

# Comparison of the diagnostic performance of microscopic examination with nested polymerase chain reaction for optimum malaria diagnosis in Upper Myanmar.

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## Abstract

**BACKGROUND:** Accurate diagnosis of Plasmodium infection is crucial for prompt malaria treatment and surveillance. Microscopic examination has been widely applied as the gold standard for malaria diagnosis in most part of malaria endemic areas, but its diagnostic value has been questioned, particularly in submicroscopic malaria. In this study, the diagnostic performance of microscopic examination and nested polymerase chain reaction (PCR) was evaluated to establish optimal malaria diagnosis method in Myanmar.

**METHODS:** A total of 1125 blood samples collected from residents in the villages and towns located in Naung Cho, Pyin Oo Lwin, Tha Beik Kyin townships and Mandalay of Upper Myanmar were screened by microscopic examination and species-specific nested PCR method.

**RESULTS:** Among the 1125 blood samples, 261 samples were confirmed to be infected with malaria by microscopic examination. Evaluation of the 1125 samples by species-specific nested PCR analysis revealed that the agreement between microscopic examination and nested PCR was 87.3% (261/299). Nested PCR successfully detected 38 Plasmodium falciparum or Plasmodium vivax infections, which were missed in microscopic examination. Microscopic examinations also either misdiagnosed the infected Plasmodium species, or did not detect mixed infections with different Plasmodium species in 31 cases.

**CONCLUSIONS:** The nested PCR method is more reliable than conventional microscopic examination for the diagnosis of malaria infections, and this is particularly true in cases of mixed infections and submicroscopic infections. Given the observed higher sensitivity and specificity of nested PCR, the molecular method holds enormous promise in malaria diagnosis and species differentiation, and can be applied as an effective monitoring tool for malaria surveillance, control and elimination in Myanmar.

**KEYWORDS:** Diagnosis; Malaria; Microscopic examination; Myanmar; Species-specific nested PCR