

## Original Article

## Anxiolytic Effect of Aromatherapy Massage in Patients with Breast Cancer

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We examined how aromatherapy massage influenced psychological and immunologic parameters in 12 breast cancer patients in an open semi-comparative trial. We compared the results 1 month before aromatherapy massage as a waiting control period with those during aromatherapy massage treatment and 1 month after the completion of aromatherapy sessions. The patients received a 30 min aromatherapy massage twice a week for 4 weeks (eight times in total). The results showed that anxiety was reduced in one 30 min aromatherapy massage in State-Trait Anxiety Inventory (STAI) test and also reduced in eight sequential aromatherapy massage sessions in the Hospital Anxiety and Depression Scale (HADS) test. Our results further suggested that aromatherapy massage ameliorated the immunologic state. Further investigations are required to confirm the anxiolytic effect of aromatherapy in breast cancer patients.

**Keywords:** anxiety–aromatherapy massage–breast cancer

### Introduction

Aromatherapy is one of the complementary and alternative medicines used to treat various diseases and symptoms, because essential oils have many kinds of pharmacologic actions including anti-microbial, sedative, analgesic, spasmolytic and estrogen or steroid hormone-like effects, etc. Since various kinds of essential oils such as true lavender, rose, mandarin, sweet orange, sandalwood, geranium, etc have anxiolytic activity, aromatherapy has been used for the relief of depression

and anxiety. We have clarified that aromatherapy massage reduced anxiety and depression in healthy subjects and that it increased CD8-positive and CD16-positive lymphocytes in peripheral blood (1). Furthermore, we found that aromatherapy massage improved mild depression (2). Patients with cancer tend to be very anxious about the recurrence of cancer, even after complete remission. This anxiety in turn might reduce immunologic activity, resulting in an increase in the probability of recurrence.

Several studies have centered on this anxiety in cancer patients. Fellowes *et al.* (3) concluded in a systematic review that aromatherapy massage conferred short-term benefits on psychological well being, with the effect on anxiety supported by limited evidence and that effect

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on physical symptoms might also occur. Corner *et al.* (4) evaluated the use of massage and essential oils on the well being of cancer patients. The results showed that anxiety scores reduced significantly over time only for the essential oil massage group. Concerning effectiveness for pain, mobility, ability to work and communication with family, the essential oil group performed better than the control group. Wilkinson *et al.* (5) also evaluated aromatherapy massage in palliative care in a randomized control study involving full body aromatherapy massage or carrier oil massage three times a week. For the aroma group, significant improvements were found for physical, psychologic, quality of life and severe physical and psychologic subscales of the Rotterdam Symptom Checklist (RSCL), pre- to post-test. For the massage group, there were no differences in any RSCL subscales, from the pre- to post-test. For the whole group and each group, significant improvements in the State-Trait Anxiety Inventory (STAI)-state were noted pre- to post-test for each massage. Kohara *et al.* (6) also reported that combined modality treatment consisting of aromatherapy, soaking the feet and reflexology appears to be effective for alleviating fatigue in terminally ill cancer patients.

Few studies have examined the psychologic and immunologic effects of aromatherapy on breast cancer patients. Since immunologic activity is a critical factor in determining a patient's prognosis, it is very important to examine the effect of aromatherapy on immunologic activity. Therefore, in the present study, we examined the psychologic and immunologic parameters of aromatherapy massage for breast cancer patients.

## Methods

### Subjects

This study was performed between 2003 and 2005. The subjects were selected according to the following criteria:

- (i) Inclusion criteria
  - (a) patients with breast cancer
  - (b) subjects aged 20–70-years old
  - (c) more than 1 month after surgery, chemotherapy or irradiation
  - (d) indifferent from stage of cancer and
  - (e) possibility of hormonal therapy
- (ii) Exclusion criteria
  - (a) patients with recurrence of cancer
  - (b) patients with marked edema

This study was conducted after obtaining approval from the Ethics Committee of Kyoto Prefectural University of Medicine. We gave detailed explanations on the project

