# Efficacy of Transcutaneous Acupoint Electrical Stimulation in Reducing Chemotherapy-induced Peripheral Neuropathy Symptoms in Breast Cancer Patients

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## BACKGROUND

Peripheral neuropathy is a common side effect of chemotherapy in breast cancer patients. Neuropathical symptoms negatively impact many aspects of a patient's life. The study purpose was to test the efficacy of transcutaneous acupoint electrical stimulation (TAES) in reducing chemotherapy-induced neuropathological symptoms in breast cancer patients.

## METHODS

This study adopted an experimental research design. A convenient sample of 77 breast cancer patients with chemotherapy-induced neuropathy were recruited from a medical center in Taiwan. They were randomly assigned to either the experimental group or the control group. The experimental group received 4-week of TAES intervention, using the P5 Disperse-Dense Modulation mode to stimulate Neiguan point (PC6), Hegu point (LI4), Sanyinjiao point (SP6) and Taichong point (LR3) twice a day. The control group received usual care. Data on neuropathic pain in the hands and feet measured with the numeric rating scale (NRS) and peripheral neuropathy symptoms measured with the FACT/GOG-NTX were collected at baseline and 1, 2, 3, and 4 weeks after enrollment. The data collector also assessed participants' peripheral neuropathy symptoms using the Total Neuropathy Score Clinical Version and assessed pain interfere with daily life using the interference subscale of the Brief Pain Inventory at baseline and at week 4.

## RSULTS

Results from generalized estimating equations (GEEs) showed significant between-group differences in score change from baseline to week 4 for hand pain (β=-1.95, 95% CI:-2.68- -1.23), foot pain (β=-2.35, 95% CI:-3.17- -1.52) and FACT/GOG-NTX (β=-4.62, 95% CI:-7.12- -2.12). After controlling for baseline scores, ANCOVA showed significant between-group differences in TNSc (MD=-1.45, 95%CI: -2.24 - -0.67) and BPI (MD=-5.83, 95%CI: -10.98 - -0.68) post-test (week 4) scores.

## CONCLUSION

The results of this study support the efficacy of a 4-week TAES intervention in alleviating neuropathic symptoms associated with chemotherapy-induced peripheral neuropathy and its interference with daily life in breast cancer patients.

## KEYWORDS

transcutaneous acupoint electrical stimulation, peripheral neuropathy, breast cancer, chemotherapy

