CASE REPORT

# Rhabdomyolysis Causing Acute Renal Failure due to *Plasmodium vivax* Malaria: A Case Report

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*Received on:* 21 November 2022; *Accepted on:* 10 January 2023; *Published on:* 13 April 2023

## Abstract

Malaria is an acute febrile illness caused by *plasmodium* parasites, which are endemic in India. Malaria is caused by the bites of infected female *Anopheles* mosquitoes. There are five parasite species that cause malaria in humans. *Plasmodium falciparum* and *Plasmodium vivax* are having higher complications. The malaria parasite, *P. falciparum*, causes shock and multiorgan failure. This causes hypovolemia, excessive hemolysis, disseminated intravascular coagulation, or multiorgan failure. Another uncommon complication of *P. falciparum* malaria infection is rhabdomyolysis. This causes metabolic acidosis and renal failure. Rhabdomyolysis is quite common in *P. vivax* malaria. We report a case of *P. vivax* malaria infection causing severe rhabdomyolysis, which leads to acute renal failure.

**Keywords:** Acute renal injury, Multiorgan failure, *Plasmodium falciparum*, *Plasmodium vivax*.

*SBV Journal of Basic, Clinical and Applied Health Science* (2023): 10.5005/jp-journals-10082-03190

## Introduction

Malaria is an acute febrile illness caused by *Plasmodium* parasites, which are endemic in India.[1] Malaria is caused by the bites of infected female *Anopheles* mosquitoes.[1] There are five parasite species that cause malaria in humans;[1,2] *Plasmodium falciparum* is having more complications.[2] The malaria parasite *P. falciparum* causes shock and multiorgan failure.[2] This causes hypovolemia, excessive hemolysis, disseminated intravascular coagulation, or multiorgan failure.[2] Another uncommon complication of *P. falciparum* malaria infection is rhabdomyolysis.[3–5] This causes metabolic acidosis and renal failure.[4,5] Kidney failure is a feature of black water fever caused by *P. falciparum* malaria, where hemoglobin from hemolyzed red blood cells leaks into the urine.[5–7] Also, *Plasmodium vivax* malaria is associated with a less severe disease. It does not lead to organ involvement in many cases, and most of the cases are mild in nature.[8–10] We report a case of *P. vivax* malaria infection causing severe rhabdomyolysis, which leads to acute renal failure.

## Case Description

A 28-year-old male patient presented with a 5-day history of fever and chills, as well as headache and body ache. He was put on paracetamol and further evaluated for his illness. He was fine and healthy for 5 days. He lives in an endemic area where malaria is common. The rapid malaria antigen kit test revealed that he had *P. vivax* malaria, which was confirmed by thick and thin smears (Table 1). His other lab parameters were within normal limits, and the test for dengue and leptospira was negative (Table 2). His serology tests for human immunodeficiency virus and hepatitis B and C viruses were negative. He does not have any addictions. His blood pressure was 140/90 mm Hg, his pulse rate was 110 beats/min, his respiratory rate was 20 beats/min, and his oxygen saturation was 98% on spirometry. He was hospitalized and started on intravenous fluids and antimalarial treatment with intravenous artesunate and paracetamol for his fever. On day 2 of hospitalization, he was

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**How to cite this article:** Kolhe AB. Rhabdomyolysis causing Acute Renal Failure due to *Plasmodium vivax* Malaria: A Case Report. J Basic Clin Appl Health Sci 2023;6(2):43–44.

**Source of support:** Nil

**Conflict of interest:** None

**Table 1:** Laboratory investigations

| | *Patient profile* | |
|---|---|---|
| *Parameter* | *Value* | *Reference range* |
| Dengue profile | Negative | – |
| *P. vivax* malaria test | Positive | – |
| Total bilirubin | 3.1 mg/dL | 0.1–1.2 mg/dL |
| Direct bilirubin | 2.1 mg/dL | 0.0–0.4 mg/dL |
| Indirect bilirubin | 1.1 mg/dL | – |
| Alkaline phosphatase | 154 mg/dL | 40–130 U/L |
| AST | 367 U/L | 9–30 U/L |
| ALT | 1300 U/L | 0–28 U/L |
| LDH | 560 U/L | 200 U/L |
| HIV/HBV/HCV | Negative | – |
| Leptospira antibody | Negative | – |
| Creatine phosphokinase | 22700 U/L | < 300 U/L |

LDH, lactate dehydrogenase; AST, aspartate aminotransferase; ALT, alanine aminotransferase; HIV, human immunodeficiency virus; HBV, hepatitis B virus; HCV, hepatitis C virus

**Table 2:** Laboratory investigations routine

| *Routine profile* | | |
|---|---|---|
| *Parameter* | *Value* | *Reference range* |
| Random blood sugar | 128 | 70–140 mg/dL |
| Serum sodium | 136 | 135–138 mmol/L |
| Serum potassium | 6.90 | 3.5–4.5 mmol/L |
| Blood urea | 64 | 17–43 mg/dL |
| Serum creatinine | 1.39 | 0.72–1.2 mg/dL |
| Leukocytes | 5900 | 4000–10,000 cells/$mm^3$ |
| Hemoglobin | 18.4 | 13–17 gm/dL |
| MCV | 78.4 | 83-95f1 |
| Platelet count | 143,000 | 150,000–450,000/$mm^3$ |
| Neutrophils | 72 | 40–80% |
| Lymphocytes | 21 | 20–40% |
| Eosinophils | 03 | 1.0–6.0% |

MCV, mean corpuscular volume

complaining of bilateral lower limb weakness and severe pain during movement and on palpation, and he could not move his limbs. He also complains of blackish urine and decreased urine output. His creatine phosphokinase was very high, and his serum alanine aminotransferase was elevated. His renal function test was abnormal, showing acute renal failure, and his blood gases showed severe metabolic acidosis. He was diagnosed as having acute rhabdomyolysis causing renal failure. He has no history of any medical illness. He was placed on hemodialysis for his acute renal failure. After 7 days of hospitalization, he was better and started pouring urine; his urine output was 40–50 mL/hour. On the day 15 of hospitalization, he was discharged. On follow-up examinations, he was doing well, and all lab parameters were within normal limits. All necessary consent and permission were taken from patients and relatives for submission of reports to this article.

## Discussion

It is noted that *P. falciparum* malaria causes myoglobinuria, but the development of muscle necrosis is less likely.[4–6] Rhabdomyolysis causes acute renal failure due to the release of nephrotoxic myoglobin from muscles. Malaria associated with hypovolemia, hypotension, fever, and acidosis can increase renal failure. Rhabdomyolysis associated with *P. vivax* malaria is rare. Rhabdomyolysis in vivax malaria is caused by the *P. vivax* parasite's direct effect on the muscle and the increased inflammatory response caused by the parasite's killing.[6–8] A rapid malaria antigen test and thick and thin smear were used to confirm *P. vivax* infection. Rhabdomyolysis increases the severity of the acute renal failure.[9,10]

## Conclusion

It is to be noted that *P. falciparum* malaria causes myoglobinuria and is associated with rhabdomyolysis, giving rise to acute renal failure. However, *P. vivax* malaria is also associated with severe rhabdomyolysis and severe renal injury requiring hemodialysis.

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