

Original Article

The Effect of a PNF Technique Program after Mastectomy on Lymphedema Patients' Depression and Anxiety

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Abstract. [Purpose] This study was conducted to examine the effects of exercises applied with PNF techniques performed for 30 minutes per session, three times per week, after receipt of radiation therapy following mastectomy on depression and anxiety in patients diagnosed with lymphedema and to prepare basic data for creation of self-directed exercise programs for lymphedema patients that will enable them to perform exercises within the range of no pain. [Methods] The subjects of this study were 45 patients selected from among those diagnosed with breast cancer who showed lymphedema after anti-cancer therapy following mastectomy. [Results] The Beck depression score changed significantly during the five assessment periods however, there was no significant difference between the treatment groups. Post hoc analyses revealed that there was significant improvement in the Beck depression score from 4 weeks in all three groups. The interaction between group and time was also statistically significant. [Conclusion] In conclusion, PNF techniques helped to improve the depression and anxiety rates. Four weeks after the start of therapy, PNF techniques Depression and anxiety to create a greater degree of decline was on display.

Key words: Lymphedema, Depression, Anxiety

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INTRODUCTION

Recently, mastectomies have been most commonly performed in breast cancer patients. After undergoing a mastectomy, the patients experience lymphedema and sensory changes due to physical changes along with restriction of the range of motion of the shoulder joints and upper extremity muscle weakening¹⁾. Although treatments such as radiation therapy and anti-cancer therapy are implemented as a prescription immediately after surgery to reduce recurrence and mortality, these treatments are reported to greatly affect the quality of life of the patients due to their adverse effects that cause physical changes²⁾. Radiation therapy and other anti-cancer therapies cause nerve lesions, lymphedema, muscle pain, headache, weight gain, a sense of fatigue, cognitive disorders, and feelings of anxiety and depression in patients³⁾.

Concern over rehabilitation treatment and the quality of life after a mastectomy is discussed as an important issue. Many studies have implemented rehabilitation programs to resolve physical, emotional, and functional problems experienced after a mastectomy and psychological issues appearing in return to society⁴⁾. In addition, rehabilitation of

lymphedema patients is achieved through exercise, which is regarded as the most effective method of restoring their physical and psychological functions⁵⁾.

A previous study reported that lymphedema patient groups that received exercise treatment in combination with mental treatment showed significantly higher physical indexes and better depression and anxiety conditions than groups that received only mental treatment and that exercise performed by lymphedema patients consequently led to not only physical improvement but also psychological improvement in terms of depression and anxiety⁶⁾.

Existing exercise methods for mastectomy patients have been reported to increase the heart rate by 60–80% through aerobic exercises, and physical changes have been reported⁷⁾. These exercises were performed with a view to increasing the patients' range of joint motion, and many cases where these exercise caused pain have been reported⁸⁾. Meanwhile, Proprioceptive Neuromuscular Facilitation (PNF) exercises, which are patient self-exercise methods conducted through PNF techniques, require patients to move within their ability to move without pain^{9, 10)}, thereby enabling the patients to perform exercises with relatively less pain. Therefore, PNF exercises are regarded as an important element in reducing and preventing injuries due to exercise^{9–11)}. Not many studies have been conducted on the effect of these exercises within the range of no pain on the depression and psychological variables of patients.

Therefore, this study was conducted to examine the effects of exercises applied with PNF techniques performed for 30 minutes per session, three times per week, after

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receipt of radiation therapy following mastectomy on depression and anxiety in patients with lymphedema and to prepare basic data for creation of self-directed exercise programs for lymphedema patients that will enable them to perform exercises within the range of no pain.

SUBJECTS AND METHODS

The subjects of this study were 45 patients selected from among those who showed lymphedema after receiving anti-cancer therapy following a mastectomy after being diagnosed with breast cancer at D University Hospital located in B Metropolitan City. Information on the purposes, procedures, and risks of the experiment was provided to the recruited participants in the experiment, and prior written consent was received from the participants.

