



The Effect of Self-Acupressure on Peripheral Neuropathy, Disturbance in Daily Activity, and Quality of Life in Breast Cancer Patients undergoing Chemotherapy

Kim, Su Young¹ · Park, Jeong Sook²

¹Yeungnam University Medical Center, Daegu; ²College of Nursing, Keimyung University, Daegu, Korea

Purpose: This study was done to investigate the effects of self-acupressure on chemotherapy-induced peripheral neuropathy (CIPN), the degree of disturbance in daily activity, and the quality of life in breast cancer patients undergoing chemotherapy. **Methods:** A randomized controlled pre-post experimental design was employed. The mean difference of study variables between pre- and post-test was evaluated to test the effects of self-acupressure on LI11, LI10, LI4, ST36, Ex-UE9, and Ex-LE10. The study participants were breast cancer patients treated with taxane-based chemotherapy (experimental group 28 and control group 30). Participants were instructed on the method of self-acupressure and performed self-acupressure three times a day for three weeks. Peripheral neuropathy symptoms, the degree of disturbance in daily activity caused by peripheral neuropathy, and the quality of life were measured before and after self-acupressure. Data were collected from July 2020 to January 2021. **Results:** The experimental group that performed self-acupressure showed a significant decrease in the degree of peripheral neuropathy symptoms and the degree of disturbance in daily activity caused by peripheral neuropathy compared with the control group. The experimental group also showed a significant improvement in the quality of life compared with the control group. **Conclusion:** The self-acupressure program adopted in this study was found to be an effective method to reduce peripheral neuropathy and the degree of disturbance in daily activity, and to improve the quality of life. Therefore, self-acupressure is recommended to reduce CIPN among breast cancer patients undergoing chemotherapy.

Key Words: Acupressure, Chemotherapy, Peripheral Neuropathy, Breast Cancer, Quality of Life

INTRODUCTION

1. Background

Breast cancer is the second most common cancer among women in Korea, exceeding 20,000 new cases every year and accounting for 20.5% of all cancer cases in female patients.¹⁾ As more and more women participate in breast cancer screening programs, the rate of early-stage (0 or 1) breast cancer patients accounted for 62.4% of the total cases, and the 5-year survival rate for breast cancer is 93.3%, due to early diagnosis and improved treatment technologies.¹⁾ Treatment options for breast cancer include surgery, chemotherapy, target therapy, radiation therapy, and hormone therapy. Among them, chemotherapy is one of the most basic treatment methods applied to many breast cancer patients be-

cause it reduces the risk of recurrence and increases the survival rate.²⁾ Although chemotherapy is an important treatment method for increasing the survival rate of cancer patients, it also causes many side effects because it affects not only cancer cells but also normal cells. Among the side effects of chemotherapy, peripheral neuropathy is the second most common neurotoxic side effect after hematologic toxicity, and it occurs in about 40% of those who receive combination chemotherapy.³⁾ Chemotherapy-induced peripheral neuropathy (CIPN) can be permanent, and currently, there is no clear cure or treatment that will repair nerve damage even though many patients suffer from peripheral neuropathy symptoms.³⁾ In particular, more than 80% of breast cancer patients undergoing chemotherapy receive taxane-based chemotherapy, and about 70.8% of those who received taxane-based chemotherapy experience peripheral neuropathy.⁴⁾

The main symptoms of CIPN include numbness, dullness, prickling, tingling, burning, aching, weakness, convulsions or dizziness, and functional disorders in daily life.⁴⁾ The symptoms of peripheral neuropathy experienced by breast cancer patients receiving chemotherapy include numbness in the lower and upper extremities as if one is wearing tight socks and gloves and impaired mobility due to dullness and weakness.^{4,5)} A significant number of patients have experienced these

주요어: 경혈지압, 항암화학요법, 말초신경병증, 유방암, 삶의 질

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Address reprint requests to: Park, Jeong Sook

College of Nursing, Keimyung University, 1095 Dalgubeol-daero, Dalseo-gu, Daegu 42601, Korea

Tel: +82-53-580-3907 Fax: +82-53-580-3916 E-mail: jsp544@kmu.ac.kr

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symptoms for more than two years,⁵⁾ and such symptoms may persist for months to years or remain irreversible even after drug discontinuation or completing chemotherapy.⁶⁾ When the symptoms of peripheral neuropathy get worse for breast cancer patients undergoing chemotherapy, their quality of sleep deteriorates, and depression gets worse, resulting in a decrease in quality of life.⁷⁾ In relation to the cultural characteristics of Korea, where women do the majority of household chores such as cooking, sewing, cleaning, and washing dishes, breast cancer patients with peripheral neuropathy are not able to perform these tasks well. They also experience difficulties in micromovement such as walking, writing, handling small objects, resulting in psychological stress and a decrease in quality of life.⁸⁾ Breast cancer patients showed more severe deterioration in health, function, and quality of life due to peripheral neuropathy than colorectal and hemologic cancer patients who received neurotoxic chemotherapy,⁹⁾ so effective interventions are needed to reduce peripheral neuropathy in breast cancer patients.

