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Effects of Different Acupuncture Treatment Schedules on Chemotherapy-Induced Peripheral Neuropathy in Patients With Breast Cancer: A Randomized Controlled Trial

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Ethics approval registration details (registry, trial registration number, and date of registration)
The study was performed in line with the principles of the Declaration of Helsinki, and approved by the Ethics Committee of Guangxi Cancer Institute (approval no. KY2023068). The trial was registered with the International Traditional Medicine Clinical Trial Registry (ITMCTR; registration no. ITMCTR2025002507).

Abstract

Purpose: This study compared high-frequency short-course acupuncture (HSFA) with low-frequency long-course acupuncture (LFSA) for chemotherapy-induced peripheral neuropathy (CIPN) in patients with breast cancer and explored whether different treatment schedules were associated with the timing of clinical improvement when the total number of treatment sessions was the same.

Methods: This single-center, randomized, controlled, two-arm parallel-group trial included 80 patients with breast cancer and CIPN who were randomly assigned 1:1 to the HSFA (four sessions/week for 4 weeks) or LFSA (two sessions/week for 8 weeks); both groups received 16 sessions in total. Assessments were performed at baseline and Weeks 4, 8, and 12. The primary outcome was the FACT/GOG-Ntx score. Other outcomes included EORTC QLQ-C30 scores and nerve conduction velocity (NCV).

Result: At Week 4, FACT/GOG-Ntx scores were higher with HSFA than with LFSA [23.22 (5.71) vs 20.26 (4.38); adjusted P=0.043], whereas no between-group differences were observed at Weeks 8 or 12. After the same 16 treatment sessions, FACT/GOG-Ntx scores did not differ between HSFA at Week 4 and LFSA at Week 8 [23.22 (5.71) vs 23.89 (5.45); P=0.606]. Earlier improvements in some quality-of-life domains were observed with HSFA. NCV improved in both groups, without significant between-group differences in changes.

Conclusion: Both HSFA and LFSA improved CIPN symptoms and peripheral nerve conduction function. Earlier symptomatic improvement was observed in the HSFA group, while the clinical effects of the two groups gradually converged over time, indicating that different acupuncture schedules may affect the temporal course of clinical improvement.

Keywords: Chemotherapy-induced peripheral neuropathy.Acupuncture.Breast cancer.Randomized controlled trial.Treatment schedule.

Introduction

Chemotherapy-induced peripheral neuropathy (CIPN) is one of the most common adverse effects of anticancer treatment and is characterized primarily by distal sensory symptoms, including sensory loss, numbness, tingling, and burning pain, sometimes accompanied by motor and autonomic dysfunction[1]. The reported incidence ranges from 19% to 85%[2], and varies according to the chemotherapeutic agent, cumulative dose, and individual patient factors, with taxanes and platinum compounds being among the most common causative agents[3]. Patients with breast cancer are at particular risk because of the widespread use of taxane- and platinum-based chemotherapy, and in some patients, symptoms may persist for years after treatment[4, 5]. Persistent CIPN can impair patients' quality of life and may lead to chemotherapy dose reduction, treatment delay, or regimen modification. Current treatment options remain limited, with pharmacological therapies providing modest overall benefit[6-8]. Therefore, safe and effective non-pharmacological interventions are needed.

Acupuncture has increasingly been investigated as a potential treatment for CIPN. Randomized controlled trials and systematic reviews suggest that acupuncture may improve sensory symptoms, neuropathic pain, and quality of life[9-11]. However, previous studies have generally used relatively low-frequency, long-course treatment schedules, typically one to two sessions per week for 6–10 weeks[12]. Prolonged treatment may increase the time burden for patients, disrupt daily activities, and reduce treatment adherence. Direct comparisons of different acupuncture frequencies and course durations remain limited. Further research is therefore needed to optimize acupuncture treatment schedules while balancing clinical benefit, treatment duration, and patient adherence.

To address this gap, we conducted a randomized controlled trial comparing different acupuncture treatment schedules for CIPN in patients with breast cancer, with particular attention to the timing of clinical improvement.

Methods

Ethics approval, informed consent, and trial registration

This single-center, parallel-group randomized controlled trial was conducted at Guangxi Medical University Cancer Hospital between July 2024 and June 2025. The study was conducted in accordance with the Declaration of Helsinki [13],and was approved by the Ethics Committee of Guangxi Cancer Institute (approval no. KY2023068). The trial was registered with the International Traditional Medicine Clinical Trial Registry (ITMCTR; registration no. ITMCTR2025002507). All participants provided written informed consent before enrollment. The study was reported in accordance with the CONSORT statement and the STRICTA guidelines [14].

Participants

Women with breast cancer who developed CIPN following chemotherapy were recruited. CIPN severity was assessed by trained investigators according to the National Cancer Institute Common

Terminology Criteria for Adverse Events (NCI-CTCAE).

Inclusion criteria :(1) pathologically or clinically confirmed breast cancer, with documented receipt of multiple cycles of chemotherapy and subsequent CIPN-related symptoms, and an NCI-CTCAE grade ≥1 as assessed by a study investigator; (2) age 18–80 years; (3) expected survival ≥6 months; (4) no severe organ dysfunction, coagulation disorders, or hematopoietic dysfunction, with laboratory parameters adequate for study participation; (5) Karnofsky Performance Status (KPS) ≥70; and (6) ability to comply with treatment and follow-up procedures.

Exclusion criteria: (1) severe cardiac, hepatic, renal, or hematopoietic dysfunction, severe psychiatric disorders, pregnancy, or breastfeeding; (2) a history of significant skin allergy; (3) trauma, ulceration, or infection at acupuncture sites; (4) diabetic peripheral neuropathy or other conditions that could affect peripheral nerve function; (5) participation in another clinical trial; or (6) any condition considered by the investigators to preclude participation.

