

Development of Foot Massage Program on Nausea and Vomiting for Cancer Patients: A Literature Review

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Objective: This study aims to develop a foot massage program to support care activity in reducing nausea and vomiting for cancer patients undergoing chemotherapy. Two phases, a literature review and the development of a foot massage program were conducted. The literature review was to analyze state of the art massage techniques by reviewing problems, related theories and supporting evidence.

Method: Eight published studies in the English language were reviewed. A massage can be performed for different durations, from 10 minutes up to 60 minutes for three to six weeks and can be applied on various body areas. We found that the soft stroke/effleurage seems to be the best method and is most suitable for patients with cancer. It is also evident that foot massaging can be applied as a modality to reduce nausea and vomiting for cancer patients undergoing chemotherapy.

Result: We developed a foot massage program specifically for patients with cancer. The foot massage program comprised of three sessions, including 1) education session, 2) preparation session, and 3) foot massage session. In the education session, patients obtain brief information about the definition of a foot massage, the benefits and contraindication of foot massaging. During the preparation phase, foot soaking and warming up are performed. Subsequently, the foot massage is applied and should last for 30 minutes. Further research is recommended to test the effectiveness of the proposed foot massage program for nausea and vomiting in cancer patients across countries including Indonesia.

Key Words: Foot massage program, chemotherapy, nausea and vomiting

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Introduction

Cancer is a global health problem and is a leading cause of death worldwide. In 2002, there were 10.9 million new cases, 6.7 million deaths, and 24.6 million people living with cancer (Parkin, Bray, Ferlay & Pisani, 2005). In Indonesia, cases of cancer reached 153,000 annually (World Health Organization [WHO], 2007). The prevalence of cancer in Indonesia is 4.3 per 1000 people, and has become the second leading cause of death after cardiovascular disease (Indonesia Health Profile, 2010). It is estimated that there would be at least 170-190 new cancer cases annually for each 100,000 people (Tjindarbumi & Mangunkusumo, 2002).

Chemotherapy is one of cancer treatments that can destroy cancerous cells and prevent metastasis. Nausea and vomiting are distressing symptoms for patients with cancer, especially those who are receiving chemotherapy (Bender et al., 2002; Rhodes & McDaniel, 2001). Despite the development of anti-emetic therapy, nausea and vomiting are commonly seen in clinical practice. Since the anti-emetic drugs can not totally relieve the symptoms of chemotherapy-induced nausea and vomiting, several techniques have been used in combination with medications to reduce the symptoms (Rose et al., 1999). Nurses can play a significant role to help the patients to cope with these symptoms through non-pharmacological therapy such as massage, aromatherapy, reflexology, guided imagery, etc.

Among various types of non-pharmacological therapy, massage has been reported to have a positive effect on reducing several symptoms such as pain, anxiety, fatigue, nausea and vomiting. Several massage techniques are evident and are used in various populations including patients with cancer, bone marrow transplantation patients, patients with lower-back pain, end-stage renal disease and patients who have had abdominal surgery. However, a systematic review aimed at identifying the methodological issues revealed the inconsistent findings of the effect of massage in the cancer population (Jane, Wilkie, Gallucci & Beaton, 2008). In this systematic review study, 15 studies published during 1966 to 2006 were included. These studies incorporated a wide range of outcome measures, including pain, fatigue, anxiety, depression, and nausea. Among 15 studies, only three of them included nausea as the outcome of massage intervention. These three studies (Ahles et al., 1999; Cassileth & Vickers, 2004; Grealish, Lomasney & Whiteman, 2000), therefore, were included in this present review for further examination together with the more recent evidence.

Massage can be applied on any part of the body. However, some parts of the body may not be easily accessible or relevant to apply in some cultures. For example, Muslim women may feel reluctant to have others to touch their body. Thus, a foot massage may be an alternative type of massage for them.

Considering the nurses' role, massaging is a complementary therapy that nurses can deliver independently to their clients. However, it is necessary to examine which type of massage should be applied, and whether there is adequate evidence to support its effectiveness before nurses can apply this method to guide their evidence-based nursing practice. Moreover, concerning the body area that is easily accessible in most clients, the development of a foot massage program for cancer patients should be developed based on the current stage of knowledge in massage literature.

This review aims to assess the state of the art techniques of massage therapy in reducing chemotherapy-induced nausea and vomiting (CINV) in the cancer population. The proposed foot massage program was developed based on the literature review.

