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Research Article

HEMATOLOGICAL ALTERATIONS ASSOCIATED WITH ACUTE MALARIA

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Abstract:

Objective: There are recognized hematological alterations linked with the disease of malaria. This research work was carried out to evaluate and provide a comparison of prevalence & seriousness of hematological alterations in different kinds of acute malaria in adult peoples of the community.

Methodology: This research work was an observational work which included one hundred and thirty-three patients of acute malaria who got admission in the unit of infectious diseases in Allied / DHQ Hospital Faisalabad. The duration of this research work was from March 2017 to March 2019. Leishman staining method for the parasite of malaria with the help of thin and thick stained film was in use for the identification of the malaria. Hematologist reviewed all the slides and an autonomous Beckman coulter machine was in use to perform FBC.

Results: In general, 83.0% patients found with thrombocytopenia, 64.0% patients were available with anemia, 24.0% patients had lymphopenia and 10.0% patients had monocytosis. The occurrence of thrombocytopenia was a little bit higher in *P. Falciparum* (87.0%) in comparison with *P. Vivax* (81.0%) patients, whereas we found no important disparity in the occurrence of anemia in the patients of both groups (67.0% vs 63.0%). Though, lymphopenia was available in 36.0% in *P. Vivax* in comparison with 15.0% in *P. Falciparum* patients. The count of eosinophil & basophil was in normal range among the patients of both groups.

Conclusions: *P. Falciparum* & *P. Vivax* are the reason of significant changes in hematology with a very high rate of occurrence of thrombocytopenia, monocytosis, anemia & lymphopenia.

KEY WORDS: Occurrence, Vivax, Anemia, Thrombocytopenia, Comparison, Identification, Infectious.

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INTRODUCTION:

The disease of malaria is very ancient disease and human beings know it from centuries, this is also very common disease in the countries of Asia as well as in Africa. Regardless of the advantages in the field of knowledge, this disease of malaria is still a reason behind high rate of morbidity as well as mortality [1]. This is among one of the most occurring infection of humans in the complete world. More than 40.0% population of the world live in the areas where malaria is an endemic and it is estimation that from 300 to 500 million patients & from 1.50 to 2.70 million mortalities occurs each year [2]. The rate of mortality is very high (20.0%) in malaria of sever nature (parasitemia greater than 5.0%) [3], these changes in hematology which are very frequent issues, perform an important role in formation of those complications which can lead to fatality.

Hematological anomalies accompany thrombocytopenia, lymphocytosis, and anemia & sometimes scattered intra-vascular coagulation [4]. Leucopenia, monocytosis, leucocytosis, eosinophilia & Neutropenia are also available in some reports [3, 5]. The main purpose of this research work was to assess the changes in hematology that has the ability to occur in Young population.

METHODOLOGY:

The duration of this research work was from March 2017 to March 2019. This research work was carried out in unit of infection diseases in Allied / DHQ Hospital Faisalabad. The patients who were completely fulfilling the standard of the research work were the part of this research work. Leishman staining for the parasite of malaria with the utilization of stained thick and thin film for the identification of the presence of malaria. The design of the research work formed to include all the clinical as well as demographic data and the information about the hematological alterations was also in record with a relation to the malaria kind. The patients suffering from any other diseases as liver abnormalities, disorder of bleeding, drug addiction, thrombocytopenia or other conditions associated with the blood changes were not the part of this research work. An autonomous Beckman counter machine was in use to perform the FBC. We also carried out WBC for all the patients.

Hematologist reviewed all the positive smears to confirm the occurrence, diagnosis of species & review of the count of platelets and hematological alterations carried out. In accordance with the count of platelets, thrombocytopenia defined as mild (Platelets 50 to 150 x 10³ /ul), moderate (Platelets 20 to 50 x 10³ /ul) & severe (Platelets less than 20 x 10³ /ul) [6, 7], while in accordance with the standard of World Health Organization, patients were available with anemia with hemoglobin less than 13 gm/dl in men and less than twelve gm/dl in women [8]. SAS enterprise guide was in use for the analysis of the collected information [4].