Sample size

The sample size was calculated based on the FACT/GOG-Ntx score as the primary outcome. Based on previous studies [15, 16] , and our pilot data, a 5-point difference in the FACT/GOG-Ntx score was considered clinically meaningful, with an assumed standard deviation of 8 points. With a two-sided α of 0.05 and 90% power, at least 36 participants were required per group. Allowing for an approximately 10% dropout rate, the target sample size was set at 40 participants per group (80 participants in total).

Randomization and blinding

Following baseline assessment, participants were randomly assigned to the HSFA or LFSA group in a 1:1 ratio using a computer-generated randomization sequence prepared by an independent statistician. Allocation concealment was maintained using sequentially numbered, opaque, sealed envelopes, which were opened in order by a study investigator after completion of the baseline assessment.
Because both groups received acupuncture but differed in treatment frequency and course duration, blinding of participants and acupuncturists was not feasible. Treatment delivery and outcome assessment were conducted independently to minimize assessment bias. Outcome assessors and the statistician were blinded to group allocation.

Intervention

The acupuncture protocol was developed based on traditional Chinese medicine meridian theory, previous clinical studies of acupuncture for CIPN [17, 18] , and our clinical experience. Both groups received the same acupuncture protocol and the same total number of treatment sessions, differing only in treatment frequency and course duration. The HSFA group received four sessions per week for 4 weeks, whereas the LFSA group received two sessions per week for 8 weeks; both groups completed 16 sessions.
Acupuncture points included LI4 (Hegu), PC6 (Neiguan), LI11 (Quchi), and EX-UE9 (Baxie) on the

upper extremities, and ST36 (Zusanli), GB34 (Yanglingquan), SP6 (Sanyinjiao), KI3 (Taixi), LR3 (Taichong), and EX-LE10 (Bafeng) on the lower extremities (Fig. 1). After routine skin disinfection, disposable sterile acupuncture needles (Huatuo, Suzhou Medical Appliance Factory, China) were used. Needles measuring 0.25 × 15 mm were inserted approximately 5–8 mm at Baxie and Bafeng, while 0.25 × 25 mm needles were inserted approximately 15–20 mm at the remaining points, according to local anatomy. Manual needle manipulation was performed to elicit de qi, characterized by sensations such as soreness, numbness, or distension. Needles were retained for 30 min.

All treatments were administered by two licensed traditional Chinese medicine physicians. Treatment delivery was supervised by a senior physician with more than 20 years of clinical experience to ensure consistency of the intervention.

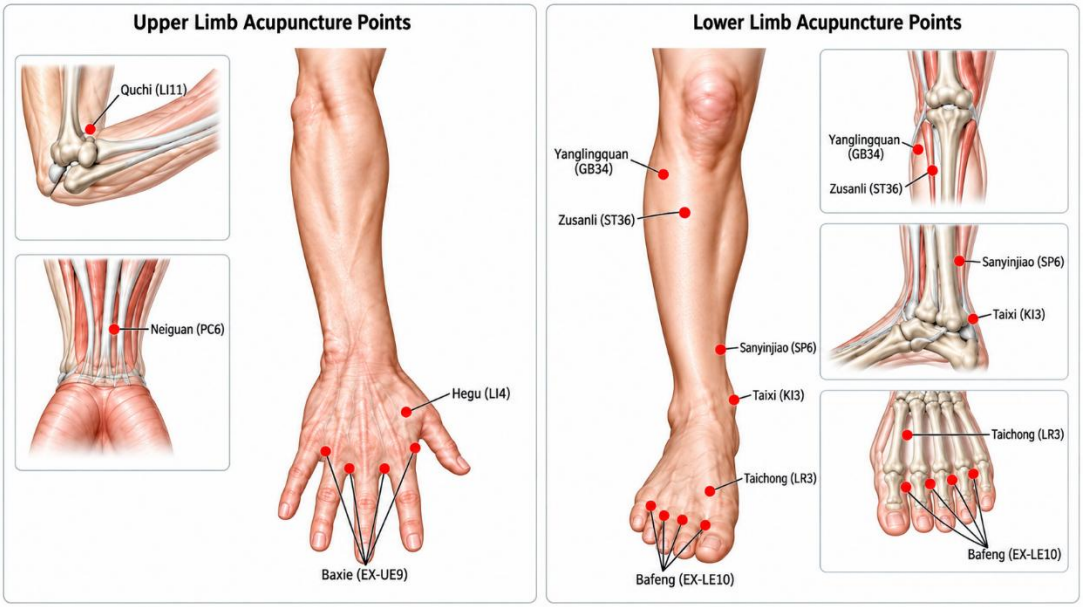


Figure 1. Acupuncture points used in the study.

Upper-limb acupoints included Hegu (LI4), Neiguan (PC6), Quchi (LI11), and Baxie (EX-UE9). Lower-limb acupoints included Zusanli (ST36), Yanglingquan (GB34), Sanyinjiao (SP6), Taixi (KI3), Taichong (LR3), and Bafeng (EX-LE10). All acupoints were treated bilaterally.

Outcome measures

The primary outcome was the Functional Assessment of Cancer Therapy/Gynecologic Oncology Group-Neurotoxicity (FACT/GOG-Ntx) subscale score, which was assessed at baseline and Weeks 4, 8, and 12. The 11-item subscale assesses CIPN-related symptoms and is scored from 0 to 44, with higher scores indicating fewer neurotoxicity-related symptoms.

Secondary outcomes included the European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire-Core 30 (EORTC QLQ-C30) [19]and nerve conduction velocity (NCV). The EORTC QLQ-C30 was assessed at baseline and Weeks 4, 8, and 12, with raw scores transformed to a 0–100 scale according to the standard scoring procedure [20]. Higher scores on the functional scales and global health status/quality-of-life scale indicate better functioning or quality of life, whereas higher scores on the symptom scales and single items indicate greater symptom burden.

