Detection of malaria in Malaysia by nested polymerase chain reaction amplification of dried blood spots on filter papers

Balbir Singh 1, Janet Cox-Singh 1, Andy Olivier Miller 1, Mohammad Shukri Abdullah 1, Georges Snounou 2, Hasan Abdul Rahman 2

a School of Medical Sciences, University of Science Malaysia, Kubang Kerian 16150, Kelantan, Malaysia
b Imperial College School of Medicine, Department of Infection and Tropical Medicine, Lister Unit, Northwick Park Hospital, Harrow, HA1 3UJ, UK
c Vector-Borne Diseases Control Programme Office, Sabah Department of Health, Kota Kinabalu 88814, Sabah, Malaysia

Abstract

A modified nested polymerase chain reaction (PCR) method for detection of Plasmodium falciparum, P. vivax and P. malariae was combined with a simple blood collection and deoxyribonucleic acid (DNA) extraction method and evaluated in Malaysia. Finger-prick blood samples from 46 hospital patients and 120 individuals living in malaria endemic areas were spotted on filter papers and dried. The simple Chelex® method was used to prepare DNA templates for the nested PCR assay. Higher malaria prevalence rates for both clinical (78.2%) and field samples (30.8%) were obtained with the nested PCR method than by microscopy (76.1% and 27.5%, respectively). Nested PCR was more sensitive than microscopy in detecting mixed P. falciparum and P. vivax infections, detected 5 more malaria samples than microscopy on the first round of microscopical examination, and detected malaria in 3 microscopically negative samples. Nested PCR failed to detect parasite DNA in 2 microscopically positive samples, an overall sensitivity of 97.4% compared to microscopy. The nested PCR method, when coupled with simple dried blood spot sampling, is a useful tool for collecting accurate malaria epidemiological data, particularly in remote regions of the world.

Keywords: malaria; Plasmodium falciparum; Plasmodium vivax; diagnosis; polymerase chain reaction

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