INTISARI

Resistensi *Plasmodium* terhadap obat malaria mengakibatkan kegagalan pengobatan. Hal ini merupakan ancaman terlebih belum ditemukannya obat alternatif yang efektif untuk melawan resistensi. Oleh karena itu ketersediaan antimalaria baru sangat diperlukan untuk melawan resistensi. Pencarian obat baru terus dilakukan melalui berbagai cara termasuk eksplorasi dan pengembangan bahan alam. Pemilihan bahan alam biasanya berdasarkan penggunaan secara empiris oleh masyarakat.Tanaman hati tanah (*Angiopteris evecta*) digunakan oleh masyarakat diPalangkaraya Kalimantan Tengah untuk mengobati malaria. Ekstrak etanol umbi *A. evecta* mempunyai aktivitas antiplasmodium *in vitro* tergolong sangat potensial dengan IC_{50} 2,86 ± 0,27 µg/mL. Berdasarkan hal tersebut perlu dilakukan penelitian lebih lanjut untuk melakukan isolasi dan penentuan struktur kimia dari senyawa aktif yang memiliki aktivitas antiplasmodium *in vitro*. Perlu juga mengetahui aktivitas antiplasmodium *in vitro*senyawa aktif padastadiumintraeritrosit kultur *P. falciparum strain* FCR3 serta mekanisme aksi penghambatan polimerisasi hem.

Isolasi senyawa dilakukan berdasarkan *bioassay guidedfractionation* pada umbi *A.evecta*terhadap kultur *P. falciparum strain* FCR3. Senyawa aktif yang murni dielusidasi dan diidentifikasi struktur kimianya berdasarkan data spektra UV-Vis, FT-IR, Massa,^{1}H-NMR, dan^{13}C-NMR serta NMR dua dimensi (COSY, HMQC, dan HMBC). Uji aktivitas antiplasmodium *in vitro* dilakukan menurut metode *candle jar* yang dimodifikasi. Parameter yang digunakan untuk menyatakan aktivitas antiplasmodium *in vitro* adalah nilai IC_{50}.

Hasil fraksinasi yang dilakukan dengan triturasi diperoleh 3 fraksi yaitu FA (*n*-heksana), FB (etil asetat), dan FC (tidak larut etil asetat) dengan nilai IC_{50}masing-masing 37,93 ± 1,19; 5,16 ± 0,11; > 250 µg/mL. Fraksi FB mempunyai aktivitas antiplasmodium *in vitro* yang paling baik diantara fraksi lainnya. Isolasi FB menggunakan KCV dihasilkan 5 fraksi yaitu B1, B2, B3, B4, dan B5. Aktivitas antiplasmodium *in vitro* dari B1, B2, B3, B4, dan B5 ditunjukkan dengan nilai IC_{50} masing-masing fraksi adalah berturut-turut > 200; 37,13 ± 0,22; 4,48 ± 0,01;> 200; dan > 200 µg/mL. Fraksi B3 diisolasi dan dimurnikan sehingga diperoleh isolat B3b. Dari analisis spektrum FT-IR, LC-MS, DEPT, dan NMR satu dan dua dimensi, serta membandingkan dengan data spektra NMR dari literatur, mengidentifikasikan bahwa isolat B3b memiliki kesesuaian data dengan senyawa Angiopterisida. Aktivitas antiplasmodium *in vitro* dari senyawa B3b tergolong sangat aktif dengan nilai IC_{50}0,85± 0,42 µg/mL. Aktivitas antiplasmodium *in vitro*pada stadium perkembangan intraeritrosit dari senyawa B3b adalah menghambat perkembangan tahap tropozoit menjadi skizon serta mencegah terjadinya invasi merosoit ke eritrosit. Terjadi penghambatan polimerisasi hem senyawa B3b berdasarkan nilai IC_{50} yang diperoleh yakni 368,77 ± 12,33 µg/mL.

Kata Kunci: *Angiopteris evecta*, *Plasmodium falciparum*, IC_{50}, Malaria, Angiopterisida

ABSTRACT

The resistance of *Plasmodium* to antimalarial drugs resulted in treatment failure. It posed a threat in the absence of alternative effective drug for the resistance. Therefore, the availability of new antimalarial drug was highly required to overcome this problem. Exploration of new antimalarial drugs was conducted using various methods, including exploration and development of natural substance. The selection of the natural substance was usually conducted on the basis of empirical use by people. *Angiopteris evecta* was used by people living in Palangkaraya of Central Kalimantan to treat malaria. The ethanol extract of the tubers of the *A. evecta* had *in vitro* antiplasmodial activity that was considered to be very potential with IC_{50}2,85± 0.27µg/mL. Based on the fact it was necessary to further study by insulating and determining the chemical structure of the active compound with the *in vitro* antiplasmodial activities. It was also necessary to investigate the *in vitro* antiplasmodial activity of the active compound at intraerythrocytic development cycle of *P. falciparum* strain FCR3 culture and the inhibiting action mechanism of heme polymerization.

The isolation of the compound was conducted using bioassay guided fractionation of the tubers of the *A. evecta* and the *P. falciparum strain* FCR3 culture. The pure active compoundwas elucidated and its chemical structure was identified on the basis of spectra data of UV-Vis, FT-IR, ^{1}H-NMR, ^{13}C-NMR one and two dimensional NMR (i.e., COSY, HMQC, and HMBC), andmass spectra. The test of the *in vitro* antiplasmodial activity was carried out using modified candle jar method. The parameter used to identify the *in vitro* antiplasmodial activity was IC_{50} value.

The results of the fractionation conducted using trituration method were three fractions, which were FA (*n*-hexane), FB (ethyl acetate), and FC (insoluble in ethyl acetate) with the IC_{50} value of each37,93 ± 1,19; 5,16 ± 0,11; > 250 µg/mL. The fraction FB had better *in vitro* antiplasmodial activity among other fractions. The fractionation of FB using VLC gave 5 fractions, which were B1, B2, B3, B4 and B5. The *in vitro* antiplasmodial assay of the B1, B2, B3, B4 and B5 indicated the IC_{50} value of each of the fractions, were > 200; 37,13 ± 0,22; 4,48 ± 0,01;> 200; dan > 200 µg/mL, respectively. The fraction B3 was purified to give B3b isolate. The results of the analysis of the spectrum of FT-IR, LC-MS, DEPT and NMR one and two dimensional and the results of the comparison of them and the NMR spectra data found in literature showed that the data of the B3b isolate fitted angioptericide compound. The *in vitro* antiplasmodial activity of the B3b was considered to be very active with the IC_{50} value of 0,85± 0,42µg/mL. The *in vitro* antiplasmodial activity at the intraerythrocytic development cycle of the B3b compound was to inhibit the development of trophozoite stadium into schizone and prevented the invasion of merozoit into erythrocyte. The inhibition of the heme polymerization of the B3b compound took place based on the resulting IC_{50} value, which was 368.77±12.33 µg/mL.

Key words: *Angiopteris evecta*, *Plasmodium falciparum*, IC_{50}, Malaria, Angioptericide