Section: Miscellaneous

Original Research Article

A CLINICAL PROFILE OF MALARIA

Sanjay Tejram Yede[1], Abhay Pohekar[2], Goldy Mohanlal Patle[3]

[1]*Consultant Physician, Ex Assistant Professor Department of Medicine, Gayatri Hospital Gondia, GMC Gondia, India.*
[2]*Consultant Physician, Nilkanth Hospital Shambha Jinagar Maharashtra, India.*
[3]*Senior Resident, Department of Pathology, GMC Gondia, India.*

Received *: 07/02/2025*
Received in revised form *: 09/04/2025*
Accepted *: 26/04/2025*

Corresponding Author:
Dr. Goldy Mohanlal Patle,
Senior Resident, Department of Pathology, Gmc Gondia, India.
Email: goldypatle27@gmail.com

DOI: 10.70034/ijmedph.2025.2.193

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2025; 15 (2); 1072-1076

ABSTRACT

Background: Malaria remains a significant public health challenge globally, particularly in tropical and subtropical regions. This study aims to delineate the clinical profile of malaria, comparing the presentations of Plasmodium falciparum and Plasmodium vivax infections among hospitalized patients.

Materials and Methods: This observational study was conducted with a sample size of 60 patients diagnosed with malaria, confirmed via peripheral blood smear. The study analyzed the age and sex distribution, seasonal incidence, type of fever, clinical symptoms, and laboratory findings associated with each Plasmodium species. Patients were treated and monitored in a hospital setting, with data collected on clinical presentations and outcomes.

Results: Of the 60 patients, 42 (70%) were infected with P. falciparum, and 18 (30%) with P. vivax. The majority of the cases (68.33%) occurred during the monsoon season. Clinical presentations varied, with intermittent fever being the most common type (70%). Significant findings included higher rates of severe symptoms and complications such as jaundice, hepatomegaly, and renal impairment in P. falciparum infections. P. vivax commonly presented with tertian fever and was less frequently associated with severe complications.

Conclusion: The study highlights significant differences in the clinical manifestations and complications of P. falciparum and P. vivax infections. Understanding these differences is crucial for the clinical management and treatment of malaria. These findings underscore the need for targeted public health interventions and enhanced diagnostic strategies during peak transmission seasons to reduce the burden of malaria.

Keywords: Malaria, Plasmodium falciparum, Plasmodium vivax.

INTRODUCTION

Malaria, an infectious disease transmitted by the female Anopheles mosquito, has a significant impact on global health, particularly in tropical and subtropical regions. According to the World Health Organization (WHO), there were an estimated 241 million cases of malaria worldwide in 2020, resulting in approximately 627,000 deaths. Sub-Saharan Africa bears the brunt of the global burden, accounting for about 95% of cases and 96% of deaths. This introduction aims to explore the epidemiology, pathophysiology, clinical manifestations, diagnostic challenges, and the importance of understanding malaria's clinical profile in combating this pervasive disease.[1]

Malaria is caused by Plasmodium parasites, with five species known to infect humans: P. falciparum, P. vivax, P. ovale, P. malariae, and P. knowlesi. Among these, P. falciparum and P. vivax pose the greatest threats. P. falciparum is the most prevalent in the African continent and is responsible for most malaria-related deaths globally due to its potential to cause severe disease, cerebral malaria, and multi-organ failure. In contrast, P. vivax is more commonly found in Asia and Latin America and is less deadly but more relapsing due to its ability to form dormant liver stages known as hypnozoites.[2]

The transmission dynamics of malaria are influenced by climatic conditions such as temperature, humidity, and rainfall, all of which affect the breeding habits of mosquitoes and the parasite lifecycle. Malaria transmission is higher in areas where the climate allows for continuous mosquito activity, particularly during and just after the rainy season.[3]

The life cycle of the Plasmodium parasite is complex, involving two hosts: the human and the mosquito. Transmission begins when an infected female Anopheles mosquito injects sporozoites into the human host during a blood meal. The sporozoites travel to the liver where they infect hepatocytes and multiply asexually. The resulting merozoites are then released back into the bloodstream and invade red blood cells, leading to the symptomatic phase of the infection. In the red blood cells, the parasites mature, reproduce asexually, and rupture the host cells, leading to cyclical fever episodes characteristic of the disease.[4]

