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The effect of massage on immune function and stress in women with breast cancer — A randomized controlled trial

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ABSTRACT

Objectives: To examine the short-term effects of light pressure effleurage on circulating lymphocytes by studying the number and activity of peripheral blood natural killer (NK) cells in patients with breast cancer compared to a control group. Furthermore, the effect of light pressure effleurage on salivary cortisol levels, heart rate and blood pressure was studied.*Design:* Single centre, prospective, randomized and controlled study.
Methods: Thirty women, aged 50 to 75 years (mean 61 sd = 7.2) with breast cancer undergoing radiation therapy in a hospital in southwestern Sweden were enrolled in the study. They were allocated to either receive massage in the form of a full-body light pressure effleurage treatment, or a control visit where they were given an equal amount of attention. Blood samples, saliva, notation of heart rate and blood pressure were collected before and after massage/control visit. Differences in change over time between groups were analyzed by Student's *t*-test.
Results: Light pressure effleurage massage decreased the deterioration of NK cell activity occurring during radiation therapy. Furthermore it lowered heart rate and systolic blood pressure. No effects were demonstrated on cortisol and diastolic pressure.
Conclusions: A single full-body light pressure effleurage massage has a short-term effect on NK cell activity, systolic blood pressure and heart rate in patients with breast cancer. However, the long-term clinical importance of these findings needs to be further investigated.

1. Introduction

Cancer is continuously increasing with an average annual increase of 1.1% for Swedish women. Breast cancer is a common cancer form for women in Sweden, accounting for 29% of all female cancer, affecting 6500 women yearly (Socialstyrelsen [National Board of Health and Welfare]., 2006, January 26). Stress is a common symptom in women treated for breast cancer (Millar et al., 2005) and can have negative effects on the immune system. Stress-induced suppression of natural killer (NK) cell activity can cause enhanced tumour development (Ben-Eliyahu et al., 1999). Additionally, high NK cell activity is a strong predictor of disease-free survival (Levy et al., 1987). Lowering stress and enhancing natural immunity in patients with breast cancer are therefore important.

Previous research on massage has shown effects in various areas and populations such as levels of cortisol, and cellular immunity in patients with HIV (Ironson et al., 1996), women with breast cancer (Hernandez-Reif et al., 2000) and healthy adults (Field et al., 1996).

However, these studies use massage techniques with moderate or high pressure such as kneading, squeezing or pressing. Massage using only light pressure effleurage has recently been introduced in Sweden. We have, in previous studies (Billhult et al., 2007a,b) found this technique especially suited to cancer patients due to its light pressure. However, we could not demonstrate an effect of light pressure effleurage on immunity stimulating part-body only (Billhult et al., 2008). This study evaluated repeated massage and although repeated massage could have better effect, single massage is more likely to be a realistic option in many countries due to the extensive personnel resources required.

When comparing previous studies it is important to consider differences in used massage technique such as pressure, repetition of treatment and area of body treated. Part-body effleurage is a less intense stimulation than full-body effleurage. Thus, if we want to evaluate the effect of single effleurage, full-body effleurage, covering a larger body-surface area, would be the most legitimate alternative. Today, no study has evaluated the effect of single light pressure full-body effleurage on immunity in women with breast cancer.

The primary aim of the present study was to investigate the immediate effect of a single, full-body, light pressure effleurage on cellular immunity in women with breast cancer. Since patients with

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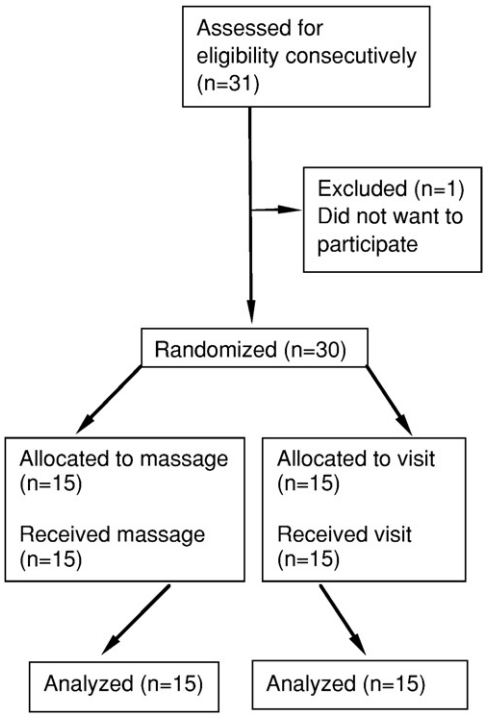

Fig. 1. Participants flowchart.

breast cancer often suffer from stress and anxiety, the secondary aims were to measure the immediate effect on cortisol concentrations in saliva, heart rate and blood pressure.

