

The Prevalence and Proportion of Haematological complications of Malaria in District Shaheed Benazirabad

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ABSTRACT

Objectives: To find out the prevalence of malaria in district Shaheed Benazirabad (SBA). To Study the proportion of haematological complications among the patients who present with malaria.

Study Design: This is descriptive and experimental study.

Place and Duration of Study: This study was conducted at Medical Out Patients Department (OPD) and Pathology Department of PUMHSW Peoples Medical College and Hospital at district (SBA) from April 2008 to September 2010.

Patients and Methods: A total 1200 cases of malaria diagnosed on basis of clinical and laboratory findings were recorded. The proportion of haematological complication including anaemia, leucocytosis and thrombocytopenia among these patients were also studied.

Results: Out of 1200 patients, 700 (58.33%) were children and remaining 500 (41.77) were adults. Ages of these patients including children and adults ranged between 5 to 65 years with a mean of 35 ± 30 years. Male to female ratio in these patients were 1.1:1.

The diagnosis of malaria was made by clinical as well as 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: Malaria is more prevalent in district SBA, and many of these patient are children and women. Anaemia, leucocytosis and thrombocytopenia are common haematological complications in them.

Key Words: Malaria, Prevalence, Haematological complications, Complete Blood Count (CBC).

INTRODUCTION

Malaria is a major cause of morbidity in the tropics and about 300 million cases were reported worldwide in 2006.¹ Among the 100 species of genus *Plasmodia*, the four species namely *P. Falciparum*, *P. Vivax*, *P. Ovale*, *P. Malariae* cause the malaria & the former two species of malarial parasites are common in Pakistan as recorded by national malaria control program.² The malaria is transmitted by the bite of female anopheles mosquitoes. There are about 430 species of mosquitoes and out of them about 30 – 50 species such as *A. Culicifacies* and *A. Stephensi* are common in Pakistan and these transmitted the malaria as records of national malaria control program.³

The life cycle of malarial parasite is completed in human beings and female anopheles mosquitoes. In the human the sporozoites are transmitted into blood by mosquito bite and they first infect the liver cells, then red blood cells which release merozoites that mature into the male and female gametocytes. 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 release sporozoites and cycle start again.⁴

Blood is the most easily accessible diagnostic tissue. The changes in haematological parameters are likely to be induced by any disease like malaria which affects the physiology of haemopoiesis at the level of bone marrow resulting in hematological complication along with clinical presentation of malaria such as anemia, leukocytosis and thrombocytopenia, fever with rigor, sweating, body ache, headache, vomiting, pallor and splenomegaly.⁵ Hence the diagnosis of malaria is necessary for the prevention and treatment which make the physician to control this devastating disease that causes death due to complications including Cerebral malaria and haematological ones.⁶ The microscopic examination of peripheral blood for detection of malarial parasite along with estimation of haemoglobin concentration, ESR and complete blood count are important laboratory investigation for diagnosis of malaria and its hematological complications.⁷ The rapid malaria diagnostic test has been used for detection of *P. Vivax* and *P. Falciparum* malaria by immuno chromatography (IC) technique. This test has been developed recently.⁸

The aim of this study was to evaluate prevalence of malaria among the patients living in areas of District SBA & also to study the hematological complication in

these patients so that a physician remain aware of these complications for early diagnosis prevention and prompt to treatment of malaria.

PATIENTS AND METHODS

This descriptive and experimental study was conducted from April 2008 to September 2008 at pathology, pediatric and medical out patients departments. Total 1200 patients including children and adults of both sexes were selected. The prevalence of malaria on the basis of age, sex, areas of residents at district SBA and clinical findings of all this 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 and examined under the microscope for detection of various developmental stages of malarial parasites after staining with Giemsa's stain. The haemoglobin concentration, CBC including total leukocyte count (TLC), differential leukocyte count (DLC) and platelet count were determined by haematology analyzer. ESR and Malaria Rapid Diagnostic Test were also performed.

RESULTS

A total of 1200 cases were studied, among these 700 (58.3%) were children and 500 (41.7%) were adult. The ages of these patients were ranged between 5 and 65 years with their mean age was (35 ± 30) while male to female ratio was 1.7:1. out of total 1200 patients 400 (32.3%) were residents of Nawabshah city and 800 (66.7%) belonged to the rural areas of district SBA. (Table 1). The clinical findings in these patients were fever with rigor, feeling of cold and hot, sweating, pallor, body aches & splenomegaly (Table No. 2). The laboratory findings in these patients are shown in Table No. 3, such as mean values of hemoglobin, ESR, TLC, DLC, platelet count, 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.