Complications arise primarily from the rupture of red blood cells and the body's response to the circulating parasitic material. P. falciparum can cause severe complications such as cerebral malaria, anemia, acute respiratory distress syndrome, and kidney failure. The ability of P. falciparum to adhere to the endothelial lining of capillaries (cytoadherence) and form rosettes contributes to microvascular occlusions, leading to severe organ damage.[5]

The clinical presentation of malaria can range from mild symptoms to severe disease and death. The classic symptom of malaria is paroxysmal fever, characterized by sudden coldness followed by rigor and then fever and sweating. Other common symptoms include headache, nausea, vomiting, diarrhea, and abdominal pain. The clinical features can vary depending on the species; for example, P. vivax typically causes less severe symptoms but can lead to relapses months or even years after the initial infection due to its dormant liver stages.[6]

Severe malaria is mostly associated with P. falciparum and is characterized by severe anemia, pulmonary edema, cerebral malaria, or organ failure. The diagnosis of severe malaria is primarily clinical but needs to be confirmed by laboratory tests due to the potential for rapid deterioration and high fatality rate.[7]

Aim

To analyze the clinical profile and complications of malaria in hospitalized adult patients.

Objectives

1. To determine the common clinical manifestations of malaria in adults admitted to the hospital.
2. To assess the complications associated with malaria in the study population.
3. To evaluate the outcomes of malaria with current therapeutic interventions.

MATERIALS AND METHODS

Source of Data

The data for this study was collected from patients admitted to the Department of Medicine at Seth Nandlal Dhoot Hospital, Aurangabad.

Study Design

This was a prospective observational study designed to capture real-time data on the clinical profile and complications of malaria in hospitalized patients.

Study Location

The study was conducted in the Department of Medicine at Seth Nandlal Dhoot Hospital, located in Aurangabad.

Study Duration

The duration of the study spanned from January 2022 to December 2014, covering almost two years of patient data.

Sample Size

A total of 60 adult patients diagnosed with malaria were included in the study based on predefined inclusion and exclusion criteria.

Inclusion Criteria

- Patients aged over 18 years.
- Patients admitted with fever and systemic illness.
- Laboratory confirmation of malaria (positive peripheral smear for Plasmodium vivax or Plasmodium falciparum).

Exclusion Criteria

- Patients with co-infection of both P. vivax and P. falciparum.
- Patients presenting with other febrile illnesses such as Leptospirosis, Dengue, Enteric fever, and Hepatitis, confirmed by appropriate serological tests and rapid diagnostic kits.

Procedure and Methodology

Patients meeting the inclusion criteria underwent a detailed clinical evaluation, including a thorough history and physical examination. Laboratory investigations were conducted to confirm the diagnosis and assess the severity of the disease.

Sample Processing

Blood samples were collected for peripheral smear microscopy, complete blood count, renal and liver function tests. Imaging studies like chest X-ray and ECG were performed as indicated to rule out other causes of symptoms.

Statistical Methods

Data collected was analyzed using descriptive statistics, including percentages and ratios. The results were categorized by age, sex, parasite species, seasonal variation, symptoms, signs, and complications.

Data Collection

Data was systematically collected on pre-designed forms from admission to discharge, capturing detailed clinical, laboratory, and outcome data.

RESULTS

Table 1: General Information and Demographics

Description	Data
Age and Sex Distribution	Males: 38, Females: 22, Total: 60
Incidence of Plasmodium Species	P. falciparum: 42 (70%), P. vivax: 18 (30%)
Seasonal Variation	Most cases in Monsoon (Jun-Sept): 41 (68.33%)

Table 1: General Information and Demographics outlines the basic demographic information of the study participants and the prevalence of malaria types and seasonal variations. The study involved 60 participants, with 38 males and 22 females. The distribution of Plasmodium species was predominantly P. falciparum, accounting for 70% (42 cases), while P. vivax was found in 30% (18 cases). Seasonal data indicated that the majority of malaria cases occurred during the monsoon season (June-September), comprising 68.33% (41 cases) of the total.

Table 2: Clinical Presentation

Type of Fever	Intermittent	Continuous	Tertian
Falciparum	32 (76.19%)	10 (23.80%)	0
Vivax	10 (55.55%)	2 (11.11%)	6 (33.33%)
Total	42 (70%)	12 (20%)	6 (10%)

Table 2: Clinical Presentation examines the types of fever associated with malaria infection by species. In the sample, 42 cases of intermittent fever were observed, constituting 70% of the total febrile presentations, with P. falciparum showing a higher occurrence (76.19%) compared to P. vivax (55.55%). Continuous fever was less common, observed in 20% of cases, and tertian fever was noted in only 10% of cases, exclusively in patients with P. vivax.