Method

A relevant literature search was conducted by using the CINAHL, PubMed, Science Direct, ProQuest, Nursing and Allied Health Source, and Cochrane Library databases over the last ten years (1999-2009). The universal case entry websites such as Google-web and Google scholar were also used. Keywords used to obtain relevant articles included massage, non-pharmacology, nausea and vomiting, cancer and chemotherapy-induced nausea and vomiting. Only articles in English and Indonesian language were reviewed. The authors critically analyzed each article and extracted key information needed to guide the development of the foot massage program specific for reducing nausea and vomiting in cancer patients.

Result

Foot massage as an intervention for nausea and vomiting reduction

Out of eight published studies, three studies were randomized control trials (RCTs) (Ahles et al., 1999; Billhult et al., 2007; Mehling et al., 2007), three studies were quasi experimental studies (Grealish et al., 2000; Post-White et al., 2008; Sturgeon et al., 2009) and two were observational, exploratory studies (Andersen et al., 2006; Cassileth & Vickers, 2004).

A study by Post-White et al. was a pilot study examining the feasibility to apply massage to both children with cancer and their parents. Massaging was conducted on both outpatients and hospitalized patients.

Three studies combined massaging with other methods, including music (Sturgeon et al., 2009), physical activities (Andersen et al., 2006), and acupressure (Mehling et al., 2007). In this regard, the true effect of massaging is unclear. Only a study conducted by Cassileth and Vickers (2004) used massage as a single intervention and they reported a significant reduction of nausea with persisting benefits across a total of 48 hours for the outpatients. A review by Wilkinson, Barnes and Storey (2008) evaluated the evidence for the effectiveness of massage combining aromatherapy for people with cancer on quality of life, psychological or physical problems and unwanted side effects. They suggested that massaging may reduce anxiety on a short term, and it may reduce physical symptoms in cancer patients including nausea.

When a massage should be given to reduce nausea and vomiting and how it works are still unclear. Only a study conducted by Billhult et al. (2007) mentioned about the cycle of chemotherapy. Massaging was conducted at the third to the seventh cycle of chemotherapy in this study without clear rationale. The 20-minute massage was given at each cycle with a pre and post intervention measured by using a Visual Analog Scale for nausea. Only one study elaborated using acts of touch and muscle relaxation as their theoretical framework (Grealish et al., 2000). The other studies did not address a specific theory to explain how massaging works in reducing nausea.

Massage therapy is an effective adjunct to reduce nausea and vomiting in cancer patients with various numbers of sessions and duration of time at each massage session. A massage can be conducted in one session (Ahles et al., 1999), three sessions (Cassileth & Vickers, 2004), and five sessions (Billhult et al., 2007). It can be conducted over various durations of time, starting from ten minutes (Grealish et al., 2000), 20 minutes (Ahles et al., 1999; Billhult et al., 2007), 10 - 30 minutes (Mehling et al., 2007) and 20 to 60 minutes (Cassileth & Vickers, 2004). In short, a massage can be conducted over various durations of time, ranging from 10 minutes up to 60 minutes.

Massaging was performed by expert therapists or trainers in most studies. Only a study conducted by Sturgeon et al. (2009) did not mention clearly about the therapist. Massage techniques being used included effleurage, petrissage, friction, vibration and tapotement. Based

on voluntary testing, Billhult et al. (2007) suggested using effleurage as the best method and most suitable method for cancer patients. Massaging can be done on any part of the body including the feet (Grealish et al., 2000), foot/lower leg or hand/lower arm (Billhult et al., 2007), shoulders, neck and head (Ahles et al., 1999) and full body massage (Sturgeon et al., 2009).

Generally, these studies supported that massage therapy has a significant effect to reduce nausea. Only two studies failed to show a significant reduction of nausea and vomiting, the first conducted by Post-White et al. (2008), which compared body massage and standard care, and the other by Sturgeon et al. (2009), which used full body massage for three consecutive weeks. They found that the mean scores were lower after each massage which was similar to that of the control group. This may be caused by many factors, such as the use of antiemetic drugs, introductory massage technique, or an adjustment for the treatment of cancer. Details of each study are presented in Table 1.

