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Clinical Features and Complications of *Plasmodium falciparum* Malaria at the Liaquat University Hospital Hyderabad

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Abstract: A six months descriptive case series study was conducted on fifty patients of *plasmodium falciparum* malaria to determine the common clinical features and its various complications. These patients were then followed during their hospitalization and the relevant informations were recorded on pre-designed proforma. The mean age of the studied 50 cases (62 males and 38% females) was 26.90±10.0 (12-55 years).. Fever was present in all patients. 96, 62 and 30% of, patients had rigor and malaise, vomiting and headache and altered behavior, respectively, while anemia, jaundice, dehydration and abdominal pain was seen in 58, 34, 24, 26% of patients, respectively. Shortness of breath was present 10.0% and only 4.0% had cough. Clinical examination revealed that 40 and 28% patients had hepatomegaly and splenomegaly. However, 20.0% of the patients presented with hepatosplenomegaly. Cerebral malaria was diagnosed in 30%) of patients and acute renal failure and black water fever in 14 and 2% of patient, respectively. Hypoglycemia was observed in 5(10.0%) patients and 4(8.0%) patients had seizures. Pulmonary edema was found in 03(6.0%). one (2.0%) patients had history of upper gastrointestinal bleeding, while 5(10.0%) patients presented with acute abdomen. Nine (19.0%) had bacterial septicemia and DIC was diagnosed in 2(4.0%) patients. Presentation and complications of *falciparum* malaria in our region differs from the results of the available local and regional works.

Key words: *Plasmodium falciparum* · Malaria · Cerebral malaria

INTRODUCTION

Human malaria is caused by four species of Plasmodia: *P. falciparum*, P. vivax, P. ovale and P. malariae. P. knowlesi, a fifth species previously confined to monkeys, has also been implicated in human disease [1]. Malaria is the most important of the parasitic diseases of humans [2]. It ranks among the major health problems in Pakistan. Malaria is endemic in ninety one countries consisting 40% of the world population. It affects an estimated 300 million people per year world wide causing more than a million deaths per year[3]. Malaria is endemic in areas of the Americas, parts of Asia and most of Africa; whereas in sub-Saharan Africa, 85– 90% malaria fatalities occur [4]. The geographic distribution of malaria is complex and malaria affected and malaria free areas are found close to each other [5]. Begin new paragraph Infection with *plasmodium falciparum* is more serious than with any other species because of the fatal complications i.e cerebral malaria, acute renal failure, hypoglycemia, hyperpyrexia, non cardiogenic pulmonary oedema or adult respiratory distress syndrome, adrenal insufficiency like syndrome, black water fever, cardiac dysrhythmias and gastrointestinal syndromes like secretory diarrhea and dysentery [6]. The case fatality of *plasmodium falciparum* is around 1 percent, this accounts for 1 to 3 million deaths per year all over the world and 80% of these deaths are caused by cerebral malaria [7,8] As *falciparum* malaria is very common in Pakistan and its presentation and complications are different in different sort of patients. The present study was carried out to observe the different presentations and complications of *falciparum* malaria.

MATERIALS AND METHODS

This descriptive case series was conducted in department of medicine at Liaquat University Hospital, Hyderabad. The inclusion criteria of the study were; all the febrile patients above 12 years of age with either

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gender whose peripheral blood film for *plasmodium falciparum* is positive (+ve), patients with any pattern of fever (continuous, intermittent) with or without shivering and peripheral blood film positive for *plasmodium falciparum*, patients presenting with un-explained shock, acute abdomen, pharyngitis, dry cough and peripheral blood film positive (+ve)for *plasmodium falciparum* and un-arousable coma (Glasgow coma Scale 3/15 -11/5) or patients with confused stuparous state, having positive peripheral blood film for *plasmodium falciparum* malaria. The patients who fulfilled the inclusion criteria were enrolled in the study. Informed consent was obtained from all the competent patients and relatives of incompetent patient after full explanation of the procedure. The data were collected on the pre-designed proforma. Relevant clinical sings were highlighted at the time of admission including jaundice, anemia, hepatomegaly, splenomegaly, signs of meningeal irritation, tone, reflexes, or clonus. Blood was analyzed for hemoglobin concentration, packed cell volume, white blood cells (TLC and DLC) count and erythrocyte sedimentation rate. Bio-chemical investigations including serum urea, creatinine, electrolytes, blood sugar and liver function test (LFT) were done. Coagulation profile was also done in special cases. Patient's clinical course was closely monitored and the patients were called back for following 3 weeks past discharge for any evidence of late occurrence of disease complication. Regarding ethical justification, all the expenses of this study were paid by cooperation of whole research team. The exclusion criteria of the study were; patients with malarial parastic slide positive (+ve) for other species such as plasmodium ovale, plasmodium vivax and plasmodium malariae, patients presenting with history of high grade fever but the peripheral blood film for *plasmodium falciparum* was negative (-ve), patients with concomitant illness like diabetes mellitus, hypertension, epilepsy, cerebrovasular accidents, encephalitis and patients who came after taking oral or parenteral antimalarial treatment.

