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Letter to Editor

Asian Pacific Journal of Tropical Medicine

doi: 10.4103/apjtm.apjtm_241_24

Potential mosquito-associated melioidosis and analysis of sample processing results in Hainan, China, 2023

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Burkholderia (B.) pseudomallei is a Gram-negative bacterium causing melioidosis, a tropical infection that is being recognized as a growing public health problem[1]. Melioidosis, with mortality rates ranging from under 10% to 40%, is a significant concern in Southeast Asia, Australia, and beyond[2]. The underdiagnosis, particularly in rural areas, emphasizes the need for improved awareness, surveillance, and management, potentially classifying melioidosis as a neglected tropical disease[3]. In Hainan, reported cases have increased during the last decade, with 170 confirmed cases between 2002 and 2013. Human cases, typically sporadic, may cluster around contaminated products or water sources[4]. There have also been occasional cases in which circumstantial evidence suggested the possibility of transmission by biting insects. For example, in 2016, a 15-year-old from Pennsylvania, shortly went back from Thailand, presented with symptoms including a sore throat, fever, and thigh abscesses at mosquito bite sites, leading to hospitalization. Later, the patient developed inguinal lymphadenopathy and worsening abscesses from which *B. pseudomallei* was identified by culture. Though the author suggested soil contact as the most likely source of infection, the proximity of the thigh abscesses to mosquito bites raises the possibility that the bites directly caused the infection[5]. *B. pseudomallei* can infect a wide range of hosts, including mammals like horses, cattle, pigs, goats, cats, dolphins, and even some plants. Many researchers have linked melioidosis incidence to rainfall and humidity, with 75% to 81% of cases occurring during the rainy season[6], which also favors mosquito breeding. We therefore try to explore whether *B. pseudomallei* contaminated water could be a source for mosquito infection in the aquatic larval stages, giving rise to a potential for bacterial transmission by adult mosquitoes.

On September 11, 2023, a 31-year-old male patient presented with an atypical medical condition upon admission to the First Affiliated Hospital of Hainan Medical University in Haikou, Hainan Province. Prior to participation in the study and the use of his clinical data for analysis, informed consent was obtained from the patient in accordance with ethical guidelines. The patient, stationed for work in Luo Fan Village, Changzheng Town, Li and Miao Autonomous County of Qiongzong, Hainan Province, had not recently traveled

and had not participated in farming, construction, or mud-exposure activities. The patient stated that onset of symptoms occurred after he was bitten by a mosquito while sleeping in the dormitory on August 21, 2023. Subsequent to this incident, the affected area on his left thigh and buttocks expanded, displaying a deep red hue. Despite the application of Brooke's fish stone ointment, a topical treatment known for its anti-inflammatory and antibacterial properties, there was no improvement over several days. The escalation of redness and swelling, coupled with increasing pain, prompted the patient to seek medical attention (Figure 1).

On September 18, the hospital's laboratory conducted tests and suspected *B. pseudomallei* as the pathogen. Subsequent identification of the pathogen as *B. pseudomallei* was achieved by culturing wound pus and performing susceptibility testing on the Vitek-Compac 2 system (bioMérieux). This included using bacterial identification and antimicrobial susceptibility cards, followed by PCR amplification targeting the *wcbG* gene[7], which confirmed the presence of *B. pseudomallei*. Remarkably, the patient exhibited no signs of pneumonia or septicemia. A skin tissue rupture on the left buttock and substantial edema in the subcutaneous tissue and pelvic wall were observed. The patient showed significant improvement after a four-week intensive therapy with parenteral ceftazidime, administered as 2.0 g every 8 hours *via* intravenous infusion. This initial recovery was supported by a twelve-week outpatient eradication therapy with oral sulfamethoxazole/trimethoprim (SMX/

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How to cite this article: Kang X, Cheng SW, Zheng R, Zhu HJ, Xia QF. Potential mosquito-associated melioidosis and analysis of sample processing results in Hainan, China, 2023. Asian Pac J Trop Med 2024; 17(5): 235–236.

Article history: Received 12 April 2024 Revision 13 May 2024
Accepted 22 May 2024 Available online 30 May 2024

TMP), taking tablets containing 400 mg of sulfamethoxazole and 80 mg of trimethoprim three tablets twice daily, which led to full recovery. Although the infection initially presented after a mosquito bite, further research is needed to conclusively determine whether mosquito bites can directly transmit *B. pseudomallei*.



Figure 1. Left thigh and buttocks abscesses resulting from mosquito bites in a 31-year-old resident working in Luo Fan village, Hainan Province, September 2023. Photo of patient (used with permission, name withheld for confidentiality). The photo was taken 5 weeks after the initial onset of symptoms.

Between September 26 and 27, 2023, our research team conducted a village visit for comprehensive sample collection. The primary focus was on larvae, human-attracted adult mosquitoes from the patient's environment, and other insects. Subsequently, collected samples, predominantly *Aedes albopictus*, underwent mosquito DNA extraction in the laboratory. PCR results revealed that out of 149 adult *Aedes albopictus* mosquitoes, 8 tested positive for *B. pseudomallei* infection. In the environmental soil and water samples, no traces of *B. pseudomallei* were detected [8]. Furthermore, these findings imply instances where healthy individuals may have contracted the infection.

This report highlights the patient's clinical journey, the identification and successful treatment of *B. pseudomallei*, and subsequent investigations into potential mosquito of infection. The collaboration between clinical care and research underscores the significance of understanding and mitigating risks associated with such infections within the community [9].

Conflict of interest statement

The authors declare that they have no conflict of interest.

Funding

This work was supported by the Hainan Provincial Natural Science Foundation of China (824QN269) and the Hainan Province Science

and Technology Talent Innovation Project (KJRC2023D29), as well as the Major Science and Technology Program of Hainan Province (Grants No. ZDKJ202003 and ZDKJ2021036), and the National Natural Science Foundation of China (Grants No. 81960002 and 82370018).

Authors' contributions

X.K. and R.Z. conducted the sampling and identification of all mosquitoes and pathogens, performed the molecular experiments. S.W. C. and H. J. Z. treated patients and provided identification of pathogens. X.K., R.Z. and Q.F.X. conducted the sampling in Qiongzong. X.K. and Q.F.X. approved the final version of the manuscript.

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