ORIGINAL ARTICLE

Factors Causing Derangement in Hematological Parameters among Malaria Patients: Descriptive Study

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ABSTRACT

Malaria is a global health issue caused by Plasmodium Falciparum.

Purpose: To determine the effect of age and duration of disease on the derangement in hematological parameters among patients with malaria.

Study Design: Descriptive, cross-sectional.

Methodology: The current project was conducted at department of Department of Hematology, Combined Military Hospital, Multan. Study comprised of 186 subjects suffering from malaria with hematological de-arrangements. Blood taken for routine investigations like ICT malaria and CBC to diagnose anemia and low platelet count.

Statistical analysis: The collected data was analyzed by using SPSS version 20. Post-stratification chi-square test was used with p-value<0.05 as significant.

Results: Patients were with mean age of 41.80 ± 8.51 years. Mean duration of disease in our study was 4.91 ± 1.32 days. Out of 186 cases, total plasmodium vivax cases were 127 and the remaining 59 cases were of plasmodium falciparum. Among these 127 cases of plasmodium vivax 20 cases were having anemia and 101 cases had thrombocytopenia.

Conclusion: We concluded that the frequency of derangement in hematological parameter in terms of low platelet count was high in comparison to anemia among enrolled subjects. Low platelet count was significantly linked with age groups.

Key Words: Malaria, Age, Anemia, Platelet Count and Duration of Disease.

INTRODUCTION

Causative agent for malaria is mainly Plasmodium Falciparum thus a major public health issue globally. It is an ancient scourge of humanity. Its prevalence is quite high thus causing around 207 million/year malaria cases resulting into 627,000 deaths. Four species of Plasmodium family have been identified as revealed by literature review.[1,2]

Even in modern era, it is still an endemic disease in many countries globally and it is the the most widespread human parasitic disease having its impact on socioeconomic and public health status.[3,4] Unfortunately, Pakistan is carrying a high burden of malarial cases and is ranked 6th among high burden countries for malaria and tuberculosis worldwide.[5] Mortality rate due to plasmodium infection as recorded is approximately 50,000 deaths annually. This disease victimizes mainly young people, children and immune-compromised elderly patients. According to one estimate from 2006-2010, 219 million cases were reported resulting in 60,000 death among young people and children under five years of age.[6] Plasmodium falciparum and vivax malaria are common vectors in Pakistan causing this big health issue.[7]

This disease usually present with high grade fever, rigors and chills, night sweating and weakness with typical history of mosquito bite. It presenting picture is quite variable due to number of complications like anemia, low platelets, hematuria, jaundice, low cell lines and hepatosplenomegaly. The most important contributing factors for anemia include parasitic infections, chronic inflammatory disorders and genetic disorders. Study from Cameron has documented anemia was 14.08% in patients with malaria.[8] One researcher reported that 85.5% low platelet count in malaria patients as they play a critical role in its pathogenesis.[9] In the light of above description, we planned current project to stratify anemia and low platelets in terms of age groups and duration of disease.

Objectives: To determine the effect of age and duration of disease on the derangement in hematological parameters among patients with malaria.

METHODOLOGY

Present study held at Department of Hematology, CMH, Multan from following approval by the Hospital's Ethical Committee. Study comprised of 186 subjects suffering from malaria with hematological de-arrangements. Consent was taken from subjects. Venous sample (5ml) was taken for routine investigations to diagnose anemia and low platelet count. Both gender patients having age (20 – 60 years) presenting with fever ≥ 101 F° plus positive test with ICT malaria and disease duration should be < 7 days were included in present study. Known Patients with

coagulopathy & bleeding disorders, on anti-malarial drugs within 48 hours and previously diagnosed CNS disorders like multiple sclerosis were excluded.

Statistical Analysis: The collected data was analyzed by SPSS v20. Mean ± SD was given for age and duration of disease. Parameters like sex, age groups, type of malaria, intake of anti-malarial drugs, anemia and low platelet count were shown as frequencies and percentages . Data were stratified for age and duration of disease. Post-stratification chi-square test was used with p-value<0.05 as significant as significant.