Table 1. Massage therapy to relieve nausea and vomiting in cancer patients

Author (year)	Sample & setting	Study design	Experimental treatment	Control treatment	Type, length, and site of massage	Therapist	Instrument	Conceptual framework	Main results
1. Ahles et al., (1999)	Thirty-four patients scheduled for autologous bone marrow transplantation	RCT	Massage therapy (n=16)	Standard treatment (n=18)	Swedish' massage (effleurage and petrissage) 20 minutes to upper body: shoulder, neck, head, and face, approximately 3 massages/ weekly for 3 weeks	One trained, healing-arts specialist who has over 10 years experience in providing massage to medically ill, hospitalized patients.	Numerical Scale (0–10) for Nausea (representing symptoms of distress)	Not explicitly specified but “reduction of muscle tension and relaxation” were addressed	The massage group demonstrated immediate effect (pre to post massage) with significantly larger reduction in nausea than that of the control group (p = .01), particularly in the first seven days of treatment.
2. Andersen et al., (2006)	54 patients undergoing chemotherapy	Prospective exploratory, non-experimental	Multidimensional exercises	-	A 6-week intervention with structured physical activity. Two levels of physical training were classified without clear instruction how each subject was instructed to perform which one. High intensity physical training (in group-1.5 hr X 3 times/wk). Low intensity physical training included: progressive muscle relaxation (in group-0.5 hr X 4 times/wk), massage (individual-0.5 hr twice/wk), and body-	Trained physiotherapists and a specially trained nurse	Common Toxicity Criteria, scale from 0 to 4 and 0 to 3, including “vomiting” and “nausea”, respectively	Not specified and not specific to massage	The score for vomiting was unchanged (from 0.04) and nausea increased from 0.22 to 0.24 (negative finding)

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3. Billhult et al., (2007)	39 women with breast cancer undergoing chemotherapy	RCT	Five 20-minute massage sessions (n=19)	20-minute visit by hospital staff (n=20)	awareness training (in group-1.5 hr/ wk) Swedish (effleurage strokes massage) 20 minutes, to either hand/lower arm or foot/lower leg	Five staff nurses or nurse aids	VAS (0-100). Change of scores on the VAS between pre and post treatment was computed as percent of improvement out of the five sessions	Not specified	Nausea score was significantly lower in the massage group than that of the control group (p =.025) with approximately 1.5 fold in number of subjects indicating an improvement between massage group (73.5%) and the control group (49.5%)
4. Cassileth and Vickers, (2004)	1,290 cancer patients at Memorial Sloan-Kettering Cancer Center, with 3,609 episodes of massage	Observational study	Massage	-	Standard (Swedish) massage, light touch, and foot massage, 20 min for inpatients (n=961) and 60 min for outpatients (n=329)	12 licensed massage therapists	Numerical rating scale (0-10)	Not specified	Swedish and light touch massage had superior outcomes to foot massage. The immediate effect of massage on nausea was significant but the percent of improvement was considered lower than the other symptoms (21% improvement). The effect was more apparent in patients who reported nausea at “moderate” intensity (51% improvement)
5. Grealish et al., (2000)	87 inpatients, mixed cancer	A quasi-experime	Massage (two	No massage	Swedish slow firm or gentle strokes toward the	Two nurses trained in	VAS (0-100)	Acts of touch	Immediate effect of massage on nausea was

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	diagnoses	ntal , crossover	occasions)	(one occasion)	heart, 10 minutes on the foot for three consecutive evenings	massage techniques		and muscle relaxation	evident. In the massage sessions, nausea scores were significantly lower from pre to post massage on both occasions (p<.01) . Although this is statistically significant, the clinical significance is considered low (with mean differences ranging between 6.4 to 4.9 mm, respectively).
6. Mehling et al., (2007)	138 postoperative patients with cancer	RCT	Massage and acupuncture added to usual care (n=93)	Usual care (n=45)	Swedish massage (kneading and strokes), and acupressure-type foot massage, with duration ranging from 10 to 30 minutes (average 20 minutes)	One of two certified massage therapists and one of two licensed acupuncturists	Self-report: 11-point numeric rating scale 0-10 (NRS) for nausea and number of vomiting episodes in the past 24 hours	-	No between group difference (p=.13) but there was more improvement in nausea in the experimental group (4.5 ± 3.1) than that of the control group (2.1 points ± 3.1) , particularly on POD1
7. Post-White et al., (2008)	Seventeen children with cancer aged 1-18 yrs who received two identical cycles of chemotherapy	A quasi-experimental-crossover	Massage	Quiet-time	Full-body massage for 4 weeks (once a week X 4 weeks)	Four certified massage therapists	Children aged 1-2 yrs-parent rated Aged 3-8, self-report using Wong-Baker's Faces Scale	-	No significant effect on nausea (Z=-.17, p=.07)

