# GROUP 3

# COMPARATIVE ANALYSIS OF HAEMATOLOGICAL PARAMETERS OF PATIENTS WITH MALARIA BEFORE AND AFTER TREATMENT OF MALARIA AT LEKMA HOSPITAL IN ACCRA

# CHAPTER ONE

# INTRODUCTION

## 1.1 BACKGROUND

According to Ketaki Motram Surve (2017), malaria got its name from the Italian word "Mal'aria" as it was believed to be caused by the stagnant air common near swampy areas. Malaria was a deadly disease that was transmitted to humans by several species of mosquitoes and was mainly found in tropical countries. Malaria was mainly transmitted to humans through the bite of an infected female Anopheles mosquito and was preventable and treatable (WHO, World malaria report 2024: addressing inequity in the global malaria response, 2024). Although there were many species of Plasmodium parasites, only five were known to harm humans: P. falciparum, P. vivax, P. malariae, P.ovale and P.knowlesi, but the most common was P.falciparum which killed more than a million people in Africa alone every year and more than 100 countries in the world were considered malaria-free, and more than 2.4 billion of the world's population were at risk according to Arota (2019). According to the study by Badu (2022), P. falciparum caused 90 to 98% of the morbidity and mortality related disease in Ghana, where malaria was hyperendemic and Ghana accounted for 2.11% and 1.9% of the global malaria cases and deaths respectively. The global annual incidence of malaria was estimated at approximately 300 to 500 million cases and malaria killed between 1.1 and 2.7 million people annually, the majority of whom were children under five years of age (Ketaki Motram Surve, 2017). Despite a series of interventions, malaria remained a major cause of illness and death worldwide, while haematological complications were among the most important obstacles encountered during infection and recovery, and malaria was observed to have a general impact on haematological factors, including anaemia (Abdulmajeed Qalil Alanzi, 2024). These changes could then affect the overall physiology of the host, leading to a variety of clinical manifestations, with anaemia and thrombocytopenia being the most common (Abdul-Hakim Mutala, 2020). Haematological parameters often affected included the relative numbers of circulating cell types such as erythrocytes, platelets, granulocytes, and lymphocytes, as well as parameters such as haemoglobin concentration (Abdul-Hakim Mutala, 2020).  Furthermore, according to Abdulmajeed Qalil Alanzi (2024), a study showed that malaria had a comparable impact on haematological parameters in adult and paediatric populations. The study evaluated the impact of Plasmodium falciparum malaria infection on blood cells and platelets, finding that the effects on white blood cells were relatively milder than those on platelets. Thrombocytopenia usually resolved after successful treatment of the underlying disease. In another study, it was observed that the incidence of changes in haemoglobin and platelet levels was more pronounced in people with malaria, compared to changes in white blood cell counts (Abdulmajeed Qalil Alanzi, 2024). Also, it was observed that there was generally a significant decrease in the number of red blood cells (RBC), platelets, haemoglobin (Hb), white blood cells (WBC), monocytes, neutrophils, lymphocytes, and eosinophils in patients diagnosed with malaria (Abdulmajeed Qalil Alanzi, 2024). However, thrombocytopenia was reported as an early sign of malaria infection, especially in Plasmodium falciparum malaria (Nange, 2020). While erythrocyte and platelet levels were always decreased in people infected with malaria, there were conflicting reports on the effects.

## 1.2 PROBLEM STATEMENT

Malaria continued to be the most significant protozoan infection of humans and remained to have a huge impact on the health and quality of life of people across the world (Abdul-Hakim Mutala, 2020). The WHO African Region continued to carry the heaviest burden of the disease, accounting for an estimated 94% of malaria cases worldwide in 2023 (WHO, World malaria report 2024: addressing inequity in the global malaria response, 2024). According to Ketaki Motram Surve (2017), malaria got its name from the Italian word "Mal'aria" as it was believed to be caused by the stagnant air common near swampy areas. According to the report by WHO (2024), the approximated cases of malaria in Ghana were ~6,552,000. Malaria killed between 1.1 and 2.7 million people annually of which the greater part were children below five years (Ketaki Motram Surve, 2017). Haematological parameters that were mostly affected included the relative numbers of circulating cell types such as erythrocytes, platelets, leukocyte, as well as parameters like haemoglobin concentration (Abdul-Hakim Mutala, 2020). These variations could subsequently affect the general physiology of the host, resulting in a series of clinical manifestations, with anaemia and thrombocytopenia being the most common which affected the patients (Abdul-Hakim Mutala, 2020).There had been research studies which focused more on the acute phases of infection and not on the post treatment although there were a variety of interventions and attempts to analyse the impact of malaria on haematological parameters which still remained a major cause of disease and mortality worldwide, and haematological complications were among the most significant problems faced during both infection and recovery (Abdul-Hakim Mutala, 2020) (Abdulmajeed Qalil Alanzi, 2024) (Nange, 2020). Hence, the problem arose because there was close to none comparative evidence on what happened after treatment leading to ~20.475% of the reported cases from WHO (2024) in Ghana.

## 1.3 JUSTIFICATION AND SIGNIFICANCE OF STUDY

A comparative analysis of haematological parameters before and after treatment could establish benchmarks for patient recovery and enhance treatment protocols. Gaining insight into the recovery dynamics of these parameters enabled physicians to anticipate complications like prolonged anaemia or thrombocytopenia, ultimately reducing post-treatment health issues. Given the substantial burden of malaria in endemic regions, research on recovery after treatment aided in better resource allocation and patient education. This study aimed to bridge the knowledge gap by providing insights into the post-treatment changes in haematological parameters, thereby contributing to the overall understanding of malaria Management.

## 1.4 RESEARCH QUESTIONS

1. What were the main haematological changes seen in malaria patients before treatment?
2. How did haematological parameters like haemoglobin levels, platelet counts, and white blood cell differentials change following malaria treatment?
3. How quickly did blood parameters return to normal after treatment for malaria?
4. Did the severity of haematological changes during malaria indicate how long recovery would take after treatment?
5. Were there variations in blood recovery among different demographic groups (such as age and gender)?

## 1.5 HYPOTHESIS

There were changes in haematological parameters like red blood cells, white blood cells, haemoglobin and platelets in patients with malaria before and after treatment of malaria.

**1.6 AIM**

The aim of the study was to compare the haematological parameters of malaria patients before and after treatment in order to assess how these haematological parameters became normal and to investigate the effects of malaria treatment on blood cell indices.

**1.7 SPECIFIC OBJECTIVES**

1. To monitor blood changes in malaria patients before treatment.
2. To assess the duration needed for hematological parameters to return to normal and how they are normalized after antimalarial therapy.
3. To explore the effects of age and gender on the recovery of haematological parameters.