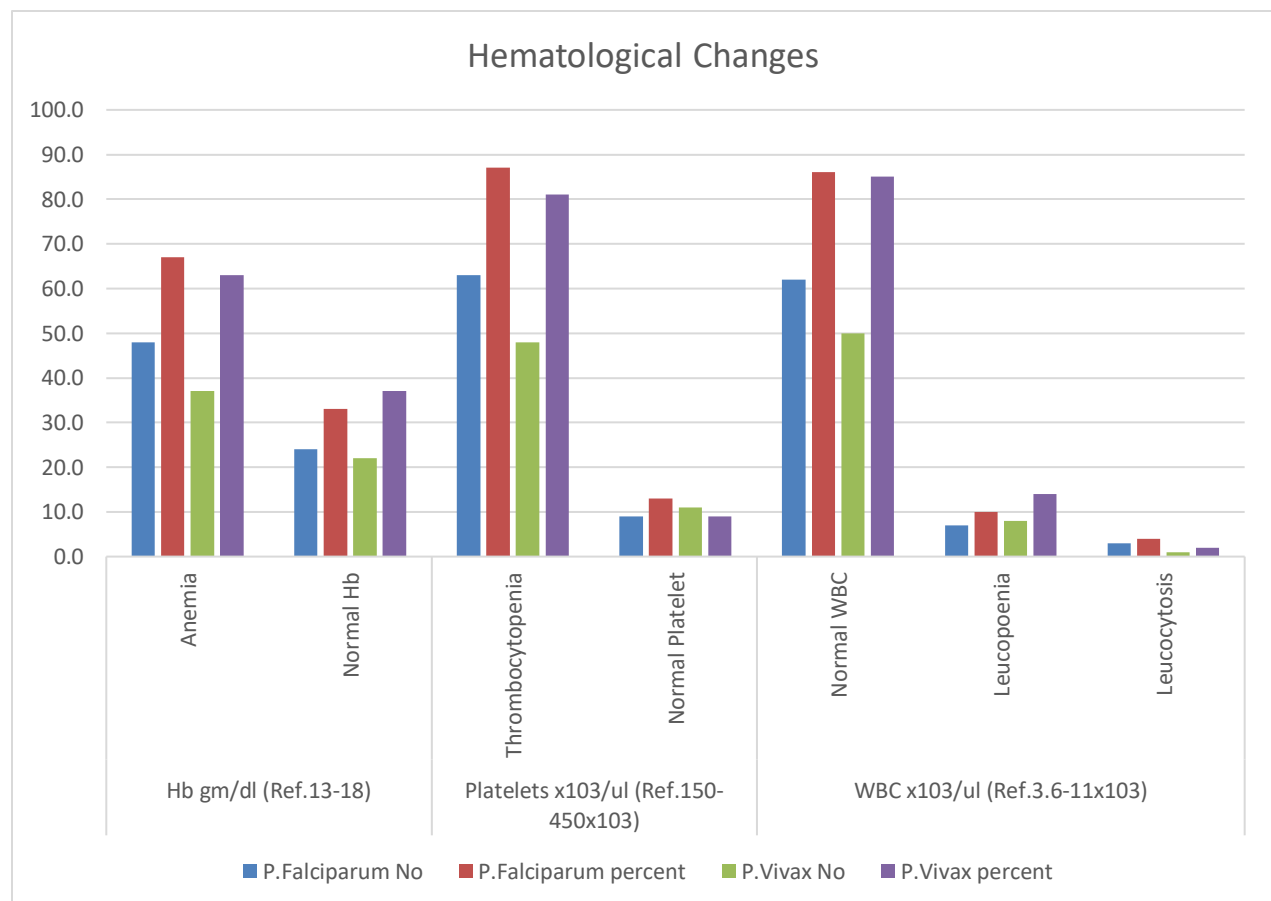
RESULTS:

There were total one hundred and thirty-three patients in this research work. Malaria because of *P. Falciparum* was present in 54.0% (n: 72) patients and *P. Vivax* malaria was present in 45.0% (n: 59), whereas *P. Malariae* was available in only two patients. The average age of the patients was 31.70 years with arrange from 14 to 76 years. There were 92.0% (n: 123) males and 8.0% (n: 10) females. Most of the patients were the residents of Lahore. Past history of current travel to the areas where malaria was endemic was available in 81.0% patients. The very common available symptoms were high fever with chills, headache, nausea, hunger loss and very bitter taste in mouth. Most of the patients were from working class of the society.

