Effects of Autogenic Training on Perioperative Anxiety and Pain in Breast Cancer Patients: A Randomized Controlled Trial

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Background & Aims: Immediately after undergoing breast cancer surgery, patients may usually have some psychological and physiological distress. Autogenic training (AT) is a complementary medicine and self-relaxation technique to relieve anxiety in patients. The aim of the study is to investigate the impact of AT on perioperative anxiety and pain in patients with breast cancer. Methods: Between July 2010 and March 2012, 60 patients who were diagnosed with breast cancer and scheduled for surgery were randomly assigned to the AT group or the control group. In the AT group, patients underwent 20 min of AT, three times a day within 3 days after surgery, and the control group received the usual care. The assessment was done based on the State Anxiety Inventory, Visual Analogue Pain Scale, heart rate variability, and analgesic requirement. Results: The AT group had a significantly decreased anxiety score during postoperative three days. Postoperative pain score was also significantly decreased, despite the fact that the two groups had received an equivalent amount of analgesics. No statistically significant difference was observed between the groups in their analgesic requirement. Conclusion: AT may be a useful non-pharmacological approach for relieving anxiety and pain immediately after breast cancer surgery. (Kitakanto Med J 2013; 63: 1~11)

Key words: autogenic training, breast cancer, relaxation, anxiety, pain

1. Introduction

According to the latest global statistics for the year 2004 1 and the latest cancer statistics in Japan for 2011,2 one of the largest cause of cancer deaths among women was breast cancer. In Japan, the incidence rate of breast cancer has been increasing rapidly, from 25.2 in 1980 to 73.4 in 2007 (per 100,000 population): Japan now has one of the highest incidence rates for breast cancer, with more than 50,000 new breast cancer cases being diagnosed annually since 2004.2 On the other hand, breast cancer is no longer considered a deadly disease as recent follow-up studies reveal 5-year survival rates above 75% in most countries.2-5 Studies have shown that the anxiety levels of patients are already high before diagnosis,6 with the rate being 40% before surgery7-10; 25% of patients continue to have a high level of anxiety at 1 year,8,9 and it remains high even for 2 year after diagnosis.10 Therefore, many breast cancer survivors experience psychological distress for a long time after treatment.

As the recurrence of breast cancer is not rare even 5 years after the surgery, patients continue to suffer the anxiety of recurrence for long period.11 In case of chemotherapy, patients fear the side effects, such as nausea, fatigue and hair loss. Especially, female patients have a greater anxiety for hair loss.12 Moreover, the deformation or loss of breast due to surgery would change their body appearance and chemotherapy and hormone therapy would cause early menopause and menopausal disorders affecting sexuality.13 Compared to other cancers, patient population is younger in breast cancer, so such changes in appearance and sexuality would be important problems for their partners who are supposed to play central role in patient support. Because the adjuvant chemotherapy would last for six months to one year and adjuvant hormone therapy would last at least for 5 years, the anxiety would continue for a long period. Financial burden,14 such as the cost of treatment and the reduc-

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tion in income, would also exacerbate their anxieties. Anxiety has a significant impact on patients, and is related to depression and stress disorders, resulting in an increase in side effects such as fatigue, insomnia, pain, decline in immune function, and poor quality of life. As these treatment are usually applied for outpatient except for the short period of hospitalization for surgery, the healthcare provider can provide limited mental support. Breast cancer typically occurs between 40 and 50 years of age. Women in this age group play important roles at home and the workplace. Therefore, high anxiety levels among women in this age group would have a high impact on society.

Many studies suggest that preoperative anxiety can predict postoperative pain. Furthermore, patients with high preoperative anxiety and depression levels had severe postoperative pain. Anxiety, pain, and muscle tension are inter-related. Anxiety being an emotional stress increases sympathetic nervous system activity as a form of defense in crisis situations. It causes tension in the muscles as a primary reaction to fight any external agent immediately, and blood vessels contract, resulting in an ischemic state. As a result, the pain threshold is decreased. Strong anxiety increases severe pain, and an anxiety-tension-pain vicious cycle has been proposed to exist. Postmastectomy pain syndrome, which leads to prolonged postoperative pain, occurs in almost 20% of breast surgery patients. In order to break this anxiety-tension-pain vicious cycle, many researchers have investigated the effect of relaxation that could reduce anxiety without serious side effects. More recent studies demonstrated significant relief of perioperative anxiety and pain using more rigorous approaches, including hypnosis, reflexology, and music. The downside is that most techniques require the assistance of a healthcare provider and equipment.

