguly²*¹Associate Professor, Department of Pathology, SCB Medical College, Cuttack.²Postgraduate Student, Department of Pathology, SCB Medical College, Cuttack.**ABSTRACT****BACKGROUND**

Malaria continues to be a major health problem in at least 91 countries/territories including India and continues to cause significant morbidity and mortality. The haematological abnormalities that have been marked consistently with malaria are anaemia, thrombocytopenia, and atypical lymphocytosis and infrequently disseminated intravascular coagulation.

MATERIALS AND METHODS

This cross sectional study was conducted in SCB Medical College, Cuttack of Odisha. The laboratory confirmed cases of malaria from January to December 2012 were included in the study. Haematological profile of complicated cases of malaria was evaluated compared to uncomplicated cases.

RESULTS

A total of 120 complicated malaria patients and 80 uncomplicated malaria patients were investigated. The difference in mean haemoglobin level and platelet count was significantly low in complicated cases compared to uncomplicated cases. Peripheral blood smear examination indicated that 68.60% of the complicated cases were associated with microcytic hypochromic anaemia, 23.26% with normocytic-normochromic anaemia and 8.14% had dimorphic anaemia. Atypical lymphocytes were observed in around 3.33% cases, while at least 2.5% cases of complicated cases were having eosinophilia and basophilia. Around 20.83% of complicated cases had hyperparasitaemia who had a worse prognosis.

CONCLUSION

The low level of haemoglobin and platelet can be used as a predictor of severity of the infection and thus prediction of the haematological changes enables the clinician to establish an effective and early therapeutic intervention in order to prevent the occurrence of major complications.

KEYWORDS

Plasmodium Falciparum, Haematological Profile, Complicated Malaria.

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BACKGROUND

Malaria is well known to human being since centuries. It is a disease of tropical and subtropical countries, particularly Africa and Asia. It is caused by protozoan Plasmodium, transmitted by female anopheles mosquitoes, which typically bite between dusk and dawn.

Malaria continues to be a major health problem in some of the most populated areas of the world and continues to be a cause of heavy morbidity and mortality. As per World Malaria Report 2015, half of the world's population is at risk of malaria and an estimated 214 million cases led to nearly 438,000 deaths.¹ In India, the incidence of malaria was around 1.31 million cases, where 0.67 million cases were

due to Plasmodium falciparum and deaths due to malaria were around 754 deaths in 2011.²

Haematological changes are considered a hallmark of malaria.^{3,4} The haematological abnormalities that have been reported consistently in malaria are anaemia, thrombocytopenia, atypical lymphocytosis and infrequently disseminated intravascular coagulation. Leucopenia, leucocytosis, neutropenia, neutrophilia, eosinophilia and monocytosis also have been reported.⁵ In tropical countries like India, the majorities of the shared complications commencing due to malarial consequences is from hyperparasitaemia. Mortality is very high (10-30%) in complicated *P. falciparum* infection.

This study aimed to evaluate and determine of various haematological alterations in complicated *P. falciparum* patients and to add more detailed information, especially from this highly endemic zone.

MATERIALS AND METHODS

This comparative cross sectional study was conducted from January to December 2012 in SCB Medical College, Cuttack, Odisha. The uncomplicated cases were recruited from among acute febrile cases attending the OPD and found to be slide/ICT (OptiMAL) positive for *P. falciparum* infection. The complicated cases admitted in the IPD and found to be

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slide/ICT (OptiMAL) positive for *P. falciparum* infection were selected for the study. The detailed clinical history of the patients including name, age, sex, date of admission were collected with reference to anaemia, jaundice, purpuric spots, level of consciousness (Glasgow coma scale), sign of meningeal irritation, focal neurologic deficits, hepatosplenomegaly and cardiovascular system. In followup of the patients, the following symptoms were noted: duration of unconsciousness, convulsion, renal failure, pulmonary oedema, hypoglycaemia, bleeding manifestation and outcome (recovery/death).

