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

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 pain9, 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 exercise9–11). 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...
receipt of radiation therapy following mastectomy on depression and anxiety in patients with lymphedema and to prepare basic date 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 anticancer 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 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

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/m²)    | 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       | 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   |

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).

P values are derived from the between-group effect.
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 anxiety\(^1\).

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 depression\(^1\). Another study reported that although anxiety and depression were significantly relieved after performing aerobic exercises, self-regard was not changed\(^1\). 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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