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Clinical Features and Outcomes in Patients Presenting with Plasmodium Falciparum

Noor Ullah Khan[1], Kaleemullah Kakar[2], Gulandam[2], Mohammed Atif Gulzar[2], Shahzada Dawood Ahmed Babar[2], Muhammad Afzal[2]

[1]Department of Medicine, Sandeman Provincial Hospital, Quetta, Balochistan, Pakistan.
[2]Department of Medicine, Bolan Medical College, Quetta, Balochistan, Pakistan.

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Correspondence to: Noor Ullah Khan, Department of Medicine, Sandeman Provincial Hospital, Quetta, Balochistan, Pakistan.
Email: khannoorullah828@gmail.com

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ABSTRACT

Background: Despite international efforts to lessen its effects, Plasmodium falciparum malaria continues to pose a serious threat to public health in endemic areas. There is little information available on the clinical characteristics and results of P. falciparum infections, in contrast to P. vivax, which is more commonly in South Asia. The purpose of this study was to assess the range of P. falciparum-related clinical symptoms and sequelae among hospitalized patients in a Pakistani tertiary care facility. **Objective:** To determine the common clinical features, complications, and outcomes in adult patients presenting with Plasmodium falciparum malaria. **Methods:** Over the course of six months, Bolan Medical College/Hospital conducted this qualitative, descriptive cross-sectional study. Using sequential sampling, 167 patients with proven P. falciparum infections between the ages of 18 and 65 were included. Physical tests and structured interviews were used to document clinical characteristics and problems. Co-morbid conditions such as cancer, autoimmune diseases, chronic liver disease, or recent blood transfusions were not included in the study. **Results:** Fever was universal (100%), followed by chills and rigors (92.2%), headache (71.9%), vomiting (64.7%), and myalgia (58.7%).Common physical signs included pallor (68.9%), hepatomegaly (47.3%), splenomegaly (37.7%), jaundice (36.5%), and altered consciousness (17.3%) Major complications observed were malarial hepatitis (37.7%), acute kidney injury (24.5%), severe anemia (19.2%), cerebral malaria (8.4%), ARDS (5.3%), and multi-organ dysfunction (4.4%). **Conclusion:** Plasmodium falciparum malaria in this study presented with a broad clinical spectrum and substantial risk for serious complications. Malarial hepatitis and AKI were the most common complications, while cerebral malaria and ARDS, though less frequent, signaled severe disease. Early recognition of atypical presentations and prompt, comprehensive management are essential to reducing morbidity and mortality in endemic regions.

INTRODUCTION

Most cases of malaria are caused by parasitic protozoans from the Plasmodium genus. Today, malaria mainly occurs due to Plasmodium falciparum, Plasmodium vivax, Plasmodium oval, Plasmodium malaria and Plasmodium Knowles, all of which were a serious concern in the 20th century. Thanks to the efforts of public health agencies and access to artemisinin derivatives, the cases and deaths from malaria are now decreasing, so people are hopeful that this disease will be eradicated from our country before long. Though the rate of malaria cases has fallen recently, it still results in many cases of sickness and death. Each year, about 3 million people die because of the illness and hundreds of millions of others develop it [2].

People with human malaria may experience everything from no symptoms to relatively simple infections, all the way to illnesses that can be fatal.[3]. The growth of the disease in individuals depends on how a parasite, a host and their environment influence each other [4]. Due to low resistance to infections, people living in temperate and sub-tropical Asia and Latin America are likely to have severe or acute disease and these mostly last for a long time and affect adult men.

The article by Herrera et al. suggests that 30 out of the 68 patients with plasmodium falciparum did not survive. Nineteen percent of patients were affected by cholera, 25% had faster respirations, 16.17% continued feel nauseous and 13.23% showed loss or alteration in their awareness. However, 11.76% cases of hepatic dysfunction, 17.64% for renal dysfunction and 1.47% people had anemia and respiratory distress. It was reported in another paper that all 100% of plasmodium falciparum patients had a fever and 65% displayed pallor, 35% presented with yellow skin tone and 7.5% demonstrated crackling in their lungs. Still, 7.5% of patients with plasmodium falciparum show decreased consciousness and jaundice is found in 12.5%.

