

INTISARI

Paparan radiasi ultraviolet-B (UV-B) dari sinar matahari diidentifikasi sebagai faktor ekstrinsik penyebab penuaan kulit, yang dikenal sebagai photoaging. Dampak kronis dari paparan UV-B mampu mengaktifkan matriks metalloproteinases (MMPs), terutama MMP-1 dan MMP-3, yang merusak kolagen sehingga menyebabkan penuaan sel kulit. Antioksidan diketahui dapat meredam efek *photoaging* dan mencegah proses penuaan sel. Senyawa analog kurkumin, Tetrahidroheksagamavunon-5 (THHGV-5), terbukti memiliki aktivitas antioksidan. Senyawa THHGV-5 diduga dapat menurunkan ekspresi MMP-1 dan MMP-3 sebagai mekanisme pencegahan penuaan. Penelitian ini bertujuan untuk menganalisis pengaruh THHGV-5 dalam menurunkan ekspresi MMP-1 dan MMP-3 pada sel *Human Dermal Fibroblast* (HDF) terinduksi UV-B.

Sel HDF diberikan paparan radiasi UV-B sebesar 920 mJ/cm² dan diinkubasi selama 2 jam sebelum diberikan senyawa uji THHGV-5 sebagai rancangan pertama. Rancangan kedua, sel HDF diberikan THHGV-5 selama 2 jam kemudian dipaparkan radiasi UV-B. Metode MTT *assay* digunakan untuk uji sitotoksik THHGV-5. Konsentrasi THHGV-5 kemudian digunakan untuk analisis penurunan ekspresi MMP-1 dan MMP-3 menggunakan ELISA. Data diolah menggunakan *Shapiro-Wilk Test*, *one-way ANOVA*, serta uji *post hoc Tukey LSD* (95%).

Senyawa THHGV-5 dalam rentang konsentrasi 100 – 6,25 μM tidak menunjukkan efek toksik terhadap sel HDF dengan mempertahankan viabilitas sel HDF. Selain itu, konsentrasi 6,25 μM dari senyawa THHGV-5 terbukti mampu menurunkan ekspresi MMP-1 pada sel HDF yang diinduksi oleh UV-B pada kedua rancangan. Namun, penurunan ekspresi MMP-3 bervariasi antara kedua rancangan perlakuan. Pada rancangan setelah paparan UV-B, penurunan signifikan ekspresi MMP-3 terjadi pada konsentrasi 50 μM dan 25 μM , sedangkan pada rancangan sebelum paparan UV-B, penurunan signifikan hanya terjadi pada konsentrasi 100 μM . Kemampuan ini dimungkinkan karena aktivitas antioksidan THHGV-5 dalam menghambat aktivator MMP, sehingga dapat menurunkan produk MMP-1 dan MMP-3 yang berlebih. Dengan demikian, hasil penelitian ini menunjukkan bahwa senyawa THHGV-5 memiliki efektivitas yang signifikan dalam menurunkan ekspresi MMP-1 dan MMP-3.

Keyword : Photoaging, THHGV-5, MMP-1, MMP-3, UV-B

ABSTRACT

Exposure to ultraviolet-B (UV-B) radiation from sunlight is identified as an extrinsic factor causing skin aging, known as photoaging. The chronic impact of UV-B exposure can activate matrix metalloproteinases (MMPs), particularly MMP-1 and MMP-3, which damage collagen and lead to skin cell aging. Antioxidants are known to mitigate the effects of photoaging and prevent the cellular aging process. The curcumin analog compound, Tetrahydrohexagamavunon-5 (THHGV-5), has been proven to have antioxidant activity. THHGV-5 is hypothesized to reduce the expression of MMP-1 and MMP-3 as a mechanism for preventing aging. This study aims to analyze the effect of THHGV-5 on the expression of MMP-1 and MMP-3 in UV-B-induced Human Dermal Fibroblast (HDF) cells.

HDF cells were exposed to UV-B radiation at 920 mJ/cm² and incubated for 2 hours before being treated with the test compound THHGV-5 as the first scheme. In the second scheme, HDF cells were treated with THHGV-5 for 2 hours and then exposed to UV-B radiation. The MTT assay method was used for the cytotoxicity test of THHGV-5. The concentrations of THHGV-5 were then used for the analysis of MMP-1 and MMP-3 expression inhibition using MMPs ELISA Kit. Data were processed using the Shapiro-Wilk Test, one-way ANOVA, and post hoc Tukey LSD test (95%).

THHGV-5 in the 100 – 6.25 μ M concentration range did not show toxic effects on HDF cells maintaining cell viability. Additionally, the concentration of 6.25 μ M of THHGV-5 was proven to reduce the expression of MMP-1 in HDF cells induced by UV-B in both experimental designs. However, the reduction in MMP-3 expression varied between the two experimental designs. In the design where UV-B exposure preceded treatment, a significant reduction in MMP-3 expression occurred at concentrations of 50 μ M and 25 μ M, whereas in the design where treatment preceded UV-B exposure, a significant reduction was only observed at a concentration of 100 μ M. This ability is likely due to the antioxidant activity of THHGV-5 in inhibiting MMP activators, thereby reducing excessive MMP-1 and MMP-3 production. Thus, the results of this study indicate that THHGV-5 has significant effectiveness in reducing the expression of MMP-1 and MMP-3.

Keyword : Photoaging, THHGV-5, MMP-1, MMP-3, UV-B