RESEARCH ARTICLE

A study on metabolic parameters in Falciparum Malaria cases: Clinical Study

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ABSTRACT

Introduction: Cytokines are responsible for many of the symptoms and signs of the infection, particularly fever and malaise. Plasma concentrations of cytokines are elevated in both vivax and falciparum malaria. **Methodology:** All these patients were subjected to slide test for thick and thin smear as well as immunochromatographic test, ROT, Pan malaria or Falci check. Blood investigations like hemoglobin level, total leukocyte count, differential count and serum electrolyte and also renal function tests, liver function tests, random blood sugar were done in all cases. **Results:** Serum bilirubin was raised in 33 cases, but only14 cases had serum bilirubin > 3 mg/dL. maximum total bilirubin noted was 18.4 mg/dl. Out of 14 cases, 9 cases had conjugated hyperbilirubinemia and 5 cases had unconjugated hyperbilirubinemia **Conclusion:** Hepatic dysfunction in acute P.falciparum malaria ranged from mild elevation of liver enzymes to acute hepatitis.

Keywords: Malaria, Liver Function tests, Renal function tests

INTRODUCTION

Malaria still continues to be a major killer of mankind especially in developing countries. Almost all deaths and severe disease are due to Plasmodium Falciparum. It is observed that the patients of falciparum malaria with liver function abnormalities are more vulnerable to the development of complications like cerebral malaria, anemia, renal failure, acute respiratory distress syndrome, etc.

Malaria parasites induce release of cytokines in much the same way as bacterial endotoxin. A glycolipid material with many of the properties of bacterial endotoxin is released on meront rupture. These parasite products like endotoxin induce activation of the cytokine cascade initially tumor necrosis factor (TNF) and interleukin-1 (IL-1) are produced and these in turn induce release of other proinflammatory cytokines like IL-6 then IL-8 (Gram et al.,1989).

Cytokines are responsible for many of the symptoms and signs of the infection, particularly fever and malaise. Plasma concentrations of cytokines are elevated in both vivax and falciprum malaria (White NJ and Hom et al.,1992).

Cytokines appear to play an important role in the pathogenesis of cerebral symptoms in murine models of severe malaria. It has been suggested that severe malaria and in particular cerebral malaria, results from specific immune mediated damage. This is unlikely. There is no pathological evidence in man for vasculitis with a cellular infiltrate in or around the cerebral vessels.

In the nephritic syndrome associated with chronic P.malariae infections, malarial antigen and immune complexes can be eluted from the kidney, indicating a role for quartan malaria in this condition (Peter G Kremseur et al.,1996). There is accelerated coagulation activity with accelerated fibrinogen turnover, consumption of antithrombin III and increased concentrations of fibrin degradation products.

In severe infections the prothrombin and partial thromboplastin times may be prolonged and 5% of patients bleeding may be significant (Howard and Gilbadoga,1989).

MATERIAL AND METHODS

The present work was a prospective study conducted in Medical college hospital. This study consists of 50 cases satisfying inclusion and exclusion criteria.

Inclusion Criteria:

All cases of Plasmodium Falciparum malaria diagnosed by peripheral smear examination or by immunochromatographic test – Falci Check,Pan malaria with pf or by Rapid optimal test.

Exclusion Criteria:

1. Patients taking hepatotoxic drugs
2. Patients having evidence of liver disease prior to illness.
3. Patients with history of alcoholism.

Investigations:

All these patients were subjected to slide test for thick and thin smear as well as immunochromatographic test, ROT , Pan malaria or Falci check.

Blood investigations like hemoglobin level, total leukocyte count, differential count and serum electrolyte and also renal function tests, liver function tests, random blood sugar were done in all cases. Urine examination was done in all the patients.

RESULTS

In the present study, the youngest patient is 18 years old and oldest is 75 years old. Total numbers of male patients were 37 and females 13. The maximum numbers of patients (34) were in the age group of 21-40 years. In this study, hemoglobin level between 6.1-8.0 gms/dL was seen in 18% of patients & hemoglobin level between 8.1-10.0 gms/dL was seen in 44% of patients. Leukocyte count <4000/ cumm was seen in 18% of patients & count >11,000 was seen in 4% of patients.

Table-1: Showing Age and Sex Distribution

Age Group (Years)	Males	Females	Total	Percentage
15-20	4	2	6	12.00
21-30	16	3	19	38.00
31-40	11	4	15	30.00
41-50	3	2	5	10.00
51-60	1	2	3	6.00
61-70	1	-	1	2.00
. >70	1	-	1	2.00
Total	37	13	50	100.00

Table-2: Showing Blood and Urine parameters

Findings	No. of Cases	Percentage
Hemoglobin (gm/d1)		
< 6 gm	1	2.00
6.1 to 8.0	9	18.00
8.1 to 10.00	22	44.00
> 10	18	36.00
Leukocyte count (cells/cumm)		
< 4000	9	18.00
4001 to 11,000	39	78.00
> 11001	2	4.00
Platelet count		
<1.5lakhs	16	32.00
1.5 – 4.5 lakhs	34	68.00
Urine Examination		
Albumin		
Trace	3	6.00
Positive	2	4.00
Nil	45	90.00
Microscopy		
Pus cells 0 – 5	47	96.00
5-10	3	4.00