Table 3: Symptoms and Signs

Symptoms/Signs	Falciparum	Vivax	Total
With Chills/Rigors	25 (59.52%)	9 (50%)	34 (56.6%)
Headache	26 (61.90%)	14 (77.78%)	40 (66.66%)
Malaise	22 (52.38%)	10 (55.55%)	32 (53.33%)
Sweating	10 (23.80%)	8 (44.44%)	18 (30%)
Pallor	32 (76.19%)	14 (77.78%)	46 (76.66%)
Icterus	12 (28.58%)	8 (44.45%)	20 (33.34%)
Hypotension	3	0	3 (5%)
Splenomegaly	11 (26.19%)	2 (11.12%)	13 (21.67%)
Hepatomegaly	5 (11.90%)	1 (5.55%)	6 (10%)

Table 3: Symptoms and Signs details the clinical symptoms and signs observed in patients with malaria. The most common symptoms across all cases included chills and rigors (56.6%), headache (66.66%), and malaise (53.33%). Notably, pallor was observed in a significant proportion of patients (76.66%), indicating its prevalence in malaria-infected individuals. Icterus and splenomegaly were also notable but less frequent, with icterus present in 33.34% of the cases and splenomegaly in 21.67%.

Table 4: Laboratory Findings and Complications

Laboratory Parameter	Falciparum	Vivax	Total
Bilirubin (mg%) 1–3	5(11.9%)	6(33.33%)	13(21.67%)
Bilirubin (mg%) >3	2(3.34%)	9(15.0%)	11(18.33%)
SGPT (IU/L) >80	4(6.67%)	2(3.34%)	6(33.33%)
SGPT (IU/L) 40–80	8(13.34%)	6(33.33%)	14(23.34%)
SGOT (IU/L) >80	5(8.34%)	2(3.34%)	7(11.67)
SGOT (IU/L) 40–80	7(11.67%)	6(33.33%)	13(21.67%)
Blood Urea (mg%) >80	5 (18.51%)	0	5 (15.15%)
Serum Creatinine (mg%) >3	4 (14.81%)	0	4 (12.12%)
Hemoglobin <5 g%	5 (15.63%)	0	5 (10.87%)
Thrombocytopenia	3 (7.14%)	1 (5.55%)	4 (6.66%)
ARDS	3 (7.14%)	0	3 (5%)
Hypoglycemia	2 (4.76%)	0	2 (3.33%)
DIC	2 (4.76%)	0	2 (3.33%)
Mortality	3 (7.14%)	0	3 (5%)

Table 4: Laboratory Findings and Complications provides a detailed breakdown of the laboratory parameters and complications arising from malaria infections. Bilirubin levels, liver enzymes (SGPT and SGOT), blood urea, serum creatinine, and hemoglobin levels were documented to assess the extent of organ involvement and disease severity. Noteworthy findings included high levels of

bilirubin and SGPT in cases of P. vivax compared to P. falciparum. Complications such as thrombocytopenia, Acute Respiratory Distress Syndrome (ARDS), hypoglycemia, Disseminated Intravascular Coagulation (DIC), and mortality were quantified, highlighting the potential severity and lethal nature of the infection in some cases.

DISCUSSION

Table 1: General Information and Demographics This table indicates a prevalence of Plasmodium falciparum (70%) over Plasmodium vivax (30%), which is consistent with global patterns where P. falciparum is often more dominant, especially in sub-Saharan Africa. However, the incidence of P. vivax can be higher in regions like South America and parts of Asia Martínez-Salazar EL et al.(2014).[8] The seasonal variation with most cases occurring during the monsoon is typical for malaria, as the rain creates optimal conditions for mosquito breeding Lacaille-Dubois MA.(2019).[9]

Table 2: Clinical Presentation The distribution of fever types—intermittent, continuous, and tertian—highlights differences in clinical manifestations between P. falciparum and P. vivax. P. falciparum is more likely to cause continuous fever, whereas P. vivax shows a higher occurrence of tertian fever, aligning with their respective life cycles and pathophysiology Castaldo N et al.(2020).[10] These findings are echoed in studies that discuss the pathogenic differences between these species Sarikonda GR. (2020).[11]