The data was analyzed by using statistical program i.e. SPSS version 10.0. The categorical parameters like sex, history, presentation, clinical examination findings were presented by their frequencies and percentage. The chi square test of proportion was applied among the categorical parameters for significance of clinical features and complications P value < 0.05 was considered as a significant level.

RESULTS

Total fifty patients of *falciparum malaria* were recruited, of which patients, 31(62.0%) were males and 19 (38.0%) were females (Table 1). 35 out of the 50 patients (70.0%) were brought in emergency, 10(20.0%) patients were of outpatient department and 05(10.0%) were from ward. Regarding clinical presentation of the investigated 50 patients at the time of admission (Table 2); fever was present in all patients (100%) with a mean of 101.78±2.15, 48 (96.0%) of the examined patients had rigor and malaise, vomiting and headache were present in 31(62.0%) of the patients and 15(30.0%) patients had altered behavior with significance (P value = 0.02) of age group 12-20 year. While, anemia was seen in 29(58.0%) and found highly significant in majority among age group of 12-20 years (P = <0.001), jaundice was present in 17(34.0%) patients and common age group was 12-20 years (P = 0.001), dehydration was manifested in 12(24.0%) patients and it was commonly seen in the age group 12-20 years (P = 0.002), abdominal pain was observed by 13(26.0%) patients, shortness of breath was present in 05(10.0%) and only 02(4.0%) had cough. Among the 50 patients, clinical examination revealed that there were 20(40.0%) patients had hepatomegaly and was significantly found in age group 12-20 years (P = 0.001) whereas 14(28.0%) had splenomegaly and these patients were common and highly significant in the age group of 12-20 years (P = <0.001), however, 10(20.0%) of the patients were presenting with hepatosplenomegaly. The cross tabulation of age with clinical presentation and complications in relation to *falciparum* infection is mentioned in table 2.

Table 1: Gender distribution among the studied age groups

Age (in groups)	Male *n* = 31 (%)	Female *n* = 19 (%)	Total *n* (%)
12 to 20	10(32.3%)	6(31.6%)	16(32.0%)
21 to 30	12(38.7%)	6(31.6%)	18(36.0%)
31 to 40	6(19.4%)	5(26.3%)	11(22.0%)
41 to 50	02(6.5%)	01(5.3%)	03(6.0%)
> 50	01(3.2%)	01(5.3%)	02(4.0%)
Age in years	26.90±10.0 (12-55)*		

*Results are expressed as Mean±Standard deviation (Range)

Table 2: Cross tabulation of age with clinical presentation and complications (N = 50)