Only 0.25% of patients develop ARDS I [8]. In Chandrashekar's research (9), it was found that fever, chills and rigors, sweating, headache, vomiting and myalgia were the most common symptoms for plasmodium falciparum infections. Researchers also noticed that 18% of the children had diarrhea, 28% had pain in the belly, 28% had a cough and 2% had convulsions. Symptoms of anemia, jaundice and hepatosplenomegaly were most apparent in many of the cases, reported in that order; hepatosplenomegaly was present in more than half. Of the patients with malarial hepatitis, four percent who also had cerebral malaria did not survive. We intend to study both the clinical features and what happens to patients suffering from malaria caused by plasmodium falciparum. The majority of materials covering the symptoms and results of this infection focus on plasmodium vivax. There is less research available about plasmodium falciparum than malaria in general.

LITERATURE REVIEW

The malaria caused by Plasmodium falciparum may progress to severe and dangerous cases such as cerebral malaria, kidney failure and very low blood levels (severe anemia), among others. This is why P. falciparum is the deadliest malaria species for humans [10]. The P. falciparum parasite can attach to young, middle-aged and mature red blood cells, causing failures in several organs.

There are a number of studies that describe the symptoms linked to P. falciparum malaria. Usually, the early symptoms include high fever, chills, headache, muscle aches and vomiting; later, the infection might lead to difficulty in breathing, seeking jaundice, kidney problems or passing out [12]. Indian researchers noted that each case involved fever, then chills and rigors, headache, vomiting and muscle pain or weakness. People who died from such diseases were often jaundiced, had pale coloring and had strongly enlarged liver and spleen [13].

For young people as well as those who are not immune, the frequently expected complications are severe anemia, cerebral malaria and malarial hepatitis. Malarial hepatitis is commonly mistaken for a different condition and develops from P. falciparum malaria, causing the patient to feel sick and have irregular levels of liver enzymes and bilirubin [14]. Recent scientific studies found that almost a third of patients in the hospital with falciparum malaria developed malarial hepatitis, although the risk of dying was greater for those who experienced symptoms of cerebral malaria [15].

You should understand that there is an equal importance between issues affecting the liver and the kidneys. Up to 45% of patients with P. falciparum malaria who receive care in the hospital seem to suffer from acute kidney damage, making death more likely [16]. Every case of hemoglobinuria happens because of hemolysis, low blood pressure and hazards from the parasite. When kidney problems are identified and treated early and dialysis is provided at the appropriate time, the outcome is generally better [17]. Malaria from P. falciparum often results in problems involving the nervous system. When cerebral malaria influences a child, it may cause fits, fainting and difficulties with the brain that can impact the child in the future. According to researchers, cerebral malaria is the reason for the death of 15-20% of children in the sub-Saharan region [18].

Fewer cases of respiratory symptoms are reported, yet sometimes it can result in death. If the walls in capillaries become more permeable, edema and ARDS in the lungs can take place, causing many deaths. In cases where parasite levels are severe and the person has delayed treatment; their chances of complications are greater [19]. Though there are advanced treatments for malaria, people in many countries continue to die from serious P. falciparum infection. It was found from the review of several cases that the mortality rate for serious P. falciparum malaria varied from 5% to 20% [20]. Singh et al. (2020) state that in eastern India, most cases requiring admission to tertiary hospitals for severe malaria involved P. falciparum accounts for approximately 61%. Six-point eight percent of the multisystem malfunction cases were fatal [21]. Every patient had a fever and the most likely next symptoms were vomiting (in 65% of patients), depression or drowsiness (in 19%) and hard or fast breathing (seen in 14%). One in three adults with P. falciparum malaria suffered from acute liver or kidney problems (Baluku et al., 2022). These studies focus on Africa which has a higher risk of malaria. A combination of kidney and liver failure made the outcome less likely to be good [22]. P. falciparum malaria was responsible for 9.5% of cerebral malaria, 21% of severe anemia and resulted in 7.2% of deaths for patients studied in southern Pakistan by Ahmed et al. (2021). The results showed that both recovery and epileptic seizures were very common among people with cerebral malaria [23]. In 2023, an article was published by the team that discusses cases of unusual falciparum malaria in hospitals in Bangladeshi towns. Based on the findings, thrombocytopenia is present in 74%, hypotension is seen in 18% and spontaneous bleeding occurs in 3%. The reports suggest that falciparum malaria could be mistaken for infectious diseases because it can be difficult to tell them apart [24].

