



## Letter to Editor

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## Proactive detection of imported malaria in malaria-eliminated Sri Lanka

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The World Health Organization declared Sri Lanka a malaria eliminated country in 2016[1–3]. At present, the country is in the phase of preventing the re-establishment of malaria[4]. However, travelers who contract the disease overseas in malaria endemic countries continue to present a constant risk of re-establishing malaria in Sri Lanka, where malaria-transmitting mosquitos is prevalent. In this context, robust measures are being implemented in the country to prevent re-establishment of malaria and to stop travelers infected with malaria progressing into severe disease and death.

In February 2023, a 32-year-old male traveler returned to Sri Lanka from South Sudan after a one-year stay in this malaria endemic country. The traveler took mefloquine as chemoprophylaxis during his stay in South Sudan, which was prescribed by the Anti Malaria Campaign, Ministry of Health in Sri Lanka, according to the national guidelines for chemoprophylaxis for malaria in Sri Lanka[5,6]. He was asymptomatic on arrival and tested negative for the malaria parasite during the initial screening. He was tested for malaria one month after arrival at the regional malaria office in Kurunegala district, according to the national routine screening schedule of returned travelers from malaria endemic countries. Microscopy examination one month after arrival detected *Plasmodium falciparum* malaria with a parasite density of 1 120/μL, specifically in the ring stages. The patient received artemisinin-based combination therapy and showed complete parasite clearance by day 3 of treatment, as confirmed by blood smear microscopy. After 6 doses of artemisinin-based combination therapy, the patient was treated with a stat dose of primaquine according to the national treatment guidelines for malaria in Sri Lanka[7,8]. The patient was admitted to a tertiary care hospital and treated as an inpatient until the microscopic examinations revealed zero parasitaemia. This patient was followed up by repeated

microscopic examinations of blood on days 7, 14, 21, 28 and 42 for *Plasmodium falciparum* infections (considering the date of diagnosis as day zero)[9].

The patient's white blood cell count was  $5.98 \times 10^9/L$ , with a neutrophil percentage of 52.9% and a lymphocyte percentage of 32.0%. Eosinophils accounted for 6.0%. The platelet count was  $186\,000 \times 10^9/L$ . The packed cell volume was 38.3%, and the hemoglobin level was 13.1 g/dL. Liver enzymes showed an alanine transaminase level of 50 IU/L, and an aspartate transaminase level of 25 IU/L. Serum creatinine was 96 micromoles per liter (within the normal range of 53–115 micromoles/L). The C-reactive protein level was elevated at 14.3 mg/L.

Case investigation started within 48 hours of detecting this malaria patient and included both parasitological and entomological surveillance. On 2nd March 2023, primary parasite surveillance was conducted in the Gokarella and Pitapahamuna localities in Kurunegala district, and 111 individuals were screened, with all results being negative for malaria. Primary surveillance was performed to screen persons living within a 1-km radius of the residence of the index case. It also included screening those the

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patient came into contact with, if the patient stayed overnight elsewhere during the 2 weeks preceding the onset of symptoms, to ensure that the index case did not acquire malaria in Sri Lanka. Primary surveillance was not recommended if the patient presented with signs and symptoms of malaria within 7 days of arrival in the country. Secondary surveillance occurred following the primary survey in the same locality where 103 individuals were screened, and again, all results were negative. Secondary surveillance was conducted in the previously mentioned cohort 2-3 weeks after diagnosis of malaria to ensure that the patient had not transmitted malaria in the community. Entomological surveys implemented in the area revealed no presence of malaria-infected vectors, which ensured that there was no risk of local transmission. Case-based entomological surveillance, a reactive survey covering 1-km radius from the location of the case is carried out within 48 hours of diagnosing a malaria case<sup>[10–12]</sup>.

Despite the increase in international travelers to and from malaria-endemic regions, maintaining a malaria-eliminated status in resource-constrained countries like Sri Lanka remains a significant challenge. Timely diagnosis and treatment of malaria infections are essential to prevent severe complications and fatalities. Sri Lanka's success in maintaining its malaria-eliminated status depends largely on effective surveillance of travelers returning from malaria-endemic areas. With growing global travels, malaria-free regions are at heightened risk of imported cases, complicating efforts to sustain their malaria-eliminated status. Sustaining diagnostic expertise in malaria and implementing comprehensive protocols for case management and response activities are crucial for maintaining malaria elimination.

Even with prescribed malaria chemoprophylaxis, some travelers return with infections, suggesting potential non-compliance with the treatment. Furthermore, asymptomatic travelers who test negative for malaria upon arrival may later manifest malaria infections, which can be detected months later through routine follow-up screenings due to the characteristic features of the malaria parasites. In Sri Lanka, the clinicians are regularly reminded by the Anti Malaria Campaign to suspect malaria infection in travelers returning from malaria endemic countries presenting with fever, maintaining this vigilance for at least one year after their return.

Confirmatory diagnosis using microscopy, combined with prompt administration of anti-malarial treatment, ensures favorable outcomes. Vigilant surveillance is key to maintaining malaria-free status in eliminated countries. A triangulated approach, tailored to local context, is essential to prevent severe malaria and death while sustaining elimination efforts.

## Conflict of interest statement

There is no competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Ethics declaration

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## Authors' contributions

MKSIK and SS contributed to the case detection, case management and writing the article. The manuscript has been read and approved by all the authors.

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