STUDI PROFIL METABOLIT DAN *VIRTUAL SCREENING* EKSUDAT TANAMAN MANGROVE (*Avicennia marina* (Forsk.) Vierh.) SEBAGAI AGEN PENGHAMBAT ENZIM XANTIN OKSIDASE

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ABSTRAK

Latar belakang : Eksudat *Avicennia marina* berpotensi sebagai inhibitor xantin oksidase. Namun, metabolit yang berperan sebagai inhibitor belum teridentifikasi. Penelitian ini menganalisis profil metabolit menggunakan LC-HRMS dan *virtual screening* untuk mengidentifikasi kandidat inhibitor xantin oksidase.
Tujuan : Mengetahui aktivitas inhibisi fraksi HEMWat eksudat *Avicennia marina* secara *in vitro*, mengidentifikasi metabolit berdasarkan LC-HRMS, dan menentukan kandidat inhibitor melalui *virtual screening*.
Metode : Eksudat *Avicennia marina* diekstraksi secara infudasi dan difraksinasi menggunakan HEMWat. Fraksi polar dan nonpolar diuji aktivitas inhibisi xantin oksidase *in vitro* dan dianalisis menggunakan LC-HRMS. Senyawa diseleksi berdasarkan struktur 2D, kemudian dievaluasi menggunakan Lipinski's *Rule of Five*, BOILED-Egg, *molecular docking*, dan visualisasi interaksi.
Hasil : Fraksi polar dan nonpolar menunjukkan aktivitas inhibisi dengan IC_{50} 10.295,83 ppm dan 7.855,38 ppm, sedangkan febuxostat 0,0030 ppm. LC-HRMS mengidentifikasi 228 metabolit. Karwinaphthol B (16,03%) dominan pada fraksi nonpolar dan 6-[(1E)-3,4-dihydroxy-3-methyl-1-buten-1-yl]-7-methoxy-2H-chromen-2-one (17,57%) pada fraksi polar. *Virtual screening* menunjukkan Shikalkin, 2-(3,4-Dihydroxyphenyl)ethyl (4Z)-4-formyl-3-(2-oxoethyl)-4-hexenoate, dan L-α-Palmitin sebagai kandidat inhibitor dengan skor penambatan -108,78; -108,52; dan -106,26. Shikalkin menunjukkan afinitas tertinggi dan berinteraksi dengan residu Arg880, Thr1010, Glu802, Glu1261, Phe914, dan Phe1009.
Kesimpulan : Shikalkin merupakan kandidat inhibitor xantin oksidase paling potensial berdasarkan *virtual screening*.

Kata Kunci : Eksudat *Avicennia marina*, hiperurisemia, profil metabolit, *virtual screening*, xantin oksidase

METABOLITE PROFILING AND VIRTUAL SCREENING OF MANGROVE (*Avicennia marina* (Forsk.) Vierh.) EXUDATE AS A XANTHINE OXIDASE INHIBITORY AGENT

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ABSTRACT

Background : *Avicennia marina* exudate has potential as a xanthine oxidase inhibitor. However, metabolites have not been identified. This study analyzed metabolites using LC-HRMS and virtual screening.
Objective : To determine the inhibitory activity of HEMWat fractions from *Avicennia marina* exudate in vitro, identify metabolites using LC-HRMS, and determine inhibitors through virtual screening.
Methods : *Avicennia marina* exudate was extracted by infusion and fractionated using HEMWat. Polar and nonpolar fractions were tested for xanthine oxidase inhibitory activity in vitro and analyzed using LC-HRMS. Compounds were selected based on 2D structures, then evaluated using Lipinski's Rule of Five, BOILED-Egg, molecular docking, and interaction visualization.
Results : Polar and nonpolar fractions showed inhibition with IC_{50} values of 10,295.83 and 7,855.38 ppm, respectively, while febuxostat showed 0.0030 ppm. LC-HRMS identified 228 metabolites. Karwinaphthol B (16.03%) dominated the nonpolar fraction, while 6-[(1E)-3,4-dihydroxy-3-methyl-1-buten-1-yl]-7-methoxy-2H-chromen-2-one (17.57%) dominated the polar fraction. Virtual screening identified Shikalkin, 2-(3,4-Dihydroxyphenyl)ethyl (4Z)-4-formyl-3-(2-oxoethyl)-4-hexenoate, and L-α-Palmitin as inhibitor candidates, with docking scores of -108.78, -108.52, and -106.26, respectively. Shikalkin showed the highest affinity and interacted with residues Arg880, Thr1010, Glu802, Glu1261, Phe914, and Phe1009.
Conclusion: Shikalkin is the most promising xanthine oxidase inhibitor candidate based on virtual screening.

Keywords : *Avicennia marina* exudate, hyperuricemia, metabolite profile, virtual screening, xanthine oxidase