Autogenic training (AT) was originally proposed by Johannes Shultz, and has been used as a psychotherapy for relaxation. Shultz found that patients experienced reduced tension in the mind and body, felt refreshed, and recovered better from fatigue. The patients reported feeling warmth and heaviness in their limbs after the hypnotic treatment. Therefore, he modified AT so that it could be practiced by the patients themselves, using a stepwise verbal formula composed of words which would induce a hypnotic state. This is different from hypnotherapy in that the relaxation state is not imposed externally, but by auto-suggestion. A review, meta-analysis and systematic review have shown that AT was effective in the management of tension headache and migraine, back pain, chronic dizziness, hypertension, and coronary disease. Further, some studies reported that AT was effective for cancer patients for group therapy, sleep management for insomnia, management for anxiety and depression, and managing cancer pain. Some studies used AT for stressful healthy individuals. In one study with nursing students, the anxiety level reduced significantly after AT for 2 months. In another study with fire service workers who suffered posttraumatic stress (10% to 30% of fire service workers are believed to have posttraumatic stress), AT for 2 months resulted in significant relaxation of autonomic nervous system activity. Thus, AT has been conducted for patients with a background of anxiety and mental strain to treat their physical diseases, to improve symptoms of their disorder and to manage their stress.

There are some reports that skilled individuals can practice AT anytime and anywhere they wish to relax once they learn the technique. AT is a so-called self-help relaxation technique, and it is suitable as a daily stress management technique for breast cancer patients, who normally require a long follow-up period. The primary treatment is surgery in the case of early breast cancer, which is followed by radiotherapy or chemotherapy as adjunct therapy in the outpatient treatment. If the patients start to learn AT during the perioperative period, it would be helpful in terms of stress management. After discharge, they will be able to continue AT at home.

The present study investigated the effect of AT for breast cancer surgical treatments in the period when primary treatment start. The randomized clinical trial examined the effect of AT on reduction of the State Anxiety Inventory score, the Visual Analogue Scale of pain, heart rate variability, and the post-operative requirement for analgesics after breast surgery.

II. Methods

1. Study design

A randomized clinical trial was carried out by comparing the AT and control groups. The study was conducted between July 2010 and March 2012 on patients recruited from a public hospital in Japan.

2. Participants

Eligibility criteria for the current study were (1) breast cancer diagnosis and scheduled surgery under general anesthesia; (2) age ≥ 20 years; (3) female gender; (4) ability to read, hear, provide written answers to questionnaires, speak Japanese, and use a compact disc (CD) player. Patients were excluded from participation if they (1) had previously undergone AT or another self-relaxation practice, (2) had severe complications, (3) had mental disorders, (4) had
arrhythmia that could affect heart rate variability (HRV) measurement.

Outpatient nurses asked outpatients who met the inclusion criteria about whether they were interested in hearing a description of the study by researcher. If the patient provided her consent, she was introduced to the researcher at the time of the preoperative examination. The patients were then provided with a detailed explanation of the purpose of the study, the procedures, potential risk and benefits, as well as data collection, and asked to participate. They were also informed that their identification number would remain anonymous, and that they had the freedom to withdraw from the study at any time, with no effect on their medical treatment or nursing care whatsoever. They were given the time to think about whether they should participate in the study or not. The final confirmation about participation was done on the day before surgery in the hospital. After consenting to participate in this study, they were randomly assigned to the control group or AT group. Patients who were randomized to the control group were given the option of receiving AT and a CD free of charge at the end of the study.

Patients' information regarding age and type of scheduled surgery were not revealed to the researchers until assignment to the AT or control group, which was based on a computer-generated randomized method. To reduce potential bias, the anesthesiologists, surgeons, and staff nurses of the ward were blinded to which patients had participated in the study.

