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HAEMATOLOGICAL ABNORMALITIES IN MALARIA

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ABSTRACT
This study was performed to observe the frequency of haematological abnormalities such as anaemia, thrombocytopaenia, and leucopaenia or disseminated intravascular coagulation (DIC) in patients suffering from malaria. The study was carried out at Bahawal Victoria Hospital, Bahawalpur from 01-07-2003 to 31-07-2004. A total of 50 consecutive patients of all ages and sex presenting with malaria in medical wards were studied. Detailed history was taken especially of fever, rigors, chills, headache, fits or bleeding from any site. The patients already taking antimalarial drugs were excluded. Baseline characteristics were recorded. In 50 patients studied, most of them were of young age with a peak occurrence between 21-35 years. More females (56%) were affected than males (44%). In most of the patients (98%) fever was the presenting symptom associated with rigors (60%), chills (74%), headache (80%), fits (40%), unconsciousness (20%) and history of bleeding (4%). The examination and investigations revealed anaemia (84%), jaundice (14%), spleenomegaly (72%), thrombocytopaenia (52%), leucopaenia (18%), haemoglobinuria (6%) and disseminated intravascular coagulation (2%). In patients presenting with malaria the most common presentation is fever associated with headache, rigors and chills. The hematological abnormalities seen included anaemia and thrombocytopaenia in the patients suffering from malaria.

INTRODUCTION

Malaria is an acute, chronic or recurrent febrile illness caused by four species of Plasmodia: Vivax, Falciparum, Malariae and Ovale. It is a protozoan disease transmitted by the bite of infected female anopheles mosquito. Malaria has played havoc with man for thousands of years. It is the most important of the parasitic diseases, affecting more than 500 million people causing 1 to 3 million deaths each year[1]. Malaria is primarily a disease of hot and humid countries at altitude less than 2200 meters above sea level[2]. Malaria transmission is most common in Africa, Asia, Oceana and Latin America.

The main organs involved in malaria are liver, red blood cells and spleen. The major effect of malaria on peripheral blood is anaemia.[3] This is mainly due to haemolysis however other factors like ineffective erythropoeisis and splenic sequestration also play some role. It is particularly characteristic of falciparum malaria. The prevalence and degree of anaemia also depend on immune status of the patient, nutritional background and other complicating factors. Moderately severe anaemia (volume of packed cells <0.35L/L) is seen in approximately 20% of previously healthy patients during or after first infection. Other abnormalities like thrombocytopaenia, leucopaenia and DIC also occur in patients of malaria. Leukocyte count may be normal but patients often have leucopaenia especially there is decrease in granulocyte count[4]. A platelet count of <80,000/µl is seen in about 2/3rd of patients and it may be in part to sequestration of platelets in capillaries of internal organs and in part due to DIC or immunopathological mechanims[5]. Another major complication is black water fever in which there is severe haemolysis.

Bahawalpur is the mesoendemic area of malaria. Malaria presents with fever and some form of haematological abnormallities like severe anaemia, thrombocytopaenia and leucopaenia. The present study was carried out to see the frequency of these haematological abnormalities in patients presenting with malaria.

The purpose of this study was to see the frequency of haematological abnormalities especially anaemia, thrombocytopaenia, leucopaenia and disseminated intravascular coagulation in malaria.

SUBJECTS AND METHODS

Subjects: A total of 50 consecutive patients of all ages and sex suffering from malaria were included in the study. They presented to Bahawal Victoria Hospital, Bahawalpur with fever. Their peripheral blood films showed malarial parasites positive on peripheral blood film. The following parameters were examined.

1. *History:* Detailed history of patients was taken on presentation. It included fever, its onset, duration, type and association with rigors, chills and headache. The history of fits, unconsciousness and

bleeding from any site or appearance of any black or bluish spots on skin was also taken. The patients were also asked about previous medications especially the intake of any anti-malarial drugs.

