Penapisan in silico antimalaria terhadap target plasmodium falciparum enoyl acyl carrier protein reductase (PfENR)

Berwi Fazri Pamudi, author

Abstrak

Malaria merupakan salah satu infeksi parasit yang menjadi permasalahan di dunia. Tidak adanya vaksin yang efektif dan strain Plasmodium yang resisten terhadap obat antimalaria menunjukkan pentingnya untuk adanya pengembangan agen kemoterapi baru. Metode yang saat ini sedang banyak dikembangkan adalah pencarian obat antimalaria dengan menggunakan penapisan in silico atau dikenal pula dengan nama virtual screening. Salah satu enzim yang berperan dalam perkembangan parasit malaria adalah Plasmodium falciparum Enoyl Acyl Carrier Protein Reductase (PfENR). Inhibisi pada enzim tersebut akan menyebabkan biosintesis lemak tipe II pada parasit akan terhenti. Pada penelitian kali ini dilakukan penapisan in silico menggunakan perangkat lunak GOLD untuk mencari kandidat inhibitor PfENR dengan menggunakan ligan yang terdapat pada database Tanaman Obat di Indonesia. Pada perangkat lunak GOLD dilakukan penambatan molekuler antara ligan dengan makromolekul target yaitu PfENR. Target ini telah dioptimasi dengan penghilangan residu dan penambahan muatan. Ligan diharapkan dapat menjadi inhibitor PfENR. Berdasarkan hasil dari penapisan in silico ini terdapat 5 kandidat senyawa inhibitor yang diharapkan dapat dikembangkan sebagai obat antimalaria. Senyawa tersebut yaitu Kaempferol 3-rhamnosyl-(1-3)-rhamnosyl-(1-6)-glucoside, Cyanidin 3,5-di-(6-malonylglucoside), 8-Hydroxyapigenin 8-(2",4"-disulfatoglucuronide), Epigallocatechin 3,5,-di-O-gallate, dan Quercetin 3,4'-dimethyl ether 7-alpha-L-Arabinofuranosyl-(1-6)-glucoside dengan kisaran GoldScore dari 80,6236 sampai 100,4109.
<hr>
Malaria is one of problematic infectious diseases worldwide. The absence of an effective vaccine and the spread of drug resistant strains of Plasmodium clearly indicate the necessity for the deveplopment of new chemotherapeutic agents. Recent method being developed is searching a new drug of antimalarial using in silico screening, or also known as virtual screening. One of enzyme target that important for growth of the malaria parasite is Plasmodium falciparum Enoyl Acyl Carrier Protein Reductase (PfENR). Inhibition of this enzyme cause the fatty acid biosynthesis type II will be terminated. In this research, in silico screening was performed using GOLD software to find inhibitor candidates of PfENR by using ligands from the database of Medicinal Plants in Indonesia. On the GOLD software moleculer docking experiments were performed between ligands and macromolecule target PfENR. This target that has been optimized with residue removal and charges addition. Ligand is expected to be the PfENR inhibitors. Based on the results obtained from the in silico screening there were 5 inhibitor candidates which expected to be developed as an antimalarials. These compounds were Kaempferol 3-rhamnosyl-(1-3)-rhamnosyl-(1-6)-glucoside, Cyanidin 3,5-di-(6-malonylglucoside), 8-Hydroxyapigenin 8-(2",4"-disulfatoglucuronide), Epigallocatechin 3,5,-di-O-gallate, and Quercetin 3,4'-dimethyl ether 7-alpha-L-Arabinofuranosyl-(1-6)-glucoside with the GoldScore ranged from 80.6236 to 100.4109.