

## ABSTRAK

Enzim  $\alpha$ -glukosidase berperan dalam pemecahan karbohidrat tahap akhir dan pengendalian kadar glukosa post-prandial. Asupan gula berlebih dapat meningkatkan kadar glukosa darah melebihi batas normal yang berpotensi menyebabkan diabetes melitus tipe 2 (DM tipe 2). Inhibitor enzim  $\alpha$ -glukosidase dapat menghambat penyerapan glukosa sehingga menjadi target pengobatan DM tipe 2. Penelitian sebelumnya melaporkan bahwa fraksi etil asetat tanaman *A. humilis* Vahl memiliki potensi terhadap penghambatan enzim  $\alpha$ -glukosidase. Oleh karena itu, penelitian ini bertujuan untuk mengevaluasi potensi penghambatan enzim  $\alpha$ -glukosidase dari ekstrak dan fraksi tanaman lampeni (*A. humilis* Vahl) serta mengisolasi dan mengidentifikasi senyawa dari ekstrak etil asetat. Beberapa ekstrak lampeni yang telah tersedia diuji *in vitro* inhibitor enzim  $\alpha$ -glukosidase dan profiling LC-HRMS. Analisa difokuskan pada ekstrak etil asetat dan difraksinasi dengan KCV menghasilkan 16 fraksi (EA1 – EA16). Fraksi EA 3 berbentuk padatan putih-kuning dan fraksi EA 5 menunjukkan aktivitas inhibisi tertinggi terhadap enzim  $\alpha$ -glukosidase. Fraksi EA 3 dianalisis menggunakan GC-MS, KKG, dan KLT-P menghasilkan isolat B yang dikarakterisasi menggunakan FTIR dan  $^1\text{H-NMR}$ . Fraksi aktif EA 5 dipisahkan dengan KKG, diuji KLT-bioautografi, kemudian diisolasi dengan HPLC semi-preparatif menghasilkan isolat I4 yang dianalisis menggunakan UPLC-ESI-MS,  $^1\text{H-NMR}$ ,  $^{13}\text{C-NMR}$ , HSQC. Hasil skrining *in vitro* menunjukkan bahwa ekstrak etil asetat dan fraksi EA 5 memiliki potensi penghambatan enzim  $\alpha$ -glukosidase karena menghasilkan nilai inhibisi di atas 50%. Profiling LC-HRMS variasi ekstrak tanaman lampeni menunjukkan beberapa golongan senyawa seperti alkaloid, flavonoid, terpenoid, asam lemak, fenolik. Hasil isolasi diperoleh isolat B dan isolat I4. Isolat B berbentuk padatan putih dan tergolong dalam senyawa triterpenoid. Hasil karakterisasi FTIR dan  $^1\text{H-NMR}$  menunjukkan bahwa isolat B masih terdapat campuran triterpen yaitu  $\alpha$ -amirin,  $\beta$ -amirin, bauerenol. Isolat I4 diduga sebagai turunan asam lemak berbentuk serbuk orange dengan  $[\text{M-H}]^-$  377,44 terdiri dari 17 karbon dan 26 hidrogen. Hasil penelitian ini mendukung potensi *A. humilis* Vahl sebagai sumber senyawa bioaktif untuk pengembangan inhibitor  $\alpha$ -glukosidase dalam terapi diabetes melitus tipe 2.

**Kata kunci:** *A. humilis* Vahl, enzim  $\alpha$ -glukosidase, metabolit sekunder, isolasi

## ***ABSTRACT***

The enzyme  $\alpha$ -glucosidase plays a role in the end-stage breakdown of carbohydrates and the control of post-prandial glucose levels. Excess sugar intake can increase blood glucose levels beyond normal limits, potentially leading to type 2 diabetes mellitus (type 2 DM). Inhibitors of  $\alpha$ -glucosidase enzyme can inhibit glucose uptake and thus become the target of type 2 DM treatment. Previous research reported that the ethyl acetate fraction of *A. humilis* Vahl plant has the potential to inhibit  $\alpha$ -glucosidase enzyme. Therefore, this study aims to evaluate the  $\alpha$ -glucosidase enzyme inhibitory potential of lampeni (*A. humilis* Vahl) plant extracts and fractions as well as isolate and identify compounds from ethyl acetate extracts. Several available lampeni extracts were tested for in vitro  $\alpha$ -glucosidase enzyme inhibition and LC-HRMS profiling. Analysis focused on the ethyl acetate extract and fractionated with KCV to produce 16 fractions (EA1 - EA16). Fraction EA 3 was a white-yellow solid and fraction EA 5 showed the highest inhibitory activity against  $\alpha$ -glucosidase enzyme. Fraction EA 3 was analyzed using GC-MS, KKG, and KLT-P to produce isolate B which was characterized using FTIR and  $^1\text{H-NMR}$ . The active fraction EA 5 was separated by KKG, tested by KLT-bioautography, then isolated by semi-preparative HPLC to produce isolate I4 which was analyzed using UPLC-ESI-MS,  $^1\text{H-NMR}$ ,  $^{13}\text{C-NMR}$ , HSQC. In vitro screening results showed that the ethyl acetate extract and EA 5 fraction had the potential to inhibit  $\alpha$ -glucosidase enzyme because they produced inhibition values above 50%. LC-HRMS profiling of lampeni plant extract variations showed several classes of compounds such as alkaloids, flavonoids, terpenoids, fatty acids, phenolics. Isolation results obtained isolate B and isolate I4. Isolate B is a white solid and is classified as a triterpenoid compound. FTIR and  $^1\text{H-NMR}$  characterization results showed that isolate B still contained a mixture of triterpenes, namely  $\alpha$ -amyrin,  $\beta$ -amyrin, bauerenol. Isolate I4 is thought to be a fatty acid derivative in the form of orange powder with  $[\text{M-H}]^-$  377.44 consisting of 17 carbons and 26 hydrogens. The results of this study support the potential of *A. humilis* Vahl as a source of bioactive compounds for the development of  $\alpha$ -glucosidase inhibitors in the therapy of type 2 diabetes mellitus.

**Key words:** *A. humilis* Vahl,  $\alpha$ -glucosidase enzyme, secondary metabolites, isolation