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Analysis of Genetic Mutations of Anti-malarial Resistance Genes in Nusa Tenggara Regions and Production of 19-kDa Fragment of Merozoite Surface Protein 1 as Malaria Vaccine Candidate

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Abstract

Malaria, sometimes called the "King of Diseases", is a leading cause of mortality and morbidity globally. There were 247 million malaria cases among 3.3 billion people at risk in 2006 from 109 countries resulting in estimated 881,000 deaths (WHO, 2008). Excessive use of antimalarial drugs resulting in drug pressure that promotes the spread of resistance to antimalarial drugs. The drug resistance is caused by point mutation at *pfcrt* and *pfmdr1* (resistance to chloroquine) and *dhfr* and *dhfs* (resistance to sulfadoxin-pyrimethamine). The aim of this research was to observe these mutations in the genes of *Plasmodium falciparum*-infected patients in Nusa Tenggara region. To anticipate the antimalaria treatment failure, $MSP1_{19}$ gene was cloned and expressed to generate blood-stage vaccine candidate of malaria. Research results showed that mutations at codon 76 in the *pfcrt* and 1034 in the *pfmdr1* are present in all samples, indicating that potential chloroquine treatment failures may occur in all areas of Nusa Tenggara. Mutations at codon 613 of the *dhfs* and codon 108 in the *dhfr* are in very low prevalence indicating that sulfadoxin-pyrimethamine can still be used as antimalaria drug in the region. $MSP1_{19}$ gene of *P. falciparum* was cloned into pET22b vector and expressed successfully in *E. coli* BL21 Star (DE3)pLysS cells. The purified $MSP1_{19}$ was obtained using BD Talon™ metal affinity resin. The protein then could be used for anti-$MSP1_{19}$ monoclonal antibody production and serological detection of malaria.