# Studying the Incidence and Clinical Significance of Thrombocytopenia in Malaria Patients

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**Abstract**

Background: Hematological abnormalities, including thrombocytopenia, anemia, and leukopenia, are frequently encountered in individuals with malaria. Objective: This study aimed at the assessment of the prevalence of thrombocytopenia in patients diagnosed with malaria in the study population. Study design: A cross-sectional study Place and Duration This study was conducted in Liaquat University of Medical and Health Sciences Jamshoro@Hyderabad from June 2022 to June 2023 Methodology: Patient data, encompassing demographics and medical histories, were collected using a pre-designed proforma. Hematological variables were derived from complete blood count (CBC) results and analyzed with a hematology analyzer. Additionally, clinical examinations were conducted for every participant who tested positive for malaria parasites as examined on a blood smear. The collected data underwent statistical analysis utilizing IBM SPSS version 26. Results: The study included a total of 120 patients, comprising 66 (55%) males and 54 (45%) females. Thrombocytopenia has been seen in 90% (n=108) of the 120 patients suffering from malaria. The breakdown of thrombocytopenia severity revealed grade 1 in 50% (n=60) of patients, grade 2 in 25% (n=30), grade 3 in 15% (n=18), and grade 4 in 10% (n=12) patients. Conclusion: This study affirms a high prevalence of thrombocytopenia among individuals with malaria. The findings underscore the significance of platelet counts as a crucial initial screening parameter for those presenting with acute febrile illnesses.

Keywords: Thrombocytopenia, Malaria, Prevalence, Hematological disorders, febrile illness, Epidemiology

## 1. Introduction

Malaria, an age-old scourge and persistent public health challenge, continues to exact a formidable toll on global health, particularly in regions characterized by tropical and subtropical climates [1]. With millions of annual afflictions, the disease is a relentless adversary, transcending geographical boundaries and impacting diverse populations worldwide [2, 3]. Among the myriad complications that malaria inflicts upon its victims, hematological disorders, notably thrombocytopenia, emerge as critical players, adding layers of complexity to the already intricate clinical picture of the disease [4]. Thrombocytopenia, characterized by a diminished platelet count, assumes a pivotal role in the physiological responses observed in patients suffering from malaria, thereby warranting focused exploration [5, 6].

This introduction endeavours to furnish a comprehensive and expansive overview of the frequency of thrombocytopenia among individuals diagnosed with malaria [7]. This multifaceted examination aims to illuminate not only the epidemiological landscape but also the multifaceted clinical implications arising from this hematological anomaly [8]. The significance of unravelling the prevalence of thrombocytopenia in the context of malaria extends beyond academic curiosity; it is a crucial endeavour that holds the potential to inform

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and refine clinical management strategies, ultimately contributing to the improvement of patient outcomes [9, 10].

It is imperative to delve into the rich tapestry of existing literature that has significantly shaped our understanding of the intricate relationship between malaria and thrombocytopenia. The primary objective of this study was to meticulously investigate and analyze the prevalence of thrombocytopenia within the cohort of patients diagnosed with malaria.

## 2. Methodology

This research employed a descriptive, cross-sectional design. The sample size, determined using the WHO sample size calculator, consisted of 120 participants. Inclusive criteria encompassed individuals of any gender who tested positive for malaria and were within the age range of 18 to 60 years. On the other hand, people who did not have malaria on a peripheral blood film, had bacterial infections at the same time, had acute viral fever, chronic liver problems, dengue fever, sepsis, viral hepatitis, disseminated intravascular coagulation, systemic lupus erythematosus, bleeding disorders, platelet disorders, were taking antimalarial drugs, or had been diagnosed with cancer were not allowed to participate.

Prior to data collection, each participant received a concise description of the research, and their informed consent was documented through signed agreements. The data collection procedure involved the use of a proforma to gather information related to patients, encompassing demographics as well as medical history. Additionally, clinical examinations were conducted for every participant who tested positive for malaria parasites as examined on a blood smear. Hematological variables were determined from complete blood count (CBC) results using a hematology analyzer. The collected data underwent analysis employing IBM SPSS version 26 to draw meaningful insights and conclusions.

## 3. Results

In this study, the analysis focused on 120 patients. The gender distribution among the 120 patients showed 66 (55%) males and 54 (45%) females. Examining the age distribution, 62 (51.67%) patients were in the 18-30 age group, 26 (21.67%) in the 31-40 range, 18 (15%) in the 41-50 age category, and 14 (11.67%) in the 51-60 age group. The mean age was 26±11 years.

Among the 120 instances, 108 cases (90%) showed a positive diagnosis for Plasmodium vivax, while 12 patients (10%) exhibited positive results for Plasmodium falciparum malaria. The total prevalence of thrombocytopenia within the group of 120 malaria patients was 90% (n=108). Further categorization of thrombocytopenia severity demonstrated that 50% (n=60) of patients experienced grade 1 thrombocytopenia, 25% (n=30) had grade 2, 15% (n=18) presented with grade 3, and 10% (n=12) exhibited grade 4 thrombocytopenia.