Ogunyemi et al. (2022) noted that half of the individuals who died from COVID-19 experienced jaundice, swelling of the liver and spleen and had difficulties with their mental abilities. People receiving both intravenous artesunate and later oral ACT for severe illnesses were more likely to survive [25]. In their 2021 study, Mårtensson et al. found that the density of parasites and a host's immune condition can accurately determine how severe the disease will be. Even with adequate medical care and treatment, patients with a high level of blood parasites were still more likely to get cerebral malaria and fail their kidneys [26].

It shows that being prompt about diagnosis, treatment and repeated follow-ups is necessary with falciparum malaria. It is also necessary to use local medical information to prepare proper treatments for each area and prevent illness in regions where diseases are common.

RESEARCH OBJECTIVE

This study tries to understand the symptoms and outcomes found in patients with Plasmodium falciparum

malaria. This study aims to find out what P. falciparum infection normally looks like compared to when it is unusual and what are the usual signs and symptoms. Experts also want to identify whether patients might experience complications related to their nervous system, breathing, kidneys and liver. The objective of this work is to give a clear view of the burden of this disease by observing the outcomes related to recovery, disease development and death. As a result of the study, authorities Will be better able to diagnose malaria at an early stage, treat patients and adopt effective health practices in regions where Plasmodium falciparum is less well examined than P. vivax.

METHODOLOGY

This study was overseen, structured and planned by the Department of Medicine at Bolan Medical College/Hospital. As soon as the CPSP approved the summary of the research, the research period extended for six months. A total of seventy cases was needed for impaired consciousness in Plasmodium falciparum patients. An online WHO sample size calculator was used to set this number which allowed selection of 167 patients in the study. Participants were selected for the study as they matched our requirements. As outlined in the study protocol, individuals suffering from Plasmodium falciparum malaria and aged 18 to 65 were allowed to participate, no matter if they were male or female. It was not suitable for individuals who were pregnant, had problems with their immune system, cancers, liver disease, blood disorders or had received blood transfusions within earlier than three months. A combination of interviews and clinical examinations provided us with the data and we reviewed them to conclude what are the most typical signs and outcomes of P. falciparum infection

RESULTS

Table 1

Demographic Characteristics of Study Participants (n = 167)

Variable	Frequency (n)	Percentage (%)
Age Group (years)		
18-30	65	38.9
31-45	54	32.3
46-65	48	28.7
Gender		
Male	97	58.1
Female	70	48.9

Table 2

Common Clinical Features on Presentation

Clinical Feature	Frequency (n)	Percentage (%)
Fever	167	100
Chills and rigors	154	92.2
Vomiting	108	64.7
Headache	120	71.9
Myalgia	98	58.7
Diarrhea	31	18.6
Cough	42	25.1

Table 3

Physical Examination and Clinical Signs

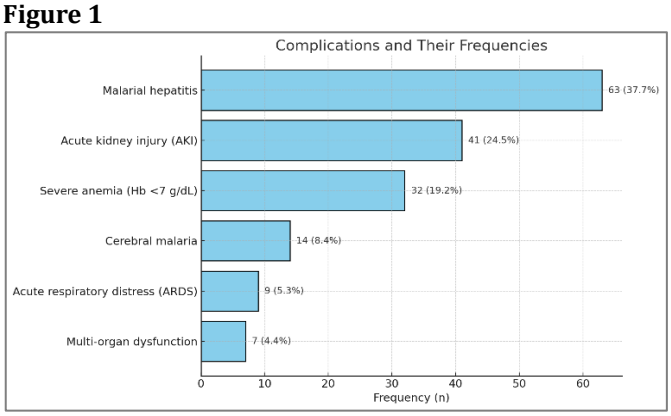
Sign	Frequency (n)	Percentage (%)
Pallor	115	68.9
Jaundice	61	36.5
Hepatomegaly	79	47.3
Splenomegaly	63	37.7
Altered level of consciousness	29	17.3
Respiratory distress	21	12.5
Crackles on auscultation	11	6.6

Table 4

Complications Observed During Hospitalization

Complication	Frequency (n)	Percentage (%)
Malarial hepatitis	63	37.7
Acute kidney injury (AKI)	41	24.5
Severe anemia (Hb <7 g/dL)	32	19.2
Cerebral malaria	14	8.4
Acute respiratory distress (ARDS)	9	5.3
Multi-organ dysfunction	7	4.4

Figure 1



DISCUSSION OF THE RESULTS

This study was focused on finding the symptoms, complications and treatments for patients with Plasmodium falciparum malaria. Information such as the complications of the disease, signs, symptoms and who is affected is available from the data on the 167 patients seen at the Bolan Medical College/Hospital. Based on the data in Tables 1 to 4, I will explain the results.