3. Intervention

All patients received perioperative nursing and medical care, and were taking equivalent doses of pain control medication. They were given a written explanation about the intervention, and the AT group patients also received a leaflet containing information on the exercise, a CD on AT (Prem Promotions Inc., Tokyo, Japan), a CD player, and earphone. The patients practiced Schultz’s AT technique by using a CD made by the Gunma University Hospital Relaxation Visitors affiliated with the medical school. The 20-min session consisted of relaxation music and verbal formulae. Patients were instructed to exercise three times a day, every day. They were asked to lie down on a bed quietly and listen to the CD using the earphone; they received guidance on how to perform AT and the points to keep in mind. Figure 1 shows study protocol. Researcher assessed the patient’s general condition and confirmed the compliance with study participation. Patients were equipped with an ECG while listening to the CD, and State-anxiety and VAS pain data were collected before and after the intervention. The patients of the control group were also asked to lie down on a bed to rest quietly on their own for the same time that the patients of the AT group listened to the CD. The patients received a visit from a researcher on the day before surgery, as well as on postoperative days 1, 2, and 3, during their stay at the hospital. A single researcher, who completed the leadership training course by Japanese Society of Autogenic Therapy, collected data and some report of self-training from the patients.

4. Outcome measures

Demographic and clinical data such as age, duration of operation, surgical procedure, breast cancer stage, and amount of analgesic required were collected using an electronic medical chart.

Anxiety was assessed using the State-Trait Anxiety Inventory (STAI),^3^ Japanese version STAI-JYZ (Jitsumu Kyoiku Press Inc. Tokyo Japan).^4^ The STAI is a 40-item scale based on self-reporting measures and typically requires a very short time for completion. The 20-item State-anxiety scale requires patients to
report how they feel at the specific moment when they are questioned, and 20-item Trait-anxiety instructions require them to report how they generally feel. Patients choose 1 of the 4 levels of anxiety for each item. Trait-anxiety reflects the anxiety-proneness of stable individuals, while State-anxiety reflects the present intensity of the anxiety. STAI is a widely used scale in research and clinical settings with surgical patients\textsuperscript{21,22,23} or breast cancer patients\textsuperscript{8,46,47} STAI-JYZ has also been thoroughly examined and assessed to be valid and reliable.\textsuperscript{44}

The visual analogue scale (VAS) for pain normally consists of a 100-mm long horizontal line between the phrases “no pain” and “the worst pain imaginable.” Participants were asked to draw a slash on the line to indicate their current level of postoperative pain. Their response was scored based on the length of the slash. VAS of pain has been used in the setting of surgery\textsuperscript{21,22,26,48,49} and is considered to be valid and reliable.\textsuperscript{50,51}

The impact of AT on the relaxation level of the patients was calculated by monitoring their heart rate before and after intervention. Stress such as anxiety and pain and relaxation influences the autonomic nervous system activity, which, in turn, controls the heart rate. An increase in the relaxation level decreases sympathetic nervous system activity and raises parasympathetic nervous system activity.\textsuperscript{52} The amplitude of the high-frequency (HF) component reflects parasympathetic nervous system activity, whereas the low to high frequency (LF/HF) ratio reflects sympathetic nervous system activity.\textsuperscript{53} In response to AT-induced relaxation, the HF amplitude of HRV increased.\textsuperscript{54,55} Electrocardiogram was recorded with LRR-03 (GMS Inc., Tokyo, Japan) in order to calculate the HF (0.15–0.4Hz) and LF (0.04–0.15Hz), analyzed by the MemCalc System (MemCalc/Tarawa; GMS Inc., Tokyo, Japan).

5. Sample size

The sample size determined using two-tailed test at a power of 0.90, \( \alpha = 0.05 \), and effect size of 0.59 based on meta-analysis of Stetter and Kupper,\textsuperscript{35} was 25 participants in each group (total 50), which was increased to 60 participants to allow for a 20% drop-out rate.

6. Data analysis

Patients’ demographic characteristic variables were analyzed by the Student’s \( t \)-test and chi-square test. Main outcome measurements like State-anxiety score and VAS pain score were compared before and after the intervention state using paired \( t \)-test, and difference in time \( \times \) group interaction were analyzed using two-way analysis of variance (ANOVA). Differences in HF amplitude and LF/HF ratios in pretest and posttest was analyzed by paired \( t \)-test, and the difference between the 2 groups of analgesic requirements was analyzed by Student’s \( t \)-test. For all the analyses, significance level was set at \( \alpha = 5 \% \) (two-tailed). Where main data were missing, the Hot-deck score was input using SOLAS for Missing Data version 4.0 (Statistical Solutions Ltd., Cork, Ireland). Data were analyzed using PASW Statistics version 18.0 (SPSS, IBM Company, Tokyo, Japan). Main outcome measures were statistically compared according to the intent-to-treat (ITT) principle. Per protocol based (PPB) analysis was also added for reference.

