

INTISARI

Kosmetik terkait dengan kecantikan telah menjadi tren di seluruh dunia. Penduduk Indonesia yang merupakan negara tropis dengan intensitas matahari tinggi berisiko dengan hiperpigmentasi. Agen inhibitor tirosinase sebagai solusi mengurangi produksi melanin berlebih diketahui memiliki efek samping. Pergeseran preferensi konsumen ke produk herbal yang lebih alami mendorong eksplorasi bahan aktif kosmetik berbasis tumbuhan. *Acriopsis liliifolia* merupakan salah satu spesies anggrek yang berpotensi sebagai sumber metabolit sekunder dengan antitirosinase. Penelitian ini bertujuan mengidentifikasi metabolit sekunder dari akar *A. liliifolia* sebagai inhibitor tirosinase.

Metode penelitian yang digunakan meliputi uji mikrokimia menggunakan beberapa reagen dan pengamatan di bawah mikroskop; identifikasi metabolit sekunder melalui teknik *Liquid Chromatography High-Resolution Mass Spectrometry* (LC-HRMS); studi pemodelan interaksi molekul (*docking*) menggunakan perangkat lunak *Molecular Operating Environment* (MOE), serta pengujian aktivitas penghambatan enzim tirosinase secara *in vitro*. Hasil mikrokimia menunjukkan bahwa akar *A. liliifolia* positif mengandung fenolik dan alkaloid. Profil metabolit menunjukkan adanya 124 senyawa dengan kelimpahan tertinggi pada superkelas *lipid and lipid-like molecules* (37,1%). Studi *docking* menunjukkan bahwa *1,3-dilinolenoylglycerol* memiliki afinitas ikatan lebih kuat dengan enzim tirosinase dibuktikan dengan *S-score* lebih rendah (-9,54 kkal/mol) dibandingkan asam kojat (-5,05 kkal/mol). Senyawa *1,3-dilinolenoylglycerol* dapat menjadi *lead compound* untuk pengembangan selanjutnya. Studi *in vitro* menunjukkan bahwa ekstrak akar *A. liliifolia* ($IC_{50} > 250.000$ ppm) menunjukkan aktivitas lebih rendah dibandingkan asam kojat ($IC_{50} = 191,41 \pm 33$ ppm). Namun, akar *A. liliifolia* dapat menjadi alternatif yang lebih aman dengan efek samping minimal. Penelitian lebih lanjut diperlukan untuk memastikan efek potensial dan penilaian keamanan kosmetik.

Kata kunci: *Acriopsis liliifolia*, akar, *brightening agent*, inhibitor tirosinase, metabolit sekunder.

ABSTRACT

*Cosmetics related to beauty have become a worldwide trend. The population of Indonesia, a tropical country with high sun intensity, is at risk of hyperpigmentation. Tyrosinase inhibitor agents, as a solution to reduce excess melanin production, are known to have side effects. The shift in consumer preferences to more natural herbal products encourages the exploration of active ingredients in plant-based cosmetics. *Acriopsis liliifolia* is one of the orchid species that has the potential as a source of secondary metabolites with antityrosinase. This study aims to identify secondary metabolites from *A. liliifolia* roots as tyrosinase inhibitors.*

*The research methods used include microchemical tests using several reagents and observations under a microscope; identification of secondary metabolites through Liquid Chromatography High-Resolution Mass Spectrometry (LC-HRMS) techniques; molecular interaction modeling studies (docking) using Molecular Operating Environment (MOE) software, and testing the activity of inhibiting the tyrosinase enzyme in vitro. Microchemical results showed that *A. liliifolia* roots positively contained phenolics and alkaloids. The metabolite profile showed the presence of 124 compounds with the highest abundance in the lipid and lipid-like molecules superclass (37.1%). Docking study showed that 1,3-dilinolenoylglycerol has a stronger binding affinity with tyrosinase enzyme as evidenced by lower *S*-score (-9.54 kcal/mol) compared to kojic acid (-5.05 kcal/mol). 1,3-dilinolenoylglycerol compound can be a lead compound for further development. In vitro study showed that *A. liliifolia* root extract ($IC_{50} > 250,000$ ppm) showed lower activity compared to kojic acid ($IC_{50} = 191.41 \pm 33$ ppm). However, *A. liliifolia* root can be a safer alternative with minimal side effects. Further studies are needed to confirm the potential effects and safety assessment of cosmetics.*

*Keywords: *Acriopsis liliifolia*, brightening agent, tyrosinase inhibitor, secondary metabolites.*