

ABSTRACT

Traumatic ulcer is a common ulcerative lesion occurring in the oral mucosa due to mechanical trauma. In diabetic conditions, wound healing is impaired due to immune cell dysfunction, including macrophages. Moringa leaves (*Moringa oleifera*) contain bioactive compounds such as flavonoids, tannins, phenols, and saponins that possess anti-inflammatory activity and can accelerate wound healing. This study aimed to determine the effectiveness of 15% Moringa leaf gel extract on macrophage cell count in the healing process of traumatic ulcers in male Wistar rats with diabetes. This was an in vivo experimental laboratory study using a Post Test Only Control Group Design with 32 male Wistar rats aged 2-3 months and weighing 150-250 grams. Animals were induced with diabetes using Streptozotocin (STZ) 150 mg/kg BW intraperitoneally. Traumatic ulcers were created using a 5 mm diameter burnisher heated for 1 minute and applied for 1 second to the lower labial mucosa. Samples were divided into 8 groups: 4 treatment groups (P1, P2, P3, P4) receiving 15% Moringa leaf gel extract and 4 control groups (K1, K2, K3, K4) receiving 3% Na-CMC gel, with observation periods on days 3, 5, 7, and 9. Gel application was performed 3 times daily. Labial mucosal tissue was collected and histopathological preparations were made with HE staining. Macrophage cell count was calculated using a microscope at 400x magnification in 5 fields of view. Data were analyzed using One Way ANOVA, Tukey Post Hoc, and Pearson correlation tests. Phytochemical screening showed that Moringa leaf gel extract contained flavonoids, tannins, phenols, and saponins. Mean macrophage counts in treatment groups were: P1=11.45, P2=10.15, P3=12.33, P4=10.28, while control groups showed: K1=5.65, K2=6.70, K3=7.65, K4=10.25. One Way ANOVA test showed significant differences between groups ($p=0.021<0.05$). Tukey Post Hoc test demonstrated significant differences between P3 and K1 ($p=0.037$). Pearson correlation test showed a significant relationship with a negative correlation value of -0.357 ($p=0.045<0.05$). Moringa leaf (*Moringa oleifera*) gel extract at 15% concentration is effective on macrophage cell count in traumatic ulcer healing of male Wistar rats with diabetes. The negative correlation indicates that Moringa leaf gel extract administration can reduce macrophage count along with decreased inflammatory phase, thereby supporting acceleration of the wound healing process.

Keywords: Moringa leaves, *Moringa oleifera*, traumatic ulcer, macrophage, diabetes mellitus, topical gel, anti-inflammatory

ABSTRAK

Traumatic ulcer merupakan lesi ulseratif yang umum terjadi pada mukosa mulut akibat trauma mekanis. Pada kondisi diabetes, proses penyembuhan luka mengalami hambatan karena gangguan fungsi sel imun, termasuk makrofag. Daun kelor (*Moringa oleifera*) mengandung senyawa bioaktif seperti flavonoid, tanin, fenol, dan saponin yang memiliki aktivitas antiinflamasi dan dapat mempercepat penyembuhan luka. Penelitian ini bertujuan untuk mengetahui efektivitas pemberian gel ekstrak daun kelor konsentrasi 15% terhadap jumlah sel makrofag pada proses penyembuhan traumatic ulcer tikus wistar jantan yang mengalami diabetes. Penelitian eksperimental laboratoris *in vivo* menggunakan rancangan Post Test Only Control Group Design dengan 32 ekor tikus wistar jantan berusia 2-3 bulan dan berat badan 150-250 gram. Hewan coba diinduksi diabetes menggunakan Streptozotocin (STZ) 150 mg/kg BB secara intraperitoneal. Traumatic ulcer dibuat menggunakan alat burnisher diameter 5 mm yang dipanaskan selama 1 menit dan disentuh selama 1 detik pada mukosa labial bawah. Sampel dibagi menjadi 8 kelompok: 4 kelompok perlakuan (P1, P2, P3, P4) yang diberi gel ekstrak daun kelor 15% dan 4 kelompok kontrol (K1, K2, K3, K4) yang diberi gel Na-CMC 3%, dengan waktu pengamatan hari ke-3, ke-5, ke-7, dan ke-9. Aplikasi gel dilakukan 3 kali sehari. Jaringan mukosa labial diambil dan dibuat preparat histopatologi dengan pewarnaan HE. Jumlah sel makrofag dihitung menggunakan mikroskop perbesaran 400x pada 5 lapang pandang. Data dianalisis menggunakan uji One Way ANOVA, Tukey Post Hoc, dan korelasi Pearson. Uji skrining fitokimia menunjukkan gel ekstrak daun kelor mengandung flavonoid, tanin, fenol, dan saponin. Rerata jumlah makrofag pada kelompok perlakuan: P1=11,45, P2=10,15, P3=12,33, P4=10,28, sedangkan kelompok kontrol: K1=5,65, K2=6,70, K3=7,65, K4=10,25. Uji One Way ANOVA menunjukkan perbedaan signifikan antar kelompok ($p=0,021<0,05$). Uji Tukey Post Hoc menunjukkan perbedaan signifikan antara P3 dengan K1 ($p=0,037$). Uji korelasi Pearson menunjukkan hubungan signifikan dengan nilai korelasi negatif -0,357 ($p=0,045<0,05$). Gel ekstrak daun kelor (*Moringa oleifera*) konsentrasi 15% efektif terhadap jumlah sel makrofag pada penyembuhan traumatic ulcer tikus wistar jantan yang mengalami diabetes. Korelasi negatif menunjukkan bahwa pemberian gel ekstrak daun kelor dapat mengurangi jumlah makrofag seiring dengan penurunan fase inflamasi sehingga mendukung percepatan proses penyembuhan luka.

Kata kunci: Daun kelor, *Moringa oleifera*, traumatic ulcer, makrofag, diabetes melitus, gel topikal, antiinflamasi.