ORIGINAL ARTICLE

Thrombocytopenia in Malaria

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ABSTRACT

Objective: To determine the frequency of thrombocytopenia in Malarial Parasite (MP) positive patients.

Study Design: A cross-sectional study.

Place and Duration of Study: Medical Unit-III, Ward-7, JPMC, Karachi, from June to October 2006.

Methodology: One hundred twenty four MP positive cases were included in the study. Infections with both *Plasmodium falciparum* and *Plasmodium vivax* species were included. Complete blood picture with platelet count was obtained in all patients. Thrombocytopenia was defined as platelets count of < 150,000/cmm.

Results: Among 124 patients of MP positive, 100 (80.6%) were found to have thrombocytopenia. Over all 64 patients had *Plasmodium falciparum*, while 60 patients were having *Plasmodium vivax* infection. The frequency of thrombocytopenia was 71.87% (n=46) in *falciparum* and 93.33% (n=56) in *vivax* infection.

Conclusion: Thrombocytopenia was a common haematological finding in patients with *Plasmodium* infection particularly marked in *vivax* species nfection.

Key words: *Malaria. Thrombocytopenia. Plasmodium vivax. Plasmodium falciparum.*

INTRODUCTION

Malaria has far-reaching repercussions on human history. Alexander the Great suffered from malaria during battle of Mesopotamia in the 4th century B.C.[1] Malaria is a vector born disease caused by the bite of the female Anopheles mosquito inoculating the sporozoites in the human blood stream leading to clinical manifestations.[2] Four species of *Plasmodium* can cause malaria in human beings. These include *Plasmodium falciparum, Plasmodium vivax*, *Plasmodium ovale* and *Plasmodium malariae*.[3] Malaria infects mankind globally. According to World Health Organization assessment, about 40% of the world population is at risk of developing malaria. About 300-500 million people are infected with it.[4] Every year about 2 million people die due to malaria and its complications.[5] The highest mortality is in Africa, mainly in young children.

Pakistan is among the countries having a high infectivity rate of malaria. The Directorate of Malaria Control has reported that one person per thousand in the population is infected with malaria.[6] Active malarial transmission happens throughout the year, while aggressive out bursts of disease are seen mainly during and after the 'monsoon' season.

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Malaria is associated with very high mortality and morbidity. The global burden of any disease is statistically assessed by Disability Adjusted Life Years (DAILYs). Malaria results in the loss of 35,728000, Disability Adjusted Life Years revealing the worldwide impact of this disease.[7] Considering the gravity of the complications of this potentially treatable disease, it is important to diagnose and treat this disease before it is too late. Microscopy remains the Gold standard for the diagnosis of malaria. Malarial parasite may not be visible on a single slide and multiple slides may be needed. In patients suffering from an acute febrile disease testing negative for malarial parasite, the decision to give empirical antimalarial therapy is always difficult. Most of the time, a delay in initiating antimalarial treatment results in catastrophe.

Thrombocytopenia is quite frequently associated with malaria and has been reported by many workers.[8,9] As thrombocytopenia is also seen in some other acute febrile illnesses therefore, a significant correlation between malaria and the presence of thrombocytopenia is mandatory before taking it as a hematological parameter of the disease. This study was conducted to determine the frequency of thrombocytopenia in patients suffering with malaria.

METHODOLOGY

This cross-sectional study was conducted at Medical Unit-III, Ward-7 of the Jinnah Postgraduate Medical Centre, Karachi, from June to October 2006. Patients presenting with a history of high-grade fever for 10 days or less were evaluated further. Patients with a diagnosis

of leukemia, Dengue fever or enteric fever were excluded. Three hundred and thirty patients were selected for initial screening. One thousand and four slides were made for MP (malarial parasite). Samples were collected in EDTA containing tubes. Films were stained by Field's stain. Patients positive for malaria parasite were finally included in the study isolated for both the *Plasmodium falciparum* and *Plasmodium vivax* species. Those 124 patients with a confirmed diagnosis of malaria were investigated for platelets, hemoglobin and total leukocyte count on sysmex auto analyzer.

The cut off point for thrombocytopenia was taken as platelets less than 150,000/cmm. The two groups were classified as: group A having thrombocytopenia and group B without thrombocytopenia. On the basis of hemoglobin, two groups were classified as group A having hemoglobin < 10 gm/dL and group B having hemoglobin > 10 gm/dL. The normal range of leukocytes was taken as 4000–11000/cmm. Any deviation from this limit was noted as abnormal.

The chi-square test was applied to evaluate statistical significance of the studied variable between groups on SPSS version 10.