7. Ethical considerations

The study protocol was approved by the Saku University Ethics Committee and the Hospital Ethics Committee of the hospital from which the data were collected. All participants signed an informed consent form.

III. Results

1. Participant flow

The participant flow diagram for the study is shown in Fig. 2. A total of 60 patients were recruited in the study. They were randomly assigned to the control (\( N = 30 \)) or AT (\( N = 30 \)) group on the day before surgery. In the control group, on POD 1, two patients did not receive the intervention because of excessive pain or its clinical implications. On POD 2, one participant was discharged. In the AT group, the patients were instructed to complete 4 treatment sessions on the day before surgery, POD 1, POD 2, and POD 3. On POD 1, 20\% of the patients did not complete the AT training due to pain, lack of interest, or clinical complications. On POD 2, 2 participants did not complete the intervention, because they were to be discharged. One patient in each group, who did not start with AT on the first post-operative day, resumed it from the second post-operative day. On the last day of the study, on POD 3, all the remaining 28 participants in the control group and 23 participants in the AT group completed the intervention. Totally, 27 patients in the control group and 22 patients in the AT group completed the intervention on all 3 postoperative days. One patient in the control group and 2 patients in the AT group withdrew because of clinical complications and were therefore excluded from the ITT analysis. Therefore, 29 patients in the control group and 28 in the AT group were analyzed by the ITT principle.
2. Demographics and clinical characteristics of the two groups

The results of comparison of demographics and medical characteristics of the participants are shown in Table 1. The average (SD) age for the control group and AT group were 55.24 (12.22) and 53.89 (8.63) years old respectively. No significant differences were found between the two groups ($t = -0.48$, $p = 0.63$). The duration of operation was 169.72 (106.64) and 211.25 (142.45) min in the control and AT groups respectively, but the difference was not significant ($t = 1.25$, $p = 0.22$). The Trait-anxiety score was 44.45
(11.54) and 42.61 (12.19), the State-anxiety score was 46.59 (10.39) and 47.39 (9.73) in the control and AT groups respectively. No significant differences were found between the two groups in the Trait-anxiety score (t = -0.59, p = 0.56) and State-anxiety score the day before surgery (t = 0.30, p = 0.76). Most patients had stage I disease (69.0% in the control group and 53.6% in the AT group), while 20.7% in the control group and 32.1% in the AT group had stage II disease. The number of patients in each stage did not differ significantly between the groups (χ² = 3.50, p = 0.48). The most common surgical procedure in the control group was breast-conserving surgery (51.7%), followed by mastectomy (27.6%). The most common surgical procedure in the AT group was mastectomy (46.4%), followed by breast-conserving surgery (28.6%). The third common surgical procedure was immediate reconstruction following mastectomy (17.2%, control group; 21.4%, AT group). There was one case of lumpectomy in each group. Furthermore, patients did not differ significantly by groups (χ² = 3.40, p = 0.34). All the patients, irrespective of which study group they belonged to, followed the routine method of medication prescribed by breast surgeons at this hospital. Routine medication included loxoprofen sodium (60mg) from the noon of POD1, three times a day.

3. Change in anxiety levels

The impact of the AT treatment on postoperative anxiety and pain is summarized in Table 2.

Pretest results showed that patients in the control group had an average (SD) State-anxiety score of 44.76 (11.00), and those in the AT group had a score of 46.46 (9.91); both these scores were lower than those recorded on the day before surgery. State-anxiety score of both groups on POD 2 and 3 was approximately 40. In the control group, the State-anxiety score did not change between pretest and posttest. However, the AT group showed significant reduction in anxiety level on all 3 days post-surgery (POD 1, p < 0.001; POD 2, p < 0.001; POD 3, p = 0.001). As observed by ANOVA, the group (control group or AT group) × time (pre or posttest) interaction effect was statistically significant on all days (POD 1, p = 0.005; POD 2, p = 0.001; POD 3, p = 0.001). Similar results were obtained using ITT analysis and PPB analysis. Cohen’s d was 0.21 on the day before surgery and 0.37 and 0.38 on POD 2 and 3 respectively. State anxiety scores were classified into 5 levels: 0–35, level 1; 36–45, level 2; 46–55, level 3; 56–65, level 4; >66, level 5. Figure 3 shows the trend in the number of patients. There was no significant change in the control group; on the other hand, the number of patients in level 1 increased day by day. On the day before surgery day, 4 patients (13.8%) in the control group and 6 patients (21.4%) in the AT group were in level 4, which shows that patients have high anxiety levels. Though there was no patients in the AT group in level 4 on POD 3, there were 3 patients (10.3%) in level 4 in the control group.