The diagnosis of malaria was confirmed by thick blood films stained with Giemsa stain for malaria parasite and bivalent ICT test. Complete blood count was performed using an automated cell counter 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 platelet count and other haematological changes. Data was analysed by Epi Info Statistical Software. P value of <0.05 was taken as significant for all statistical analysis.

RESULTS

A total number of 200 (120 complicated and 80 uncomplicated) cases were selected for the study. Out of 120 complicated malaria cases with multiorgan failure admitted to the hospital, the major pernicious clinical manifestations were cerebral malaria (55%), jaundice (53.3%), overt bleeding (45%), acute renal failure (41.6%), convulsion (38.3%) and severe anaemia (21.6%). On analysis it was observed that the complicated malaria cases had significantly low level of Hb (8.50 ± 2.82 vs. 9.90 ± 1.64) compared to uncomplicated cases ($P < 0.05$). Majority of the cases with low level of haemoglobin showed a microcytic hypochromic blood picture (59/86, 68.6%) followed by normocytic- normochromia (20/86, 23.26%) and most significantly 8.14% (7 out of 86) of cases had dimorphic anaemia. Microscopic examination of WBC revealed atypical lymphocyte in 4 cases, eosinophilia in 3 cases and basophilia in 2 cases. The patients having complicated malaria have significantly ($p < 0.05$) lower platelet count as compared to uncomplicated malaria. Hyperparasitaemia was found in 25 cases out of 120 complicated cases and 84% of them died during follow-up.

Parameter	Complicated (n=120)	Uncomplicated (n=80)	P value
Hb (g/dL) Mean $\pm$ SD	8.50 ± 2.82	9.90 ± 1.64	<0.05
Total Platelet count (Lakh/mm ³) Mean $\pm$ SD	0.89 ± 0.46	1.143 ± 0.65	<0.05

Table 1. Hemoglobin Level and Platelet Count in Enrolled Patients

Blood Picture	Number of Cases	Percentage of Anaemia
Microcytosis and hypochromasia	59	68.60
Normocytosis and normochromia	20	23.26
Dimorphic anaemia	7	8.14

Table 2. Peripheral Smear Findings Associated with Anaemia

DISCUSSION

Malaria is a major health problem in the tropical and temperate regions of the world which poses a significant burden on health expenditure. Prompt and accurate diagnosis is critical towards the effective management of malaria. Development of effective diagnostic strategies not only helps resource-limited areas but also developed countries, where malaria diagnostic expertise is often lacking.^{6,7}

There are many studies which indicate that precise haematological changes may vary with category of malaria with the background of haemoglobinopathy, nutritional status, demographic factors and malaria immunity. We observed in our study several significant changes concerning with haemoglobin and platelets.

The pathogenesis of anaemia in malaria is particularly complex and incompletely understood. It is thought to result from a combination of haemolysis of parasitised red blood cells; accelerated removal of both parasitised and innocently non-parasitised red blood cell, depressed as well as ineffective erythropoiesis with dyserythropoietic changes and anaemia of chronic disease.⁸ Other factors causative to anaemia in malaria include decreased red blood cell deformability, splenic phagocytosis and/or pooling, so they have an increased rate of clearance from the circulation.⁹ Tumour necrosis factor alpha (TNF- α) has also been implicated and may cause ineffective erythropoiesis. Microcytosis and hypochromia pattern was observed as the predominant type of anaemia and it correlates with the degree of parasitaemia.¹⁰ Further our study shows that the complication of malaria is associated with the low platelet count and prognosis becomes too bad when the parasitaemia was high.

CONCLUSION

Overall, the haematological aspects of malaria constitute a very interesting area of research. We have observed a significant correlation in haematological changes such as low Hb level and low platelet count with complicated malarial infection. Prediction of the haematological changes would enable the clinician to establish an effective and early therapeutic intervention in order to prevent the occurrence of major complications.

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