Table-3: Showing Blood sugar, Urea, creatinine

Blood sugar (mg/dl)	No. of Cases	Percentage
< 60	-	-
60-100	16	32.00
101-140	32	64.00
> 141	2	4.00
Blood urea (mg/dl)		
< 40	31	62.00
41-100	18	36.00
> 100	1	2.00
Serum creatinine (mg/dl)		
< 1.2	37	74.00
1.3-2.5	12	24.00
>2.5	1	2.00

Table-4: Liver Function Tests

Serum bilirubin (mg/dl)	No. of Cases	Percentage
< 1.0	17	34.00
1.1-2.9	19	38.00
> 3.0	14	28.00
SGOT (AST) (IU/L)		
<40	13	26.00
41-119	30	60.00
>120	07	14.00
SGPT (ALT) (IU/L)		
<35	11	22.00
36-104	28	56.00
>105	11	22.00
Alkaline phosphatase		
35-130	32	64.00
> 130	18	36.00
Serum proteins (G/dl)		
6-8	46	92.00
<6	4	8.00
Prothrombin time		
12-16	13	76.47
> 16	4	23.53

Blood sugar between60-100 mg/dL was observed in 16 patients. No patients had blood sugar <60mg/dL. Blood urea level was raised in 19 patients and serum creatinine level was raised in 13 patients. Maximum blood urea level was 126 mg/dl and maximum creatinine level was 3.8 mg/dl

Serum bilirubin was raised in 33 cases, but only14 cases had serum bilirubin > 3 mg/dL . and maximum total bilirubin noted was 18.4 mg/dl. Out of 14 cases , 9 cases had conjugated hyperbilirubinemia and 5 cases had unconjugated hyperbilirubinemia

DISCUSSION:

In the present study, the incidence of Falciparum malaria is maximum in the age groups of 21-40 years, which is also comparable with the studies carried out by Mehta et al. (1989); Sharma et al. (1998) and Dash et al. (1984)

The study series by Tamal et al, (1992) noted leucopenia in 65.5% and leukocytosis in 2% of patients. The study by Mehta SR et al noticed leukocytosis in 9.37%. In the present study leucopenia was seen in 18% of the cases and leukocytosis in 4% of the cases.

Random Blood Sugar:

In the study series by Mehta et al,(1996) hypoglycemia was seen in 9.37%. In the present study, the random blood sugar <60 mg/dL was not seen in any of the patient, random blood sugar 60 to100 mg/dLwas seen in 32% of patients.

Renal Profile:

In the present study levels of blood urea and serum creatinine were elevated in 38% and 26% of the patients respectively. The study is comparable with the study series of Nityanand et al. (1997) showing mean blood urea value 256.5±185.44 and mean serum creatinine value 3.20±2.23.

Liver Function Profile:

In the study series of Gopinathan et al. (1981) serum bilirubin 2 mg/dL was seen in 4.43% of patients. In the study series of Bajiya et al. (1996) serum bilirubin >2.5 mg/dL was seen in 30.8% and in the study series of Chawla et al. (1989) serum bilirubin > 2 mg/dL was seen in 100% of patients. In the present study serum bilirubin level higher than normal found in 66% of cases however, only 28% of cases had serum bilirubin >3 mg/dL.

In the study of AbroAH(1), Ustadi AM and others, In comparison to normal bilirubin level, the patient with bilirubin >3mg/dl had high frequency of raised ALT 87.5% vs. 45% (p<.0001), thrombocytopenia 91.6% vs. 65% (p<.01), anemia 70.8%vs. 25% (p<.05) and renal impairment 50% vs. 20% (p>.05). In the present study patients with bilirubin >3mg/dl had high frequency of raised ALT 100% vs. 35% (p<.0001), thrombocytopenia 71% vs. 17% (p<.001), anemia 85%vs. 53% (p<.05) and renal impairment 79% vs. 6% (p<.001). Association of complications was statistically significant.

In the study of Mehta VK et al and Rachanna Mazumder et al raised AST values were seen in 66% and 78% of patients respectively. In the present study raised values are seen in 74% of patients. AST levels 3 times of the normal are seen in 14% of patients.

In the study series of Nityanand et al and Chawla et al, raised ALT values were seen in 100% and 21.11% of patients respectively. In the present study raised ALT values above the reference range are seen in 78% of patients, but ALT values 3 times more than normal are seen in 22% of patients.

CONCLUSION

The presence of hepatitis with significant rise in serum bilirubin and enzymes in patients with falciparum malaria indicates a more severe illness with a higher incidence of complications and a poor prognosis.

Conflicts of interest: The authors stated that no conflicts of interest.

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