RESULTS

General parameters of enrolled patients were presented as frequency and percentage with their respective means ± SD in table-1.

Table-1: General Characteristics Of All Enrolled Patients

Variables	Groups	Frequency	Percentage (%)
Age (years)	20-40	93	50.0
	41-60	93	50.0
Mean ± SD (years)	41.80 ± 8.51		
Duration of disease (days)	≤3	131	70.43
	>3	55	29.57
Mean ± SD (days)	4.91 ± 1.32		
Gender	Males	101	54.3
	Females	85	45.7
Type of malaria	Vivax	127	68.28
	Falciparum	59	31.72
Intake of anti-malarial drugs	Yes	115	61.83
	No	71	38.17
Anemia	Yes	27	14.52
	No	159	85.48
Low platelet count	Yes	142	76.34
	No	44	23.66

Results for the stratification of hematological de-arrangements with respect to age among 186 enrolled patients was shown in table-2.

Table-2: Stratification of hematological dearrangement with respect to age

		20-40 (n=93)	41-60 (n=93)	P-value
Anemia	Yes	18	09	0.061
	No	75	84	
Low platelet count	Yes	77	65	0.038*
	No	16	28	

*Statistically significant

Results for the stratification of hematological de-arrangements with respect to duration of disease among 186 enrolled patients was shown in table-3.

Table-3: Hematological de-arrangement with respect to disease duration

		≤3 days (n=131)	>3 days (n=55)	P-value
Anemia	Yes	19	08	0.994
	No	112	47	
Low platelet count	Yes	99	43	0.702
	No	32	12	

Results for the stratification of hematological de-arrangements with respect to disease vector among 186 enrolled patients was shown in table-4.

Table-4: Hematological de-arrangement with respect to vector

		P.Vivax (n=127)	P.Falciparum (n=59)	P-value
Anemia	Yes	20	07	0.484
	No	107	52	
Low platelet count	Yes	101	41	0.134
	No	26	18	

DISCUSSION

There are various hematological alterations that occur during the asexual stage of its life cycle characterize malaria. There are number of pathological events like an increased release of inflammatory cytokines, endothelial cell activation and sequestration of parasitized RBCs upon the entrance of P. falciparum into RBCs. This ultimately causes increase in secretion of inflammation with morphological de-arrangement in all cell lines.

As recommended by WHO that any suspected case of malaria in all epidemiological settings regardless of age must receive parasitological confirmation of its diagnosis.[10] "Gold standard" methods include Giemsa stained thick blood films for screening and thin blood films for confirmation of its diagnosis.[14] Unfortunately, they have limitations like trained staff with well maintained equipment hence unavailable in some malaria endemic communities.[11]

Platelets and coagulation factors are essential components of complex environment.[12] Many studies have been done in-order to explore the effects of malaria on platelet homeostasis. They showed that development of thrombocytopenia among patients is its major complication mainly depending on parasite species or disease severity.[13] Research showed that P. vivax malaria infection and severe malaria cause severe thrombocytopenia in comparison to other species and uncomplicated malaria. Our results showed that thrombocytopenia was significantly (P = 0.00) lower than that of the non-parasitemic group which were in line with previous work. Palpable enlarged spleen is suggestive of increased platelet destruction and reduced platelet lifespan due to it with circulating immune complexes.[14]

Present study showed that anemia was predominantly present in P. falciparum cases in comparison to P. viva. This indicated that it is more associated with P. falciparum infection as reported by many studies.[15] Paradoxical to one study that indicated no significant difference between both groups in terms of anemia.[16]

Limitations: It was a single centre study and we did not perform genetic workup among patients in-order to find the genetic cause.

CONCLUSION

We concluded that the frequency of derangement in hematological parameter in terms of low platelet count was high in comparison to anemia among enrolled subjects. Low platelet count was significantly linked with age groups. It is therefore clinicians should screen these derangements in hematological parameters among patients with malaria in-order to provide proper management. Hence, suggested

that this screening should be made a routine in our clinical setups.

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