Journal of Rawalpindi Medical College (JRMC); 2019;23(2): 116-118

Original Article

Haematological Pattern of Children with Malaria Attending Paediatric OPD at Tertiary Care Hospital

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Abstract

Objective: To determine the haematological pattern among children attending Paediatric OPD with diagnosis of malaria at tertiary care Hospital

Methods: In this observational study children with diagnosis of malaria, age of <12 years and either of gender were enrolled. Each patient underwent clinical examination and medical history regarding duration of fever including sign/symptoms and previous antimalarial treatment history. Three ml blood was collected from all the patients for the complete blood count (CBC). The haematological abnormalities were recorded. Entire data was gathered and filled in the proforma and its analysis was done by SPSS version 16.0.

Results: Total 106 children were selected .Mean age was 5.31±2.47 years. Malarial infection was higher among male children 67(63.20%). Vivax parasite was most common among (53.80%), falciparum in 45.30%, while both parasites were found only in one case. Mean platelet count was 96.35±74.34 in children infected by falciparum malaria and 89.05±70.0 in vivax infected children (p-value=0.815). Mean haemoglobin level was 9.43±0.91 in falciparum malaria and 9.38±0.90 in vivax infection (p-value= 0.477). Mean WBC level was 5.81±1.35 in falciparum infected children and 6.06±1.41 in vivax infected children (p-value=0.614). There was no significant difference in haemoglobin and WBC according to parasites; p-values were insignificant.

Conclusion: Plasmodium vivax was the commonest parasite; male children remained on high risk of malarial transmission. Haematological changes markedly appeared but statistically insignificant according to falciparum and vivax.

Key words: Malaria, Platelets, RBCs, Haemoglobin, P.vivax, P. falciparum

Introduction

Malarial disease is a key health concern of population.[1] Regardless of progresses in awareness, it keeps on causing substantial morbidity and mortality globally.[2] It is a most predominant human infection globally, representing around 300.0-500.0 million malarial patients and 1.50-2.70 million fatalities yearly. Mortality rate remains generally high (20.0%) in severe malarial cases (parasitemia>5.0%).[2,3] Eastern Mediterranean region of World Health Organization (WHO) constitutes 22 countries, out of those nations; six (along with Pakistan) struggle with 95% burden of this disease.[4,5] Each year, malaria epidemic threatens Pakistan in autumn seasons leading to several deaths, which can be diminished by early diagnosis and with appropriate treatment. During 2004, malarial parasite's annual prevalence in Pakistan was reported to be 5.60% along with 33.0% ratio of plasmodium falciparum.[4,6] Balochistan and rural regions of Sindh represent a major burden of malaria within Pakistan with a well-established factor of mortality and morbidity due to severe malaria among these areas.[4,7] According to WHO pregnant females, young kids, elderly travellers and immunosuppressed individuals are mainly at risk of severe infection. Common overlapping features present in most patients with complications of cerebral malaria, severe anaemia and thrombocytopenia.[4] When an infection pathology circulates, naturally and generally it will affect systemic bio-signals of a human host. In malaria, red blood cells (RBCs) and parasites undergo an oxidative stress. Eventually the host system acts in response to protect the RBCs.[8,9] Several disease pathologies regulate the energetics of mitochondria in leucocytes (WBCs) as the signs of initial warning for bioenergetics failure.[10] This possibly reveals that circulating WBCs, mainly neutrophils and lymphocytes could act as biomarkers for oxidative

stress, and as an index of inflammation in terms of malarial parasitaemia.[8,11] Haematological variations in the pathology of malaria can possibly provide complementary criteria to enhance microscopy and clinical diagnosis by encouraging a further thorough exploration of malarial parasite for limiting the exploitation and misuse of antimalarial medications.[8] Malaria is predominant among subtropical and tropical regions worldwide and has been correlated with certain haematological variations.[12]

Patients and Methods

This observational study was carried out at the Paediatric department of Liaquat Medical University Hospital, Hyderabad from February to October 2017. All children with diagnosis of malaria, age of <12 years and either of gender were enrolled into the study. Each patient underwent clinical examination and medical history regarding duration of fever including sign/symptoms and previous antimalarial treatment history. Whole abdominal ultrasound was performed to especially comprehend the hepatomegaly and splenomegaly. All the patients who were diagnosed with, meningitis, dengue fever, typhoid fever and tuberculosis were excluded from this study. Samples of 3ml blood were collected from all the patients for the complete blood count (CBC), and were sent to the diagnostic and research laboratory of Liaquat Medical University Hospital, Hyderabad. The haematological abnormalities were recorded. Entire data was gathered and filled in the proforma and its analysis was done by SPSS version 16.0.