Several drug and non-pharmacological therapies have been used to improve the symptoms of peripheral neuropathy, but they have not yet shown a definite effect on peripheral neuropathy.⁹⁾ In recent clinical trials, tricyclic antidepressants or anticonvulsants were used to reduce pain and paresthesia, but the effects were insignificant.¹⁰⁾ Using duloxetine, a serotonin and norepinephrine reuptake inhibitor, as an antidepressant, was effective in decreasing neuropathic pain, but 23-30% of the subjects showed side effects such as fatigue, insomnia, anorexia, nausea, sedation, and dizziness.¹¹⁾ Acupuncture, exercise, and massage are non-pharmacological interventions for alleviating peripheral neuropathy, and a meta-analysis showed that acupuncture and massage have a medium-size effect on reducing peripheral neuropathy symptoms.¹²⁾ Many studies showed that acupuncture treatment using needles to stimulate acupuncture points in the body reduced symptoms of CIPN.¹³⁻¹⁵⁾ The mechanism of acupuncture for treating peripheral neuropathy symptoms is a complex action of nerves, hormones, cytokines, and other mediators.¹⁶⁾ However, acupuncture is an invasive procedure, so it requires the intervention of experts and can be a financial burden.

Nursing interventions that can provide similar effects to acupuncture include acupressure, which uses hands to apply pressure to acupuncture points in the body.¹⁷⁾ Acupressure controls the body by stimulating pain, temperature, and tactile sensations using fingers or various devices. Acupressure uses Pascal's principle and the principle of

acupuncture to apply appropriate vertical pressure to acupuncture points and stimulates the nerves around the blood to regulate nerve function, help release endorphins, and relieve pain by stimulating the large fiber.¹⁷⁾ Acupuncture requires placing needles at the precise location of acupuncture points, but acupressure can revive active physiological functions by pressing near the acupuncture points, even if they are not the exact locations.¹⁸⁾ Multiple studies have reported that applying acupressure to cancer patients relieved symptoms such as nausea, vomiting, and dyspnea and improved their quality of life.^{19,20)} Meanwhile, acupressure is economical, simple, safe, can be easily performed by anyone, has no restrictions in relation to time and place, has few side effects, is non-invasive, and can be applied without causing fear to the subject.²¹⁾

Breast cancer patients usually return home after receiving chemotherapy from outpatient infusion centers of tertiary hospitals or are hospitalized for a short period to receive chemotherapy, so they experience side effects related to chemotherapy after they return home. Therefore, tertiary hospitals that provide acute treatment need to develop and provide education on systematic self-care programs so that cancer patients can relieve their symptoms at home.²²⁾ A study that evaluated the effects of relieving peripheral neuropathy symptoms by performing self-foot reflexology reported that patients could easily intervene on their own by applying self-foot reflexology whenever they wanted, and this increased their interest in health.²³⁾ In terms of acupressure, it is also necessary to develop educational materials so that patients or family members can easily learn, practice, and receive the motivation required to apply acupressure at home.

Therefore, to reduce the symptoms of chemotherapy-induced peripheral neuropathy for breast cancer patients, this study educated patients on how to perform self-acupressure and investigated the effects of self-acupressure on the symptoms of peripheral neuropathy, degree of disturbance in daily activity, and quality of life.

2. Research purpose

The purpose of this study is to investigate the effects of self-acupressure on peripheral neuropathy and quality of life in breast cancer patients experiencing chemotherapy-induced peripheral neuropathy (CIPN). The specific objectives are as follows.

First, investigate the effects of self-acupressure on the symptoms of peripheral neuropathy in breast cancer patients who received chemotherapy.

Second, examine the effects of self-acupressure on the degree of disturbance in daily life due to peripheral neuropathy in breast cancer patients who received chemotherapy.

Third, examine the effects of self-acupressure on the quality of life of breast cancer patients who received chemotherapy.

3. Setting the hypotheses

Hypothesis 1: The experimental group that performed self-acupressure will have fewer symptoms of peripheral neuropathy after the intervention than the control group that did not.

Hypothesis 2: The experimental group that performed self-acupressure will experience less disturbance in daily life due to peripheral neuropathy than the control group that did not.

Hypothesis 3: The experimental group that performed self-acupressure will have a higher quality of life than the control group that did not.

RESEARCH METHODS

1. Research design

This study is a randomized controlled pre-post experimental design to verify the effects of self-acupressure on chemotherapy-induced peripheral neuropathy (CIPN), the degree of disturbance in daily activity, and the quality of life in breast cancer patients who received chemotherapy.