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	at week 4 to 8						Aged 9-18, self-report using the VAS (0-10)		
8. Sturgeon et al., (2009)	51 female patients during breast cancer treatment	A quasi-experimental, one group, pre-post-test, convenience sample	Full body massage	-	Swedish full body massage consisted of light, long, gliding strokes, 30 minutes per week for 3 consecutive weeks Soft music was played	unclear	Rhodes Index of Nausea, Vomiting and Retching Scale (INVR)	-	No significant reduction in nausea, and vomiting

The quality of reviewed studies

The quality of the reviewed studies was evaluated by a 10-item assessment tool modified from Detsky et al. and van Tukder et al. (as cited in Jane et al., 2008) including the research design, validity of the research, and statistical analyses. Among the eight studies, seven studies (88%) were of medium quality and one study (12%) was of high quality. The results are detailed in Table 2 and the operationalizations of the criteria for quality assessment of the research studies are presented in Table 3.

Table 2.
The quality of reviewed studies

Evaluation Items	1	2	3	4	5	6	7	8
Research design:								
1. Randomly assign the participants	1	0	1	0	1	1	1	0
2. Sample size	0	1	0	1	1	1	0	1
3. Testing the homogeneity of participants	1	0	1	0	1	1	1	1
4. Blinding the data collector or therapist	0	0	0	1	0	0	0	0
5. Treatment fidelity or standardized intervention protocol	1	1	0	1	1	0	1	1
Reliability and validity of research								
6. Report the reliability/report the validity	1	0	0	0	0	0	1	1
7. Controlling for the covariate	1	1	0	1	0	1	1	0
8. Number of dependent variables	0	0	0	0	0	0	0	0
Statistical analysis								
9. Report point estimates and measures of variability	1	1	1	1	1	1	1	1
10. Statistical tests	1	1	1	1	1	1	1	1
Total score	7	5	4	6	6	6	6	6

Note: Quality of study was determined by the total score of evaluation items and classified as low quality (≤ 3), medium quality (4-6), and high quality (≥ 7). The numbering of studies is comparable to Table 1.

Table 3 Operationalization of criteria for quality assessment of research

Research design:

1. Randomly assign the participants: adequate description of sampling and randomization and having a control group
2. Sample size: having at least 20 participants in each group or 30 in a one-group design
3. Testing the homogeneity of participants: adequate description of similarity on some demographic data (age, gender, or duration of disease, baseline of primary outcome) or description of how to minimize differences in participants in terms of inclusion criteria (types of disease, age, or previous experience)
4. Blinding the data collector or therapist: given information on blinding data collectors or therapists
5. Treatment fidelity or standardized intervention protocol: adequate description of standardized intervention protocol, duration, intensity, and frequency of treatment session or manipulation checking applied

Reliability and validity of research

6. Report the reliability/report the validity: given information about the reliability or validity of instrumentation
7. Controlling for the covariate: adequate description of confounder and strategies for adjustment or further examination
8. Number of dependent variables: inclusion of at least 3 outcome measures to reflect multidimensional nature of nausea

Statistical analysis

9. Report point estimates and measures of variability: provision of means and SD or confidence interval for primary outcome measure
10. Statistical tests: report statistical tests used and results

Note: Adopted from Detsky et al. and van Tukder et al. in “Systematic review of massage intervention for adult patients with cancer: A methodological perspective” by Jane, S. W., Wilkie, J. D., Gallucci, B. B., and Beaton, R. D. (2008) *Cancer Nursing*, 31, E25-E35.

Safety and contraindications of massage therapy

Although massage can be provided for a number of reasons, some contraindications for massage therapy exist, such as, deep vein thrombosis or localized conditions such as skin injuries or burns (Sherman et al., 2005). However, many conditions previously considered contraindications (e.g., metastatic cancer) are no longer considered as such (Batavia, 2004). The common forms of massage, tailored appropriately, are considered very low risk (Ezzo et al., 2007; Lafferty, Downey, McCarty, Standish & Patrick, 2006). A systematic review of the safety of massage therapy concluded that although massage is not entirely free of risk, serious adverse events are rare (Corbin, 2005; Ernst, 2003). The majority of adverse effects were associated with

exotic types of manual massages or massages delivered by a layperson. Therefore, providing the information related to the safety and contraindications of massaging are important.

Massaging is often associated with reflexology. Although both involve the use of hands to apply their techniques, these modalities are different. Hodgson and Andersen (2008) state that the major differences of these modalities are that reflexology uses small muscle movements that are applied to specific areas of the body (feet and hands), while massaging uses large muscle movements and is often applied to the entire body.