2. *Physical Examination:* Vital signs were recorded especially the temperature. More than 99° was regarded as fever. In general physical examination of patients special emphasis was laid on the presence of pallor, jaundice, bruises. ecchymosis etc. In systemic examination the presence of hepatomegaly, splenomegaly and other abnormal findings in various systems were looked for. The hepatomegaly and splenomegaly were assessed clinically by palpation and ultrasonography by measureing the total span of liver and spleen.

3. Lab. *Investigations:*

- Peripheral morphology of blood: Giemsa stained thick and thin films were examination: The morphology of blood film was seen in all the patients the presence and severity of any of the haematological abnormalities such as anaemia, thrombocytopaenia and leucopaenia were detected. The patients were considered having anaemia when there was either haemoglobin level <10 g/dl and the red blood cell count was <3 million/mm^6.
- Urine analysis: The urine was examined for the presence of haemoglobinuria or for the presence of blood.
- Other Investigations: Like serum urea, createnine, glucose, cerebrospinal fluid examination etc were performed as and when required to rule out other diseases and complications. While prothrombin time, activated partial thromboplastin time and fibrin degradation products and D-dimer etc, were carried out in order to rule out DIC.

RESULTS

In a total of 50 patients with malaria included in the study, their results of various observations were noted in a proforma. The age and sex distribution and seasonal variations are shown in figures 1, 2 and 3 respectively. On presentation-the patients were ill for almost 3-5 days. The various presenting symptoms with their relative frequency are given in table 1. The most common findings on examination were fever (98%) and anaemia (84%). The relative frequency of the physical findings is given in table 1.

In a total of 50 patients, 30 (60%) had plasmadium falciparum in peripheral blood film whereas 20 (40%) had plasmodium vivax (fig. 4).

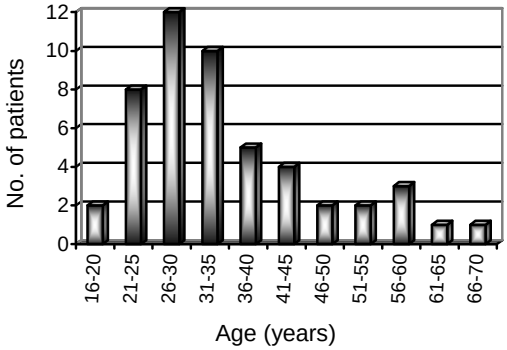

Fig. 1: *Age distribution of patients (n=50).*

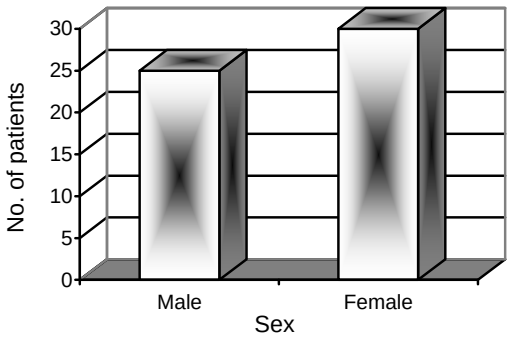

Fig. 2: Sex *distributionof patients (n=50)* .

Table 1: *Relative Frequency of Symptoms and Signs.*

Symptoms and Signs	Male	Female	%
Fever	22	27	98
Rigors	13	17	60
Chills	15	22	74
Headache	17	23	80
Fits	7	13	40
Unconsciousness	5	5	20
Nausea/vomiting	10	15	50
Bleeding	0	2	4
Pallor	20	26	92
Jaundice	2	5	14
Hepatomegaly	12	12	48
Splenomegaly	15	21	72
Hypotension	0	3	6
Black Water fever	0	3	6

Investigations:

On peripheral blood morphology the anaemia was seen in 46 patients (92%), whereas severe anaemia (haemoglobin <5gm/dl) was seen in 20 patients