Total 83.0% (n: 111) patients found with thrombocytopenia & 17.0% (n: 22) found with normal count of platelets. The average count of platelet was 82 x 10³ /ul. Patients of *P. Malariae* found with the normal count of platelets. Most of the patients 64.0% (n: 85) were suffering from anemia at the time of their appearance and anemia was available normocytic normochromic in all patients except 11.20% (n: 15). In latter patients, 9.0% (n: 12)) patients found with the deficiency of iron and 2.20% (n: 3) patients were suffering from thalassemia. The count of WBC was normal in 86.0% (n: 114) whereas reduced in 11.0% (n: 15) and enhancement in 3.0% (n: 4) patients as available in Table-1.

Table-I: Hematological changes in P.Falciparum and P.Vivax malaria.

Hematological Parameters		P.Falciparum		P.Vivax	
		No	percent	No	percent
Hb gm/dl (Ref.13-18)	Anemia	48.0	67.00	37.0	63.00
	Normal Hb	24.0	33.00	22.0	37.00
Platelets x10 ³ /ul (Ref.150-450x103)	Thrombocytopenia	63.0	87.00	48.0	81.00
	Normal Platelet	9.0	13.00	11.0	9.00
WBC x10 ³ /ul (Ref.3.6-11x103)	Normal WBC	62.0	86.00	50.0	85.00
	Leucopenia	7.0	10.00	8.0	14.00
	Leukocytosis	3.0	4.00	1.0	2.00

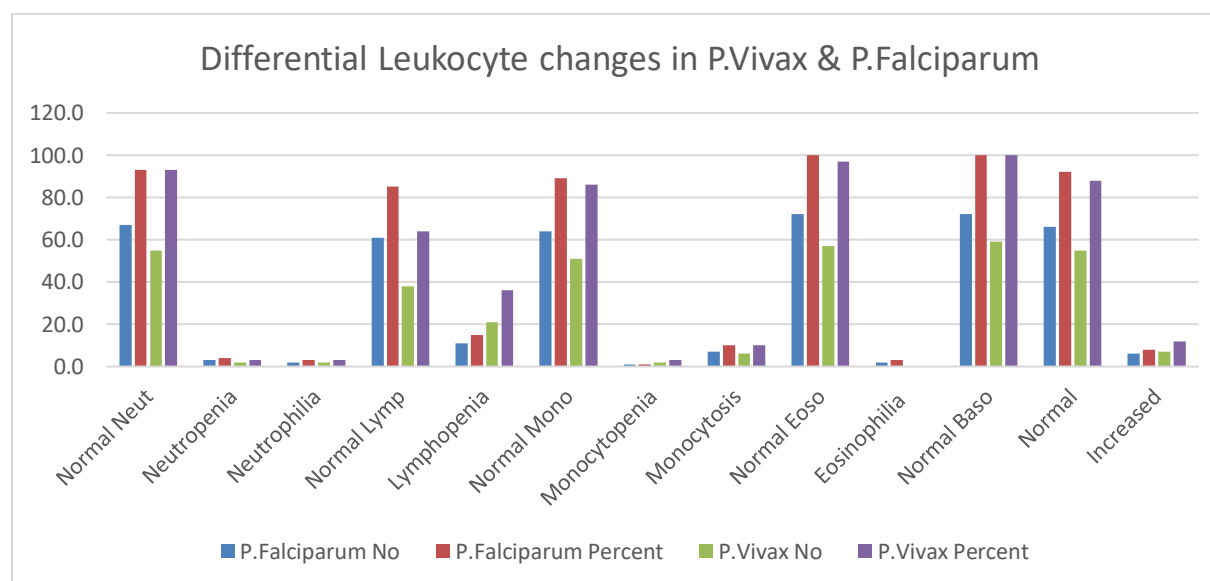


Differential count of leukocyte displayed normal count of neutrophil in 93.0% (n: 124) patients, lymphocytes in 76.0% (n: 101) patients, monocytes in 88.0% (n: 117) patients and basophil & eosinophil were available in 98.0% (n: 131) patients. The bands of monocyte & neutrophil rise in 10.0% (n: 13). But lymphopenia was available in 24.0% (n: 32) patients (Table-2).

