Plasmodium knowlesi from archival blood films: Further evidence that human infections are widely distributed and not newly emergent in Malaysian Borneo

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1. Introduction

Plasmodium knowlesi, a malaria parasite of Old World monkeys (Garnham, 1966), is one of the five malaria species known to cause human malaria (Cox-Singh and Singh, 2008). Following our report of a large focus of human P. knowlesi infections in the Kapit division of Sarawak, Malaysian Borneo (Singh et al., 2004), cases of naturally acquired human infections with P. knowlesi have been reported from many areas in Southeast Asia including Thailand (Luchavez et al., 2008), Singapore (Ng et al., 2008), Sabah State, Malaysian Borneo (Cox-Singh et al., 2008) and Peninsular Malaysia (Cox-Singh et al., 2008; Vythilingam et al., 2008).

Plasmodium knowlesi malaria in humans is routinely misdiagnosed by microscopy as Plasmodium malariae due to their morphological similarities. Although microscopy-identified P. malariae cases have been reported in the state of Sarawak (Malaysian Borneo) as early as 1952, recent epidemiological studies suggest the absence of indigenous P. malariae infections. The present study aimed to determine the past incidence and distribution of P. knowlesi infections in the state of Sarawak based on archival blood films from patients diagnosed by microscopy as having P. malariae infections. Nested PCR assays were used to identify Plasmodium species in DNA extracted from 47 thick blood films collected in 1996 from patients in seven different divisions throughout the state of Sarawak. Plasmodium knowlesi DNA was detected in 35 (97.2%) of 36 blood films that were positive for Plasmodium DNA, with patients originating from all seven divisions. Only one sample was positive for P. malariae DNA. This study provides further evidence of the widespread distribution of human infections with P. knowlesi in Sarawak and its past occurrence. Taken together with data from previous studies, our findings suggest that P. knowlesi malaria is not a newly emergent disease in humans.