**Table 1.** Profile of breast cancer patients

Age	40–49-years old 3	50–59-years old 9	
Stage	I 3	IIA & B 7	Unknown 2
Surgical intervention	BCR 8	Mastectomy 4	
Non-surgical intervention	Chemotherapy hormone 6	Chemotherapy irradiation 1	Hormone 5

BCR, breast conserving surgery.

to each subject and all subjects signed informed consent forms prior to participating. Fourteen patients were entered into the present study, aged 45–58 years, stage 1–4, from 6 months to over 3 years post-operation. Recurrence was observed in two patients. Therefore, these two were excluded from this study. All patients had received chemotherapy and/or hormonal treatment, although more than 1 month had passed since the completion of chemotherapy (Table 1).

### Study Design

We designed this study as an open semi-comparative trial, which means that the 1 month period before aromatherapy massage was a waiting control period. We compared the parameters in this period with those during the aromatherapy massage sessions and 1 month after the completion of aromatherapy.

### Carrier Oil and Essential Oils

Jjoba oil was purchased from Meadows (Canterbury, UK). Sweet orange oil (*Citrus aurantium*) (Lot No. LF3190567), Lavender oil (*Lavandula angustifolia*) (Lot No. LF3190559) and Sandalwood oil (*Santalum album*) (Lot No. LF3160489) were purchased from Laboratoire Sanoflore (Gigore-et-Lozeron, France).

### Psychologic Tests

We used the Hospital Anxiety and Depression Scale (HADS) (7), STAI (8) and Profile of Mood State (POMS) (9) for evaluation of the psychologic response.

The subjects filled out the forms for psychologic tests (STAI and POMS) 1 month before aromatherapy massage, immediately before and after the first, fifth and eighth massage, and 1 month after massage. The 1-month period before aromatherapy massage was designated as a waiting control period. We used State anxiety of STAI for determination of short-term effect of aromatherapy massage. We used Trait anxiety of STAI and POMS for the determination of long-term effect.

For the HADS test, the subjects filled out the forms 1 month before aromatherapy massage, immediately before the first, fifth and eighth massage and 1 month after massage. HADS was used for determination of long-term effect.

### Procedure of Aromatherapy Massage

The subjects received a 30 min aromatherapy massage twice a week for 4 weeks (eight times in total). Each subject received the same standardized massage performed on the anterior area of the neck and thorax, back, shoulders, arms, hands and upper legs for ~30 min by skilled therapists.

### Methods for Immune Measurements

Peripheral blood was drawn 1 month before aromatherapy massage, immediately before the first, fifth and eighth massage, and 1 month after massage. Blood cell counts including numbers and proportions of leukocytes were examined at the Central Laboratory Unit of Kyoto Prefectural University of Medicine. Heparinized blood samples of 2 ml were used to determine the levels of various lymphocyte subsets. Mononuclear cells were isolated by Ficoll-Paque™ PLUS (Amersham Biosciences AB, Sweden) gradient centrifugation. Lymphocyte subsets were identified by FACS analysis (FACS Caliber, Becton, Dickinson and Company, Franklin Lakes, NJ, USA) using FITC (fluorescein-isothiocyanate)-CD16, PE (Phycoerythrin)-CD8, FITC-CD4 antibodies (Becton, Dickinson and Company), CFS (carboxyfluorescein succinimidylester)-CXCR3 antibodies (DAKO A/S, Glostrup, Denmark) and PE-CCR4 (BD Bioscience Pharmingen, San Jose, CA, USA).

### Statistical Analysis

We examined differences in data between pre- and post-massage sessions using the paired *t*-test. Temporal changes in the scores of psychologic tests were examined using the repeated measures ANOVA and Bonferroni test. All statistical analyses were conducted using SPSS software (Advanced Models 14.0J). A *P*-value < 0.05 was considered significant.

