

Research Article

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Antiplasmodial Activity of Stigmastane Steroids from *Dryobalanops oblongifolia* Stem Bark

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Abstract: Three stigmastane steroids: 6-hydroxystigmast-4-en-3-one (1), stigmast-4-en-3-one (2), and 3-hydroxystigmast-5-en-7-one (3) were successfully isolated from the acetone extract of *Dryobalanops oblongifolia* stem bark. The structural determination of isolated compounds was carried out on the basis of data analysis of NMR and MS spectra. In order to identify the antiplasmodial activity, the isolated compound was put to test against *Plasmodium falciparum* 3D7. Antiplasmodial activity of the isolated compounds showed that the IC_{50} values of 6-hydroxystigmast-4-en-3-one were 37.29 $\mu\text{g/mL}$ while the IC_{50} values of stigmast-4-en-3-one were 43.54 $\mu\text{g/mL}$ and the IC_{50} values of 3-hydroxystigmast-5-en-7-one were 13.34 $\mu\text{g/mL}$ (chloroquine phosphate was used as a positive control, IC_{50} 0.006 $\mu\text{g/mL}$). Judging from the results, the isolated compounds were proven to demonstrate mediocre antiplasmodial activity. Compound (3) indicated a better antimalarial activity than compound (1) and (2), even though there was no satisfactory activity that indicated its ability to combat chloroquine. Therefore, it might not be developed as an antimalarial drug.

Keywords: Antiplasmodial; *Dryobalanops oblongifolia*; *Plasmodium falciparum*; Stigmastane steroid.

1 Introduction

Malaria is one of the infectious diseases that has become a major problem of health. It is found in nearly most of all tropics, particularly developing and poor countries. *Plasmodium*, a parasitic protozoa genus, is what causes malaria in humans. The parasite that derived from the genus namely *Plasmodium falciparum* is the lethal part that causes acute infection worldwide with an annual death toll of 1-2 million people [1, 2].

Quinine which isolated from cinchona tree has been widely used to cure malaria, yet it is still powerless to comprehensively break the life cycle of *Plasmodium* parasites [3]. Artemisinin, a sesquiterpene lactone, is reported as a potential antimalarial drug and have the ability to kill all phases of the parasites' life cycle through interaction with heme, yet animal experiment shows neurotoxic and cardiotoxic effect [4]. Development of synthesized drugs, such as chloroquin, pyrimethamine, cycloguanil, and sulfadoxine, have indicated the decline of effectivity caused by the resistance of *Plasmodium* [3,5,6,7]. Therefore, it is crucial to develop alternative medicines from plants by constituent exploration as potential antimalarial drugs.

Dryobalanops oblongifolia belongs to the family of Dipterocarpaceae and is widely found in Indonesia and Malaysia [8]. The phytochemical screening of fruit of *D. oblongifolia* revealed the presence of steroids compounds in this species [9]. *Dryobalanops* is known to produce oligostilbene constituents with various interesting activity such as antibacterial, antioxidant, antimalarial and cytotoxic [10, 11, 12, 13, 14]. In continuation for searching bioactive compounds from Indonesia's plants, a study towards *D. oblongifolia* was conducted by isolating the agents and examining the antiplasmodial activity against *Plasmodium falciparum* 3D7. Based on our knowledge this three stigmastane steroids (1-3) were first report from family Dipterocarpaceae and these isolated metabolites expressed only moderate antiplasmodial activity.

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