In this study, the subjects were divided into three groups and performed exercises for 30 minutes per session, three times per week for 16 weeks, and questionnaire surveys were conducted every four weeks. The PNF exercises were performed using Rhythmic initiation (RI), which is a PNF technique, for 10 minutes as warm-up exercises, and main exercises were performed for 20 minutes using a Combination of Isotonic (CI), Contract-relax, and Hold-relax techniques. The PNF+ Super Lizer group performed the same warm-up exercises as those in the PNF group for 10 minutes and was irradiated with light by a Super Lizer during performance of the main exercises. The PNF+Manual lymph drainage (MLD) group performed the same warm-up exercises as those in the PNF group for 10 minutes followed by the same main exercises as those in the PNF group for 10 minutes and received MLD treatment for 10 minutes. Finishing MLD treatment was implemented. In this study, the psychological variables of the patients were measured using the standard Korean versions of the Beck Anxiety Inventory (BAI) and Beck Depression Inventory (BDI), which are mental state rating scales for anxiety and depression respectively. The BAI and BDI are scales consisting of 21 questions and are measuring methods with high reliability and validity that have been the most widely used since 1961, which is when they were proposed. After rating, the mental states of the patients and their levels of satisfaction with the different treatment methods were evaluated using the average values.

The data collected in this experiment were analyzed with SPSS ver 18.0. The effects of the treatment methods (PNF, PNF+Super Lizer, PNF+MLD) on the lymphedema patients after mastectomy were verified by 3×2 repeated measures ANOVAs. Post hoc comparisons were conducted using contrast tests to verify changes over time (before the experiment, at 4, 8, 12, and 16 weeks, and after the experiment). The statistical significance level of this study was $p < 0.05$.

RESULTS

General characteristics of the subjects of this study are shown in Table 1. The Beck depression score changed significantly during the five assessment periods ($p < 0.0001$); however, there was no significant difference between the

Table 1. Study patients' baseline and demographic characteristics

Variable	PNF+Super Lizer (n=17)	PNF (n=17)	PNF+MLD (n=18)
Age (years)	53 ± 1	51 ± 1	53 ± 1
Height (cm)	158 ± 1	160 ± 1	159 ± 1
Weight (kg)	62.3 ± 0.9	63.4 ± 1.2	66.0 ± 1.6
BMI (kg/m ²)	24.93 ± 0.41	24.92 ± 0.46	26.21 ± 0.63

A total of 52 participants (PNF+Super Lizer, 17; PNF, 17; PNF+MLD, 18) were included in the final analysis. In the PNF+Super Lizer group, the mean age and BMI were 53±1 years and 24.93 ± 0.41, respectively.

Table 2. Depression and anxiety after mastectomy at five assessment points by treatment group (mean ± SEM) (value: mean±SEM)

Variable	Group		
	PNF+Super Lizer (n=17)	PNF (n=17)	PNF+MLD (n=18)
Depression			
Before treatment	28.24±1.13a	28.29±1.13a	28.44±1.10a
4 wks	26.12±1.13b	25.06±1.13b	23.89±1.10b
8 wks	24.35±1.13c	22.77±1.13c	19.56±1.10c
12 wks	21.53±1.13d	19.47±1.13d	17.39±1.10d
16 wks	17.77±1.13e	16.35±1.13e	14.28±1.10e
Anxiety			
Before treatment	35.77±1.63a	32.88±1.63a	37.33±1.58a
4 wks	27.41±1.63b	25.35±1.63b	26.00±1.58b
8 wks	21.12±1.63c	20.77±1.63c	21.28±1.58c
12 wks	15.88±1.63d	17.18±1.63d	15.11±1.58d
16 wks	12.47±1.63d	13.06±1.63e	11.94±1.58d

¹ Values are means±SEM, and the Holm-Sidak method was used for multiple comparisons. Means with different letters are different from each other ($p < 0.05$).

² P values are derived from the between-group effect.

treatment groups ($p = 0.094$). Post hoc analyses revealed that there was a significant improvement in Beck depression score from 4 weeks in all three groups. The interaction between group and time was also statistically significant ($p = 0.035$; Table 2).

Regarding the time course changes in Beck depression score in the PNF+Super Lizer, PNF, and PNF+MLD groups, there were significant decreases in Beck depression score compared with the previous value at all assessment points, and there were also significant differences between the PNF+Super Lizer and PNF+MLD groups at 4 and 8 weeks.

Regarding the time course changes in Beck anxiety score in the PNF+Super Lizer, PNF, and PNF+MLD groups, there were significant decreases in Beck anxiety score compared

with the previous value at all assessment points; however, there was no significant difference between the three groups.