2. Research subjects

The subjects were patients diagnosed with breast cancer and received chemotherapy from July 2020 to January 2021 at Y-University Hospital in Daegu, Korea. The specific criteria for inclusion in the research study were those who understood the purpose of the study and agreed to participate in the study among patients receiving taxane-based chemotherapy before or after breast cancer surgery or within one month after completing chemotherapy, and patients currently experiencing symptoms of peripheral neuropathy due to chemotherapy. Patients who experienced self-acupressure with a medical history other than chemotherapy, those with wounds on their arms, legs, hands, feet, and bleeding disorders, and those who experienced acupuncture or acupressure due to peripheral neuropathy were excluded from the study.

The sample size was calculated using G-Power 3.1.9. Based on a large effect size of .8, a significance level of .05, and a power of .90 for an in-

dependent sample one-sided t-test of two groups, the minimum sample size required was 56 (experimental group 28 and control group 28), but 31 patients were assigned in each group considering a 10% dropout rate. Among the patients who met the selection criteria, 62 patients wanted to participate in the study after hearing an explanation regarding the purpose of the study over the phone among those who made appointments for outpatient treatment or were scheduled to be hospitalized for chemotherapy at the breast surgery department of Y-University Hospital in Daegu and those who were recommended by breast surgeons and outpatient nurses of the gynecology department. Except for two outpatients who missed their appointments, 60 people who gave written consent after hearing detailed explanations about the study participated in the research. After two people from the experimental group dropped out during the study, a total of 58 participants (28 in the experimental group and 30 in the control group) were analyzed (Figure 1).

The subjects were randomly assigned to the experimental group and the control group using Research Randomizer version 4.0. The patients who gave their written consent to participate in the study were numbered one by one and randomly assigned to the experimental group and control group. Subjects were blinded so that they did not know who was in which group. The experimental group received a consent form to receive self-acupressure education, and the control group received a consent form to receive training on peripheral neuropathy management methods for three weeks and self-acupressure education afterwards.

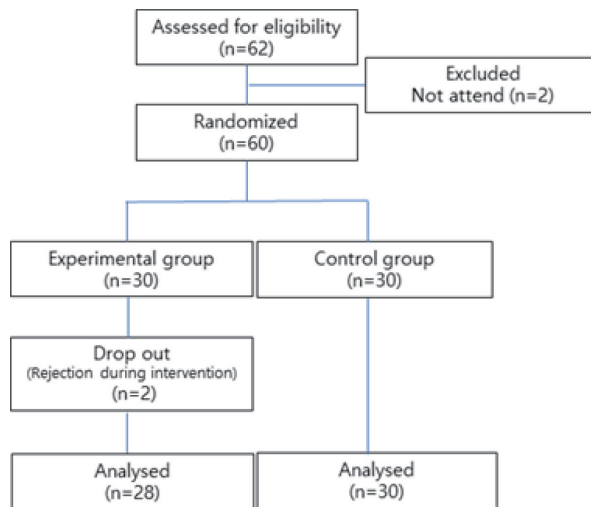


Fig. 1. Research flow diagram of the study.

3. Research tools

1) Peripheral neuropathy

This study used the European Organization for Research and Treatment of Cancer-Quality of Life Questionnaire Chemotherapy-Induced Peripheral Neuropathy 20 (EORTC-QLQ CIPN 20) developed by the European Organization for Research and Treatment of Cancer- Quality of Life Questionnaire (EORTC-QLQ) to assess the symptoms and functional limitations of CIPN, which was translated into Korean by Kwak et al.⁶⁾ This tool (EORTC-QLQ CIPN 20) consists of 20 questions, including 9 questions regarding sensory neuropathy, 8 regarding motor neuropathy, and 3 regarding autonomic neuropathy. Since question No. 20 in the autonomic neuropathy part is only for men, this study used 19 questions excluding this question. Each question is rated on a 4-point scale ranging from 'not at all' to 'very much.' According to the scoring manual from 0 to 100, the higher the score, the more severe the peripheral neuropathy. The Cronbach's α was .82 in the study by Kwak et al.,⁶⁾ and .84 in this study.

2) Degree of disturbance in daily life due to peripheral neuropathy

The degree of disturbance in daily life was measured using the Chemotherapy-induced Peripheral Neuropathy Assessment Tool (CIP-NAT) developed by Tofthagen et al.²⁴⁾ and translated by Hwang²⁵⁾ with the author's permission. This tool consists of 14 questions about the degree of disturbance or hindrance in dressing, walking, lifting objects, holding objects, driving, working, participating in hobbies or leisure activities, exercising, sleeping, writing, doing daily chores, forming relationships with others, and sexual life due to peripheral neuropathy. The tool uses a number rating scale, with a minimum score of 0 to a maximum of 140, and the higher the score, the more disturbance in daily life. The Cronbach's α was .91 in the study by Tofthagen et al.²⁴⁾ and .92 in the study by Hwang.²⁵⁾ The Cronbach's α was .93 in this study.