NCV was assessed at baseline and after completion of all 16 treatment sessions (Week 4 for HSFA and

Week 8 for LFSA). Measurements were performed using an electromyography and evoked-potential system (NeuroCare-D1, Shanghai NCC Electronic Co., Ltd., China). Sensory and motor conduction velocities of the median nerve, sensory conduction velocity of the sural nerve, and motor conduction velocity of the common peroneal nerve were recorded.

Statistical analysis

All statistical analyses were performed using SPSS version 27.0. Continuous variables are presented as mean (SD) or median (interquartile range), as appropriate, and categorical variables as number (percentage). Between-group comparisons were performed using the independent-samples *t* test, Mann–Whitney *U* test, chi-square test, or Fisher's exact test, as appropriate. Repeated-measures outcomes were analyzed using two-way repeated-measures analysis of variance to assess the effects of time, group, and the group × time interaction, with Bonferroni adjustment for multiple comparisons. For NCV outcomes, changes from baseline to the end of treatment were assessed within each group, and changes (ΔNCV) were compared between groups. A prespecified comparison of FACT/GOG-Ntx scores was also performed between the HSFA group at Week 4 and the LFSA group at Week 8. All tests were two-sided, with $P<0.05$ considered statistically significant.

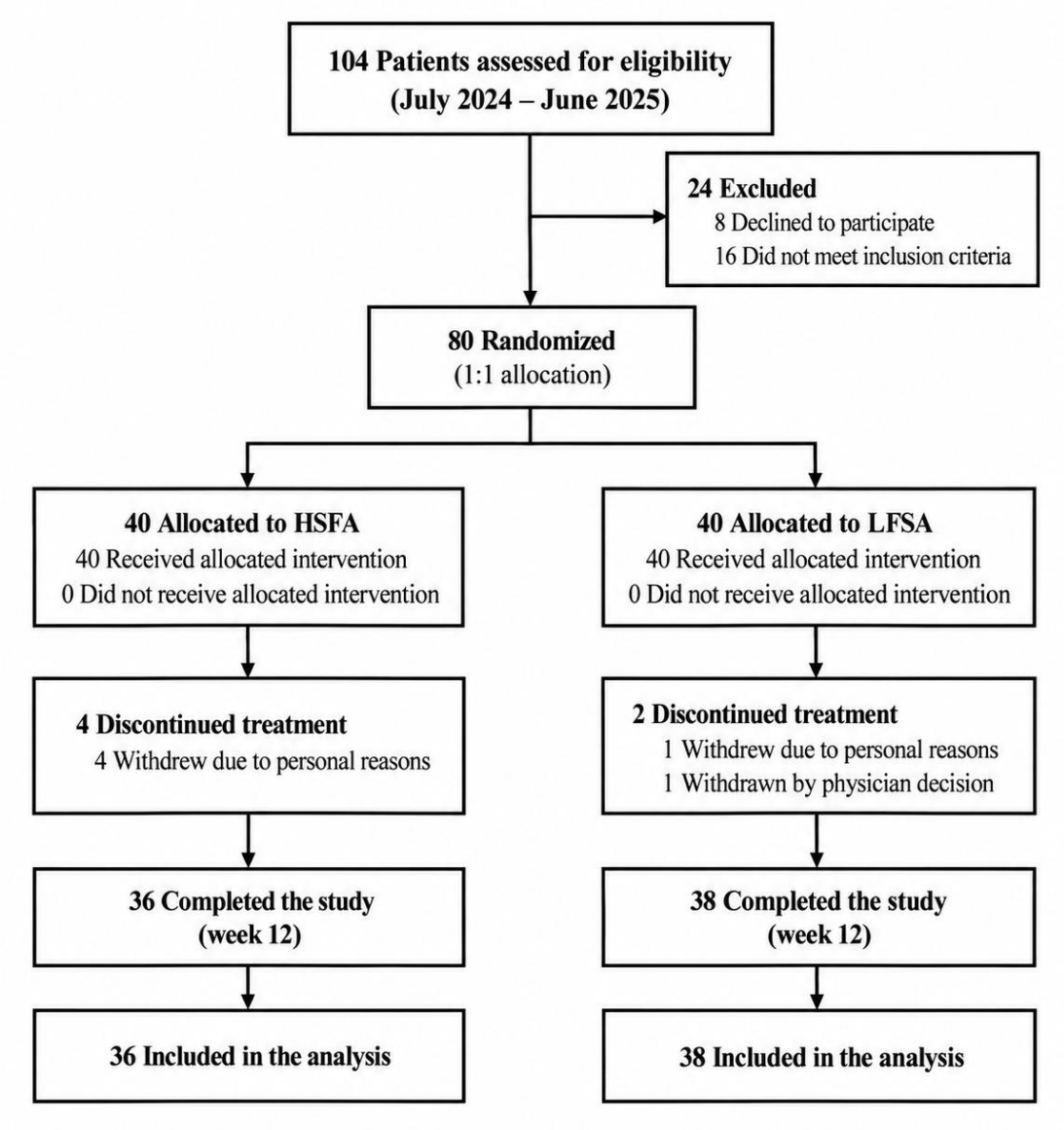


Figure 2. Study flowchart

Results

Participant flow

Participants were enrolled between July 2024 and June 2025, and the study flow is shown in Fig. 2. Of 104 patients assessed for eligibility, 80 (76.9%) were randomized to the HSFA or LFSA group (40 per group). Twenty-four patients were excluded during screening: 8 declined participation and 16 did not meet the inclusion criteria. During the study, 4 participants in the HSFA group discontinued treatment. In the LFSA group, 1 participant withdrew for personal reasons and 1 was withdrawn by physician decision. Overall, 74 participants (36 in the HSFA group and 38 in the LFSA group; 92.5% of those randomized) completed the study and assessments at baseline and Weeks 4, 8, and 12.