2. Material and methods

The study was a single-centre, prospective, randomized controlled trial. The study was approved by the Regional Ethical Review Board (Dnr. 521-05).

2.1. Patients

Consecutive women scheduled for adjuvant radiation therapy following breast cancer surgery, at an oncology clinic in southwestern Sweden were asked to participate. Recruitment continued until 30 women were included. Inclusion criteria were: female gender, surgically treated breast cancer, scheduled for 5 weeks of radiation, age 50 or above. Women were not included if they had received chemotherapy, hormonal treatment or any other medication with potential immunomodulatory effects or were still ovulating (Fig. 1).

One patient declined participation prior to randomization (Fig. 1). Thirty women, aged 50 to 75 years (mean = 61 sd = 7.2) with breast cancer undergoing 5 weeks of adjuvant radiation therapy at an oncology clinic in southwestern Sweden were enrolled in the study. Fifteen patients had right sided and 15 left sided breast cancer. Twenty-nine women had a lumpectomy/sentinel node dissection and 1 had a lumpectomy/axillary node dissection. Twenty-seven women had stage 1, and 3 women stage 2, according to the tumour, nodes, metastasis (TNM) classification. Mean age was 61.1 (sd = 7.6) years for the massage group and 60.8 (sd = 6.9) years for the control group. Mean time from diagnosis until inclusion in the study was 3.1 months for both groups.

2.2. Procedures

Patients were contacted on the second day of radiation treatment and, if consenting, enrolled in the study within the first week. Informed consent was obtained following oral and written information about the study. If consenting, they were randomized by random digit table to either massage or a control visit with the same degree of attention. They received one full-body massage ($n = 15$) or a control visit ($n = 15$). All massage/visits took place between 8:00 and 10:00 am.

2.3. Treatment

The patients received one full-body massage. The massage consisted of light pressure effleurage with patients placed on a massage table at the oncology clinic. A cold-pressed vegetable oil was used. The effleurage technique used was strokes with both hands, palms and fingers, using light pressure (in average 0.0090 kg/cm^2). The massage, lasting about 45 min (range 40–50 min), was administered solely by a registered nurse trained in the massage technique. No instructions were given regarding conversation during massage.

The control group received the same degree of attention as the massage group but no massage. They were visited by the same person administering massage. The visit consisted primarily of a 45 min (range 40–50 min), unstructured conversation. All other treatments and procedures were similar for both groups.

2.3.1. Massage protocol

The following massage procedure was used for the study.

Patient lay in supine position on the massage table draped with a blanket.

- Beginning at the foot, light effleurage on ventral side of the leg and back to the foot. Circular movements around the knee joint as well as around the ankle. Small circular movements bilateral on the leg starting at the foot, conclude with long strokes back to the foot. Drape the leg with blanket. Same procedure on the other leg and foot (10 min total).
- Beginning at the hand, light effleurage on ventral side of the arm and back to the hand. Circular movements around the shoulder joint, elbow and wrist. Small circular movements bilateral on the arm starting at the hand, conclude with long strokes back to the hand. Light effleurage on the dorsal side of the hand. Circular movements bilateral of each finger. Strokes on the ventral side of the hand. Drape the arm with blanket. Same procedure on the other arm and hand (10 min total).
- Light effleurage from middle of forehead towards the temple (2 min).

Patient moved to prone position.

- Light effleurage of the scalp (3 min).
- Light effleurage from the sacral area to the neck fanning out on the shoulders and back to the sacral area. Circular movements starting at the sacral area towards the neck. Light effleurage from the spine moving lateral on both sides. Stroking from neck to sacral area using both hands intermittent (10 min).
- Beginning at the foot, light effleurage on dorsal side of the leg and back to the foot. Circular movements around the knee joint as well as around the ankle. Small circular movements bilateral on the leg starting at the foot, conclude with long strokes back to the foot. Drape the leg with blanket. Same procedure on the other leg and foot (10 min total).

2.4. Outcome measures for cellular immunity

Outcome measures for cellular immunity were Natural Killer Cell Cytotoxicity (NKCC), NK cell number and frequency and finally frequency of activated NK cells. NK cells were analyzed since they are important for anti-tumour immunity and they belong to the innate immune system responding quickly to environmental changes.