

Abstrak

Background. *Negative pressure wound therapy* (NPWT) telah digunakan sebagai salah satu terapi modalitas perawatan ulkus kaki diabetes yang efektif dan aman. Penggunaan terapi ini di Indonesia masih cukup terbatas. Sementara terapi konvensional atau perawatan luka dengan kassa lembab NaCl 0,9% menunjukkan hasil yang terbatas. *Electronic pneumatic massage* (EPM) diketahui memberikan efek lokal terhadap aliran darah.

Aim. Penelitian ini bertujuan untuk mengetahui efektivitas kombinasi NPWT dan EPM terhadap proses penyembuhan ulkus kaki diabetes dan suhu di sekitar luka pada pasien dengan ulkus kaki diabetes.

Methods. Penelitian ini menggunakan desain *Randomized controlled trial* (RCT) melibatkan 120 pasien dengan ulkus kaki diabetes grade 2 dan 3 yang dibagi menjadi 4 kelompok. Kelompok ke-1 yang menerima terapi kombinasi NPWT dan EPM, kelompok ke-2 diberikan terapi *single* NPWT, kelompok ke-3 mendapatkan perawatan ulkus kaki diabetes dengan kassa lembab NaCl 0,9% dan EPM serta kelompok ke-4 atau kelompok kontrol diberikan perawatan dengan kassa lembab NaCl 0,9%. *Modified* NPWT dan EPM digunakan dalam penelitian ini. *Bates Jensen Wound Assessment Tool* (BWAT) dan *Flir One Camera* digunakan sebagai instrumen dalam penelitian ini. Selanjutnya, Uji *Friedman* dan uji *Independent-sample Kruskal Wallis* digunakan sebagai uji analisis dalam penelitian ini.

Results. Hasil penelitian ini menunjukkan bahwa terdapat perbedaan signifikan antara kelompok 1, 2, 3 dan 4 terhadap proses penyembuhan ulkus kaki diabetes dengan skor BWAT pre-test sebesar $34,53 \pm 5,33$ menjadi $18 \pm 5,72$ pada post minggu ke-3 di kelompok kombinasi NPWT dan EPM. Sementara itu, pada kelompok *single* NPWT tercatat skor BWAT sebesar $37 \pm 6,80$ pada pre-test menurun menjadi $18 \pm 5,47$. Adapun pada kelompok EPM tercatat $34 \pm 6,94$ pada pre-test menjadi $23 \pm 5,74$. Sedangkan pada kelompok kontrol skor BWAT tercatat $35 \pm 7,45$ pada pre-test menjadi $25 \pm 6,03$ pada post minggu ke-3. Hasil analisis menunjukkan nilai test statistic sebesar 9,873 dengan $p=0,020$ ($p<0,05$). Sementara itu, hasil pengukuran suhu di sekitar ulkus pada masing – masing kelompok 1,2,3 dan kelompok kontrol menunjukkan $36,38 \pm 0,097$, $36,41 \pm 0,10$, $36,36 \pm 0,419$, dan $36,18 \pm 0,153$ pada pengukuran pre-test menjadi $36,47 \pm 0,094$, $36,43 \pm 0,083$, $36,34 \pm 0,113$ dan $36,16 \pm 0,153$ pada pengukuran post minggu ke-3. Hanya kelompok kombinasi NPWT dan EPM yang menunjukkan adanya perbedaan yang signifikan terhadap suhu di sekitar ulkus kaki diabetes dengan $p=0,000$.

Conclusion. Ada perbedaan efektivitas terapi kombinasi NPWT dan EPM, *single* NPWT, EPM dan terapi konvensional terhadap proses penyembuhan ulkus kaki diabetes dimana kombinasi NPWT dan EPM serta *single* NPWT lebih efektif dalam proses penyembuhan ulkus kaki diabetes dibandingkan dengan kedua perawatan ulkus kaki diabetes yang lain. Sementara hanya kombinasi NPWT dan EPM yang efektif terhadap perubahan suhu di sekitar ulkus kaki diabetes. Beberapa faktor berpengaruh terhadap penyembuhan ulkus kaki diabetes termasuk lama menderita DM, mulai ulkus diabetes dan tingkat stres.

Key words: *negative pressure wound therapy, electronic pneumatic massage, wound healing, diabetic foot ulcers.*

Abstract

Background Negative pressure wound therapy (NPWT) has been used as an effective and safe modality for treating diabetic foot ulcers. However, its use in Indonesia is still quite limited. Meanwhile, conventional therapy or wound care with 0.9% NaCl moist gauze shows limited results. Electronic pneumatic massage (EPM) is known to have a local effect on blood flow.

Aim This study aims to determine the effectiveness of the combination of NPWT and EPM on the healing process of diabetic foot ulcers and temperature around the ulcers in patients with diabetic foot ulcers.

Methods This study used a randomized controlled trial (RCT) design involving 120 patients with grade 2 and 3 diabetic foot ulcers, divided into four groups. The first group received a combination of NPWT and EPM therapy, the second group received single NPWT therapy, the third group received EPM therapy, and the fourth or control group received conventional treatment with 0,9% NaCl moist gauze. Modified NPWT and EPM were used in this study. The Bates-Jensen Wound Assessment Tool (BWAT) and Flir One Camera were used as instruments in this study. Subsequently, the Friedman and Independent-sample Kruskal-Wallis tests were used as the analytical tests in this study.

Results The results of this study showed a significant difference in scores between groups 1, 2, 3, and 4 regarding diabetic foot ulcer healing, with pre-test BWAT scores of 34.53 ± 5.33 decreasing to 18 ± 5.72 in the third-week post-test in the combination of NPWT and EPM group. Meanwhile, in the single NPWT group, the BWAT score decreased from 37 ± 6.80 in the pre-test to 18 ± 5.47 . In the EPM group, the score decreased from 34 ± 6.94 in the pre-test to 23 ± 5.74 . In the control group, the BWAT score decreased from 35 ± 7.45 in the pre-test to 25 ± 6.03 in the third-week post-test. The analysis showed a test statistic value of 9.873 with $p=0.020$ ($p<0.05$). Furthermore, the temperature measurement around the wound in groups 1, 2, 3, and the control group showed 36.38 ± 0.097 , 36.41 ± 0.10 , 36.36 ± 0.419 , and 36.18 ± 0.153 in the pre-test, increasing to 36.47 ± 0.094 , 36.43 ± 0.083 , 36.34 ± 0.113 , and 36.16 ± 0.153 in the third-week post-test. The only combination of NPWT and EPM showed a statistical difference in the temperature around the diabetic foot ulcers with $p=0,000$.

Conclusion There is a difference in the effectiveness of the combination of NPWT and EPM, single NPWT, EPM, and conventional therapy on the healing of diabetic foot ulcers, with the combination of NPWT and EPM and single NPWT being more effective in the healing process of diabetic foot ulcers compared to the other two therapies. Meanwhile, only the combination of NPWT and EPM effectively maintains the temperature around the diabetic foot ulcers. Several factors influence the healing of diabetic foot ulcers, including the duration of having diabetes, the onset of diabetic ulcers, and stress levels.

Key words: negative pressure wound therapy, electronic pneumatic massage, wound healing, diabetic foot ulcers