



# A Field evaluation of Polymerase Chain Reaction assay for diagnosis of malaria.

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W. M. K. T. de A. W. Gunasekera

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## Abstract

A sustained and marked reduction in the reported malaria incidence during the past decade has made it possible for Sri Lanka to embark on a malaria elimination programme. As part of this effort the Anti Malaria Campaign is carrying out extensive malaria surveillance measures, targeting elimination of malaria from the entire country by 2014. This study was done to determine the applicability of PCR method of diagnosis in comparison to microscopy in determining the prevalence of malaria infections and the proportion of the sub microscopic malaria infections among symptomatic and asymptomatic individuals. It also describes the clinico-epidemiology characteristics of malaria patients.

This study was carried out over a period of six months from June to November 2008 in the Anuradhapura district. Two hundred and fifty symptomatic patients attending selected medical institutions and 140 asymptomatic individuals in the Anuradhapura district were screened by nested PCR and microscopy. Sensitivity, specificity and predictive values of microscopy were calculated considering PCR as the gold standard diagnostic method, due to its advantages over microscopy in cases with low-level parasitaemia. The severity of clinical symptoms suggestive of malaria was evaluated using a previously described clinical evaluation. Statistical analysis was done using MedCalc statistical software. Characteristics of the population were determined using contingency tables. Differences in proportions were compared using chi square test.

PCR detected 84 *Plasmodium vivax*, 8 *P. falciparum* and 6 mixed (*P. vivax* and *P. falciparum*) and 1 *P. malariae* infection. Microscopy detected only 85% of these positives (85/99). Thereby 15% of total infections (15/ 99) were considered submicroscopic. Species identification was the same for 82 malaria infections (82/84) by PCR and microscopy. Except for 2 cases of *P. vivax* infections, all the others were symptomatic. The calculated parasitaemia of microscopically positive infections ranged from 80 parasites /  $\mu$ l to 12,320 parasites/  $\mu$ l. Considering PCR as the gold standard, microscopy had a sensitivity of 86.6% (95% CI: 77.8-92.4) and specificity of 100% (95% CI: 96.9-100) in symptomatic individuals.

The three most frequent symptoms experienced by the 97 symptomatic malaria patients were headache (90.9 %), myalgia (73.7 %) and backache (62.6 %). However, the clinical profile does

not differ markedly between non malaria (mean clinical score 14.3) and malaria patients (mean clinical score 9.6) ( $p>0.5$ ). Prevalence of malaria had a significantly high association with type of occupation as 82.8% patients were military personnel and 71.7% of patients had a history of travel to other malaria endemic districts during the previous six months ( $p<0.001$ ).

Considering the above factors, it can be concluded that genus and species specific PCR should be incorporated as a diagnostic option, especially in symptomatic patients with negative microscopy at least in endemic areas in the country. This will be the optimal diagnostic strategy in view of increasing proportion of malaria cases detected especially among military personnel and those with a travel history to malarious areas in order to ensure that the elimination strategy in Sri Lanka is successful.