Characteristics	HSFA (n=36)	LFSA (n=38)
Age, years	50.78 ± 7.39	49.92 ± 8.90

Characteristics	HSFA (n=36)	LFSA (n=38)
BMI, kg/m²	23.59 ± 3.44	23.52 ± 2.63
Tumor stage, n (%)		
I	9 (25.0)	8 (21.1)
II	20 (55.6)	25 (65.8)
III	5 (13.9)	4 (10.5)
IV	2 (5.6)	1 (2.6)
Chemotherapy cycles	9.97 ± 5.40	9.61 ± 5.13
CIPN duration, months	9.56 ± 3.11	9.42 ± 2.82
Previous cancer treatments, n (%)		
Taxane	34 (94.4)	36 (94.7)
Platinum agents	8 (22.2)	7 (18.4)
Radiotherapy	23 (63.9)	28 (73.7)
Hormonal therapy	17 (47.2)	21 (55.3)
Hormone receptor status, n (%)		
ER positive	25 (69.4)	28 (73.7)
PR positive	22 (61.1)	22 (57.9)
HER2 positive	22 (61.1)	16 (42.1)
NCI-CTCAE grade, n (%)		
Grade 1	10 (27.8)	7 (18.4)
Grade 2	20 (55.6)	22 (57.9)
Grade 3	6 (16.7)	9 (23.7)

Table 1. Baseline characteristics of the study participants

Baseline characteristics

Baseline demographic and clinical characteristics are presented in Table 1 and were generally comparable between the two groups.

Primary endpoint

Changes in FACT/GOG-Ntx scores are shown in Fig. 3 and Table 2. Compared with baseline, FACT/GOG-Ntx scores increased significantly at Weeks 4, 8, and 12 in both groups (all $P<0.001$). At Week 4, the FACT/GOG-Ntx score was significantly higher in the HSFA group than in the LFSA group [23.22 (5.71) vs 20.26 (4.38); adjusted $P=0.043$]. No significant between-group differences were observed at Weeks 8 or 12 (both adjusted $P>0.05$). In the prespecified comparison after the same cumulative 16 treatment sessions, the FACT/GOG-Ntx score did not differ significantly between the HSFA group at Week 4 and the LFSA group at Week 8 [23.22 (5.71) vs 23.89 (5.45); $P=0.606$].

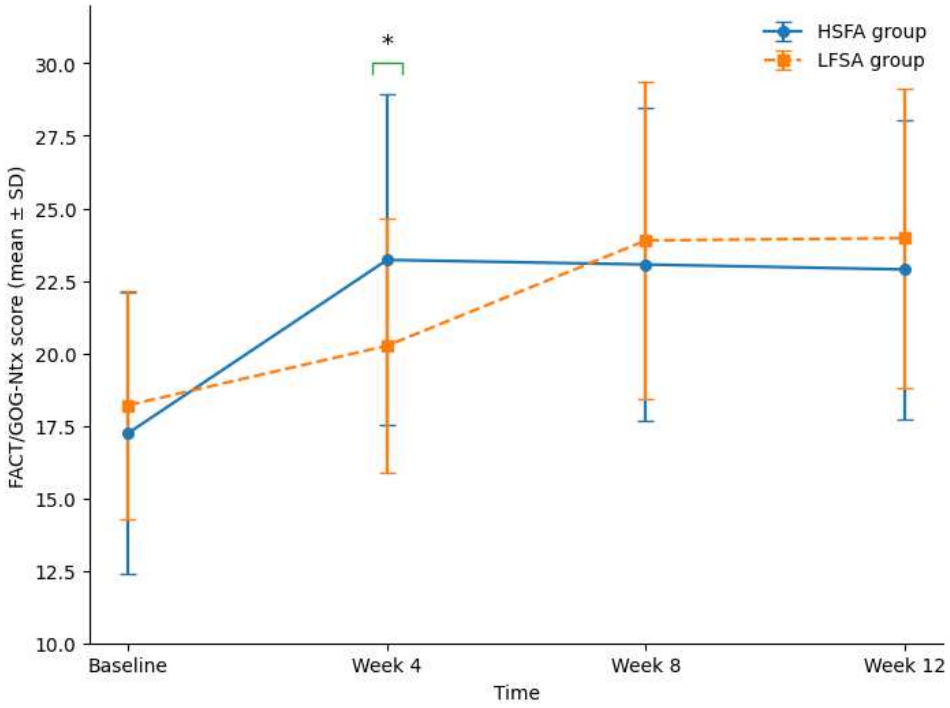


Figure 3. Changes in FACT/GOG-Ntx scores over time in the HSFA and LFSA groups.
Data are presented as mean ± SD. Higher FACT/GOG-Ntx scores indicate fewer neurotoxicity-related symptoms. HSFA, high-frequency short-course acupuncture; LFSA, low-frequency long-course acupuncture. *Adjusted P*<0.05 for the between-group comparison at Week 4 (Bonferroni-adjusted).

Time	HSFA, Mean (SD)	Within-group *P*	LFSA, Mean (SD)	Within-group *P*	Between-group *P*
Baseline	17.25 (4.86)	—	18.21 (3.93)	—	0.352
Week 4	23.22 (5.71)	<0.001	20.26 (4.38)	<0.001	0.043
Week 8	23.06 (5.39)	<0.001	23.89 (5.45)	<0.001	1.000
Week 12	22.89 (5.17)	<0.001	23.97 (5.16)	<0.001	1.000
Prespecified comparison					
HSFA Week 4 vs LFSA Week 8†	23.22 (5.71)	—	23.89 (5.45)	—	0.606

Table 2. Longitudinal changes in FACT/GOG-Ntx scores in the HSFA and LFSA groups
Notes: Data are presented as mean (SD). Higher FACT/GOG-Ntx scores indicate fewer neurotoxicity-related symptoms. Within-group *P* values were obtained using paired-samples *t* tests comparing each follow-up with baseline, with Bonferroni adjustment. Between-group *P* values were obtained using independent-samples *t* tests, with Bonferroni adjustment for Weeks 4, 8, and 12; the baseline *P* value was unadjusted.
† Prespecified comparison of HSFA at Week 4 versus LFSA at Week 8 after completion of 16 treatment sessions; *P*=0.606 (two-sided independent-samples *t* test).