3) Quality of life

The Korean version of FACT-G was used to measure the quality of life after receiving permission to use Functional Assessment Cancer Therapy-General (FACT-G) version 4 devised by Cella & Tulsky²⁶⁾ through the official FACT website (www.facit.org). FACT-G consists of 27 items on a 5-point Likert scale in 5 sub-domains, including physical well-being (7 items), social/family well-being (7 items), emotional well-

being (6 items), and functional well-being (7 items). The minimum score is 0 and the maximum is 108 by assigning 0 point for 'not at all' and 4 points for 'very much,' and the higher the score, the better the quality of life. The Cronbach's α was .87 in the study by Cella & Tulsky²⁶⁾ and .89 in this study.

4) General characteristics

The subjects' general characteristic was age, and the disease-related characteristics were the onset of peripheral neuropathy symptoms, when breast cancer was diagnosed, treatment methods, and types of breast cancer surgery.

4. Development of self-acupressure and intervention

Domestic and foreign literatures¹³⁻¹⁵⁾ were considered to find effective acupuncture points for CIPN, and individual interviews were conducted with five breast cancer patients experiencing CIPN to investigate the need to manage peripheral neuropathy. Based on the results, six World Health Organization (WHO) standard acupuncture points (LI11, LI10, LI4, ST36, Ex-UE9, Ex-LE10) were selected among the effective acupuncture points for peripheral neuropathy after consulting with an acupuncture specialist at the College of Oriental Medicine with 25 years of clinical experience. The location of the acupuncture points can be found at www.kmcric.com/database/acupoint. Based on the acupressure method used in a previous study by Kang et al.,²⁷⁾ the intervention in this study applied acupressure to each acupuncture point 3 times for 10 seconds, 3 times a day, for 3 weeks by applying vertical pressure, continuous pressure to convey deep pressure for a long time, comfortable pressure to feel cool and a bit of pain while applying pressure, and concentrated pressure with the belief that good results will be obtained. Four oriental medicine specialists validated the location of acupuncture points, acupressure methods, and frequency of self-acupressure intervention outlined above.

A systematic and easy-to-understand educational material was developed to help the participants perform self-acupressure at home. It included general information on CIPN, the definition and effects of acupressure, self-acupressure methods, precautions, and images of the location of acupressure points. The participants received individual training for self-acupressure intervention for 30 minutes. The researcher first showed how to perform self-acupressure on one arm and leg using the educational material, and the subject practiced on the opposite arm and leg while the researcher corrected any mistakes. After

discharge, the participants performed self-acupressure 3 times a day for 3 weeks and filled out a checklist to describe how well they followed the program. The researcher made phone calls twice a week to encourage and check whether the participants complied with the program. As a result of analyzing the checklists, more than 90% of the experimental group followed the program.

5. Data collection

1) Research assistant training

A nurse working at the cancer center at Y-University Hospital in Daegu, Korea, who had more than three years of experience in counseling and education for cancer patients was selected as a research assistant and received training on how to collect data for about 30 minutes. The research assistant was responsible for collecting data for all participants, and she blinded the subjects by referring to them as Groups 1 and 2 so that the participants did not know whether they were in the experimental group or control group.

2) Pre-test survey

The research assistant, who was unaware of the experimental group or control group, visited the subject's ward or outpatient training room before the intervention to conduct a pre-test survey using questionnaires on general characteristics and degree of peripheral neuropathy symptoms, the degree of disturbance in daily life due to peripheral neuropathy, and quality of life. The research assistant used electronic medical records to collect data on disease-related characteristics.

3) Experimental treatment

After the research assistant completed the pre-test survey, the researcher visited the participants in the experimental group for 30 minutes to provide education on how to manage peripheral neuropathy and perform self-acupressure before intravenous infusion began the day before chemotherapy. In the case of inpatients, the participants in single rooms received education in their rooms, and those in multiple-bed hospital rooms received separate education in the training room to prevent others from knowing about the treatment. After discharge, the subjects were asked to perform self-acupressure at home, 3 times a day for 3 weeks. The control group received educational material on general peripheral neuropathy management methods and were educated on the peripheral neuropathy management methods they usually used for 20 minutes. After three weeks, at the end of the experimental pe-

riod, the control group received the same materials and education on self-acupressure as the experimental group.

4) Post-test survey

After the experimental treatment, the research assistant conducted the post-test survey to measure the degree of peripheral neuropathy symptoms one week two weeks and three weeks after the intervention. The purpose was to find out when the effects of performing self-acupressure occur. Since the participants did not visit the hospital after one week and two weeks after the intervention, the research assistant called them, read the questions over the phone, and filled out their answers on the questionnaire to measure their degree of peripheral neuropathy symptoms. When the participants visited the hospital three weeks after the intervention, the research assistant measured the degree of peripheral neuropathy symptoms, the degree of disturbance in daily life, and quality of life in the same way as the pre-test survey.