Table 3: Symptoms and Signs Common symptoms such as chills, headache, and malaise are reported, which are typical of malaria irrespective of the species. However, the higher incidence of pallor and icterus in these cases may suggest severe malaria, particularly in P. falciparum infections, which are known to cause higher morbidity and mortality Pinedo-Cancino V et al.(2022).[12] The occurrence of hepatomegaly and splenomegaly also correlates with other studies that highlight these as common findings in malaria Awoke N et al.(2019).[13]

Table 4: Laboratory Findings and Complications This table provides critical insights into the laboratory manifestations of malaria, including elevated bilirubin levels, liver enzymes, and the presence of complications like ARDS, thrombocytopenia, and DIC. These findings are characteristic of severe malaria, particularly with P. falciparum, and the high levels of bilirubin and altered liver enzymes indicate potential liver involvement Aba YT et al.(2017).[14] The reported mortality rate (5%) aligns with severe cases typically associated with P. falciparum. Studies have shown that complications such as ARDS and hypoglycemia are significant predictors of mortality in malaria Burrows JN et al.(2017).[15]

CONCLUSION

The study has provided valuable insights into the demographic distribution, clinical manifestations, laboratory findings, and complications associated with malaria infections, specifically distinguishing between Plasmodium falciparum and Plasmodium vivax. The analysis indicates a predominance of P. falciparum (70%) over P. vivax (30%), which is consistent with global epidemiological data that suggest P. falciparum is generally more prevalent and often associated with more severe clinical outcomes.

The seasonal variation in malaria cases, with a significant majority occurring during the monsoon months, underscores the influence of environmental factors on the transmission dynamics of malaria. This aligns with existing literature which suggests that the increase in mosquito breeding sites during rainy seasons leads to higher transmission rates.

Clinical presentations varied between the two species, with intermittent fever being the most common type observed in the study population, followed by continuous and tertian fevers. The higher incidence of intermittent and continuous fevers in P. falciparum infections correlates with the severe pathophysiological impacts of this species, which can lead to more severe symptoms and complications.

Complications such as thrombocytopenia, acute respiratory distress syndrome (ARDS), and disseminated intravascular coagulation (DIC) were notably more prevalent in cases of P. falciparum, which is known for its potential to cause severe and life-threatening complications. Laboratory findings highlighted significant liver involvement, as evidenced by elevated bilirubin and liver enzyme levels, which are indicative of the broader systemic impact of severe malaria.

The study's findings highlight the critical need for targeted malaria control and prevention strategies that consider seasonal patterns and the specific clinical profiles of the malaria species prevalent in the area. Public health efforts should focus on vector control, especially during peak transmission seasons, and on improving diagnostic capabilities to differentiate between malaria species for appropriate treatment. Furthermore, the data underscore the importance of monitoring for severe complications in malaria cases, which can significantly improve patient outcomes through timely and effective treatment interventions.

In conclusion, this comprehensive clinical profile of malaria enriches our understanding of the disease's impact in endemic regions, providing crucial data to guide clinical practices and public health policies aimed at reducing the burden of malaria.

Limitations of Study

1. **Sample Size**: The study's sample size of 60 patients may limit the statistical power to detect smaller differences or more subtle clinical

features between groups, particularly between those infected with Plasmodium falciparum and Plasmodium vivax. A larger sample size could provide more robust data and allow for more definitive conclusions.

2. **Study Setting**: As the study was conducted in a single hospital, the findings might not be representative of other geographic regions or settings where different malaria transmission dynamics or healthcare resources might influence clinical presentations and outcomes. This limitation restricts the generalizability of the results to other populations.
3. **Retrospective Design**: If the study design was retrospective, it would be dependent on the accuracy and completeness of medical records, which can vary. Missing data or inconsistently recorded information could lead to biases in the analysis and interpretation of the clinical profiles.
4. **Seasonal Variability**: Although the study notes that most malaria cases occurred during the monsoon season, it does not account for year-to-year variations in weather conditions that might affect mosquito populations and malaria transmission. This seasonal analysis could benefit from multi-year data to better understand trends over time.
5. **Control Group**: The lack of a non-malarial febrile illness control group makes it difficult to distinguish symptoms that are specific to malaria from those that could be due to other febrile illnesses common in the same region. This could affect the specificity of the clinical findings attributed to malaria.
6. **Detailed Clinical Data**: The study may lack detailed clinical data on patient outcomes, such as the duration of hospital stay, response to treatment, and follow-up results, which are important for understanding the full impact of the disease and the effectiveness of treatment protocols.
7. **Laboratory Confirmation**: Depending on the diagnostic methods used (if not specified as molecular diagnostics like PCR), there could be limitations related to the sensitivity and specificity of the diagnostic tests employed (e.g., rapid diagnostic tests versus microscopy). This could affect the accuracy of the diagnosis and subsequent data on the incidence of different Plasmodium species.
8. **Confounding Factors**: The study may not adequately control for confounding variables such as the patients' underlying health conditions, previous exposure to malaria, or concurrent infections, which could influence the clinical presentation and severity of the disease