Table No.1: Prevalence of malaria among the children and adults on the basis of age, sex and dwelling (n=1200)

Age	Sex	Dwelling
Adults 500 (41.7%)	Male 770 (64.1%)	Rural 800 (66.7%)
Children 700 (58.3%)	Female 430 (35.9%)	Urban 400 (33.3)
Age range 5 – 65 years	Male to Female ratio 1.7:1	
Mean age 35 ± 30		

Table No. 2: Clinical finding in patients with malaria (n=1200)

S.No.	Clinical finding	No. of patients	Percentage
1.	Fever	1200	100%
2.	Associated symptoms with fever like chills, sweating or feeling of coldness and hotness	980	81.7%
3.	Bodyache	750	62.5%
4.	Headache	600	50.0%
5.	Pallor	800	66.6%
6.	Splenomegaly	300	25.0%

Table No. 3: Laboratory finding in patients with malaria and its hematological complications (n=1200) N = 1200

S. No.	Laboratory finding	No. of patients	Percentage
1.	Hemoglobin concentration $5.5 - 11.5 \text{ g / dl } (8.5 \pm 3)$	800	66.6%
2.	ESR: $40 - 110 \text{ mm Hg. } (37.5 \pm 72.5)$	1200	100.0%
3.	Total leukocytes count $6500 - 25000 / \text{cumm } (1625 \pm 8750)$	900	75.0%
4.	Red Cell Counts $2.5 - 4.5 \text{ m / cumm } (3.5 \pm 1.0)$	700	58.3%
5.	Platelet count $40,000 - 110,000 / \text{cumm } (75000) \pm 35000)$	750	62.5%
6.	Differential leukocytes count Neutrophils $67 - 85 \% (80.5 \pm 5.5)$ Lymphocytes $10 - 14 \% (11 \pm 3)$ Monocytes $10 - 18 \% (14 \pm 4)$ Eosinophils $2 - 4 \% (3 \pm 1)$	1,000 900 950 1200	83.3% 75.0% 79.1% 100.0%
7.	Microscopy Pl: vivax Pl: Falciparum	850 350	70.8% 29.2
8.	Malaria diagnostic test Immunochromatography Technique (ICT) +ve for Pl: Vivax +ve for Pl: Falciparum	850 350	70.8% 29.8%

The mean values of hemoglobin, RBC and platelet counts were significantly reduced while WBC count with percentage of neutrophils and ESR were significantly increased. The microscopic examination of stained thick and thin blood smears of all these patients were showing Plasmodium vivax in 70.8% of cases and

P.falciparum in 29.2% of cases. The ICT malaria test was positive for *P.Vivax* in 70.8% cases and 29.8% positive for *P. Falciparum*.

DISCUSSION

Malaria remain a major cause of morbidity and mortality in Asian as well as African countries of the world. According to Snow et al⁹, globally the incidence of malaria cases is about 300-500 million and malaria related deaths are 1 million. It is also stated that 90% cases of malaria caused by *plasmodium falciparum* occur in Africa. Prevalence of malaria is common cause of death among the children and pregnant women as reported by Luxemburger et al¹⁰. Malaria in pediatric age group of 200 cases was investigated by Jamal et al¹¹ and they founded high ratio of *P.vivax* (62.5%) than *P. falciparum* (36%). Malaria in Karachi and other areas of Sindh was studied by Mahmood¹² and he observed *P. Vivax* to be two times higher than *P. Falciparum*. According to Nizamani et al¹³ that *P. Falciparum* ratio is increasing in many districts of Sindh while Yasin Zai and Kakar suleman Khel¹⁴ founded high prevalence of *P.Vivax* malaria in Mastung and Khuzdar districts of Balochistan. The hematological complications of malaria such as anemia, leukocytosis with neutrophilia and thrombocytopenia are reported by Bashawri et al¹⁵, Scott et al¹⁶ and Ladhani et al¹⁷. They stated that anaemia is one of the most common complications in malaria that result from a combination of haemolytic mechanisms and accelerated removal of both parasitized and non-parasitized red blood cells, depressed and ineffective erythropoiesis. According to Adedapo et al¹⁸ age is a risk factor for thrombocytopenia and anaemia in children treated for acute uncomplicated *falciparum* malaria.

In our study, prevalence of *P.Vivax* malaria(70.8%) is commoner than the *P. Falciparum*(29.2%). The significant clinical findings in these patients were fever with rigors, pallor, body ache and headache while hematological complication in these patients were anemia, leukocytosis with neutrophilia, ESR and thrombocytopenia and these were detected by haemoglobin, ESR and complete blood count estimations. In our study, hemoglobin, platelet count and RBC count were significantly reduced while ESR, leukocyte count and percentage of neutrophils were significantly increased.

CONCLUSIONS

The following conclusion has been made from the above study.

1. The prevalence rate of the malaria caused by *P.Vivax* is 2.5 times greater than the malaria caused by *P.Falciparum* among the children and adults in District Shaheed Benazirabad.
2. The hematological complications such as Anemia, leucocytosis with neutrophilia and thrombocytopenia among the children and adults were assessed by hemoglobin and ESR estimations and complete blood count. 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 studies are needed to determine cold agglutination test, platelet aggregation test and serum interleukin level in the malaria.

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