6. Data analysis

The data were analyzed using SPSS/WIN 26.0. The subjects' general characteristics, disease related characteristics and peripheral neuropathy were calculated into real numbers, percentages, mean, and standard deviation. The homogeneity test between the experimental group and control group was analyzed by χ^2 test, Fisher's exact test, and t-test. The measurement variables and the normality of the distribution were analyzed by the Kolmogorov-Smirnov test. In terms of hypothesis testing, the differences between the experimental and control groups with regard to the degree of peripheral neuropathy symptoms, the degree of disturbance in daily life, and quality of life before and after intervention were analyzed by t-test, and the changes in the intervention effect with regard to peripheral neuropathy symptoms in the experimental group and the control group over time were analyzed by repeated measured ANOVA. The repeated measured ANOVA did not meet sphericity, so the Greenhouse-Geisser correction was used to adjust the lack of sphericity. All statistical significance levels were set to $p < .05$.

7. Ethical consideration

The data were collected after obtaining approval from Keimyung University's Institutional Review Board (40525-202002-HR-088-02), the hospital where the research took place, and the consent of the medical department. The research began after explaining the purpose and method of the study, guaranteeing anonymity and confidentiality,

confirming whether the subjects were willing to participate in the study, and obtaining written consent from the participants. After explaining and obtaining consent that the disease-related characteristics would be inquired about through electronic medical records, the subjects' names were managed with serial numbers so others could not identify them.

RESEARCH RESULTS

1. Homogeneity test

The results of the homogeneity test for the subjects' general characteristics, disease-related characteristics, and dependent variables are as follows (Table 1). A total of 58 subjects were included in the study, 28 in the experimental group and 30 in the control group. The average age of the participants was 52.1 years old, and the results of testing the homogeneity of general characteristics and disease-related characteristics showed that there were no statistically significant differences in age, peripheral neuropathy symptom onset, when they were diagnosed with breast cancer, treatment method, and types of breast cancer surgery between the experimental and control groups, thereby confirming homogeneity (all $p>.05$). The pre-dependent variable homogeneity test results of the experimental and control groups also showed that there

were no statistically significant differences between the two groups in peripheral neuropathy symptoms, the degree of disturbance of daily life, and quality of life, confirming homogeneity between the two groups.

2. Hypothesis testing

As a result of analyzing the normality of all measurement variables in the experimental and control groups with the Kolmogorov-Smirnov test, the Kolmogorov-Smirnov statistics regarding the degree of peripheral neuropathy were 0.14 ($p=.164$) in the experimental group and 0.12 ($p=.200$) in the control group. The Kolmogorov-Smirnov statistics regarding the degree of disturbance in daily life due to peripheral neuropathy was 0.12 ($p=.200$) in the experimental group and 0.13 ($p=.164$) in the control group, and the Kolmogorov-Smirnov statistics regarding quality of life was 0.09 ($p=.200$) in the experimental group and 0.14 ($p=.138$) in the control group, and were found to all form a normal distribution. The hypotheses test results of the experimental group and the control group are as follows (Table 2).

Hypothesis 1: The experimental group that performed self-acupressure will have fewer symptoms of peripheral neuropathy after the intervention than the control group that did not.

According to the results of measuring the degree of peripheral neu-

Table 1. Homogeneity Tests of General Characteristics and Dependent Variables between Experimental and Control Groups ($N=58$)

Variables	Categories	Exp. (n=28)	Cont. (n=30)	χ^2	p
		n (%) or M \pm SD	n (%) or M \pm SD		
Age (year)	< 40	2 (7.1)	3 (10.0)	4.47	.217 [†]
	40~49	14 (50.0)	7 (23.3)		
	50~59	7 (25.0)	11 (36.7)		
	\geq 60	5 (17.9)	9 (30.0)		
When peripheral-neuropathy occurs	After 1 st chemo.	2 (7.1)	1 (3.3)	2.80	.627 [†]
	After 2 nd chemo.	6 (21.4)	11 (36.7)		
	After 3 rd chemo.	9 (32.1)	7 (23.3)		
	After 4 th chemo.	7 (25.0)	5 (16.7)		
	After 5 th or more chemo.	4 (14.3)	6 (20.0)		
Years since breast cancer diagnosis	< 1	23 (82.1)	23 (76.7)	0.93	.711 [†]
	1~2	4 (14.3)	4 (13.3)		
	> 2	1 (3.6)	3 (10.0)		
Treatment	Surgery+chemotherapy	19 (67.9)	23 (76.7)	0.56	.561*
	Chemotherapy only	9 (32.1)	7 (23.3)		
Surgery	No surgery	9 (32.1)	7 (23.3)	0.56	.754*
	Breast conserving surgery	9 (32.1)	11 (36.7)		
	Mastectomy	10 (35.7)	12 (40.0)		
Peripheral neuropathy symptom (range 0~100)		26.85 \pm 12.66	27.27 \pm 11.68	0.80	.423
Disturbance in daily activity (range 0~140)		52.75 \pm 25.22	59.30 \pm 23.87	1.01	.314
Quality of life (range 0~108)		56.02 \pm 13.80	53.31 \pm 12.53	0.78	.436

Exp.= Experimental group; Cont.= Control group; chemo.= chemotherapy; M= Mean; SD= Standard deviation; *Chi-square test; [†] Fisher's exact test.