## Results

### Anxiolytic and Anti-Depressive Effects

We assessed psychologic responses to treatment as changes in anxiety and depression using HADS and STAI (Fig. 1). In HADS, we tested the anxiety level 1 month before aromatherapy massage, immediately before the first, fifth and eighth massage and 1 month

after massage. The results showed a significant difference among whole periods, tested by repeated measures ANOVA ( $P < 0.01$ ). It was found that there were no significant changes in anxiety or depression in HADS during the waiting control period and the anxiety level gradually reduced over time and that there were significant differences between anxiety scores 1 month before massage and immediately before the eighth massage ( $P < 0.05$ ) and between those tested 1 month before and after massage ( $P < 0.01$ , by paired *t*-test and  $P < 0.05$ , by Bonferroni test). However, there were no significant differences observed in the depression scores, by repeated measures ANOVA. Also, in the total HADS score, there were significant differences among whole periods and between those of 1 month before massage and immediately before the eighth massage ( $P < 0.01$ , by paired *t*-test and  $P < 0.05$  by Bonferroni test), and between those of 1 month before and after massage ( $P < 0.01$  by paired *t*-test and Bonferroni test), as in the anxiety scores.

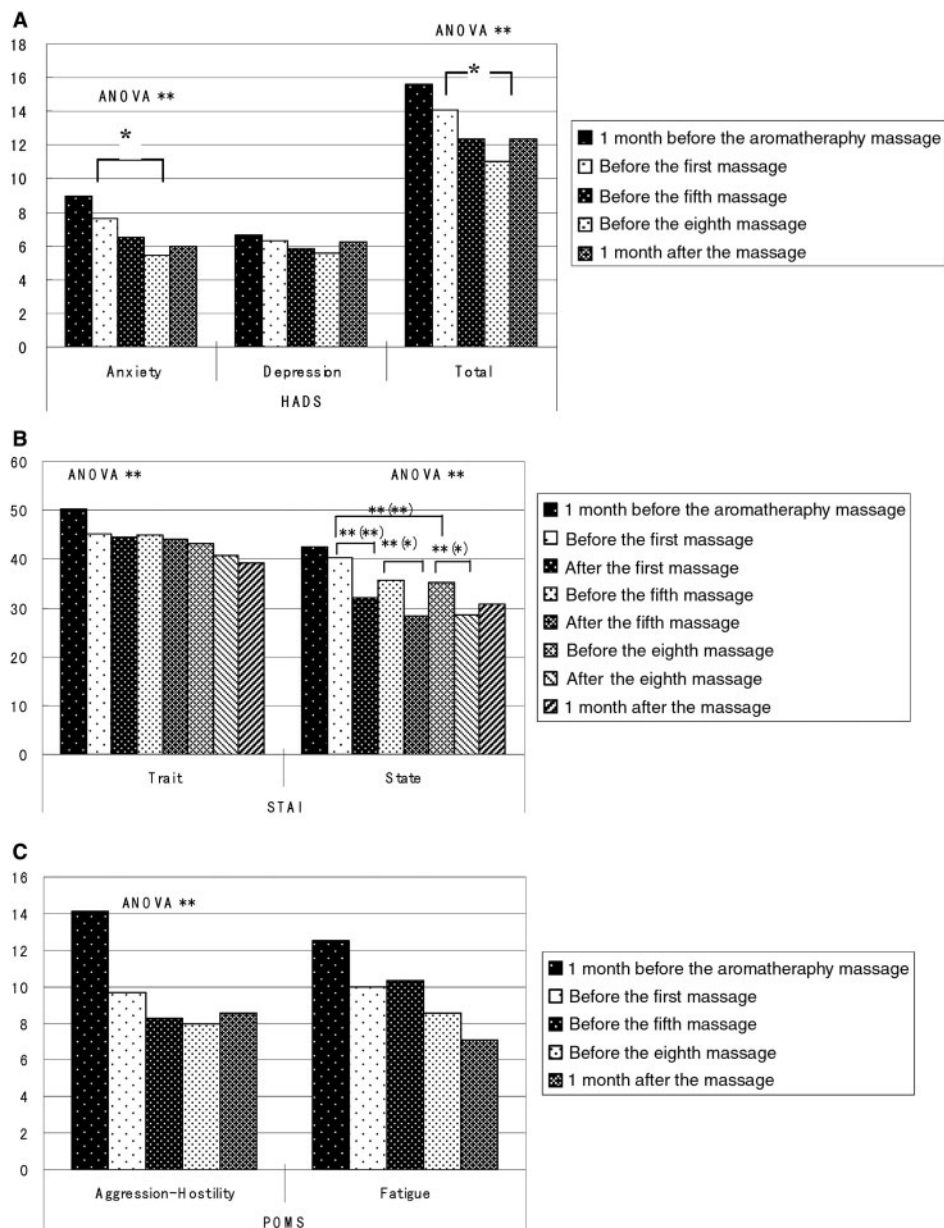
In STAI, trait anxiety was gradually reduced and there were significant differences among whole periods, between the scores tested 1 month before massage and immediately before the first massage ( $P < 0.05$ ) and between those tested 1 month before and after the first massage ( $P < 0.05$ ). State anxiety scores from STAI were significantly reduced after aromatherapy massage. Namely, there were significant differences among whole periods and between the scores tested 1 month before massage and immediately before the fifth massage and between those tested immediately before and after the first, fifth and eighth massages. However, there was no significant difference in the waiting control period.