4. Change in pain levels

With respect to the pain level, both groups on POD 1 presented a similar reduction in pain. The average (SD) of VAS pain score decreased from 36.86

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Results from post Hot-deck imputation of State-anxiety score and VAS of pain score</th>
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<tr>
<td></td>
<td>Pre test mean (SD)</td>
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<tr>
<td>State-anxiety Score</td>
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<tr>
<td>POD 1</td>
<td></td>
</tr>
<tr>
<td>Control Group</td>
<td>44.76(11.00)</td>
</tr>
<tr>
<td>AT Group</td>
<td>46.46(9.91)</td>
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<tr>
<td>POD 2</td>
<td></td>
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<tr>
<td>Control Group</td>
<td>40.93(10.83)</td>
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<tr>
<td>AT Group</td>
<td>40.57(7.56)</td>
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<tr>
<td>POD 3</td>
<td></td>
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<tr>
<td>Control Group</td>
<td>39.86(11.33)</td>
</tr>
<tr>
<td>AT Group</td>
<td>40.54(8.98)</td>
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<tr>
<td>VAS pain score</td>
<td></td>
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<tr>
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<tr>
<td>Control Group</td>
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<tr>
<td>AT Group</td>
<td>29.54(30.18)</td>
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<td>POD 2</td>
<td></td>
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<tr>
<td>Control Group</td>
<td>23.07(30.77)</td>
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<tr>
<td>AT Group</td>
<td>16.71(25.13)</td>
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<tr>
<td>POD 3</td>
<td></td>
</tr>
<tr>
<td>Control Group</td>
<td>15.93(21.68)</td>
</tr>
<tr>
<td>AT Group</td>
<td>11.64(19.57)</td>
</tr>
</tbody>
</table>

AT: autogenic training  POD: postoperative day  PPB: per protocol based analysis  * p < 0.05  ** p < 0.001
(33.53) to 30.97 (32.31) in the control group and from 29.54 (30.18) to 20.89 (30.47) in the AT group on POD1. However, on POD 2, only the AT patients presented a significant reduction (p=0.001) in VAS pain score from 16.71 (25.13) to 12.86 (24.89), in contrast to the control group 23.07 (30.77) to 21.07 (27.87). On POD 3, there were no significant reduction in both group control group: 15.93 (21.68) to 14.24 (20.80), AT group: 11.64 (19.57) to 10.64 (20.37). Patients with a VAS pain score of 10 or less reported a sense of incongruity rather than pain. As observed by ANOVA, the group × time interaction effect was not statistically significant on all days. There were small to medium AT effects on anxiety and pain based on Cohen’s d, which ranged from 0.17 to 0.32. Fig. 4 shows the change in the VAS pain score, which was used to divide the patients into 3 groups: those with a score less than 10, between 10 and 50, and 50 or more. The number of patients with a VAS pain score less than 10 was 10 patients (34.5%) in the control group and 15 patients (53.6%) in the AT group on POD 1, and this increased gradually to 18 patients (62.1%) in the control group and 21 patients (75.0%) in the AT group on POD 3. The number of patients who had VAS pain score 50 or more (severe pain) was 3 patients (10.3%) in the control group and 2 patients (7.2%) in the AT group.

5. Change in HRV

Table 3 shows changes in the HF amplitude, which increased posttest in both groups. However only AT group showed significant increase in HF amplitude on all 3 days (p<0.05). There were no significant difference in LF/HF ratios between pretest and posttest in both groups.