Table 2. Comparison of Change in Dependent Variables between Experimental and Control Group (N = 58)

Variable	Time	Exp. (n=28)	Cont. (n=30)	t	p	Source	F	p
		M ± SD	M ± SD					
Peripheral neuropathy symptom	Pretest	26.85 ± 12.66	24.72 ± 11.68	0.80	.423	Group	2.11	.151
	Posttest 1 st week	25.96 ± 11.31	26.18 ± 10.90	-0.76	.940		Time	2.44
	Posttest 2 nd week	22.63 ± 10.98	31.03 ± 11.75	-2.80	.007	Time*Group	25.30	<.001*
	Posttest 3 rd week	22.52 ± 12.37	33.12 ± 11.40	-3.39	.001			
Disturbance in daily activity	Pretest	52.75 ± 25.22	59.30 ± 23.87	-1.01	.314			
	Posttest 3 rd week	49.29 ± 25.29	72.80 ± 19.45	-3.98	<.001			
	Difference (post-pre)	-3.46 ± 13.18	13.50 ± 13.40	-4.85	<.001			
Quality of life	Pretest	56.02 ± 13.80	53.31 ± 12.53	0.78	.436			
	Posttest 3 rd week	60.15 ± 13.48	50.10 ± 10.25	3.20	.002			
	Difference (post-pre)	4.12 ± 6.94	-3.21 ± 7.27	3.92	<.001			

Exp.= Experimental group; Cont.= Control group; M= Mean; SD= Standard deviation; *Greenhouse-Geisser correction.

ropathy symptoms in the experimental group and control group 4 times, the average score of peripheral neuropathy symptoms in the experimental group and control group before the intervention was 26.85 ± 12.66 and 24.72 ± 11.68, respectively, showing no significant difference ($t=0.80$, $p=.423$). The average score of peripheral neuropathy symptoms in the experimental group and control group one week after the intervention was 25.96 ± 11.31 and 26.18 ± 10.90, respectively, showing no significant difference ($t=-0.76$, $p=.940$). However, the average score of peripheral neuropathy symptoms two weeks after the intervention was 22.63 ± 10.98 in the experimental group and 31.03 ± 11.75 in the control group, significantly lower in the experimental group ($t=-2.80$, $p=.007$), and the average score of peripheral neuropathy symptoms three weeks after the intervention was 22.52 ± 12.37 in the experimental group and 33.12 ± 11.40 in the control group, also significantly lower in the experimental group ($t=-3.39$, $p=.001$).

The repeated measured ANOVA did not meet sphericity, so Greenhouse-Geisser correction was used to adjust the lack of sphericity. As a result, the interaction between group and time was significant ($F=0.63$, $p<.001$). Therefore, there was no significant difference in the effect of self-acupressure on the degree of peripheral neuropathy symptoms one week after the intervention, but there was a significant difference after two and three weeks (Figure 1).

Hypothesis 2: The experimental group that performed self-acupressure will have less disturbance in daily life due to peripheral neuropathy than the control group that did not.

In terms of the degree of disturbance in daily life due to peripheral neuropathy in the experimental group and control group, the degree of disturbance in daily life due to peripheral neuropathy in the experimental group was 52.75 ± 25.22 before performing self-acupressure and

49.29 ± 25.29 after self-acupressure, and the degree of disturbance in daily life due to peripheral neuropathy decreased by a difference of -3.46 ± 13.18. However, the degree of disturbance in daily life due to peripheral neuropathy in the control group increased by 13.50 ± 13.40 from 59.30 ± 23.87 to 72.80 ± 19.45, indicating that the degree of disturbance in daily life due to peripheral neuropathy became more severe. The pre-post test difference in the degree of disturbance in daily life due to peripheral neuropathy between the two groups showed a statistically significant difference ($t=-4.85$, $p<.001$).

Hypothesis 3: The experimental group that performed self-acupressure will have a higher quality of life than the control group that did not.

In terms of the quality of life between the experimental group and control group, the experimental group's quality of life score was 56.02 ± 13.80 before performing self-acupressure and 60.15 ± 13.48 after, showing that their quality of life improved by 4.12 ± 6.94 before and after the intervention. The control group's quality of life decreased by -3.21 ± 7.27 from 53.31 ± 12.53 to 50.10 ± 10.25. The pre-post test difference in the quality of life between the two groups showed a statistically significant difference ($t=3.92$, $p<.001$).

DISCUSSION

Based on the results above, the discussion on the effects of self-acupressure on the symptoms of peripheral neuropathy, the degree of disturbance in daily life due to peripheral neuropathy, and quality of life in breast cancer patients who experienced CIPN are as follows.