Foot Reflexology

Reflexology is a specialized foot massage, targeting specific areas of the foot that represent other parts of the body. Reflexology aims to promote health and works by stimulating nerve endings in the feet, sending impulses via the spinal cord to other parts of the body. It has been claimed that localized finger pressure on reflex points on the foot can influence the function of the corresponding target organs to promote homeostasis, relaxation, and the healing response (Wang, 2008). Reflexology improves circulation and may help with the disposal of waste products of tissue metabolism, particularly lactic acid (Lakasing & Lawrence, 2010). It is believed that reflexology works by a combination of biomechanical and spiritual factors. Other effects of reflexology could be due to the additional social and physical contact that the intervention entails (Frank, et al. as cited in Sharp, 2010).

Reflexology has been offered to patients with cancer in an attempt to improve the adverse physical and psychological symptoms associated with the illness or its treatments (Hodgson, 2000; Quattrin et al., 2006; Ross et al., 2002; Stephenson et al., 2000; Wright et al., 2002,). Studies evaluating the effect of reflexology in a variety of health conditions have shown that it is a promising treatment in promoting well-being with little risk of side-effects (Richardson as cited in Hodgson & Anderson, 2008) and does not interfere with patients' privacy (Stephenson et al., 2000). In addition, the human touch accompanied by reflexology offers care and attention for patients, and this psychological comforting has been reported as a primary benefit of reflexology (Gambles et al. as cited in Wang, 2008). Integrating reflexology points with foot massaging would improve the result, as well as involving some physical and social contact for the patients. Thus, we developed a foot massage program specifically for cancer patients and integrated reflex points of reflexology to determine the area of massage.

Development of Foot Massage Program

The foot massage program comprised of three sessions, including 1) education session, 2) preparation session, and 3) foot massage session (Table 4). Prior to an intervention, intervention preparations, as explained in Table 4, were carried out. The subjects were instructed to have breakfast at least one hour before the intervention or to have meals after the intervention, to remain in bed for at least 30 minutes immediately before the intervention, to wear loose clothes, and to empty their bladder. The foot massage program lasted for 30 minutes.

Since this massage protocol is specifically designed for cancer patients, some points need to be considered. Based on the experts' opinion, a foot massage should not be performed at the reflex points such as the genital organ, uterus and lymph nodes because it may be harmful for patients with cancer and may lead to the spreading of the cancer cells

Table 4 Foot massage program

Sessions	Contains
Education session	Subjects obtain brief information about: <ul style="list-style-type: none">- Definition of foot massage- Benefits and contraindications of foot massage.
Preparation session	Set the environment by drawing the curtain. Instruct the subjects to lie in a prone position and measure the vital signs, follow with foot soaking for 5 minutes. Instruct the subjects to close their eyes and take three deep breaths. Warm up is performed, starting gently, working slowly and rhythmically by using natural oil (coconut oil) as a lubricant Minimize the conversation during the intervention.
Foot massage session	A 30-minute foot massage is performed following the steps of the massage protocol. Every step consists of pressure and effleurage/gliding/stroking movements. Effleurage is performed in four different ways; with the palm of one hand, with the palms of both hands, with the thumb, with the tips of the fingers. In each area of the organ is pressed 10 times, the count is then released slowly, and continued by technique of effleurage massage. The subjects are asked about their comfort of massage pressure. The foot massage is ended with some stretching techniques and cleaning off of the excessive oil. Immediately after the foot massage: <ul style="list-style-type: none">- Subjects are encouraged to quietly rest for an additional 30 minutes and drink a glass of mineral water.- Subjects are interviewed regarding their perceptions of receiving the foot massage therapy

Conclusion

This review demonstrated that massage therapy can be utilized to reduce nausea and vomiting. Massaging has been recommended as an aid in reducing the side effects of treatment with cancer, specifically nausea and vomiting. Most studies has given promises to the benefit of both massage and foot reflexology. However, there is limited data on how cancer patients, particularly for those who receive chemotherapy, could benefit from receiving these treatments. The foot massage program has been developed by incorporating the foot massage and points of reflexology. The effectiveness of using the reflex points of foot reflexology to determine the area of massage should be tested with regards to reducing nausea and vomiting as a side effect of chemotherapy. Further research is needed in this field, especially in Indonesia. Another study should be conducted to test the feasibility of the foot massage protocol in the real setting. Furthermore, since this program was conducted over a short term, a future program should be conducted to assess and evaluate the persistence of the effects of foot massaging in the long term and involving family members.

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