Most of the patients appearing at the hospital were between young and middle age. Among all age groups, those who were 18 to 30 years of age experienced the most infections at 38.9%, followed by 31 to 45-year-olds at 32.3% and those aged 46 to 65 accounted for the lowest number of cases, at 28.7%. Many scientists explain that the pattern Is similar to other reports linking young males in these regions to risky activities at work or during movement [5,6]. Furthermore, the study had a greater number of male participants than female, suggesting that men might be exposed to different health problems and seek treatment differently than women. Still, women represented 41.9% of the missing, so both men and women are being affected similarly.

Patients were found by the doctors to have a fever as the first symptom of malaria. Other studies explain that most people recognize that they have the infection because of a fever [12,13]. Ninety-two-point two percent of patients with traditional malaria complained of major chills or shivering. While headache was a problem for 71.9% of people, vomiting affected 64.7%. Apart from other noticeable signs, 58.7% of studied cases had myalgia due to changes in metabolic processes and body wide inflammation. At that time, researchers found that cough affected 25.1% of COVID patients and diarrhea affected 18.6% [9]. The presence of digestive and lung issues might indicate that the disease is affecting more than only one part of the body.

Seeing pallor in most of the patients (68.9%) was likely due to the anemic effect of hemolysis resulting from infected blood cells. High bilirubin and jaundice experienced by 36.5% of patients could indicate either rapid breakdown of red blood cells or an issue with the liver. According to studies, it is common for P. falciparum to result in malarial hepatitis [14,15].

In a lot of cases, doctors observed hepatomegaly (47.3%) and splenomegaly (37.7%), reflecting the patient's body 's response against parasites (from the immune and reticuloendothelial systems). Often, these symptoms appear in areas where malaria is common and usually indicate the infection has lasted longer.

In addition, 17.3% of the patients presented changes in awareness, so their brains were most likely involved. Sometimes, this problem could be caused by a major disease called cerebral malaria [18]. Often, when people have severe or kidney-related illness, doctors may discover that the person is short of breath (12.5%) and can hear crackling noises in the lungs (6.6%) by using a stethoscope.

The discovery of multiple difficulties means that Plasmodium falciparum malaria can be quite serious. In many cases, the outcome was malarial hepatitis, a liver condition (37.7%). Similar results were found in this study when compared to what Chandrashekar et al. found, who stated that 36% of patients developed malarial hepatitis [9,14]. Kidney injury (acute renal injury) concerns are extremely common and present in more than one-quarter of cases. As the parasites may lead to hemoglobinuria, decreased blood volume and kidney damage, a person may develop AKI and confront major health complications [16,17]. When patients are examined, a lot of them display pale skin, matching with extremely lower numbers of blood cells (19.2%). My hypothesis is that hemolysis in the body and fewer blood cells being made in the bone marrow result in this issue. A number of studies suggest that anemia is a main indicator of malaria [13]. It was found that 8.4% in the group had cerebral malaria and these individuals were more likely to die from it. It may only occur in rare cases, but any spotting must be addressed immediately. In addition to other issues, ARDS (at 5.3%) develops when air sacs in the lungs become more permeable to leaky fluid [19].

In cases where MODS develops in 4.4% of patients, it reflects many parts of the body are not functioning normally. Quick treatment and management are necessary when P. falciparum is very severe.

CONCLUSION

The researchers investigated how malaria from Plasmodium falciparum was treated in patients staying at the Bolan Medical College/Hospital. Based on the data, cough and diarrhea are commonly found in people who visit the doctor with fever, chills, vomiting and headache.

Experts confirmed that P. falciparum is responsible for many serious problems, among which are cerebral malaria, kidney and liver injury and complications from respiratory viruses. Acute kidney injury and severe anemia were the other major complications after malarial hepatitis. Keep in mind that though such problems with organs and the brain don't occur often, they remain serious and are closely linked to higher sickness and death rates.To control the effects, we need to act promptly and keep analyzing, monitoring and noticing any changes in the patient. In such places, the information included here allows medical staff to better manage and provide care for local people.

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