Result

Total 106 children after diagnosis of malaria were studied. Their mean age was 5.31±2.47 years. Mean haemoglobin was 9.41±0.90, mean platelets was 92.13±70.14, mean WBC was 5.95±1.39 and mean haemocrit was 30.64±2.47 (Table 1). Malarial infection was higher among male children 67(63.20%) as compared to female children 39(36.80%). Plasmodium vivax parasite was most common among 57(53.80%) of cases, falciparum found in 48(45.30%) cases, while both parasites found only in one case (Figure 1). Mean platelets was 96.35+74.34 in children infected by falciparum malaria, 89.05+70.0 in vivax infected children and 65.0 in dual infection, there was no significant difference in mean of platelets according to malarial parasites, p-value 0.815 (Table 1). Mean haemoglobin level was 9.43+0.91 in falciparum malaria, 9.38+0.90 in vivax infection and 9.5+0 in dual infection. Mean WBC level was 5.81+1.35 in falciparum infected children, 6.06+1.41 in vivax infected children and 6.5+0 in children infected by both parasites. There was no significant difference in haemoglobin and WBC according to parasites p-values were quit insignificant (Table 2).

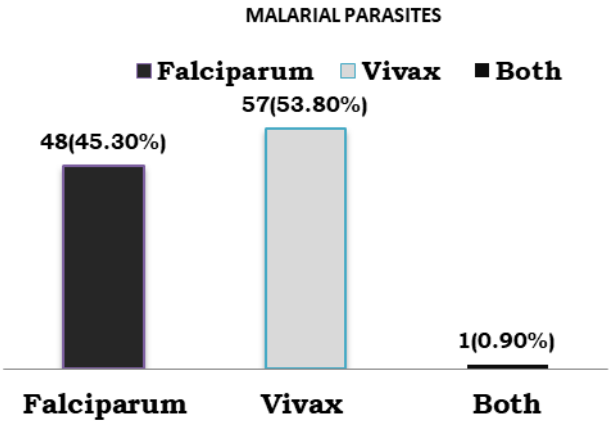

Figure 1: Malarial parasites-Disribution

Table 1: Descriptive statistics of age, and hematological pattern (n=106)

	Age	Hb	Platelets	wbc	Hct
Mean	5.31	9.41	92.13	5.95	30.64
S.D	2.47	0.90	7.14	1.39	2.47
Minimum	1.00	6.80	10.00	3.40	20.40
Maximum	11.00	11.50	460.00	9.10	282.00

Table 2 Hematological pattern according to malarial parasites (n=106)

Hematological pattern	Malarial parasite			P-value
	Falciparum	Vivax	Both	
Platelets	96.35±74.34	89.05±70.0	65.0±0	0.815
Haemoglobin	9.43±0.91	9.38±0.90	9.5±0	0.477
RBCs	3.14±1.34	3.21±1.44	3.8±0	0.352
WBC	5.81±1.35	6.06±1.41	6.5±0	0.614
Haemocrit	28.29±2.75	32.61±3.73	31.50±0	0.677

Discussion

Malaria is a disease of human which causes high morbidity and mortality.[13] Haematological changes are some of the most common complications in malaria and they play a major role in malarial pathology. These changes involve the major cell lines

such as red blood cells, leucocytes and thrombocytes.[13] In this study p. vivax was most common in 53.80% of cases and falciparum was in 45.30%. These findings were similar to the study of Tanveer M et al as vivax 248 (41.3%) and Falciparum malaria93 (15.5%). [14] Singh G et al also found similar findings as 65.51% vivax and 6.55% falciparum, while mixed infection was 27.94%.[13] In this series mixed infection was only in one case. Latif N et al found similar findings regarding age and gender as males 93 (62%) and females 57 (38%) with mean age of 6.73 ± 3.36 years.[2]

Thrombocytopenia is the major complication of early infected vivax malaria. In this series mean platelets was decreases (89.05±70.0) in vivax infected children as compared to falciparum infected children, but statistically insignificant. The study of Latif N et al reported thrombocytopenia in 91% out of all cases.[2] Consistently, LAM Bashawriet al reported that thrombocytopenia was higher in P.vivax infected cases than P. falciparum.[16] Though inconsistently Tanveer M et al reported that thrombocytopenia was lower 70.6% in Vivax malaria and 89.2% in falciparum malaria.[14] In this study mean haemoglobin level and RBCs was decreased as compared to normal but statistically insignificant on comparison p.vavax versus falciparum.

Chhawchharia R et al reported that anaemia was 50.8% in P.vivax cases and 56.3% in P. falciparum cases.[17] Latif N et al reported that anaemia was among 34% cases of vivax malaria and in 53.8% cases of falciparum malaria. [2] Inconsistently in a report of Jain et al reported that anemia among 94.28% cases followed by 56.06% of p. falciparum and 31.81% p. vivax.[19] In this series mean of WBCs, almost with normal range, which is similar to LAM Bashawriet al[16]as mostly cases 78.3% had normal range of total WBC count. Although some studies reported that leukopenia appears to be a most common complication among non- immune cases with falciparum malaria.[16,18] Hematological alteration among cases of malaria may vary due to severity of disease, endemicity of the malaria, patient's nutritional status, demographic characteristics, hemoglobinopathies and immune status of the cases.[15]

Conclusion

Plasmodium vivax was the commonest parasite, male children remained on high risk of malarial transmission. Hematological changes markedly appeared but statistically insignificant according falciparum and vivax. Early diagnosis and management should be done among children to reduce the haematological variations.

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