



# Transfusion-transmitted Malaria in a Pregnant Woman with Beta Thalassemia Minor: A Case Report

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## Abstract

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**BACKGROUND:** Malaria is an infectious disease that is caused by plasmodium parasites. Malaria is commonly spread by female anopheles mosquitoes carrying the plasmodium parasite, although it can also be transferred through blood transfusion. In the developing world, malaria frequently affects the most vulnerable, including small children and pregnant women, resulting in severe morbidity and mortality.

**CASE PRESENTATION:** This case report presents a primigravida with beta-thalassemia who developed malaria during her pregnancy despite never having visited a malaria-endemic region. A 22-year-old primigravida in her 29th week of pregnancy presented to an outpatient clinic with a 1-week history of fever. Blood smears, both thick and thin, revealed *Plasmodium malariae* trophozoites, schizonts, and gametocytes. She was diagnosed with a mild form of beta-thalassemia and required monthly blood transfusions. We think the patient got malaria from a blood transfusion because she has never been to or lived where malaria is common. Infections transferred through blood transfusions should be prevented in thalassemia patients who require regular transfusions, particularly in vulnerable groups such as pregnant women.

**CONCLUSION:** Transfusion-transmitted diseases can be prevented by screening donors who have a history of malaria and have traveled to endemic areas.

## Introduction

According to the World Health Organization, malaria accounted for around 228 million clinical episodes and 405,000 deaths in 2018 [1]. Malaria frequently affects the most vulnerable members of the population, particularly young children and pregnant women in developing countries, resulting in significant morbidity and mortality [2]. An estimated 125 million pregnant women are at risk of malaria every year [3]. The prevalence of malaria during pregnancy remains high, particularly in endemic tropical nations like Indonesia [4]. Malaria in pregnancy is frequently more severe than the disease in non-pregnant adults, with a greater risk of sequelae, including risks to the fetus. *Plasmodium falciparum* is estimated to cause 20% of stillbirths in endemic areas of sub-Saharan Africa [3].

In most tropical places, malaria is endemic, but transmission is rare in non-endemic regions. Malaria is typically transmitted by female anopheles mosquitoes, although transmission is possible under particular situations, including (i) transmission by locally competent mosquito vectors and (ii) infection by infected mosquitoes on an airplane or in luggage.

(iii) Nosocomial transmission occurs through blood transfusions, needle-stick injuries, or organ transplants [5]. Transfusion-transmitted malaria (TTM) is one of the earliest transfusion-associated infections to be documented [6]. The unintentional transfer of plasmodium parasites from an asymptomatic donor with parasitemia to a blood recipient is a major problem, particularly in non-endemic regions. The patient's history of monthly blood infusions for 2 years suggests malaria transmission by transfusion. Since the patient has never visited other endemic places, an additional transmission route is unlikely. This case report presents a primigravida with beta-thalassemia who developed malaria during her pregnancy despite never having visited a malaria-endemic region.

## Case Description

### Patient information

A 22-year-old primigravida in her 29<sup>th</sup> week of pregnancy presented to an outpatient clinic with a

1-week history of fever. A fever was felt, especially at night, accompanied by chills, sweating, muscle aches, and fatigue. She was diagnosed with a mild form of beta-thalassemia and required monthly blood transfusions. The diagnosis of thalassemia was reconfirmed through haemoglobin electrophoresis examination, with the results indicating decreased HbA and increased HbA2, which is consistent with a diagnosis of beta-thalassemia. The patient has never visited or stayed in a malaria-endemic region.

### Clinical findings

The patient's body temperature was 38°C, she had tachycardia with 101 beats/min, her blood pressure was normal at 120/70 mmHg, and her respiration rate was 20 breaths/min. Physical examinations revealed bilateral anemic conjunctiva, icteric sclerae, and splenomegaly with Schufner's 2. Her test results revealed hypochromic microcytic anemia with Hb levels of 8.8 g/dL and mean corpuscular volume, mean corpuscular hemoglobin values of 65.7 fL and 21.6 pg, which are consistent with profiles of hemoglobinopathies such as thalassemia disease. With a slight increase in lactate dehydrogenase of 545 U/L, the likelihood of anemia due to hemolysis was also surveilled. However, the Coombs direct antiglobulin test result was negative, ruling out the possibility of anemia due to hemolysis. In addition, the ANA IF test results were negative, indicating that no suspicion of hemolytic anemia associated with an autoimmune disease process exists. The leukocyte and platelet counts were within normal range of  $6.38 \times 10^9$  g/mL and  $249 \times 10^9$  g/mL, respectively. Normal liver and kidney tests were SGOT 18 U/L, serum glutamic-pyruvic transaminase 9 U/L, blood urea nitrogen 8.60 mg/dL, and creatinine 1.15 0.65 mg/dL. The Tubex test yielded a result of < 2, which can be used to rule out typhoid fever. Negative results for anti-dengue immunoglobulin (Ig) G and IgM antibodies also rule out the possibility of dengue fever.