The degree of peripheral neuropathy symptoms in the experimental group that performed self-acupressure was significantly lower than the

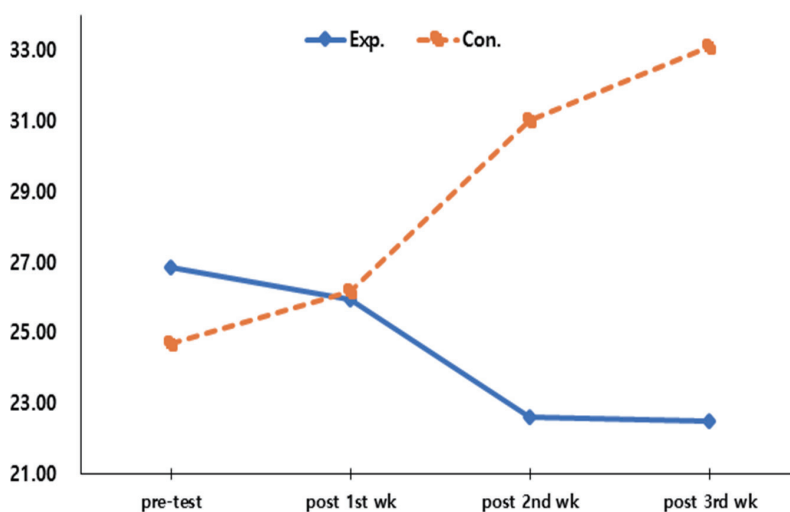


Fig. 2. Comparison of change in peripheral neuropathy symptom after self-acupressure between experimental and control groups.

control group. The results of this study are similar to a study by Yeh et al.,²⁸⁾ which showed that auricular point acupressure can improve sensation in the lower extremities and reduce pain in the upper extremities by applying auricular point acupressure to the ear reaction points of Shenmen, Brain, and Sympathetic 3 times a day for 3 minutes, 5 days a week, for 4 weeks. This is because some of the acupressure points in this study (ST36, LI4, LI10, LI11) belong to the meridian system (12 meridians), and they are connected to the ears as they pass through the ears and have a corresponding system that influences each other.¹⁹⁾

The effect of self-acupressure on peripheral neuropathy stimulates acupuncture points and reaction points on the meridians to cause various complex physiological and biochemical reactions in the human body, thereby relieving pain in the skin, muscle joints and surrounding connective tissue, and increases the physiological activity of the peripheral sensory system and the nervous system to adjust the pathological process.¹⁸⁾ The six acupuncture points in this study (LI11, LI10, LI4, Ex-UE9, ST36, Ex-LE10) are located where large nerves in the hands and feet pass, so these points are often used to improve symptoms of neuralgia or numbness and relieve pain in the hands and feet, and several previous studies showed that they were effective in alleviating CIPN symptoms.¹³⁻¹⁵⁾ In particular, these six acupressure points are located on the arms, hands, legs, and feet, so the patients can easily perform acupressure by themselves. The subjects in the experimental group who performed self-acupressure said they could easily perform acu-

pressure by themselves and reported that they felt relieved and had a sense of coolness immediately after performing acupressure.

It was difficult to find evidence on how long one should perform self-acupressure to see the effects, and the breast cancer patients receiving chemotherapy in this study showed significantly fewer peripheral neuropathy symptoms than the control group after two weeks of performing self-acupressure. Research should be conducted in the future to determine how long one should perform self-acupressure to relieve symptoms associated with peripheral neuropathy. When educating patients about non-pharmacologic therapies such as self-acupressure, it is necessary to inform them that the effects do not appear immediately after performing self-acupressure but after a certain period of continuous practice. As a result of interviewing participants in the experimental group about their satisfaction after three weeks of self-acupressure, most of them said that performing self-acupressure did not eliminate the symptoms of peripheral neuropathy but helped alleviate the symptoms, so they were willing to continue the practice in the future.

The experimental group's degree of disturbance in daily life due to peripheral neuropathy was also reduced significantly compared to the control group. Although it is difficult to make a direct comparison because there are no previous studies confirming the effect of self-acupressure on the degree of disturbance in daily life due to peripheral neuropathy, a similar study by Kim and Jun²⁹⁾ applied 8 sessions of foot bath therapy for 2 weeks on patients with metastatic and recurrent cancer who received chemotherapy and reported that the results re-

duced their degree of disturbance in daily life and improved their quality of life. Considering that the symptoms of peripheral neuropathy and the degree of disturbance in daily life due to peripheral neuropathy were simultaneously alleviated in this study, controlling peripheral neuropathy symptoms could help enhance the patients' independence and satisfaction by improving their activity in daily life. Therefore, effective nursing interventions need to be developed for periodic assessment and symptom relief for patients with CIPN in clinical settings.

According to the results of analyzing the effects of self-acupressure on the quality of life of breast cancer patients who received chemotherapy, the experimental group's quality of life improved significantly compared to the control group. This is consistent with the results of a study by Vallim et al.,³⁰⁾ which reported that applying crystal pellets to six acupoints of breast cancer patients 27 times for 12 weeks improved their quality of life by reducing fatigue and anxiety. The results of this study are also consistent with the study by Doğan and Taşci,²⁰⁾ which applied acupressure on the hands, forearms, and chest of lung cancer patients 2 times per day for 4 weeks and reported significant reductions in their levels of dyspnea and significant increases in their quality of life. These results show that performing acupressure by identifying the correct acupuncture points can alleviate the patients' symptoms and improve their quality of life.