6. Change in the amount of analgesic required

No statistically significant difference (p=0.20-0.83) was observed in the average amount of postoperative analgesic required between the two groups (Table 4). On the day of the surgery, the average (SD) postoperative analgesic required was 3.06 (5.98) mg of pentazocine and 12.04 (18.82) mg of diclofenac in the control group and 2.05 (5.27) mg of pentazocine and 5.68 (15.30) mg of diclofenac in the AT group. This was approximately the same amount for two groups on POD 1.
Table 3  Results of pretest and posttest HF amplitude (msec²)

<table>
<thead>
<tr>
<th></th>
<th>Pre test</th>
<th>Post test</th>
<th>p value</th>
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<tbody>
<tr>
<td>POD 1</td>
<td></td>
<td></td>
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<tr>
<td>Control Group</td>
<td>191.70(206.32)</td>
<td>222.14(379.75)</td>
<td>0.45</td>
</tr>
<tr>
<td>AT Group</td>
<td>213.77(135.69)</td>
<td>283.14(186.56)</td>
<td>0.02*</td>
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<tr>
<td>POD 2</td>
<td></td>
<td></td>
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<tr>
<td>Control Group</td>
<td>132.51(132.16)</td>
<td>141.97(159.11)</td>
<td>0.57</td>
</tr>
<tr>
<td>AT Group</td>
<td>174.19(136.20)</td>
<td>259.10(160.87)</td>
<td>0.001*</td>
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<tr>
<td>POD 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Group</td>
<td>144.04(151.11)</td>
<td>173.44(169.75)</td>
<td>0.18</td>
</tr>
<tr>
<td>AT Group</td>
<td>204.55(143.79)</td>
<td>288.60(182.76)</td>
<td>0.02*</td>
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</table>

Values are expressed as mean (SD)
AT: autogenic training  POD: postoperative day  * p<0.05  ** p<0.001

Table 4  Postoperative analgesic requirement comparison between groups

<table>
<thead>
<tr>
<th></th>
<th>Pentazocine (mg)</th>
<th>p value*</th>
<th>Diclofenac (mg)</th>
<th>p value*</th>
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<td>The operative day</td>
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<tr>
<td>Control Group</td>
<td>3.06 (5.98)</td>
<td>0.54</td>
<td>12.04 (18.82)</td>
<td>0.20</td>
</tr>
<tr>
<td>AT Group</td>
<td>2.05 (5.27)</td>
<td>5.68 (15.30)</td>
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<tr>
<td>POD 1</td>
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<tr>
<td>Control Group</td>
<td>1.11 (4.00)</td>
<td>0.83</td>
<td>7.04 (13.18)</td>
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</tr>
<tr>
<td>AT Group</td>
<td>1.36 (4.41)</td>
<td>7.95 (16.16)</td>
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<td>POD 2</td>
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<tr>
<td>Control Group</td>
<td>1.11 (5.77)</td>
<td>0.37</td>
<td>3.70 (9.05)</td>
<td>0.61</td>
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<tr>
<td>AT Group</td>
<td>0.00 (0.00)</td>
<td>2.27 (10.66)</td>
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<td>POD 3</td>
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<tr>
<td>Control Group</td>
<td>1.11 (5.77)</td>
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<tr>
<td>AT Group</td>
<td>0.00 (0.00)</td>
<td>0.93 (4.81)</td>
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Values are expressed as mean (SD)  AT: autogenic training  POD: postoperative day  * p values are calculated using Student’s t-test  * p<0.05

**IV. Discussion**

The present study was aimed to evaluate the impact of AT on perioperative anxiety and pain in breast cancer patients. First, we showed that AT significantly reduces the level of anxiety of the patients for 3 days after surgery comparing to the control group, based on the STAI score. Second, the AT reduced the pain levels of the patients after surgery despite the fact that they were receiving pain medication. Only patients can determine whether they are performing AT or just resting. However, Sakakibara et al.³⁴ and Miu et al.⁵⁵ reported that HF increased after performing AT. In AT, the patient is asked to repeat the verbal formula, “my legs and arms are warm, my legs and arms are heavy”, which activates parasympathetic nervous system activity. After that, dilatation of the peripheral vascular bed, relaxation of muscles, and a feeling of warmth and heaviness of arms and legs are felt.³⁵ In this study, the HF increased significantly in the AT group as compared to the control group, which means that the patients in the AT group definitely practiced the AT protocol, causing higher parasympathetic nervous system activity and greater relaxation. At the same time, it seemed that the patients calmed down, their anxiety levels decreased, and the vicious cycle of anxiety-tension-pain was broken.