EORTC QLQ-C30

Individual score distributions for the main EORTC QLQ-C30 domains are shown in Fig. 4, and longitudinal changes across all 15 domains are presented in Fig. 5. Repeated-measures ANOVA showed significant time effects for PF, RF, EF, CF, SF, QL, FA, PA, SL, CO, and DI (all $P<0.05$). Significant group × time interactions were observed for QL, PF, RF, CF, FA, and PA (QL, $P<0.001$; PF, $P=0.001$; RF, $P=0.003$; CF, $P=0.037$; FA, $P=0.019$; PA, $P=0.046$), whereas no significant main effect of group was found for any domain (all $P>0.05$).

PF, RF, and QL showed distinct temporal patterns between the groups. Improvements in PF and RF in the HSFA group occurred mainly during the first 4 weeks and remained generally stable thereafter, whereas further improvement was observed in the LFSA group between Weeks 4 and 8. A similar pattern was observed for QL, with scores in the two groups becoming more comparable at later assessments. Although CF showed a significant group × time interaction, the overall magnitude of score changes was small.

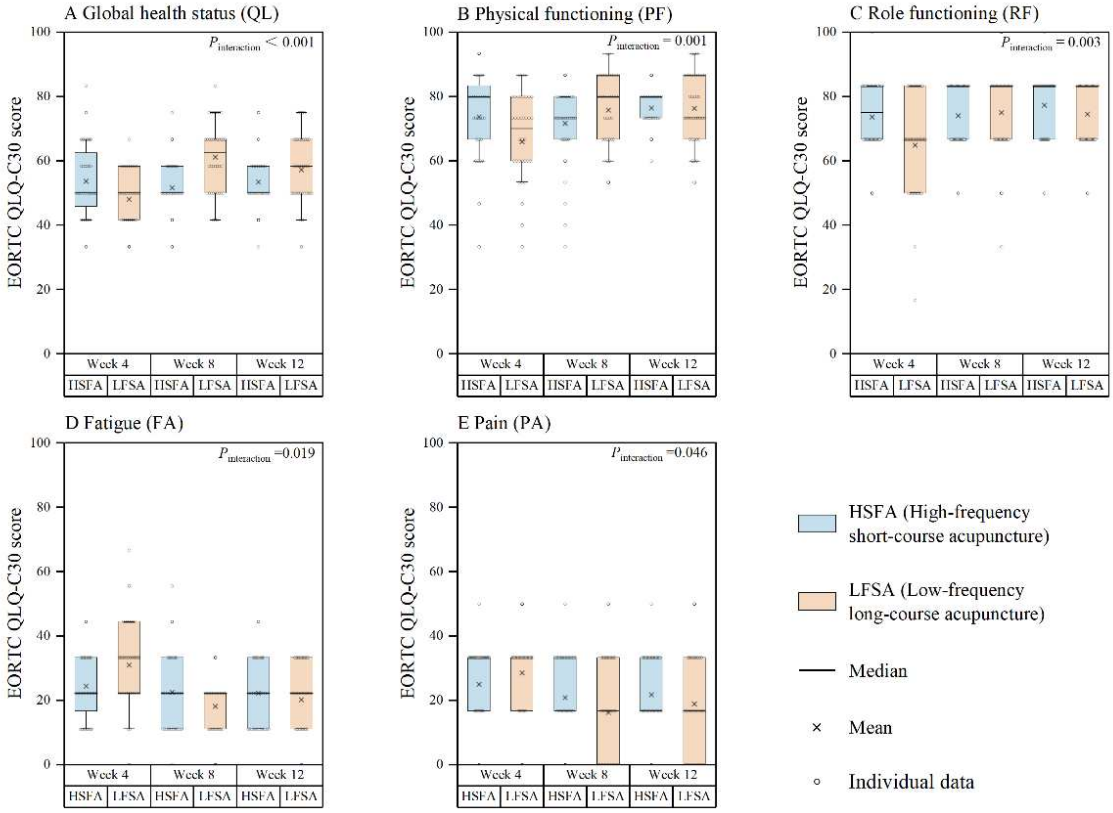


Figure 4. Boxplots of EORTC QLQ-C30 scores over time in the HSFA and LFSA groups.

Scores range from 0 to 100. Higher scores on the functional scales (physical, role, emotional, cognitive, and social functioning) and global health status/quality of life indicate better functioning or quality of life, whereas higher scores on the symptom scales/items indicate greater symptom burden.

