

# Massage Modalities and Symptoms Reported by Cancer Patients: Narrative Review

Cynthia D. Myers, PhD, LMT, Tracy Walton, MS, LMT, NCTMB, Lindsay Bratsman, MS, Jennifer Wilson, BS, Brent Small, PhD

The results of several studies on the use of massage therapies for cancer patients have been published in the peer-reviewed literature over the past 20 years. The current article provides a summary and critique of published studies in which patient-reported symptom ratings were assessed in relation to massage. Twenty-two studies are discussed. Most studies were on Swedish massage, followed by aromatherapy massage, foot reflexology, and acupressure. Symptoms assessed as outcomes included pain, fatigue, anxiety, nausea, and depression. Study designs included uncontrolled observational studies, crossover designs, and quasiexperimental and randomized controlled studies. Several studies included methodologic limitations such as small sample sizes, lack of blinded assessment, lack of accounting for subject attrition in statistical analyses, and other limitations. The results of the studies reviewed are mixed and vary as a function of several study characteristics. The most consistent symptom reduction was anxiety reduction. Additional well-designed studies are needed. Several recommendations are offered for future studies.

**Key words:** acupressure, aromatherapy, massage, reflexology, touch

In recent years, the results of several studies on the effect of massage on cancer symptoms and treatment side effects have been published in peer-reviewed journals.<sup>1-22</sup> The massage modalities receiving the most research attention in the oncology context have included Swedish massage, aromatherapy massage, reflexology, and acupressure. All of these modalities can be characterized as massage because they involve manual manipulation of the soft tissues of the body through pressure or movement with the intended purpose of enhancing well-being. Beyond that common feature, the modalities differ markedly from one another in terms of their theoretical

bases, their methods of applying touch, and the training and regulatory requirements for professional practice.

Swedish massage is the classic European massage, which aims to facilitate circulation, reduce excess muscle tension, increase flexibility, and promote relaxation. Most studies of Swedish massage with cancer patients have focused on massage provided by licensed or certified massage therapists or by nurses with massage expertise. Manual techniques studied have chiefly been gentle, broad, flowing strokes (“effleurage”) applied in the direction of vascular and lymphatic circulation with lotion or oil as a lubricant on the skin and gentle kneading of soft tissues (“petrissage”). Aromatherapy massage incorporates specially selected aromatic essential oils into Swedish massage with the goal of enhancing the beneficial effects on specific symptoms, such as mood. Reflexology theory postulates zones on the feet, hands, and ears that can be stimulated to affect remote areas of the body to promote health. Studies of reflexology as applied to cancer patients have involved focal pressure to specific areas of the feet and lower legs. Acupressure is based on the classic traditional Eastern Asian health paradigm of facilitating dynamic balance in the flow of life force through a network of meridians by stimulating specific acupoints along the meridians with focal pressure.

The purpose of the current article is to summarize and appraise the published peer-reviewed literature on the

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Cynthia D. Myers: *Integrative Medicine Program, H. Lee Moffitt Cancer Center and Research Institute, Tampa FL*; Tracy Walton: *Training and Consultation, Caring for Clients with Cancer, Cambridge, MA*; Lindsay Bratsman and Brent Small: *School of Aging Studies, University of South Florida, Tampa, FL*; Jennifer Wilson: *College of Osteopathic Medicine, Nova Southeastern University, Fort Lauderdale, FL*.

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Reprint requests: Cynthia D. Myers, PhD, LMT, H. Lee Moffitt Cancer Center and Research Institute, 12902 Magnolia Drive, MRC-PSY, Tampa, FL 33612-9497; e-mail: cynthia.myers@moffitt.org.

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effect of manually administered massage on subjective symptoms assessed by cancer patients' self-report. Our goal is to contribute to understanding the state of the research on massage for cancer patients and thereby to facilitate the development of strong research designs for future studies targeting optimal symptom prevention and control. For each study, we have attempted to extract details of the study design, sample characteristics, experimental and control conditions, training of interventionists, assessments and who performed them, and results.