### Changes of Mood State

Next, we examined the POMS using the POMS test. The results showed that aggression-hostility and fatigue were gradually reduced, but there were no significant differences in anger-hostility between scores tested 1 month before massage and immediately before the fifth massage and between scores tested 1 month before massage and immediately before the eighth massage. A significant difference was observed in aggression-hostility between scores tested 1 month before and after massage ( $P < 0.05$ ).

### Immunologic Measures

There were no significant differences in the number of leukocytes, and neutrophils, lymphocyte, CD4-positive lymphocytes and CD8-positive lymphocytes which are types of leukocytes, in the waiting control period. Leukocytes and lymphocyte increased significantly after the eighth aromatherapy massage session, as compared with those before the eighth massage (Fig. 2).



**Figure 1.** Psychologic effects of aromatherapy massage on breast cancer patients. (A) The subjects filled out the forms of HADS test 1 month before aromatherapy massage, immediately before the first massage fifth massage and eighth massage and 1 month after massage. (B) The subjects filled out the forms for psychologic tests (STAI) 1 month before aromatherapy massage, immediately before and after the first massage, fifth massage and eighth massage and 1 month after massage. (C) The subjects filled out the forms of POMS test 1 month before aromatherapy massage, immediately before the first, fifth and eighth massage and 1 month after massage. \* $P < 0.05$ , \*\* $P < 0.01$ , NS: not significant: not done, by repeated measures ANOVA or by paired  $t$ -test. \* $P < 0.05$ , (\*\*) $P < 0.01$ , by Bonferroni test.

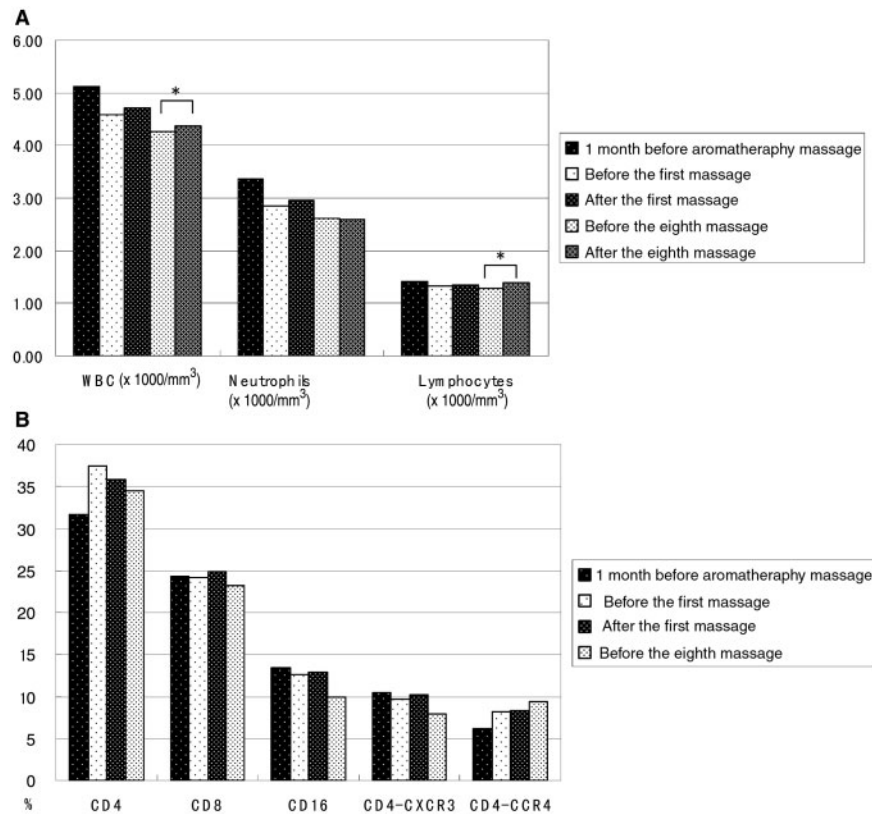
CD4-CXCR3-positive lymphocytes have a tendency to increase after the first and eighth aromatherapy massage, compared with those before the first and eighth massage. CD4-CCR4-positive lymphocytes also tend to increase by the first aromatherapy session.