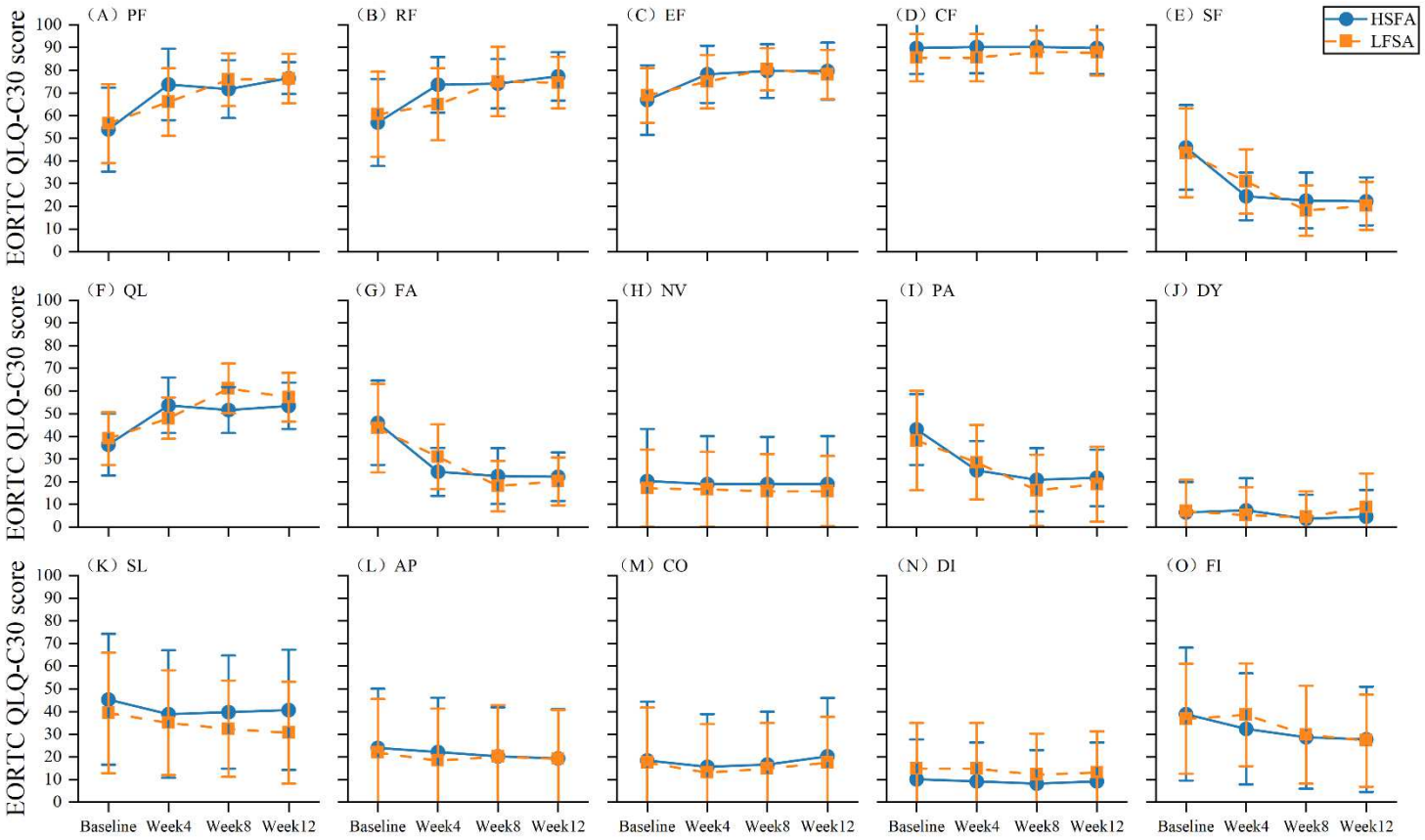


Figure 5. Changes in the 15 EORTC QLQ-C30 domain scores over time in the HSFA and LFSA groups.

Data are presented as mean ± SD. Higher functional and global health status/quality-of-life scores indicate better outcomes, whereas higher symptom scores indicate greater symptom burden.

Nerve conduction velocity

Nerve conduction velocity results are presented in Table 3. Within-group analyses showed significant increases from baseline in median sensory and motor NCV, sural sensory NCV, and common peroneal motor NCV after treatment in both groups (all $P<0.05$). No significant between-group differences were observed in the changes in any NCV measure (ΔNCV; all $P>0.05$).

Variable	HSFA Baseline	HSFA Post-treatment	ΔNCV	LFSA Baseline	LFSA Post-treatment	ΔNCV	*P*Δ

Variable	HSFA Baseline	HSFA Post-treatment	ΔNCV	LFSA Baseline	LFSA Post-treatment	ΔNCV	*P*Δ
Median sensory NCV (m/s)	41.44± 4.21	44.18 ± 4.26*	2.74± 2.16	42.19 ± 4.00	44.58 ± 4.06†	2.39 ± 1.77	0.445
Median motor NCV (m/s)	45.08± 2.46	46.51 ± 2.58*	1.43 ± 1.77	44.85 ± 1.81	46.76 ± 2.21†	1.91 ± 1.68	0.236
Sural sensory NCV (m/s)	37.79± 2.62	40.13 ± 3.01*	2.34 ± 1.77	38.50 ± 2.45	40.93 ± 2.24†	2.43 ± 2.41	0.863
Peroneal motor NCV (m/s)	40.25± 1.92	41.94 ± 2.00*	1.69 ± 1.03	40.48 ± 2.40	42.41 ± 2.35†	1.94 ± 1.81	0.473

Table 3. Changes in nerve conduction velocity in the HSFA and LFSA groups

Notes: Data are presented as mean ± SD. Post-treatment assessments were performed after completion of 16 acupuncture sessions (Week 4 for HSFA and Week 8 for LFSA). ΔNCV was calculated as post-treatment minus baseline. **P*<0.001 versus baseline. *P*Δ represents the between-group comparison of changes from baseline.

Discussion

This study compared the clinical effects of HSFA and LFSA in patients with breast cancer and CIPN. Both treatment schedules improved CIPN-related symptoms, but the timing of improvement differed. Symptom improvement occurred earlier with HSFA, whereas outcomes gradually became more comparable as LFSA treatment continued. These findings suggest that the cumulative number of treatment sessions may contribute to the progressive improvement in symptoms, while a higher treatment density may primarily shorten the time required to achieve a comparable level of improvement rather than produce greater effects at later assessments.

Some EORTC QLQ-C30 domains showed a similar pattern. PF and RF improved by Week 4 in the HSFA group and remained generally stable thereafter, whereas improvements in the LFSA group were more evident between Weeks 4 and 8. QL also showed a different temporal pattern between the groups. These findings suggest that the effects of different treatment schedules may extend beyond CIPN-related symptoms to the timing of improvements in functional status and quality of life.

A different pattern was observed for nerve conduction outcomes. After completion of 16 treatment sessions, NCV increased from baseline in both groups, but no significant between-group differences were observed in ΔNCV. This suggests that the difference in the timing of symptom improvement was not accompanied by a greater improvement in nerve conduction after the same cumulative number of

treatment sessions. This may reflect differences in the aspects of CIPN captured by the two measures: FACT/GOG-Ntx primarily reflects patient-reported symptoms and functional impact, whereas NCV reflects peripheral nerve conduction function, and changes in these outcomes may not occur in parallel. Future studies incorporating neurophysiological assessments at additional intermediate time points may help clarify the temporal relationship between symptom improvement and recovery of nerve function.