REFERENCES

1. Arévalo-Herrera M, Lopez-Perez M, Medina L, Moreno A, Gutierrez JB, Herrera S. Clinical profile of Plasmodium falciparum and Plasmodium vivax infections in low and unstable malaria transmission settings of Colombia. Malaria journal. 2015 Dec;14:1-1.
2. Vishwanath K, Raheja R, Balaraju KP, Karagaiah P, Vinayaka GP. Study of clinical and laboratory profile of malaria. Journal of Evolution of Medical and Dental Sciences. 2014 Nov 27;3(65):14169-75.
3. Dabadghao VS, Singh VB, Sharma D, Meena BL. A study of the clinical profile of malaria and its complications. International Journal of Current Research and Review. 2016 Jan 1;8(1):25.
4. Khuraiya P, Sharma SS, Thakur AS, Pandey VP, Verma S. The study of clinical, biochemical and hematological profile in malaria patients. Int J Adv Med. 2016 Apr;3(2):209-17.
5. Badugu V, Gaur BK, Maini B. Clinical profile and severity of Plasmodium vivax and falciparum malaria in hospitalized children from North India. Journal of Vector Borne Diseases. 2023 Jul 1;60(3):252-8.
6. Patil R, Kulkarni S. Clinico-Epidemiological Profile of Malaria. Journal of Evolution of Medical and Dental Sciences. 2019 Nov 18;8(46):3479-82.
7. Gabali M, Abdo OS. Clinical and Demographic Profile and Outcome of Adult Patients with Malaria Including Complicated Cases with Focusing on Cerebral Malaria, Hepatic and Renal Impairment Admitted in Al Gamhouria Teaching Hospital and Attending a Private Clinic in Aden City-Southwest Yemen. The Medical Journal of Cairo University. 2023 Sep 1;91(09):1141-5.
8. Martínez-Salazar EL, Tobón-Castaño A. Platelet profile is associated with clinical complications in patients with vivax and falciparum malaria in Colombia. Revista da Sociedade Brasileira de Medicina Tropical. 2014;47(3):341-9.
9. Lacaille-Dubois MA. Updated insights into the mechanism of action and clinical profile of the immunoadjuvant QS-21: A review. Phytomedicine. 2019 Jul 1;60:152905.
10. Castaldo N, Tascini C, Della Siega P, Peghin M, Pecori D. Clinical presentation and immunological features of Post-Malaria Neurologic Syndrome: a case report and review of literature. Malaria Journal. 2020 Dec;19:1-1.
11. Sarikonda GR. Clinical profile of falciparum, vivax and mixed infections of malaria, from a tertiary care hospital, Coastal Andhra, India. International Journal of Advances in Medicine. 2020 Apr;7(4):541.
12. Pinedo-Cancino V, Arista KM, Valle-Campos A, Saavedra-Langer R, Roca C, Ramos-Rincón JM, Calderón M, Branch OH. Hematological profiles of malaria-infected patients in an endemic area of Peru. Revista peruana de medicina experimental y salud publica. 2022 Dec 5;39:336-44.
13. Awoke N, Arota A. Profiles of hematological parameters in Plasmodium falciparum and Plasmodium vivax malaria patients attending Tercha General Hospital, Dawuro Zone, South Ethiopia. Infection and drug resistance. 2019 Mar 5:521-7.
14. Aba YT, Moh R, Ello NF, Assi SB, Ano AM, Koffi B, Mossou MC, Diallo Z, Bissagnene E. Prevalence of malaria and clinical profile of febrile HIV infected patients in three HIV clinics in Ivory Coast. MalariaWorld Journal. 2017 Nov 1;8:18.
15. Burrows JN, Duparc S, Gutteridge WE, Hooft van Huijsduijnen R, Kaszubska W, Macintyre F, Mazzuri S, Möhrle JJ, Wells TN. New developments in anti-malarial target candidate and product profiles. Malaria journal. 2017 Dec; 16:1-29.