Table 1: Demographic Characteristics

| Parameter | Total Patients | Male (55%) | Female (45%) | Age 18-30 (51.67%) | Age 31-40 (21.67%) | Age 41-50 (15%) | Age 51-60 (11.67%) | Mean Age (SD) |
|---|---|---|---|---|---|---|---|---|
| Count | 120 | 66 | 54 | 62 | 26 | 18 | 14 | 26 ±11 |

Table 2: Malaria Diagnosis

| Malaria Type | Positive (90%) | Negative (10%) |
|---|---|---|
| Plasmodium vivax | 108 | 12 |
| Plasmodium falciparum | 12 | 108 |

Table 3: Thrombocytopenia Severity

| Thrombocytopenia Grade | Frequency (n) | Percentage |
|---|---|---|
| Grade 1 | 60 | 50 |
| Grade 2 | 30 | 25 |
| Grade 3 | 18 | 15 |
| Grade 4 | 12 | 10 |

## 4. Discussion

The prevalence of Plasmodium vivax and Plasmodium falciparum-related malaria is significant in several regions of Pakistan, where malaria remains a serious hematological illness affecting various blood components [11]. Among the prominent hematological complications associated with malaria are anemia and thrombocytopenia [12]. Thrombocytopenia, characterized by a decrease in platelet counts, is particularly notable and is often used as a diagnostic indicator for malaria in patients presenting with fever [13]. Studies have shown that the risk of malaria significantly increases when platelet counts fall below 150,000/cmm [14].

In the current study, which aimed to assess the frequency of thrombocytopenia in malaria patients at a tertiary care hospital, 120 patients were initially included. The gender distribution revealed 55% males and 45% females, while 90% of the cases were positive for Plasmodium vivax and 10% were positive for Plasmodium falciparum malaria [15]. This distribution aligns with previous studies indicating a higher prevalence of P. vivax malaria in Pakistan [16].

The overall frequency of thrombocytopenia among the 120 patients with malaria was 90% (n=135) [20]. This high prevalence is consistent with other studies reporting thrombocytopenia in 60% to 80% of malaria cases [17]. Specifically, in this study, grade 1 thrombocytopenia was observed in 50% of patients, grade 2 in 25%, grade 3 in 15%, and grade 4 in 10%. Previous studies have reported similar results, emphasizing the common occurrence and varying severity of thrombocytopenia in malaria patients [18].

The precise mechanisms underlying malarial thrombocytopenia are not fully understood. Studies have proposed direct lytic impacts of the parasite on platelets, non-immune-mediated

destruction, and immunological processes involving specialized platelet-associated IgG antibodies [19]. Oxidative stress has also been suggested as a contributing factor [20].

## 5. Conclusion

In conclusion, the findings underscore the substantial prevalence of thrombocytopenia in malaria patients, particularly those infected with Plasmodium vivax. Recognizing thrombocytopenia in acute febrile patients and prioritizing malaria as a primary differential diagnosis can expedite appropriate and timely treatment. Further research is warranted to elucidate the intricate mechanisms of malarial thrombocytopenia for more targeted therapeutic interventions.

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The World Health Organization's World Malaria Report 2020 serves as a contemporary cornerstone, providing a comprehensive snapshot of the global malaria scenario and offering valuable insights into the challenges that persist (WHO, 2020).

Anand AC and Puri P's exploration of jaundice in malaria unearths a nuanced facet of the disease, showcasing the diverse clinical manifestations that extend beyond the more commonly acknowledged symptoms (Anand & Puri, 2005).

Lacerda et al.'s examination of thrombocytopenia in malaria patients prompts a critical question: "Who cares?" This question underlines the importance of understanding and addressing this hematological anomaly in the broader context of malaria (Lacerda et al., 2011).

Anstey et al.'s unraveling of the pathophysiology of vivax malaria sheds light on the complexities of the disease and its hematological implications, further emphasizing the intricate interplay between the Plasmodium parasite and the host's hematological system (Anstey et al., 2009).

Piel et al.'s exploration of the global distribution of the sickle cell gene establishes a geographical confirmation of the malaria hypothesis, linking genetic factors with the prevalence of malaria across diverse regions (Piel et al., 2010).

Kochar et al.'s documentation of severe Plasmodium vivax malaria in Bikaner, northwestern India, highlights the diverse clinical presentations of malaria, providing crucial insights into the spectrum of the disease (Kochar et al., 2009).

Mohapatra et al.'s profiling of mixed species malaria in adults adds a layer of complexity to our understanding, emphasizing the need for nuanced diagnostic approaches in malaria-endemic regions (Mohapatra et al., 2002).

Leslie et al.'s investigation into the impact of phenotypic and genotypic G6PD deficiency on the risk of Plasmodium vivax infection delves into the genetic factors that contribute to the dynamics of malaria prevalence, adding another layer to the multifactorial nature of the disease (Leslie et al., 2010).

Kochar et al.'s clinical features of children hospitalized with malaria from Bikaner, northwest India, serve as a crucial exploration into the pediatric manifestations of malaria, shedding light on the unique challenges faced by this demographic (Kochar et al., 2010).

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