## Methods

The US National Library of Medicine electronic *PubMed* database and the *Cumulative Index to Nursing & Allied Health Literature (CINAHL)* electronic database were searched from their inception through April 2007 by the first author (C.D.M.). The search terms "massage," "touch therapy," "acupressure," "effleurage," "petrissage," and "reflexology" were each paired with "cancer." Studies of these modalities reporting at least one discreetly measured symptom using a self-report instrument from the cancer patient's perspective were read independently by two massage therapists (C.D.M., T.W.) and one statistician (B.S.). Data were extracted by all members of the research team. Because our interest was in the effects of massage on symptoms, we did not examine the impact of massage on other outcomes, such as quality of life (eg, impact of symptoms on the ability to perform role functions), physiologic parameters (eg, blood pressure, heart rate), or other outcomes.

## Results

Twenty-two studies were located reporting at least one discreetly measured symptom using a self-report instrument from the cancer patient's perspective, thus meeting inclusion criteria for this narrative review. Owing to the paucity of pediatric studies, we discuss studies with adult participants. Eleven studies included data on Swedish massage (Table 1),<sup>1-11</sup> followed by five on aromatherapy massage (Table 2),<sup>12-16</sup> five on reflexology (Table 3),<sup>3,17-20</sup> and two on acupressure (Table 4).<sup>21,22</sup> Table 5 lists the symptoms assessed as discreet outcomes in given studies. Anxiety was most often assessed, with 16 of the 22 studies including a measure of anxiety. Pain was an outcome in 15 studies, including all but one of the Swedish massage studies. Nausea and depression were each outcomes in nine studies, whereas fatigue was an outcome in four studies.

A variety of self-report scales and questionnaires were used to assess symptoms. Pain was assessed with numeric rating scales (NRSs), visual analogue scales (VASs), the Brief Pain Inventory,<sup>23</sup> the Memorial Pain Assessment Card,<sup>24</sup> the McGill Pain Questionnaire Short-Form,<sup>25</sup> and the European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-C30),<sup>26</sup> and one study combined an NRS with a 4-point Likert-type scale.<sup>8</sup> Fatigue was assessed with an NRS, a VAS, and the EORTC QLQ-C30.<sup>26</sup> Anxiety was assessed with an NRS, a VAS, the Hospital Anxiety and Depression Scale (HADS),<sup>27</sup> the Profile of Mood States (POMS),<sup>28</sup> the State Trait Anxiety Inventory,<sup>29</sup> the Symptom Checklist – 90 Revised (SCL-90-R),<sup>30</sup> the EORTC QLQ-C30,<sup>26</sup> and a shortened version of the Structured Clinical Interview.<sup>31</sup> Nausea was assessed with an NRS; a VAS; a brief nausea index (used by Post-White and colleagues<sup>7</sup>; this was a modification of the Brief Pain Inventory<sup>23</sup>); the Rhodes Inventory of Nausea, Vomiting, and Retching,<sup>32</sup> a chemotherapy problem checklist (used by Dibble and colleagues<sup>21</sup>; this was a modification of the Chemotherapy Knowledge Questionnaire<sup>33</sup>); and a daily log of nausea. Depression was assessed by an NRS, a VAS, the Beck Depression Inventory,<sup>34</sup> the HADS,<sup>27</sup> the POMS,<sup>28</sup> the SCL-90-R,<sup>30</sup> and the Centers for Epidemiological Studies–Depression scale.<sup>35</sup>

Table 5 indicates the studies using each symptom assessment tool. This table also indicates the time frame of symptom assessments, which we classified as immediate effects (within 30 minutes of massage), intermediate effects (more than 30 minutes and up to 48 hours after massage), or longer-term effects (more than 48 hours postmassage). Finally, Table 5 lists the results for controlled between-group comparisons or, where no controlled results are available, for within-group (pre-post) comparisons, or in studies using subjects as their own control, within-group comparisons of intervention versus subjects as their own control. We used an alpha of less than .05 as our minimal test of statistical significance when the results of statistical tests were provided.