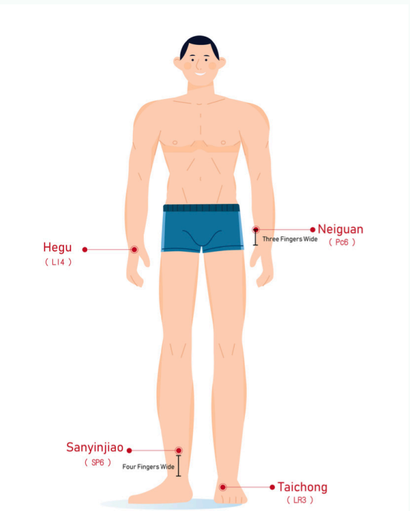


Figure 1. Transcutaneous Electrical Acupoint Stimulation Chart

**Table 1 Between-group comparisons on participants' neuropathological symptoms change over time (n = 77)**

| Variable | Time | Control group | Experimental group | Between group comparison | | Comparing the between-group difference in changes over time # | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Mean (SD) | Mean (SD) | *t* | *p* | Parameter | ß | SE | 95% CI | $X^2$ | *p* |
| Hand pain NRS | T4 | 3.37(2.64) | 1.87(1.81) | 2.91 | 0.002*** | E (T4-T0) VS. C (T4-T0) | -1.95 | 0.37 | -2.68 - -1.23 | 27.77 | <.001*** |
| | T3 | 3.76(2.65) | 2.77(2.07) | 1.84 | 0.035* | E (T3-T0) VS. C (T3-T0) | -1.45 | 0.37 | -2.18 - -0.73 | 15.32 | <.001*** |
| | T2 | 4.29(2.81) | 3.82(2.30) | 0.80 | 0.213 | E (T2-T0) VS. C (T2-T0) | -0.93 | 0.37 | -1.65 - -0.20 | 6.24 | 0.012* |
| | T1 | 4.55(2.63) | 4.28(1.96) | 0.51 | 0.305 | E (T1-T0) VS. C (T1-T0) | -0.73 | 0.37 | -1.46 - -0.001 | 3.86 | 0.050* |
| | T0 | 5.16(2.55) | 5.62(2.07) | -0.86 | 0.195 | – | | | | | |
| Foot pain NRS | T4 | 3.68(2.33) | 2.13(1.81) | 3.28 | <.001*** | E (T4-T0) VS. C (T4-T0) | -2.35 | 0.42 | -3.17 - -1.52 | 30.83 | <.001*** |
| | T3 | 4.16(2.32) | 3.05(2.08) | 2.21 | 0.015* | E (T3-T0) VS. C (T3-T0) | -1.9 | 0.42 | -2.72 - -1.07 | 20.15 | <.001*** |
| | T2 | 4.58(2.55) | 4.08(2.32) | 0.90 | 0.185 | E (T2-T0) VS. C (T2-T0) | -1.29 | 0.42 | -2.12 - -0.46 | 9.35 | 0.002* |
| | T1 | 5.03(2.55) | 4.74(2.09) | 0.53 | 0.298 | E (T1-T0) VS. C (T1-T0) | -1.07 | 0.42 | -1.90 - -0.24 | 6.44 | 0.011* |
| | T0 | 5.21(2.34) | 6.00(2.22) | -1.518 | 0.067 | – | | | | | |
| FACT/GOG-NTX | T4 | 12.32(7.49) | 9.67(6.69) | 1.64 | 0.053 | E (T4-T0) VS. C (T4-T0) | -4.62 | 1.27 | -7.12- -2.12 | 13.14 | <.001*** |
| | T3 | 14.34(6.35) | 12.46(7.12) | 1.22 | 0.113 | E (T3-T0) VS. C (T3-T0) | -5.61 | 1.27 | -8.11 - -3.11 | 19.38 | <.001*** |
| | T2 | 16.08(7.03) | 16.28(6.72) | -0.13 | 0.449 | E (T2-T0) VS. C (T2-T0) | -3.53 | 1.27 | -6.03 - -1.03 | 7.66 | 0.006* |
| | T1 | 18.03(7.43) | 18.51(7.25) | -0.29 | 0.386 | E (T1-T0) VS. C (T1-T0) | -3.24 | 1.27 | -5.74 - -0.75 | 6.48 | 0.011* |
| | T0 | 17.50(6.56) | 21.23(6.12) | -2.58 | 0.012* | – | | | | | |

Note. Using generalized estimating equations for repeated measurements and an exchangeable correlation structure. E, experimental; C, control; T0, baseline; T1, week 1; T2, week 2; T3, week 3; T4, week 4; NRS, numeric rating scale; t, value of independent test; SD, standard deviation; * $p < .05$; *** $p < .001$

**Table 2 Between-group comparison of study participants' change scores from baseline to week four in total neuropathy scores and brief pain scale scores (n = 77)**

| Variable | Time | Control group | Experimental group | Between group comparison | | Between group differences after controlling for baseline scores | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean (SD) | Mean (SD) | t | *p* | Mean difference | 95%CI | *F* | *p* |
| TNSc | T0 | 5.03(2.27) | 6.23(2.19) | -2.37 | 0.010 | | | | |
| | T4 | 3.68(2.09) | 2.23(1.27) | 3.70 | <.001*** | -1.45 | -2.24 - -0.67 | 65.36 | <.001*** |
| | Paired *t* | 6.26 | 15.88 | | | | | | |
| | *p* | <.001*** | <.001*** | | | | | | |
| BPI | T0 | 25.66(11.11) | 32.82(14.45) | -2.43 | 0.009 | | | | |
| | T4 | 19.45(11.58) | 13.62(11.12) | 2.26 | 0.014* | -5.83 | -10.98 - -0.68 | 23.29 | <.001*** |
| | Paired *t* | 5.42 | 9.52 | | | | | | |
| | *p* | <.001*** | <.001*** | | | | | | |

Note. TNSc, total neuropathy scores clinical version; BPI, brief pain inventory interference subscale scores; t, value of independent test; SD, standard deviation; T0, baseline; T4, week 4; CI, confidence interval; *F*, the value of analysis of covariance; * $p < .05$, ** $p < .01$, *** $p < .001$