

AKTIVITAS PENCERAH KULIT ASAM ASKORBAT DAN TURUNANNYA SECARA *IN SILICO* DAN *IN VIVO*

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ABSTRAK

Ascorbic acid dan berbagai derivatnya yaitu *ascorbic acid 2-O- α -glucoside*, *magnesium ascorbyl phosphate*, *sodium ascorbyl phosphate*, *ascorbyl tetraispalmitate*, *ascorbyl palmitate*, *3-O-ethyl ascorbic acid*, *2-glyceryl-3-octyl ascorbate* bermanfaat untuk mengatasi berbagai permasalahan kulit, didukung oleh beberapa bukti ilmiah sebagai antioksidan, pencerah kulit, *anti-acne* dan *anti-wrinkle*. Tujuan penelitian ini ialah menemukan prediksi derivat *ascorbic acid* yang memenuhi parameter *druglikeness*, uji *in silico* sebagai *tyrosinase related protein 1 inhibitor* (PDB 5M8R), interaksi antara ligan dan asam amino, dan selanjutnya dilakukan uji *in vivo* untuk melihat efek penggunaannya terhadap parameter *hydration*, *pore*, *melanin*, *acne* dan *wrinkle* menggunakan alat *Aramo Portable Scanner Integration (API)* dari derivat terbaru *ascorbic acid* yaitu *2-Glyceryl-3-Octyl Ascorbate (GO-VC)* dibandingkan dengan derivat terpilih berdasarkan pemenuhan aspek *druglikeness* dan nilai *binding energy* hasil *in silico*. Hasil pengamatan *druglikeness* berdasarkan *Lipinski's rule of five* menunjukkan bahwa ada 4 derivat yang melanggar peraturan *druglikeness* menurut *lipinski* yaitu *Tetrahexyldecyl Ascorbate*, *L-Ascorbyl 6-palmitate*, *L-Ascorbyl 6-Stearate*, *L-Ascorbic acid 2-glucoside*. Derivat dengan %senyawa (tak terionisasi) >90% pada pH 6,0 yaitu *3-O-ethyl ascorbic acid*, *2-glyceryl-3-octyl ascorbate* dan *ascorbic acid 2-O- α -glucoside*. Nilai binding energi terbaik yaitu *3-O-Ethyl-L-Ascorbic* dengan nilai -3,33. Sebelum uji *in vivo* dilakukan pembuatan krim yaitu 2% *3-O-Ethyl-L-Ascorbic* (krim A) yang diaplikasikan pada sisi kanan wajah dan 1% *2-Glyceryl-3-Octyl Ascorbate* (krim B) pada sisi kiri wajah. *Single-blind, split-face, Randomized Control Trial* pada 18 wanita berusia (20-50 tahun) selama 15 hari, dilakukan pengamatan terhadap *hydration*, *pore*, *melanin*, *acne* dan *wrinkle* menggunakan alat *Aramo Portable Scanner Integration (API)*. Hasil penelitian menunjukkan penggunaan krim A dan krim B memberikan manfaat yang berbeda bermakna ($P < 0,05$) dibandingkan dengan sebelum penggunaan, tetapi perbandingan krim A dan krim B memberikan hasil yang tidak berbeda bermakna terhadap kenaikan *hydration*, dan penurunan *pore*, *melanin*, *acne* dan *wrinkle* ($P > 0,05$).

Keywords: *Ascorbic Acid*, *2-Glyceryl-3-Octyl Ascorbate*, *3-O-Ethyl-L-Ascorbic Tyrosinase Inhibitor*, *Molecular Docking*

Skin Lightening Activity of Ascorbic Acid and Derivatives: *In Silico* dan *In Vivo*

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ABSTRACT

Ascorbic acid and its various derivatives, such as ascorbic acid 2-O- α -glucoside, magnesium ascorbyl phosphate, sodium ascorbyl phosphate, ascorbyl tetraisopalmitate, ascorbyl palmitate, 3-O-ethyl ascorbic acid, 2-glyceryl-3-octyl ascorbate are useful for treating various diseases. skin problems, supported by some scientific evidence as an antioxidant, skin lightening, anti-acne and anti-wrinkle. The purpose of this study was to find predictions of ascorbic acid derivatives that meet druglikeness parameters, in silico test as a tyrosinase related protein 1 inhibitor (GDP 5M8R), interactions between ligands and amino acids, and then in vivo tests were carried out to see the effect of its use on hydration, pore parameters, melanin, acne and wrinkle using the Aramo Portable Scanner Integration (API) tool from the latest ascorbic acid derivative, namely 2-Glyceryl-3-Octyl Ascorbate (GO-VC) compared with selected derivatives based on compliance with druglikeness aspects and binding energy values obtained in silico. The druglikeness observation based on Lipinski's rule of five shows that there are 4 derivatives that violate the druglikeness regulation according to Lipinski, namely Tetrahexyldecyl Ascorbate, L-Ascorbyl 6-palmitate, L-Ascorbyl 6-Stearate, L-Ascorbic acid 2-glucoside. Derivatives with % compound (non-ionized) >90% at pH 6.0 are 3-O-ethyl ascorbic acid, 2-glyceryl-3-octyl ascorbate and ascorbic acid 2-O- α -glucoside. The best binding energy value is 3-O-Ethyl-L-Ascorbic with a value of -3.33. Before the in vivo test, a cream was made, 2% 3-O-Ethyl-L-Ascorbic (cream A) which was applied to the right side of the face and 1% 2 Glyceryl-3-Octyl Ascorbate (cream B) on the left side of the face. Single-blind, split-face, Randomized Control Trial on 18 women aged (20-50 years) for 15 days, observing hydration, pore, melanin, acne and wrinkle using the Aramo Portable Scanner Integration (API) tool. The results showed that the use of cream A and cream B provided significantly different benefits ($P < 0.05$) compared to before use, but the comparison of cream A and cream B gave no significant difference in increasing hydration and decreasing pore, melanin, acne. and wrinkles ($P > 0.05$).

Keywords: Ascorbic Acid, *2-Glyceryl-3-Octyl Ascorbate*, *3-O-Ethyl-L-Ascorbic Tyrosinase Inhibitor*, *Molecular Docking*, *In Silico*