RESULTS

A total of 124 malarial parasite-positive patients was included in this study. Out of them, 90 (72.5%) were males and 34 (27.4%) were females with mean age of 28.9 ±15.42 years. Sixty four (51.60%) patients were suffering with *Plasmodium falciparum* and 60 (48.40%) patients had *Plasmodium vivax* infection. Thrombocytopenia was detected in 100 (80.6%) of patients (90% confidence interval 72.9% to 86.8%). Among the 100 patients with thrombocytopenia, 74 (74%) were males and 26 (26%) were females. The gender showed non-significant difference (p=0.46). Forty six (46%) patients with thrombocytopenia had *Plasmodium falciparum* and 56 (56%) had *Plasmodium vivax* (p=0.001). Hemoglobin analysis showed that 46 (46%) of thrombocytopenia patients had less than 10 gm/dl hemoglobin (p=0.01) (Table I).

DISCUSSION

Malaria is a major health issue for people residing in tropical and sub-tropical areas. Mortality and morbidity is mainly due to the delayed diagnosis and treatment of this potentially treatable disease. The classical pattern of disease when there is cyclic fever coinciding with the release of schizonts in the blood stream is seen in only a small percentage of cases. As there is no clinical localizing sign in malaria, therefore, it is easily confused with other diseases like enteric fever, Dengue fever or viral illness.

In this study, thrombocytopenia was taken as the haematological parameter. It is a general consensus that thrombocytopenia is very common in malaria.[10,11] In that study there were two important findings – one that thrombocytopenia was a common laboratory feature; secondly, both the *Plasmodium* species *(vivax* and *falciparum)* were associated with it.

Different mechanisms are postulated for thrombocytopenia in malaria including lysis, splenic sequestration or decreased production from the marrow.[5] In case of *Plasmodium (P.) falciparum*, immune reaction and complement activation are presumed to be the initiating steps leading to anemia and thrombocytopenia.[12] Thrombocytopenia was one of the key laboratory findings in this study found in 80.6% patients suffering from malaria. Contrary to the popular belief, *P.vivax* can give rise to thrombocytopenia,[13,14] as seen in this study. It was 93.33% in patients having *Plasmodium vivax*, while it was 71.87% in patients with *Plasmodium falciparum*. Similar results are documented by studies conducted by other researches. Memon and Afsar showed 93% thrombocytopenia in patients having malaria due to *Plasmodium falciparum*.[15] In Liberia, Mahmood *et al.* studied a total of 145 patients who had *P.falciparm* malaria. Out of those, 109 (75.18%) had thrombocytopenia.[16]

Thrombocytopenia is seen in both patient groups suffering with either *Plasmodium vivax* or *Plasmodium falciparum*. Richards and Behrens reported thrombocytopenia only in patients suffering from *Plasmodium falciparum*.[17] Similar results are reported by Erthart *et al.* from western Thailand.[18] Jadhav and Patkar conducted an extensive study regarding pattern of thrombocytopenia in patients having *vivax* and *falciparum* malaria. They documented thrombocytopenia in both groups of patients but severe thrombocytopenia, (platelets 20,000 or less) was more consistent with *Plasmodium falciparum* malaria. No such variation was seen in this study.

Anemia was another haematological indicator, which was seen in 56.45% patients. As in most of the patients,

Table I: Distribution of variables in patients with and without thrombocytopenia.

Variable	Thrombocytopenia (n=100)	Without thrombocytopenia (n=24)	Total (n=124)	p-value
Male	74	16	90	p=0.46 (ns)
Female	26	8	34	chi-square=0.53
Platelet count	100	24	124	p=0.001 chi-square=102.23
Plasmodium falciparum	46 (71.87%)	18	64	p=0.001
Plasmodium vivax	56 (93.33%)	4	60	chi-square=9.77
Hemoglobin < 10 mg/dL	46	24	70	p=0.01
Hemoglobin > 10 mg/dL	24	30	54	chi-square=5.61

previous reports of hemoglobin (Hb) were not available, it was difficult to ascertain whether anemia was due to malaria or some other disease like worm infestation, acid peptic disease or nutritional deficiency-related anemia.

In this study, leucopenia was seen in only 35.4% of patients. Low values of white blood cells in patients infected with malaria is also reported by Erhart *et al.*[18] Keeping in view these reports, it is suggested that patients having a history of acute febrile illness with leucopenia and thrombocytopenia must be thoroughly evaluated for malaria and treatment must be started in order to avoid severity of disease and its complications.

CONCLUSION

Thrombocytopenia was a common haematological finding in patient with *Plasmodium* infection particularly marked in *vivax* species infection.

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