	Age group n = 50					
Parameters	12 to 20 n = 16(%)	21 to 30 n = 18(%)	31 to 40 n = 11(%)	41 to 50 n = 3(%)	> 50 n = 2(%)	*P* value
Clinical Presentation:						
Rigors	15(93.8%)	17(94.4%)	11(100.0%)	3(100.0%)	2(100.0%)	0.91
Malaise	14(87.5%)	18(100.0%)	11(100.0%)	3(100.0%)	2(100.0%)	0.35
Vomiting	08(50.0%)	11(61.1%)	07(63.6%)	3(100.0%)	2(100.0%)	0.39
Cough	01(6.3%)	01(5.55%)	0	0	0	0.91
Abdominal pain	7(43.8%)	2(11.1%)	3(27.3%)	0	01(50.0%)	0.17
Headache	12(75.0%)	11(61.1%)	6(54.5%)	0	2(100.0%)	0.11
Altered behavior	8(50.0%)	01(5.55%)	5(45.5%)	0	1(50.0%)	0.02*
Shortness of breath	2(12.5%)	0	1(9.1%)	0	2(100.0%)	<0.001*
Anemia	15(93.8%)	4(22.2%)	7(63.6%)	1(33.3%)	2(100.0%)	<0.001*
Jaundice	10(62.5%)	1(5.55%)	4(36.4%)	0	2(100.0%)	0.001*
Dehydration	07(43.8%)	0	3(27.3%)	0	2(100.0%)	0.002*
Hepatomegaly	13(81.3%)	2(11.1%)	4(36.4%)	0	1(50.0%)	0.001*
Splenomegaly	11(68.8%)	1(5.55%)	1(9.1%)	0	1(50.0%)	<0.001*
Complications:						
Cerebral malaria	8(50.0%)	1(5.55%)	5(45.5%)	0	1(50.0%)	0.02*
Acute Renal failure	6(37.5%)	0	0	0	1(50.0%)	0.005*
Black water fever	01(6.3%)	0	0	0	0	0.70
Hypoglycemia	1(6.3%)	0	2(18.2%)	0	2(100.0%)	<0.001*
Seizures	3(18.8%)	0	1(9.1%)	0	0	0.33
Pulmonary edema	0	0	2(18.2%)	0	1(50.0%)	0.01*
Upper GI	01(6.3%)	0	0	0	0	0.70
Acute abdomen	4(25.0%)	0	01(9.1%)	0	0	0.16
Bacterial septicemia	5(31.3%)	0	3(27.3%)	0	1(50.0%)	0.07
Disseminated Intravascular Coagulation (DIC)	0	0	1(9.1%)	0	1(50.0%)	0.01*

*P value is statistically significant by using Pearson's chi square test

DISCUSSION

Falciparum malaria is an infectious disorder and has no specific diagnostic clinical features as it mimics various diseases. Apart from typical presentations, lots of patients were seen with various presentations. Cerebral malaria is the most important presentation of severe *falciparum* malaria and it is defined as deep coma in *falciparum* malaria [9]. In practice, any patient with altered consciousness should be treated for severe malaria. A study has reported 26% cases of cerebral malaria, [9] whereas in our study it accounted for 30.0% of cases.

Acute renal failure (ARF) is a complication of malaria [10] and in our study 14.0% of the examined patients presented with ARF. The prevalence of jaundice in *falciparum* malaria is rising and has been reported to be between 02% to 57% [11, 12]. In our study, 34.0% of patients had jaundice as a presenting sign which is in accordance to the findings reported by Mohanty, *et al.* [12]. However as a general routine, the jaundiced patients with disturbed consciousness are considered to have viral hepatitis rather than malarial hepatitis and this can be a fatal error and can lead to misdiagnosis. Pakistan is an area of unstable endemicity for *falciparum* malaria complicated particularly following the monsoon season [9, 13].

In our study, all the patients were febrile (100%), rigors were present in 96.0% of cases, vomiting and headache was equally present in 62.0% of cases, anemia was present in 58.0% of cases, pulmonary edema was diagnosed in 6.0% of patients and one patient developed black water fever. While, a similar study [9] showed that fever was present in 100%, rigors in 62%, vomiting in 31%, headache in 30% and anemia was present in 13% of the studied patients, one patient had pulmonary edema while another one developed black water fever. A study [14]

hypothesized that pallor (anaemia) was seen in 64% of patients and splenomegaly in 66% and DIC in 6.0% of patients, whereas our study has shown anaemia in 58%, DIC in 4.0%, hepatomegaly in 40.0%, splenomegaly in 28.0% and hepatosplenomegaly in 20.0% of patients and 18.0% had bacterial septicemia. In present study, the male gender was more prominent and affected and it is consistent with the study conducted in India [15].

CONCLUSION

Presentation and complications of *falciparum* malaria in our region differs from the results of the available local and regional works. The mortality rate is fairly high and the complications are also numerous and frequent. Early detection of the parasite on thick and thin films may help to reduce the complications associated with *falciparum* malaria.

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