DISCUSSION

In this study, the patients' psychological variables were observed before the PNF, PNF+Super Lizer, and PNF+MLD treatment methods were applied, at 0, 4, 8, 12, and 16 weeks of treatment, and after the treatment. Based on the results, PNF+MLD can be considered an effective treatment for depression in lymphedema patients after mastectomy. The results were consistent with a previous report indicating that exercise therapy has effects that significantly improve physical condition and relieve depression and anxiety¹²⁾.

This study was conducted with lymphedema patients who wanted rehabilitation treatment. Therefore, there are limitations in the interpretation of the results because there were difficulties in setting the control group. However, on reviewing a previous clinical study, it can be seen that lymphedema patients have limitations in activities and experience anxiety and depression¹³⁾. Another study reported that although anxiety and depression were significantly relieved after performing aerobic exercises, self-regard was not changed¹⁴⁾. However, the aforementioned study reported that patients who participated in the exercise program showed improvement in psychological variables compared with patients who did not participate in the exercise program. Examining the effects of exercises using PNF techniques is considered clinically meaningful. If future studies are conducted on the motility of lymphedema patients, more significant results could be obtained.

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REFERENCES

- 1) Fairey AS, Courneya KS, Field CJ, et al.: Physical exercise and immune system function in cancer survivors: a comprehensive review and future directions. *Cancer*, 2002, 94: 539–551. [[Medline](#)] [[CrossRef](#)]
- 2) Markes M, Brockow T, Resch KL: Exercise for women receiving adjuvant therapy for breast cancer. *Cochrane Database Syst Rev*, 2006, (4): CD005001. [[Medline](#)]
- 3) Partridge AH, Burstein HJ, Winer EP: Side effects of chemotherapy and combined chemohormonal therapy in women with early-stage breast cancer. *J Natl Cancer Inst Monogr*, 2001, 33: 135–142. [[Medline](#)] [[CrossRef](#)]
- 4) Helgeson VS, Cohen S, Schulz R, et al.: Education and peer discussion group interventions and adjustment to breast cancer. *Arch Gen Psychiatry*, 1999, 56: 340–347. [[Medline](#)] [[CrossRef](#)]
- 5) McKenzie DC, Kalda AL: Effect of upper extremity exercise on secondary lymphedema in breast cancer patients: a pilot study. *J Clin Oncol*, 2003, 21: 463–466. [[Medline](#)] [[CrossRef](#)]
- 6) Courneya KS, Friedenreich CM, Sela RA, et al.: The group psychotherapy and home-based physical exercise (group-hope) trial in cancer survivors: physical fitness and quality of life outcomes. *Psychooncology*, 2003, 12: 357–374. [[Medline](#)] [[CrossRef](#)]
- 7) Chae YR, Choe MA: Effects of exercise on cardiopulmonary functions and shoulder joint functioning in Breast Cancer patients undergoing radiation therapy after breast surgery. *Jr Korean Acad Nurs*, 2003, 31: 454–466.
- 8) Hwang JH, Chang HJ, Shim YH, et al.: Effects of supervised exercise therapy in patients receiving radiotherapy for breast cancer. *Yonsei Med J*, 2008, 49: 443–450. [[Medline](#)] [[CrossRef](#)]
- 9) Kim YB: Effects of static stretching and muscle energy technique stretching on the extensibility of back extensors in healthy subjects. *Korea Sport Res*, 2006, 17: 401–410.
- 10) Prentice WE: *Rehabilitation Techniques in Sports Medicine*, 3rd ed. McGraw-hill, 1999, pp 62–72.
- 11) Prentice WE, Voight MI: *Techniques in Musculoskeletal Rehabilitation*. McGrawHill, 2001, pp 83–91.
- 12) Yoo YS: Effects of aquatic exercise program in the shoulder joint function immune response and emotional state in postmastectomy patients. *J Cathol Med Col*, 2004, 13: 863–868.
- 13) Shapiro CL, Recht A: Side effects of adjuvant treatment of breast cancer. *N Engl J Med*, 2001, 344: 1997–2008. [[Medline](#)]
- 14) Segar ML, Katch VL, Roth RS, et al.: The effect of aerobic exercise on self-esteem and depressive and anxiety symptoms among breast cancer survivors. *Oncol Nurs Forum*, 1998, 25: 107–113. [[Medline](#)]