## Discussion

It is well known that aromatherapy is a representative complementary therapy to reduce anxiety. In our investigation, we gave aromatherapy massage to breast

cancer patients to see if and how it ameliorated anxiety and depression and enhanced the immunologic state.

First, we examined psychologic responses to aromatherapy massage using STAI, POMS and HADS. State anxiety scores of STAI are adequate to determine the short-term effects of aromatherapy. Especially, in STAI, state anxiety scores significantly decreased after each aromatherapy massage session. This result is in accordance with those of our previous study (1) and those of Wilkinson *et al.* (5).



**Figure 2.** Immunologic effects of aromatherapy massage on breast cancer patients. Peripheral blood was drawn 1 month before aromatherapy massage, immediately before the first, fifth and eighth massage, and 1 month after massage. And blood cell counts including numbers and proportions of leukocytes were examined. Lymphocyte subsets were identified by FACS analysis. \* $P < 0.05$ , NS: not significant.

On the other hand, trait anxiety using STAI and HADS, which are appropriate for the determination of long-term effects, gradually reduced over the sessions. That is, there was a significant decrease in trait anxiety scores between 1 month before and after massage., HADS also showed that the anxiety gradually reduced over time, while there were no significant differences in the depression scores. Coinciding with our results, Corner *et al.* (4) also reported that aromatherapy massage significantly reduced anxiety. Although other investigations (10–13) did not find that aromatherapy had an anxiolytic effect in patients with cancer, we found that aromatherapy massage had both short- and long-term effects on anxiety reduction in breast cancer patients.

Immunologic, CD16-positive lymphocytes (natural killer cells) were reduced significantly after aromatherapy massage and there was a significant difference between the numbers immediately before the first and eighth massage. However, CD4-CXCR3-positive lymphocytes (type 1 helper T cells) increased significantly after the eighth aromatherapy massage, as compared with before the eighth massage. CD4-CCR4-positive lymphocytes (type 2 helper T cells) also increased significantly by aromatherapy sessions. Although it is hard to interpret

these results theoretically, it is possible that aromatherapy massage affects the immune system. In our previous study of healthy subjects, CD8-positive and CD16-positive lymphocytes increased significantly after a 30 min aromatherapy session (1). The behavior of CD16-positive lymphocytes, however, was different from that of this investigation and we are as yet unable to explain this difference.

No significant changes in the waiting control period and significant decreases of anxiety both in the short-term and long-term show that aromatherapy massage holds promise as an effective therapy for breast cancer patients. Further investigations with an increased sample size and improved study design, including a control group, are required to confirm our results. To do this, it will be important to find a therapy suitable for the control.

Outside psychologic therapies, anxiolytic drugs and anti-depressants, conventional medicine offers no effective interventions to reduce anxiety concerning recurrence and/or metastasis. Our results suggest that aromatherapy massage is a viable complementary therapy that significantly reduces anxiety in breast cancer patients.

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