Original Article

The Prevalence & Proportion of Haematological Complications of Malaria in a Tertiary Care Hospital

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ABSTRACT

Objectives:- To find out the prevalence and hematological complications of malaria in a tertiary care hospital.

Study design:- Descriptive and observational study

Place and Duration:- This study was conducted at Out Patients Departments of PUMHS Hospital (OPD) and Pathology Department of Peoples University of Medical and Health Sciences Nawabshah from April 2011 to September 2011.

Patients and methods:- A total 1230 cases of malaria diagnosed on basis of clinical and laboratory findings were recorded. The proportion of haemotological complication including anaemia, leucocytosis and thrombocytopenia among these patients were also studied.

Results:- Out of 1230 patients, 720 (58.3%) were children and remaining 510 (41.7) were adults. Ages of these patients including children and adults ranged between 5 to 65 years with a mean of 35 $\pm$30. Male to female ratio in these patients were 1.4:1.

The diagnosis of malaria was made by clinical and confirmed by laboratory findings. The problem of haematological complications as anaemia, leucocytosis and thrombocytopenia were detected among the patient with malaria by determination of Haemoglobin concentration and Complete Blood Count (CBC).

Conclusion:- P.Vivax Malaria is more prevalent. While many of these patient are children and women. Anaemia, leucocytosis and thrombocytopenia are common haematological complications in them.

Keywords:- Malaria, prevalence, haematological complications, Complete Blood Count (CBC).

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INTRODUCTION:

According to world malaria report 2011, there were 225 million cases of malaria and malarial mortality rate reduced by 5% with overall 20-23% throughout world, as an estimated 655000 deaths in 2011 and 781,000 deaths in 2010[1]. The malaria is a commonest mosquito borne infectious disease of humans and other animals caused by five species of Plasmodium such as PL: falciparum, vivax, ovale, malariae and plasmodium knowlesi, the former two

species of malarial parasites are common while the last plasmodia causes malaria in monkeys and also infect the human of South East Asia[2,3]. The life cycle of malarial parasite begins as follow: In the human, the sprozoites are transmitted into blood by mosquito bite and they first infect the liver cells, then red blood cells to releasing merozoites that mature into the male and female gametocyte, when a mosquito bites a malaria infected human, these gametocytes in the mosquito's stomach unite together to form zygotes that develop into oocysts, which grow and rupture to releasing sporozoites and cycle start again[4].

So for hematological complications of malaria is concerned, the anemia, leucocytosis or leucocpenia and thrombocytopenia are well recognized complications. The pathogenic mechanisms that causes these complications including hemolysis of parasitazead and non parasitized red blood cells, depression of erythropoiesis, megakaryopoiesis and bone marrow suppression and immune mediated destruction of thrombocytes caused by releasing of inflammatory cytokines such as tumor-necrosis factor and interleukin (IL 1, 6 and 10).from the activated macrophages in malaria[5] . The factors contributing to the severity of hematological complications are malaria immunity, endemicity, hyperparasitemia, haemoglobinopathies, G6PD deficiency, nutritional status, co-morbidity of HIV and dengue fever and demography of malaria[6] The clinical presentation of malaria caused by all species of malarial parasite resembles and include fever, headache, joint pain, bodyache, chills sweating and vomiting and these symptoms appear within 8 - 15 days after bite of infective mosquitos[7]. Plasmodium falciparum originally was discovered in Gorillas cause severe malaria especially among the children producing anemia, respiratory distress, hepatosplenomegaly, renal failure or black water fever and cerebral malaria with retinal whitening which may be a useful clinical sign that distinguish malaria from other causes of fever[8,9]. Although blood is most frequently used to make a diagnosis of malaria by the microscopic examination of Giemsa stained blood films but saliva and urine have been investigated as alternate non invasive species[10,11]. The rapid malaria diagnostics test and polymerase chain reaction has been discovered recently used for diagnosis of malaria, how ever these tests are not implemented in poor countries like Mozambique due to the high cost value , often used only with a history of fever as the indication to treat malaria in these countries[12,13,14].

The aim of this study was to evaluate prevalence and haematological complications of malaria among the patients visiting the Out Patient Department of Peoples University of Medical and Health Sciences Hospital at District Shaheed Benazirabad. Hence physicians need to remain aware of these complications for early diagnosis, prevention and prompt treatment of malaria.