Previous studies have suggested potential benefits of acupuncture for CIPN, although treatment frequency and duration have varied considerably and treatment periods have generally been relatively long. Huang[21]delivered 15 sessions over 9 weeks, Friedemann [9]used 10 sessions over 10 weeks, and Ter[22]administered one session per week for 8 weeks. Although clinical benefits have been reported with these schedules, evidence regarding the optimal frequency and duration of acupuncture remains limited. A previous dose–response study [23]showed a progressive reduction in pain with increasing numbers of acupuncture sessions, suggesting that approximately 16 sessions may provide a favorable treatment effect, with marked pain relief or functional improvement occurring within 2–6 weeks in most patients. In the present study, both groups received 16 sessions, whereas HSFA delivered the same number of sessions within 4 weeks and showed earlier clinical improvement. This finding is broadly consistent with a possible dose–response relationship between acupuncture exposure and clinical improvement. It further suggests that, beyond the cumulative number of sessions, treatment density—the distribution of sessions within a given period—may also influence the timing of clinical improvement.

The mechanisms underlying the earlier clinical improvement associated with a higher treatment density remain unclear. Previous studies suggest that acupuncture may improve neuropathic symptoms by modulating abnormal sensory input and central pain processing, suppressing neuroinflammation, and regulating neuroimmune interactions [24]. Animal studies further indicate that repeated electroacupuncture can produce cumulative analgesic effects, potentially involving enhanced adenosine-mediated antinociception [25]. Based on these findings, a higher treatment density may allow the neuromodulatory effects of repeated stimulation to accumulate within a shorter period, providing a possible explanation for the earlier clinical improvement observed with HSFA. However, this mechanism remains hypothetical and requires further investigation.

From a clinical perspective, these findings suggest that, when the cumulative number of treatment sessions is the same, acupuncture frequency may be tailored according to patients' needs regarding the timing of symptom improvement, treatment burden, and adherence, providing a basis for more individualized treatment scheduling in CIPN.

Limitations

This study has several limitations. First, the single-center design, relatively small sample size, and short follow-up period warrant confirmation in larger multicenter studies. Second, both groups received the same cumulative number of treatment sessions, and only two treatment schedules were compared. Therefore, the relationship between treatment density and the timing of clinical improvement remains exploratory and should be further investigated using a broader range of treatment frequencies, durations, and cumulative numbers of sessions. Finally, the limited NCV assessment time points and lack of mechanistic biomarkers precluded a detailed evaluation of the temporal course of neurophysiological recovery and the underlying mechanisms.

Conclusion

Both HSFA and LFSA improved CIPN-related symptoms in patients with breast cancer. HSFA showed earlier clinical improvement, whereas outcomes gradually became more comparable between the groups over time. These findings suggest that different acupuncture schedules may influence the timing of clinical improvement; however, the effects of different treatment frequencies and durations on CIPN outcomes and their temporal patterns require further investigation.

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[参考文献]

1. Inoue M, Matsumoto K, Tanaka M, et al. (2021) Analysis of chemotherapy-induced peripheral neuropathy using the Japanese Adverse Drug Event Report database. Scientific reports 11:11324. https://doi.org/10.1038/s41598-021-90848-6
2. Sarezky J, Sachs G, Elinzano H, et al. (2021) Cancer and Peripheral Nerve Disease. Clinics in geriatric medicine 37:289-300. https://doi.org/10.1016/j.cger.2021.01.003
3. Banach M, Juranek JK, Zygulska AL (2017) Chemotherapy-induced neuropathies-a growing problem for patients and health care providers. Brain and behavior 7:e00558. https://doi.org/10.1002/brb3.558
4. Nicolae R, Uccellini A, Siderov J, et al. (2023) Taxane-induced neuropathy: How serious is this problem for patients with early breast cancer? Asia-Pacific journal of clinical oncology 19:e118-e127. https://doi.org/10.1111/ajco.13804
5. Mustafa Ali M, Moeller M, Rybicki L, et al. (2017) Long-term peripheral neuropathy symptoms in breast cancer survivors. Breast cancer research and treatment 166:519-526. https://doi.org/10.1007/s10549-017-4437-8
6. Loprinzi CL, Lacchetti C, Bleeker J, et al. (2020) Prevention and Management of Chemotherapy-Induced Peripheral Neuropathy in Survivors of Adult Cancers: ASCO Guideline Update. Journal of clinical oncology : official journal of the American Society of Clinical Oncology 38:3325-3348. https://doi.org/10.1200/jco.20.01399
7. Mezzanotte JN, Grimm M, Shinde NV, et al. (2022) Updates in the Tre

atment of Chemotherapy-Induced Peripheral Neuropathy. Current treatment options in oncology 23:29-42. https://doi.org/10.1007/s11864-021-00926-0