Studies of Swedish massage ranged in sample size from 6<sup>9</sup> to 560.<sup>3</sup> All but two studies of Swedish massage enrolled heterogeneous patient samples representing several different cancer diagnoses, often with varying stages of disease. The other two studies enrolled women with breast cancer.<sup>2,6</sup> Interventions ranged from a single 10-minute back massage<sup>10</sup> to 15 30-minute full-body massages over a 3-week period.<sup>6</sup> Interventionists possessed a wide range of training and experience in massage, from nursing students

**Table 1.** Swedish Massage Studies

<i>Study</i>	<i>Sample</i>	<i>Study Design</i>	<i>Interventionist (Assessor Collecting Data)</i>
Alhes et al, 1999 <sup>1</sup>	Inpatients, mixed cancer diagnoses, undergoing autologous BMT ( <i>n</i> = 34)	Randomized controlled. Group 1 received 4 to 9 20 min massages to shoulders, neck, face, and scalp ( <i>n</i> = 16) Group 2 received usual care and assessments pre-post 20 min periods of quiet time ( <i>n</i> = 18)	Experienced certified massage therapist nurse (another nurse)
Billhult et al, 2007 <sup>2</sup>	Outpatient women with breast cancer during chemotherapy infusion ( <i>n</i> = 39)	Randomized controlled Group 1 received 5 20 min massages to foot/lower leg or hand/lower arm ( <i>n</i> = 19) Group 2 received 5 20 min visits from hospital staff ( <i>n</i> = 20)	Five staff nurses or nurses' aides (assessor not clear)
Cassileth and Vickers, 2004 <sup>3</sup>	Inpatients and outpatients, mixed cancer diagnosis ( <i>n</i> = 560 Swedish massage)	Observational uncontrolled Swedish, foot massage (mostly reflexology), light touch, or a combination of these Average of 20 min for inpatients and 60 min for outpatients	12 licensed massage therapists (other staff)
Ferrell-Torry and Glick, 1993 <sup>4</sup>	Inpatient males, mixed cancer diagnoses (5 metastatic) with pain and no surgery in past 6 wk ( <i>n</i> = 9)	Observational uncontrolled 30 min massage to feet, back, neck, shoulders preceded by instruction on deep breathing and maintaining quiet on two consecutive evenings	Principal investigator MA, RN (assessor not clear)
Grealish et al, 2000 <sup>5</sup>	Inpatients, mixed cancer diagnoses (32 metastatic) ( <i>n</i> = 87)	Subjects as own control randomized to order 10 min foot massage 2 of 3 consecutive evenings vs 10 min of quiet activity 1 of 3 days	Research nurse (research assistant)
Hernandez-Reif et al, 2005 <sup>6</sup>	Outpatient women diagnosed with early stage I–III breast cancer in past 3 yr ( <i>n</i> = 58)	Randomized controlled Group 1 received 30 min full-body massage 3×/wk for 5 wk ( <i>n</i> = 22) Group 2 received 30 min progressive muscle relaxation audiotape 3×/wk for 5 wk ( <i>n</i> = 20) Group 3 received usual care ( <i>n</i> = 16)	Massage therapists (assessor not clear)
Post-White et al, 2003 <sup>7</sup>	Outpatients, mixed cancer diagnoses from 2 chemotherapy clinics, at least one symptom ≥ 3/10 ( <i>n</i> = 164)	Controlled crossover mixed between/within design; all groups start on day 1 of chemotherapy cycle Group 1 received 4 weekly 45 min full-body massages and 4 wk of usual care or the opposite ( <i>n</i> = 62) Group 2 received 4 weekly 45 min of healing touch and 4 wk of usual care or the opposite ( <i>n</i> = 56) Group 3 received 4 weekly 45 min sessions of attention from a caring person followed by usual care or the opposite ( <i>n</i> = 45)	RN massage therapists, RN healing touch practitioners (research assistant)
Smith et al, 2002 <sup>8</sup>	Inpatients, mixed cancer diagnoses on oncology unit undergoing chemotherapy or radiation ( <i>n</i> = 41)	Quasiexperimental, nonrandomized Group 1 received 15–30 min massage 3× in 1 wk ( <i>n</i> = 20) Group 2 received 20 min nurse interaction and discussion of an array of topics ( <i>n</i> = 21)	RN massage therapist (assessor not clear)
Toth et al, 2003 <sup>9</sup>	Inpatients, mixed advanced cancer diagnoses ( <i>n</i> = 6, data on symptoms available for 4)	Observational uncontrolled From 1 to 9 massages provided (average 3.3), 15–60 min (average 34) in duration, in evenings	Licensed or certified massage therapists (assessor not clear)
Weinrich and Weinrich, 1990 <sup>10</sup>	Inpatients, mixed cancer diagnoses ( <i>n</i> = 28)	Randomized controlled Group 1 received 10 min back massage ( <i>n</i> = 14) Group 2 received 10 min visit ( <i>n</i> = 14)	Senior nursing students (same nursing students)

