ABSTRAK

Photoaging merupakan bentuk penuaan kulit akibat paparan kronik sinar UVB yang ditandai perubahan ketebalan epidermis dan hiperpigmentasi tidak merata, sehingga menimbulkan masalah estetika dan meningkatnya kebutuhan agen peremajaan kulit dan depigmentasi yang aman. Daun mimba (*Azadirachta indica*) memiliki aktivitas antioksidan, antiinflamasi, *anti-aging*, serta dilaporkan menghambat melanogenesis melalui penurunan ekspresi tirosinase, TRP-1/2, dan MITF. Penelitian ini bertujuan menilai efektivitas ekstrak daun mimba topikal terhadap ketebalan epidermis dan jumlah melanin pada tikus putih model *photoaging* UVB. Studi eksperimental laboratorik dengan desain *randomized post test only with control group* menggunakan 24 tikus jantan Wistar yang dibagi acak menjadi empat kelompok (n=6) yaitu kontrol negatif (UVB + plasebo) dan tiga kelompok perlakuan dengan ekstrak daun mimba topikal dosis 5%, 10%, dan 15%. *Photoaging* diinduksi dengan UVB 100–200 mJ/cm² selama 2 minggu, diikuti aplikasi ekstrak dua kali sehari selama 14 hari. Ketebalan epidermis diukur pada preparat HE dengan analisis citra digital. Jumlah melanin dinilai secara morfometri pada pewarnaan S100. Ketebalan epidermis dianalisis dengan ANOVA–Tukey. Jumlah melanin dengan Kruskal–Wallis–Mann-Whitney ($p<0,05$). Rerata ketebalan epidermis (nm) meningkat dari 22467,76±4849,22 (KN-) menjadi 35270,26±12244,38 (5%), 37199,43±5418,97 (10%), dan 37830,30±7779,53 (15%) (ANOVA $p=0,012$), berbeda bermakna KN- dengan 10% ($p=0,024$) dan 15% ($p=0,018$). Rerata jumlah melanin menurun dari 8,60±4,89 (KN-) menjadi 1,10±0,41 (5%), 0,96±0,76 (10%), dan 0,73±0,41 (15%) (Kruskal–Wallis $p=0,002$), dengan perbedaan signifikan KN- terhadap semua dosis ($p=0,002$), tanpa perbedaan bermakna antar dosis. Ekstrak daun mimba topikal efektif meningkatkan ketebalan epidermis dan menurunkan jumlah melanin pada tikus *photoaging* UVB, dengan respon terbaik secara deskriptif pada dosis 15%, sehingga berpotensi sebagai agen herbal untuk rejuvenasi kulit dan agen *whitening*.

Kata Kunci: Daun Mimba, Melanin, Reepitelisasi, Penuaan, Rejuvenasi

ABSTRACT

Photoaging is a form of skin aging caused by chronic exposure to UVB radiation, characterized by alterations in epidermal thickness and uneven hyperpigmentation, leading to aesthetic problems and increasing demand for safe skin rejuvenation and depigmenting agents. Neem leaves (Azadirachta indica) possess antioxidant, anti-inflammatory, and anti-aging activities and have been reported to inhibit melanogenesis by downregulating tyrosinase, TRP-1/2, and MITF expression. This study aimed to evaluate the effectiveness of topical neem leaf extract on epidermal thickness and melanin content in UVB-induced photoaging in Wistar rats. A laboratory experimental study with a randomized post-test only control group design was conducted using 24 male Wistar rats randomly assigned to four groups (n=6): negative control (UVB + placebo) and three treatment groups receiving topical neem leaf extract at concentrations of 5%, 10%, and 15%. Photoaging was induced with UVB at 100–200 mJ/cm² for 2 weeks, followed by twice-daily application of the extract for 14 days. Epidermal thickness was measured on HE-stained sections using digital image analysis, while melanin content was quantified morphometrically on S100-stained sections. Epidermal thickness was analyzed using ANOVA with Tukey post hoc, and melanin content using Kruskal–Wallis with Mann–Whitney post hoc ($p<0.05$). Mean epidermal thickness (nm) increased from 22467.76±4849.22 (negative control) to 35270.26±12244.38 (5%), 37199.43±5418.97 (10%), and 37830.30±7779.53 (15%) (ANOVA $p=0.012$), with significant differences between the control and 10% ($p=0.024$) and 15% ($p=0.018$) groups. Mean melanin counts decreased from 8.60±4.89 (negative control) to 1.10±0.41 (5%), 0.96±0.76 (10%), and 0.73±0.41 (15%) (Kruskal–Wallis $p=0.002$), with significant differences between the control and all treatment doses ($p=0.002$), and no significant differences among treatment groups. Topical neem leaf extract effectively increased epidermal thickness and reduced melanin content in UVB-induced photoaged rats, with the best descriptive response at 15%, suggesting its potential as a herbal agent for skin rejuvenation and whitening.

Keywords: *Neem leaf, melanin, re-epithelialization, aging, rejuvenation*