8. Sugimoto M, Takagi T, Suzuki R, et al. (2022) Drug treatment for chemotherapy-induced peripheral neuropathy in patients with pancreatic cancer. Fukushima journal of medical science 68:1-10. https://doi.org/10.5387/fms.2021-32
9. Friedemann T, Kark E, Cao N, et al. (2022) Acupuncture improves chemotherapy-induced neuropathy explored by neurophysiological and clinical outcomes - The randomized, controlled, cross-over ACUCIN trial. Phytomedicine : international journal of phytotherapy and phytopharmacology 104:154294. https://doi.org/10.1016/j.phymed.2022.154294
10. Ben-Arye E, Hausner D, Samuels N, et al. (2022) Impact of acupuncture and integrative therapies on chemotherapy-induced peripheral neuropathy: A multicentered, randomized controlled trial. Cancer 128:3641-3652. https://doi.org/10.1002/cncr.34422
11. Lu W, Giobbie-Hurder A, Freedman RA, et al. (2020) Acupuncture for Chemotherapy-Induced Peripheral Neuropathy in Breast Cancer Survivors: A Randomized Controlled Pilot Trial. The oncologist 25:310-318. https://doi.org/10.1634/theoncologist.2019-0489
12. Li L, Huang Y, An C, et al. (2024) Acupuncture in the treatment of chemotherapy-induced peripheral neuropathy: a meta-analysis and data mining. Frontiers in neurology 15:1442841. https://doi.org/10.3389/fneur.2024.1442841
13. (2013) World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects. Jama 310:2191-2194. https://doi.org/10.1001/jama.2013.281053
14. MacPherson H, Altman DG, Hammerschlag R, et al. (2010) Revised STandards for Reporting Interventions in Clinical Trials of Acupuncture (STRICTA): extending the CONSORT statement. Journal of alternative and complementary medicine (New York, NY) 16:St1-14. https://doi.org/10.1089/acm.2010.1610
15. Maksten EF, Mørch CD, Jakobsen LH, et al. (2025) The course of chemotherapy-induced peripheral neuropathy (CIPN) in hematological patients treated with vincristine, bortezomib, or lenalidomide: the NOVIT study. Supportive care in cancer : official journal of the Multinational Association of Supportive Care in Cancer 33:225. https://doi.org/10.1007/s00520-025-09282-3
16. Parsons SK, Rodday AM, Pei Q, et al. (2023) Performance of the FACT-GOG-Ntx to assess chemotherapy-induced peripheral neuropathy (CIPN) in pediatric high risk Hodgkin lymphoma: report from the Children's Oncology Group AHOD 1331 study. Journal of patient-reported outcomes 7:113. https://doi.org/10.1186/s41687-023-00653-0
17. Yao Y, Zhang X, Ge R, et al. (2024) [Electroacupuncture for the preven

tion of chemotherapy-induced peripheral neuropathy: a randomized contro lled trial]. Zhongguo zhen jiu = Chinese acupuncture & moxibustion 44: 1388-1394. https://doi.org/10.13703/j.0255-2930.20240222-k0001
18. Choi V, Park SB, Lacey J, et al. (2024) Electroacupuncture use for treat ment of taxane-induced peripheral neuropathy in patients with breast can cer: protocol for a pilot, randomised, blinded, sham-controlled trial (EA for CIPN). BMJ open 14:e076391. https://doi.org/10.1136/bmjopen-2023-0 76391
19. Aaronson NK, Ahmedzai S, Bergman B, et al. (1993) The European Or ganization for Research and Treatment of Cancer QLQ-C30: a quality-of -life instrument for use in international clinical trials in oncology. Journa l of the National Cancer Institute 85:365-376. https://doi.org/10.1093/jnci/ 85.5.365
20. Cocks K, King MT, Velikova G, et al. (2008) Quality, interpretation and presentation of European Organisation for Research and Treatment of C ancer quality of life questionnaire core 30 data in randomised controlled trials. European journal of cancer (Oxford, England : 1990) 44:1793-17 98. https://doi.org/10.1016/j.ejca.2008.05.008
21. Huang CC, Ho TJ, Ho HY, et al. (2021) Acupuncture Relieved Chemot herapy-Induced Peripheral Neuropathy in Patients with Breast Cancer: A Pilot Randomized Sham-Controlled Trial. Journal of clinical medicine 1 0:https://doi.org/10.3390/jcm10163694
22. Ter LI, Yamada A, do Nascimento Martins Basilio A, et al. (2026) Acu puncture for peripheral neuropathy induced by paclitaxel in early-stage b reast cancer: a randomized, parallel, controlled, blinded study in a Brazil ian Oncologic Center (PACLILIN Study). Supportive care in cancer : of ficial journal of the Multinational Association of Supportive Care in Can cer 34:102. https://doi.org/10.1007/s00520-026-10315-8
23. Tian H, Luo Q, Huang L, et al. (2024) Exploration of the quantitative-e ffectiveness association between acupuncture temporal parameters and ch emotherapy-induced peripheral neuropathy in cancer patients: a dose-resp onse meta-analysis of randomized controlled trials. Frontiers in oncology 14:1527331. https://doi.org/10.3389/fonc.2024.1527331
24. Chen Y, Li D, Li N, et al. (2023) Role of nerve signal transduction an d neuroimmune crosstalk in mediating the analgesic effects of acupunctu re for neuropathic pain. Frontiers in neurology 14:1093849. https://doi.or g/10.3389/fneur.2023.1093849
25. Kiani FA, Li H, Guo P, et al. (2025) The cumulative analgesic effect o f repeated electroacupuncture is modulated by Adora3 in the SCDH of mice with neuropathic pain. Animal models and experimental medicine 8:1635-1644. https://doi.org/10.1002/ame2.12458

Statements&Declarations

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Competing Interests

The authors have no relevant financial or non-financial interests to disclose.

Author Contributions

Yingjie Nie and Ming He conceived and designed the study. Yingjie Nie, Shishao Chen, Liqiang Yang, and Ming He developed the study methodology. Yingjie Nie, Wei Mai, Jiujie He, Hua Qiu, and Yun Su conducted the investigation and collected the clinical data. Wei Mai, Jiujie He, and Yun Su provided clinical resources. Yingjie Nie curated and analyzed the data and prepared the tables and figures. Hua Qiu and Shishao Chen verified the data and analyses. Yingjie Nie wrote the original draft of the manuscript. Yun Su, Shishao Chen, Liqiang Yang, and Ming He critically reviewed and revised the manuscript. Liqiang Yang and Ming He supervised the study, and Ming He was responsible for project administration. All authors read and approved the final manuscript.

Consent to participate

Informed consent was obtained from all individual participants included in the study.

Consent to publish

All participants provided written informed consent for the publication of their anonymized study data.

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