Table 1. Continued

<i>Study</i>	<i>Sample</i>	<i>Study Design</i>	<i>Interventionist (Assessor Collecting Data)</i>
Wilkie et al, 2000 <sup>11</sup>	Hospice patients at their residences, mixed cancer diagnoses ( <i>n</i> = 29)	Randomized controlled Group 1 received 30–50 min full-body massage twice weekly for 2 wk ( <i>n</i> = 15) Group 2 received usual hospice care ( <i>n</i> = 14)	Licensed massage therapists (same therapists)

BMT = bone marrow transplant.

with less than an hour of training in massage<sup>10</sup> to licensed massage therapists and nurse massage therapists with years of experience caring for cancer patients.<sup>1,9</sup> Swedish massages were provided in inpatient hospital rooms, in outpatient massage settings, and in the home hospice setting. Swedish protocols were generally well described, with some studies providing detailed, replicable descriptions of protocols.<sup>6</sup>

Aromatherapy massage study participants ranged from 8 patients with malignant brain tumors seen in the outpatient neuro-oncology clinic<sup>13</sup> to 288 patients with

an array of cancer diagnoses.<sup>16</sup> Participants received from one<sup>13</sup> to eight<sup>12</sup> aromatherapy massage sessions, usually of 30 minutes' duration. In three aromatherapy massage studies, interventionists were described as experienced or credentialed in providing massage<sup>12,15,16</sup>; however, the massage training of interventionists in two aromatherapy studies was not described.<sup>13,14</sup>

Studies of foot reflexology involved samples of 17 to 585 participants with several different cancer diagnoses, many with advanced cancer. Interventions ranged from a single 20-minute session of foot reflexology to six weekly sessions.