In this study, the experimental group's degree of peripheral neuropathy symptoms decreased by a score of 4.33 from an average of 26.85 before the intervention to 22.52 three weeks after the intervention. However, the control group's score increased by 8.4 from an average of 24.72 before the intervention to 33.12 after three weeks, indicating a significant increase. The experimental group's degree of disturbance in daily life due to peripheral neuropathy also decreased by 3.46 from an average of 52.75 to 49.29, but the control group's score increased by 13.5 from an average of 59.30 to 72.80 after three weeks. These results suggest that if active interventions are not provided for CIPN, the symptoms of peripheral neuropathy may become significantly worse and result in more disturbance in daily life. This is consistent with the studies by Kim et al.,⁵⁾ Kwak et al.,⁶⁾ and Kim,⁷⁾ which argue that the pain and discomfort caused by CIPN is a nursing problem that requires active interventions because it causes persistent dysfunction and lowers the quality of life.

So far, no drug therapy will treat CIPN, and the effects of other non-pharmacological interventions are also not clear. Although acupunc-

ture was found to have a medium-sized effect,¹²⁾ it is an expensive invasive procedure that requires the intervention of experts, making it difficult to recommend to patients undergoing chemotherapy in clinical settings. The self-acupressure in this study can be easily performed by nurses after they learn the principles and techniques, and patients and family members can also easily learn and practice on their own at home to increase their interest in health. Self-acupressure is also non-invasive, economical, and an effective nursing intervention for alleviating the symptoms of peripheral neuropathy without any particular side effects. It is also necessary to continuously perform self-acupressure for at least two weeks to make an effect.

The significance of this study in terms of nursing practice is that it developed a non-invasive and cost-effective self-acupressure method with clearly defined acupoints as an intervention method for alleviating peripheral neuropathy, which is closely related to the quality of life of cancer patients, among the side effects caused by chemotherapy. Considering the circumstances of clinical practice, self-acupressure is highly likely to be adopted in clinical settings because the patients can perform self-acupressure by themselves without restrictions in relation to time and place. As an independent nursing intervention, self-acupressure can be an alternative to manage the symptoms of cancer patients. Self-acupressure can also contribute to expanding the role of community nurses because patients can easily learn how to perform the practice, and it can be used in hospitals and to nurse cancer patients at home. In terms of the significance of the study, this study is meaningful because it randomly assigned the subjects into groups and maintained blinding of the participants and data collector. This study validated the effects of acupressure, a complementary alternative medicine, and they were measured by applying the most rigorous research design possible.

The limitation of this study is that the sampling may be biased due to targeting only breast cancer patients at a local university hospital. Therefore, follow-up studies should be conducted on multiple patients who received various chemotherapeutic agents that induce peripheral neuropathy in order to establish acupressure as an evidence-based nursing intervention. In addition, the symptoms of CIPN can last for months to years after completing chemotherapy treatment,⁶⁾ so self-acupressure needs to be performed continuously over a long period to alleviate the symptoms of CIPN. Therefore, follow-up studies should be conducted to find ways to continue intervention and increase the patients' compliance rate by providing videos available at home.

CONCLUSIONS

This study investigated the effects of self-acupressure on the symptoms of peripheral neuropathy, the degree of disturbance in daily life, and the quality of life of breast cancer patients receiving chemotherapy to present evidence for using self-acupressure as an independent nursing intervention in clinical practice. The results showed that self-acupressure significantly reduced the degree of peripheral neuropathy symptoms caused by chemotherapy and the degree of disturbance in daily life due to peripheral neuropathy and improved quality of life. Peripheral neuropathy is characterized by long-term and continuous symptoms, and there is currently no specific treatment method. This study showed that self-acupressure relieves the pain caused by peripheral neuropathy. Therefore, self-acupressure can be used as an alternative to manage the symptoms of cancer patients as an independent nursing intervention that contributes to improving the therapeutic performance and quality of life of breast cancer patients receiving chemotherapy.

The following suggestions are made based on the research results above. The self-acupressure method on six acupoints (LI11, LI10, LI4, Ex-UE9, ST36, and Ex-LE10) developed in this study should be performed for at least two weeks to reduce the symptoms of CIPN. This study only targeted breast cancer patients at a local university hospital, so repeated studies should be conducted to evaluate the effects on patients treated with various chemotherapeutic agents in different regions to make it an evidence-based nursing intervention. Follow-up studies should be performed to make videos or apps to provide and distribute self-acupressure to patients and confirm the effects.

ORCID

Su Young Kim orcid.org/0000-0003-3150-8758

Jeong Sook Park orcid.org/0000-0001-8356-6998

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