APLIKASI TOPIKAL GEL MADU KELULUT *Heterotrigona itama* (Cockerell, 1918) TERHADAP PENYEMBUHAN LUKA DAN JUMLAH SEL MAKROFAG TIKUS PUTIH (*Rattus norvegicus* (Berkenhout, 1769))

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INTISARI

Madu kelulut dari *Heterotrigona itama* (Cockerell, 1918) memiliki potensi terapeutik sebagai alternatif penyembuhan luka. Aktivitas terapeutiknya meliputi antibakteri, antiinflamasi, antioksidan, dan imunomodulator. Gel madu kelulut dapat melembapkan luka, mengurangi nyeri, dan meningkatkan migrasi sel. Kandungan flavonoid dalam gel madu kelulut membantu mempercepat proses penyembuhan luka. Penelitian ini bertujuan untuk mengetahui efektivitas aplikasi topikal gel madu kelulut pada luka kulit tikus putih (*Rattus norvegicus* (Berkenhout 1769)). Luka dibuat menggunakan *biopsy punch* berdiameter 6 mm. Rancangan acak lengkap dengan lima perlakuan digunakan dalam penelitian ini pada dua kelompok waktu, yaitu hari ke-7 dan ke-14. Perlakuan meliputi KN (aplikasi akuades), KP (aplikasi *povidone iodine*), serta P1, P2, dan P3 (aplikasi topikal gel madu kelulut konsentrasi 40, 60, dan 80%). Parameter yang diamati meliputi persentase penutupan luka, ketebalan epidermis, serta jumlah sel makrofag, pembuluh darah baru, dan folikel rambut. Data dianalisis dengan *One-Way* ANOVA dan uji normalitas Shapiro-Wilk, kemudian dilanjutkan uji Duncan dan *Independent Samples T-test*. Hasil menunjukkan bahwa gel madu kelulut konsentrasi 60% efektif dalam mempercepat penyembuhan luka. Pengaruh ini terlihat dari peningkatan persentase penutupan luka dan jumlah folikel rambut, penurunan ketebalan epidermis mendekati normal, serta penurunan jumlah sel makrofag dan pembuluh darah baru seiring bertambahnya waktu perlakuan. Kesimpulannya, gel madu kelulut 60% optimal mempercepat penyembuhan luka tanpa menimbulkan risiko hiperproliferasi folikel rambut.

Kata kunci: madu kelulut, penyembuhan luka, sel makrofag, re-epitelisasi, tikus putih

TOPICAL APPLICATION OF KELULUT HONEY GEL *Heterotrigona itama* (Cockerell, 1918) ON WOUND HEALING AND THE NUMBER OF MACROPHAGE CELLS IN ALBINO RATS (*Rattus norvegicus* (Berkenhout, 1769))

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ABSTRACT

Kelulut honey from *Heterotrigona itama* (Cockerell, 1918) has therapeutic potential as a wound-healing alternative. Its therapeutic activities include antibacterial, antiinflammatory, antioxidant, and immunomodulatory. Kelulut honey gel can moisturize wounds, reduce pain, and increase cell migration. Kelulut honey gel's flavonoid concentration speeds up the healing of wounds. The purpose of this study is to evaluate the efficacy of topical kelulut honey gel application on albino rats' (*Rattus norvegicus* (Berkenhout, 1769)) skin lesions. Using the punch biopsy technique, 6 mm diameter wounds were created. A completely randomized design with five treatments was used in this study at two time points, namely days 7 and 14. Treatments included KN (distilled water application), KP (povidone iodine application), and P1, P2, and P3 (topical application of kelulut honey gel with concentrations of 40, 60, and 80%). Parameters observed included the percentage of wound closure, epidermal thickness, and the number of macrophage cells, new blood vessels, and hair follicles. Prior to conducting the Independent Samples T-test and Duncan's test, the data were subjected to One-Way ANOVA and the Shapiro-Wilk normality test. Accelerating wound healing was demonstrated by the outcomes of kelulut honey gel at a concentration of 60%. With increasing treatment time, this impact becomes more apparent as the percentage of wound closure and the number of hair follicles rise, the thickness of the epidermis falls to a normal level, and the number of macrophage cells and new blood vessels decreases. In conclusion, kelulut honey gel is 60% optimal to accelerate wound healing without causing the risk of hair follicle hyperproliferation.

Keywords: albino rats, kelulut honey, macrophage cells, re-epithelialization, wound healing