CHAPTER I

INTRODUCTION

1.1 Motivations

Malaria remains to be a major global health problem. Each year, there are around 2.7 millions malaria patients. The disease usually spreads in tropical areas including in the border regions of Thailand. The cause of malaria is a parasite in genus *Plasmodium*. Four species of *Plasmodium* are commonly found in Thailand, *P. falciparum*, *P. vivax*, *P. malariae*, and *P. ovale*. Both *P. falciparum* and *P. vivax* are more widely spreaded than *P. malariae*, and *P. ovale*. There are several diagnosis methods for malaria infection for instance; 1) thin smear blood film staining with Giemsa for the direct detection of the parasite, 2) immunological technique i.e. parasite lactate dehydrogenase (pLDH) specific monoclonal antibody and Histidine-rich protein for the detection of parasitic protein, 3) Polymerase chain reaction technique is for the detection the parasitic DNA.

At present, there is no appropriate vaccine for controlling malaria, hence; using antimalarial drug is the most popular approach to prevent and control malaria infection. Antimalarial drugs can be divided into 2 classes, nucleic acid inhibitors and blood schizontocides. Each of these antimalarial drugs affects to the parasite differently. Consequently, drug susceptibility of a parasite depends on the type and dose of treated drug and the nature of parasite. Therefore, drug susceptibility test is an important condition to adjust type and dose of the drug given to the patients. Drug susceptibility test can be performed by collecting parasite from patient, culturing each isolate of the parasite in laboratory and then treating the cultured parasite with different concentrations of drugs and determined the parasite response in the term of survival parasite. Results from drug susceptibility test could be illustrated in term of IC_{50} (inhibitory concentration) and MIC (minimum inhibitory concentration). In this study, MIC, which is the least concentration of drug eliminating almost all of the parasites, is used for evaluating the results of drug susceptibility test. MIC value can refer to the antimalarial drug resistance of the parasite in each isolate. Finding IC_{50} value could perform the same approach as diagnosis of malaria; while measuring MIC value could only perform by directly figuring out the remained parasite by light microscope. This method is very labor-intensive and requires a well-functioning and

high-resolution microscope and is performed well only by skilled readers. Besides, measuring MIC by using light microscope in a large number of samples could not be easily accomplished because of time limitation and labor shortage. Accordingly, it is necessary that a more appropriate technique should be developed for evaluating MIC quickly and easily.

1.2 Objective

To measure the minimum inhibitory concentration (MIC) of *Plasmodium falciparum* by using PCR technique.

1.3 Scope of the study

To verify the possibility of using PCR and RT-PCR technique to determine the MIC value of *P. falciparum* from which the MIC values are known.