INTISARI

Penderita diabetes melitus sering mengalami gangguan penyembuhan luka, maka dikembangkanlah terapi *Low Intensity Pulsed Ultrasound (LIPUS)* untuk mengatasi hal tersebut. Terapi *LIPUS* pada fase inflamasi awal dapat menginduksi degranulasi sel *mast*, dan pada fase proliferatif dapat meningkatkan sintesis kolagen oleh fibroblas. Tujuan penelitian ini untuk mengetahui pengaruh terapi LIPUS terhadap degranulasi sel *mast* dan ekspresi fibroblas pada proses penyembuhan luka *punch biopsy* tikus model diabetes melitus tipe 2.

Dua puluh empat tikus *Sprague dawley* yang sesuai kriteria inklusi dibuat menjadi diabetes melitus tipe 2 dengan penyuntikan *Nicotinamide* dan *Streptozotocin*, kemudian dibagi menjadi enam kelompok: DM3, DM7, DM14, DML3, DML7, DML14, masing-masing 4 ekor, dan dibuat luka eksisi *punch biopsy* pada punggung. Kelompok DML mendapat terapi *LIPUS* pada area luka (frekuensi 3 MHz, intensitas 0,5 W/cm^2, *duty cycle* 20%, durasi 3 menit setiap hari selama 3 hari (DML3), 7 hari (DML7) dan 14 hari (DML14). Jaringan area luka dilakukan pewarnaan *toluidine blue* untuk mengamati degranulasi sel *mast* dan IHC HSP-47 untuk mengamati ekspresi fibroblas. Uji *Two Way ANOVA* dan *Post Hoc LSD* digunakan untuk mengetahui perbedaan degranulasi sel mast dan ekspresi fibroblas.

Hasil menunjukkan degranulasi sel *mast* dan ekspresi fibroblas pada kelompok DML lebih tinggi daripada kelompok DM. Uji *Pearson* menunjukkan adanya korelasi antara degranulasi sel *mast* dan ekspresi fibroblas (p=0,00; r=0,839). Kesimpulan: terapi LIPUS meningkatkan degranulasi sel *mast* dan ekspresi fibroblas pada tikus model diabetes melitus tipe 2. Semakin tinggi degranulasi sel *mast*, semakin tinggi ekspresi fibroblas.

Kata kunci: Diabetes melitus tipe 2, *Low Intensity Pulsed Ultrasound (LIPUS)*, degranulasi sel *mast*, ekspresi fibroblas.

ABSTRACT

Patients with diabetes mellitus often experience impaired wound healing, so Low Intensity Pulsed Ultrasound (LIPUS) therapy was developed to overcome this. The use of LIPUS therapy in the early inflammatory phase can induce mast cell degranulation, and in the proliferative phase it can increase collagen synthesis by fibroblasts. The purpose of this study was to determine the effect of LIPUS therapy on mast cell degranulation and fibroblast expression in the wound healing process of punch biopsy rats with type 2 diabetes mellitus.

Twenty-four Sprague dawley mice that fit the inclusion criteria were made into type 2 diabetes mellitus by injecting Nicotinamide and Streptozotocin, then divided into six groups: DM3, DM7, DM14, DML3, DML7, DML14, 4 each, and punch biopsy wounds were made on the dorsal. The DML group received LIPUS therapy in the wound area (frequency 3 MHz, intensity 0.5 W / cm2, duty cycle 20%, duration 3 minutes every day for 3 days (DML3), 7 days (DML7) and 14 days (DML14). The wound area tissue was stained with toluidine blue to observe mast cell degranulation and IHC HSP-47 to observe fibroblast expression. Two Way ANOVA and Post Hoc LSD tests were used to determine differences in mast cell degranulation and fibroblast expression.

The results showed that mast cell degranulation and fibroblast expression in the DML group were higher than in the DM group. Pearson test showed a correlation between mast cell degranulation and fibroblast expression ($p = 0.00$; $r = 0.839$). Conclusion: LIPUS therapy increases mast cell degranulation and fibroblast expression in type 2 diabetes mellitus mice. The higher the mast cell degranulation, the higher the fibroblast expression.

Keywords: Type 2 diabetes mellitus, Low Intensity Pulsed Ultrasound (LIPUS), mast cell degranulation, fibroblast expression.