In the present study, both groups of patients showed a high average level of anxiety for 3 days after surgery. In the AT group, the posttest anxiety level was low, but in both groups, the pretest anxiety level was the same as that observed 3 days after surgery. This suggested that the relaxation effect of AT lasted for a short period of about 1 day. According to previous studies, 8 weeks are needed to master AT³³,³⁶,³⁷ Therefore, in such a short period, it was difficult to achieve passive concentration, which is characteristic to AT, and the relaxation response too lasted for a short period. Miu et al.⁵⁵ showed that for individuals who have not mastered AT, the relaxation response is observed when AT is started. This short period of relaxation may explain why there were no significant differences in the amount of analgesic used between the groups. However, it seems useful for patients to master AT so that their confidence in AT will surely make them relax and cope with psychological stress like anxiety, pain or insomnia.

Because recent breast surgery seldom extends to the pectoral muscles, patients complain less of pain during body motion compared to open chest or open
abdominal surgery. Therefore, the reduction of VAS score after intervention in both groups on POD 1 was considered to be strongly affected by 20-minute-rest. On POD 2, VAS score was lower in both groups than POD 1, and only AT group showed significant reduction on VAS score after intervention, which meant more efficacy of AT than 20-minute-rest. Moreover, on POD 3, the VAS pain score reduced to 11.64 in AT group. Patients usually complain the sense of discomfort at lower than 10 VAS point. We considered patient felt no pain under point of 10. Therefore AT might not have reduced pain score on POD 3. Gavito et al.\textsuperscript{49} reported a similar conclusion in patients after lung surgery that AT reduced the pain significantly immediately following the dressing change than control group; on the other hand, after settlement of the pain, AT did not show significant reduction of pain.

According to a meta-analysis by Stetter and Kupper,\textsuperscript{30} the average effect size of AT on the psychological index was $d = 0.59$. In another meta-analysis by Linden,\textsuperscript{34} the effect size was $d = 0.43$. In this study, the value was lower than that in the meta-analyses. The patients recruited for the meta-analyses had tension headache, migraine, hypertension, coronary artery disease, bronchial asthma, Raynaud’s disease, with symptoms that were exacerbated by anxiety and tension as related factors. On the other hand, the patients in our study had general physical disorders and it was clear that the cause of the pain was related to surgery, and the duration of the pain was limited: patients with psychological problems and those who were mentally upset were excluded. In another interventional study of supportive treatment for cancer patients, the effect size was reported to be $d = 0.36$, which is as low as the effect size observed in this study.\textsuperscript{57}

In this clinical trial, 3 patients dropped out in the AT group because they were not interested in AT. Some patients found AT to be similar to hypnosis. Some Japanese women had negative emotion at hypnosis because they believed that they will no longer be able to control themselves. In the previous studies on music therapy, the music selected for the patients was their favorite kind of music.\textsuperscript{51} Similarly, the type of relaxation to be received by the patient should suit the patient’s preference. Therefore, it is important that patients can choose the relaxation, whose effects have been confirmed. The medical treatment of breast cancer occurs over a long period of time, and involves fear of a recurrence and the side effects of the treatment in the meantime. Even if the patients are uneasy, it is desirable if they can manage to overcome and to have some coping methods at such time. Music therapy needs a music player, and hypnosis needs a psychiatrist or healthcare provider; however, AT can be done anywhere at any time of the day after they have mastered the skill, as it is a self-relaxation technique and does not require intervention by a specialist. It is also convenient, as a nurse teaches AT to the patients from their early stages of breast cancer treatment, and from then on the patients can practice it by themselves at home or during the long follow-up period.

A limitation of this study is that participants were recruited from only one public hospital in Japan and it is therefore difficult to generalize the results. The effectiveness of AT would be clearer if only patients who had undergone the same surgical procedure had been included. Further study is needed because breast surgery patients experience various side effects such as fatigue, nausea, and insomnia, and AT might be effective in improving these. Moreover, although HRV was one of the outcome measures, other physiological indices such as immune function should also be used. This study has evaluated the effect of performing AT in 3 days postoperative period. A long-term development program for self-care research with a large number of participants will be required in the future.

V. Conclusion

The present randomized controlled trial demonstrated that AT reduces perioperative anxiety and pain in patients with breast cancer. They can practice AT anytime and anywhere after learning it, and it may be very useful for stress management. The result suggests that breast surgery patients can easily practice AT as a relaxation procedure by themselves at home.

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Conflict of interest

None declared.

References