Table-II: Differential Leukocyte Changes in P. Falciparum and Vivax Malaria

Hematological Parameters		P.Falciparum		P.Vivax	
		No	Percent	No	Percent
Absolute Neutrophils (Ref.1.4-8.3x10 ³ /ul)	Normal Neut	67.0	93.00	55.0	93.00
	Neutropenia	3.0	4.00	2.0	3.00
	Neutrophilia	2.0	3.00	2.0	3.00
Absolute Lymphocytes (Ref.7-5x10 ³ /ul)	Normal Lymph	61.0	85.00	38.0	64.00
	Lymphopenia	11.0	15.00	21.0	36.00
Absolute Monocytes (Ref.1-1.1x10 ³ /ul)	Normal Mono	64.0	89.00	51.0	86.00
	Monocytopenia	1.0	1.00	2.0	3.00
	Monocytosis	7.0	10.00	6.0	10.00
Absolute Eosinophils (Ref.0-5x10 ³ /ul)	Normal Eoso	72.0	100.00	57.0	97.00
Absolute Basophils (Ref.0-.1x10 ³ /ul)	Eosinophilia	2.0	3.00	-	-
	Normal Baso	72.0	100.00	59.0	100.00
Neutrophil Bands (Ref.0-3%)	Normal	66.0	92.00	55.0	88.00
	Increased	6.0	8.00	7.0	12.00

When the comparison of hematological values carried out for the species of malaria, we found no important disparity in the occurrence of anemia in P. Falciparum 67.0% (n: 48) & P. Vivax in 63.0% (n: 37) patients (Figure-1) but the occurrence of thrombocytopenia was a little bit common in P. Falciparum (87.0%) than P. Vivax (81.0%) (Figure-2). Most of the patients 97.0% (n: 130) were healthy at the time of discharge. No patient was suffering from bleeding because of thrombocytopenia & there was not any requirement of transfusion of platelets in any person. Quinine sulphate was in use for the treatment of the patients of P, Falciparum. Chloroquine was in use for P. Vivax. Three patients met their death because of malaria due to P. Falciparum malaria.

**DISCUSSION:**

The hematological alteration can vary in accordance

with the severity of malaria [9]. The malaria in this city is imported malaria from other regions of the

country [10]. Anemia was available in 64.0% patients of this research work and most of the patients its type was normocytic normochromic, this similar with the finding of Facer & Beals [4, 11]. Parasitized RBC & un-parasitized were available as depressed as well as unsuccessful erythropoiesis with alterations of dyserythropoietic & anemia in chronic form of this disease [12, 13]. Deformability of the RBC is another factor contributory to malaria [14]. Variable amount of the decrease in circulating the count of platelets concluded in various kinds of malaria [15].

The severe nature thrombocytopenia is very uncommon in malaria due to *P. Vivax* [16]. The percentage of occurrence of thrombocytopenia 83.0% which was much higher than the works of Robinsons (71.0%) [17], Rodriguez (59.0%) [18] & Bashwari (53.0%) [19]. We also noticed the disparity in the prevalence of thrombocytopenia between *P. Falciparum* (87.0%) and *P. Vivax* (81.0%) which was also higher than other investigations [20]. Patient who acquired thrombocytopenia because of malaria scarcely bleed whatever the amount of decrease in the count of platelets. Peripheral demolition because of the *P. falciparum* evaluated but not assessed properly for the malaria due to *P. vivax* [22]. Some authors suggested DIC as main machinery, but other were against this view in the patients of severe thrombocytopenia [23]. Similar to some research works which displayed leukopenia a frequent outcome in both nonimmune & semi-immune patients [4], we observed normal count of white blood cells in 86.0% patients. The count of neutrophil was normal in 93.0% patients, a result which is different from past reports [24]. But, lymphopenia & monocytosis were available in 24.0% & 10.0% patients accordingly which are very much comparable with the past works [24, 25].

CONCLUSIONS:

The findings of this research work concluded that *P. Falciparum* & *P. Vivax* are the main reason for alterations in hematology with very high rate of occurrence of thrombocytopenia, lymphopenia & anemia. There are many characteristics of the changes in blood that the identification of malaria would be possible with the availability of above outcomes.

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