### Diagnostic assessment

Thick and thin blood smears indicated *Plasmodium malariae* trophozoites, schizonts, and gametocytes (Figure 1a-c), with 54,040 parasites/  $\mu$ L blood. The patient was subsequently diagnosed with malaria. Because the patient had never visited a malaria-endemic region, blood transfusion was assumed to be the transmission mechanism.

### Therapeutic intervention

The patient received three daily dihydroartemisinin-piperazine (DHP) (40 mg Dihydroartemisinin and 320 mg piperazine). After 3 days of DHP medication, the number of *P. malariae* in thick and thin blood smears was lowered to 20 parasites per microliter of blood.

### Follow-up and outcomes

The patient's pregnancy progressed until delivery without incident. There were no birth problems and no anomalies were discovered in the fetus.

## Discussion

*P. falciparum*, *Plasmodium vivax*, and *P. malariae* are the most frequently detected species in TTM. Due to the parasite's biology, inadvertent infection might occur. *P. falciparum* can persist for a year and *P. vivax* for three, while *P. malariae* can be chronic for decades [7]. Plasmodium parasites survive 18 days at 4°C in whole blood and plasma. Parasites can be detectable for up to 28 days when frozen, albeit with reduced infectivity [8]. This can enhance transmission risk in thalassemia patients who need transfusions. An early pre-erythrocytic

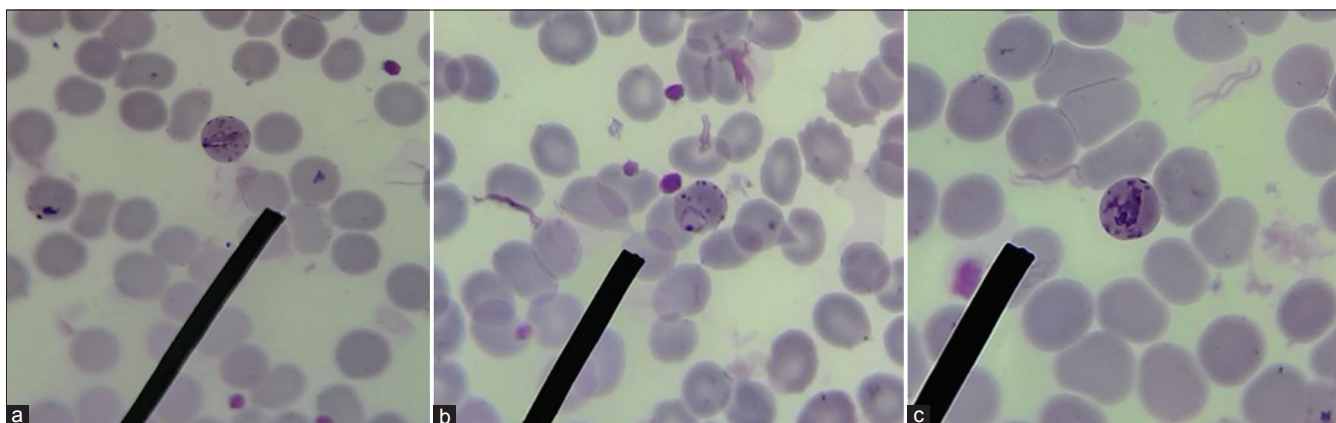


Figure 1: Blood smear of *P. malariae*. (a) Schizont of *P. malariae*. (b) Ring form of *P. malariae* Trophozoite. (c) Band form of *P. malariae* Trophozoite. *P. malariae*: *Plasmodium malariae*

asymptomatic phase of natural infection activates innate immune cells against malaria parasites and offers naive host time to establish protective immunity. In contrast, infected blood transfusions transfer malaria parasites into the recipient's circulation, causing high-risk consequences and possibly death [9].

Thalassemia patients have different susceptibilities to malaria, depending on the plasmodium type. Thalassemia increases susceptibility to *P. vivax* infection due to high cell turnover. However, in falciparum malaria, thalassemia decreased *P. falciparum* susceptibility. Higher quantities of antibodies attach to parasitized erythrocytes, allowing blood monocytes to phagocytose them [10]. Patients with thalassemia showed no evidence of resistance to *P. malariae* [11], and one case report found increased susceptibility to *P. malariae* infection in patients with alpha thalassemia [12].

Pregnancy-associated malaria causes maternal, fetal, and newborn morbidity and mortality. Pregnancy immune alterations enhance malaria susceptibility and severity. *P. falciparum* and *P. vivax* infections can induce maternal anemia, premature delivery, and fetal growth limitation [13].

## Conclusion and Suggestion

In this case, a primigravida in her 29<sup>th</sup> week of pregnancy acquired malaria but had no serious symptoms. The patient received DHP therapy for 3 days and the parasitemia index decreased. There were no complications in her pregnancy or the fetus. Screening donors with a malaria history and traveling to endemic areas are important to avoid similar occurrences.

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## Patient Consent

The patient has given his written informed consent for this case report.

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