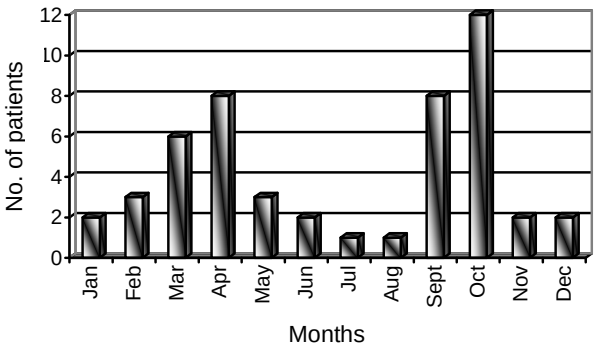

Fig. 3: *Seasonal variation in 50 patients.*

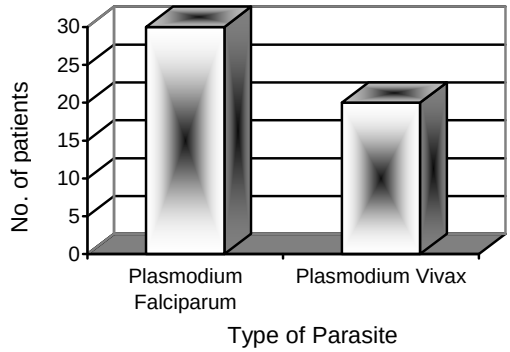

Fig. 4: Ae*tiology of 50 patients with malaria.*

Table 2: *Laboratory Abnormalities in 50 patients.*

Abnormality	Male	Female	%
Falciparum	13	17	60
Vivax	9	11	40
Anaemia	20	26	92
Thrombocytopaenia	11	15	52
Leucopaenia	4	5	18
Haemoglobinuria	0	3	6

(40%). Thrombocytopaenia of intensity moderate to severe was present in 26 (52%) and leucopaenia in 9, (18%) patients. Evidence of frank disseminated intravascular coagulation was seen in only 1 patient (2%) (Table 2).

DISCUSSION

Malaria causes high incidence of morbidity and mortality in people living in the area of Bahawalpur.

The present study shows that the disease were more common during the changing season i.e. September-October and March-April with relative frequency of 40% and 28% respectively[7]. In addition there was slight female preponderance (56%) as compared to males (44%). This is in contrast to some of the other studies[7] where male to female ratio of up to 2.9:1 was reported. This opposite preponderance may be due to the difference in the geographical distribution. The age range of patients in this study was 17-68 years with peak incidence between 21-35 years.[7,8] The patients presented mostly with fever (98%) but its intensity was higher than the figure of some other studies[9,10]. The fever was mostly associated with rigors (60%) and chills (74%).[8,11] The signs of jaundice (14%) and hepatomegaly (48%) are lower as compared to the figures of 40% (jaundice)[10] reported 80% (hepatomegaly)[10] given in other studies. The spleen was enlarged in 72% patients[12] but it is a very high figure as compared to 9%[7] and 18.8%[10] in various other studies. The purpuric spots or other evidence of bleeding was seen in 2 patients (4%) but it is less as compared to the 16.7% in an other study[13]. In laboratory data the most common; parasite was found to be plasmodium falciparum, which was seen in 30 patients (60%) and the other was plasmodium vivax seen in 20 patients (40%) however it is' different from that reported by Sevenson et al[14] that gives the figure of 62% vivax and 38% falciparum. This gross variation is due to difference in the area of study as this study was carried out in Canada which has different socioeconomic and geographical distribution than ours. The anaemia (haemoglobin <10gm/dl) was seen in 92%[13] but it is high as compared to the figures of 38% and 50%[12,15] respectively due probably due to different geographical areas of the studies i.e. one in Texas (USA) and other in Saudi Arabia. The patients with severe anaemia (haemoglobin <5gm/dl) were 20 (40%) which is a very high figure in comparison to, 10%[13] and 29%.[12] The anaemia seen in patients in our study was mostly microcytic hypochromic. The thrombocytopaenia is seen in 52% of patients[14] but it is very small figure as compared by 90% by other authors.[13] The leucopaenia was seen in 9 patients (18%) which is a higher figure to 6.6%[13].

This study **concluded** that the patients presenting with malaria mostly have fever associated with headache rigors and chills. Among the various haematological abnormalities anaemia (92%) is the most common abnormality followed by thrombocytopaenia (52%) and leucopaenia (18%) respectively. Therefore it seems necessary that not only the disease should be recognized but also the presence of the haematological abnormalities be sought actively.

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