PATIENTS AND METHODS:

This descriptive and observational study was conducted from April 2011 to September 2011 at pathology department and pediatric & medical out patients departments of PUMHS, Nawabshah. Total 1230 patients, children and adults of either gender visiting OPD during April-September 2011 were included, patients having any co-morbidity were excluded from the study. The prevalence of malaria on the basis of age, sex, areas of residents and clinical findings of all patients were recorded. For the laboratory diagnosis of malaria and its hematological complication, 2-3ml of venous blood samples were taken from all the patients and delivered in to the tubes containing EDTA and sent to the pathology department. Thick and thin blood

smears were made on the clean glass slides from the EDTA mixed blood in the tube and examined under the microscope for detection of various developmental stages of malarial parasites after staining with Giemas' stains. The hemoglobin concentration, CBC including red blood cell, total leukocyte (TLC), Differential leukocyte (DLC) and platelet counts were determined by hematology analyzer from the blood samples. The ESR and the malaria rapid diagnostic test (ICT) were also done from the same blood samples.

RESULT:

A total of 1230 cases were studied, among these 720 (58.53%) were children and 510 (41.46%) were adults, ages ranged between 5 and 65 years with their mean age of 35 ± 30 while male to female ratio was 1.4:1. Out of total 1230 patients 410 (33.3%) were residents of urban areas and 820 (66.7%) belongs to the rural areas. (Table 1). The clinical findings in these patients are shown in table11 i.e; fever with rigors, sweating or feeling of cold and hot, pallor, body ache, splenomegaly. The hematological complications are expressed in Table III. The laboratory findings in these patients are shown in table 1V such as mean values of hemoglobin, ESR, RBC, TLC, DLC, platelet counts, detection of malarial parasites and malarial antigens in serum of these patients were determined by examination of peripheral blood smears and malaria rapid diagnostic test. The mean values of hemoglobin, RBC and platelet counts were significantly reduce, while WBC count with percentage of neutrophils and ESR were significantly increased. The microscopic examination of stained thick and thin blood smears of all patients reveal Plasmodium vivax in 70.8% and P.falciparum in 29.2% of cases. The ICT malaria test was positive in the same number i.e for P.Vivax in 70.8% cases and 29.2% positive for P.falciparum.

Table I

Prevalence of malaria among the children and adults on the basis of age, sex and area of residence of district SBA.

N = 1230

Age	Sex	Residence
Age in years 5 - 65years Mean age 35 ± 30	Male 720 (58.53%) Female 510 (41.46%) Male to Female ratio 1.4:1	Suburbs 820 (66.7%) City 410 (33.3)
Adults	Children	Total
530(41.7%)	700 (58.3)	1230(100%)

N = Number of patients

Table II: Clinical finding in patients with malaria

N = 1230

S. No.	Clinical Finding	No. of Patients	Per-centage
1.	Fever	1230	100%
2.	Associated symptoms like chills, sweating or feeling of coldness and hotness.	1230	100%
3.	Bodyache	750	60.97%
4.	Headache	600	48.78%
5.	Pallor	800	65.04%
6.	Splenomegaly	300	24.39%

Table III

Hematological complications in patients with malaria

N = 1230

S. No.	Hematological Complications	Number of Patients	Per-centage
1.	Anemia	1230	100.0%
2.	Leucocytosis with Neutrophilia	950	77.23%
3.	Lymphocytosis	900	75.0%
4.	Monocytosis	950	79.1%
5.	Thrombocytopenia	750	62.5%

N = Number of patients

Table IV

Laboratory findings in patients with malaria including hematological parameters for assessment of hematological complications.

N = 1230

S. No.	Hematological Complications	Number of Patients	Per-centage
1.	Haemoglobin 5.5 - 11.5g / dl (8.5 ± 3)	800	66.6%
2.	ESR 40 - 110 mn 37.5 ± 72.5	1200	100.0%
3.	Total leukocytes count 6500 - 25000 / cumm 8750 ± 1625	900	75.0%
4.	Red Cell Counts 2.4 - 4.5 m / cumm 3.5 ± 1.0	700	58.3%
5.	Platelet count 40,000-110,000 /cumm 75000 ± 35000	750	62.5%
6.	Differential leukocytes Neutrophils 67-85% (80.5±5.5) Lymphocytes 10-14% (11 ± 3) Monocytes 10 -18% (14 ± 4) Eosinophils 2-4& (3 ± 1)	1000 900 950 1200	83.3% 75.0% 79.1% 100%
7.	**Microscopy** Pl: vivax Pl: Falciparum	 850 350	 70.8% 29.2%
8.	Malaria diagnostic test Immuochromatography Technique +ve for Pl: Vivax +ve for Pl: Falciporum	 850 350	 70.8% 29.2%

DISCUSSION:

The highest malarial mortality rate in 2010, was 50, 56 and 86 persons per 100,000 population in three African countries such as cote D'Ivoire, Angola and Burkina faso as reported by Gaurdian News London[15] on the celebration of malaria day on 25th April 2011. The map of P. Falciparum Malaria endemicity in 2010 and several other maps related to malaria were published in Asia, Africa and America as noted by Gething et al[16]. Malaria was endemic in broad band around the equator, in areas of the Americas, many parts of Asia, and much of Africa; and 85-90 % of malaria mortality due to the P.Falciparum occur among the children and pregnant women in sub-Saharan Africa[17]. Malaria was prevalent throughout the human history and one in every two people had died due to malaria and malaria Atlas project funded by Welcome UK Trust to rectify malaria mapping providing a more contemporary and robust means by which the current and future malaria disease burden was accessed as reported by Hay et al[18]. The malaria supper imposed with HIV infection increasing a person's susceptibility to malaria infection as stated by Abu Raddad et al[19]. The female anopheles mosquitoes such as A. culicifacies and A.stephensi were common in

Pakistan that transmitted the malaria as recorded by national malaria control program 2006[20], while prevalent rate of P. Vivax malaria was two times higher than the P.falciparum malaria in Sindh and Balochistan provinces of Pakistan as reported by Mahamood[21] , Nizamani et al[22] and Yasin zai et al[23]. Malaria in pediatric age group of 200 cases was investigated by Jamal et al[24] and they founded high ratio of P.vivax (62.5%) than P.falciparum. (36%)[24]. The hematological complications in malaria such as anemia, leukocytosis with neutrophilia and thrombocytopenia were studied by Khaled Taha et al[25] and age as a risk factor for thrombocytopenia and anaemia in children treated for acute uncomplicated falciparum malaria was founded by Adedapo et al[26]. The high concentration of interleukine-10 associated with thrombocytopenia in P.falciparum malaria was demonstrated by Casal-Pascual et al[27]. The haemozoin containing leucocytes (HCL) such as monocytes and neutrophils seen in blood films of patients with malaria were negatively correlated with severity of malaria in Ugandan children's, as stated by Mujuzi et al in previous study[28]. In contrast to this study, Hanscheid et al studied that presence of (HCL) in blood film of patients with malaria were used as reliable diagnostic but less prognostic tools[29]. Both studies stated that heamozoin is brownish-black malaria pigment that is digestive product of hemoglobin produced by phagocytosis of parasitased and non parasitased RBC by monocyte and neutrophil. Casal-Pascual et al demonstrated that suppression of erythropoises produced severe malarial anemia that is associated with haemozoin containing leucocytes in peripheral blood[30]. The hematological complications of malaria evaluated by hematological parameters to differentiating malaria from other acute febrile illness were studied by dinesh et al[31]. They stated that severe anemia and thrombocytopenia determined by hemoglobin and platelet count less than 5g/dl and 50,000/cumm in these patients had more specific, sensitive and predictive values to diagnosis of the malaria.

In our study, prevalence of P.vivax malaria (70.8%) was 2.4 times greater than the P.Falciparum. malaria (29.2%) among the 1230 patients belonging to rural and urban areas of district Shaheed Benazirabad. The frequent hematological complications in these patients were anemia, leukocytosis with neutrophilia and thrombocytopenia in this study. The results in our study were similar to studies by other laboratory research workers described in this context.

CONCLUSION & RECOMMENDATIONS:

The following conclusion has been made from the above study.

1. The prevalence rate of the malaria caused by P.Vivax is 2.4 times greater than the malaria caused by P.Falciparum among the children and adults in District Shaheed Benazirabad.

2. It has been observed that hemoglobin, RBC count, platelet count were decreased while ESR and total leukocyte count with percentage of neutrophils in these patients were increased.

3. Further studied are needed to determine cold agglutination test, platelet aggregation test and serum interleukin level in the malaria.

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