Table 2. Aromatherapy Massage Studies

<i>Study</i>	<i>Sample</i>	<i>Study Design</i>	<i>Interventionist and Assessor</i>
Corner et al, 1995 <sup>12</sup>	Patients on active treatment, mixed cancer diagnoses ( <i>n</i> = 52)	Randomized, matched control Group 1 received 8 weekly 30 min back massages, up to 30 min rest afterward ( <i>n</i> = 18) Group 2 received 8 weekly 30 min back massages with almond oil, up to 30 min rest ( <i>n</i> = 17) Control received usual care ( <i>n</i> = 18)	RN experienced massage therapist aromatherapist (assessor not clear)
Hadfield, 2001 <sup>13</sup>	Outpatients with malignant brain tumor ( <i>n</i> = 8)	Observational uncontrolled 30 min massage with choice of scented oil to choice of foot, hand, or neck/shoulder	Aromatherapist (assessor not clear)
Soden et al, 2004 <sup>14</sup>	Palliative care center patients, mixed advanced cancer diagnoses ( <i>n</i> = 42)	Randomized controlled; blind assessment and participants blind to group assignment Group 1 received 4 weekly 30 min back massages with lavender/sweet almond oil ( <i>n</i> = 16) Group 2 received 4 weekly 30 min back massages with sweet almond oil ( <i>n</i> = 13) Control received usual care with 4 weekly assessments ( <i>n</i> = 13)	Therapist training not described (researchers blind to treatment)
Wilkinson et al, 1999 <sup>15</sup>	Palliative care inpatients and outpatients, mixed cancer diagnoses ( <i>n</i> = 87)	Randomized controlled Group 1 received 3 full body massages over 3 wk with Roman chamomile/almond oil ( <i>n</i> = 43) Group 2 received 3 full body massages over 3 wk with almond oil ( <i>n</i> = 44)	4 nurses with diplomas in massage (assessor not clear)
Wilkinson et al, 2007 <sup>16</sup>	Outpatient and palliative care patients with mixed cancer diagnoses ( <i>n</i> = 288)	Randomized controlled Group 1 received 4 weekly 60 min massages with individualized blends of 20 essential oils ( <i>n</i> = 144) Control received usual care ( <i>n</i> = 144)	12 aromatherapists (10 researchers blinded to group "as far as possible")

**Table 3.** Reflexology Studies

<i>Study</i>	<i>Sample</i>	<i>Study Design</i>	<i>Interventionist and Assessor</i>
Cassileth and Vickers, 2004 <sup>3</sup>	Inpatients and outpatients, mixed cancer diagnosis ( $n = 585$ foot reflexology)	Observational uncontrolled Swedish, foot massage (mostly reflexology), light touch, or a combination of these Average of 20 min for inpatients and 60 min for outpatients	12 licensed massage therapists (other staff)
Quattrin et al, 2006 <sup>17</sup>	Inpatients for chemotherapy, mixed cancer diagnoses (7 metastatic) ( $n = 30$ )	Controlled, quasiexperimental (not randomized) Group 1 received 30 min foot reflexology session ( $n = 15$ ) Control received usual care ( $n = 15$ )	1 nursing student (different nursing student)
Ross et al, 2002 <sup>18</sup>	Outpatients, mixed advanced cancer diagnoses, receiving palliative care ( $n = 17$ )	Randomized controlled; blind assessment and participants blind to group assignment Group 1 received reflexology once weekly for 6 weeks Group 2 received foot massage once weekly for 6 weeks	3 trained reflexologists (blind interviewers)
Stephenson et al, 2000 <sup>20</sup>	Inpatients with breast or lung cancer reporting anxiety on VAS ( $n = 23$ )	Self as own control, quasiexperimental crossover design 30 min reflexology treatment versus 30 min period of time at least 48 h postreflexology	Certified reflexologist (assessor not clear)
Stephenson et al, 2003 <sup>19</sup>	Inpatients with metastatic cancer, mixed diagnoses, reporting pain $\geq 2$ on 0–10 scale ( $n = 36$ )	Randomized controlled Group 1 received 2 sessions of foot reflexology 24 h apart ( $n = 19$ ) Group 2 received usual care ( $n = 17$ )	Certified reflexologist (research assistant)

VAS = visual analogue scale.

Training and experience in reflexology ranged from that of a nursing student trained specifically for the purpose of providing the research protocol<sup>17</sup> to certified reflexologists with substantial training and experience.<sup>19,20</sup> One study provided a detailed description of their reflexology protocol,<sup>20</sup> but others offered less detail. Most reflexology sessions were provided in the inpatient setting.

The two acupressure studies differed from all of the other studies in that the investigators provided patients with brief instruction in acupressure self-care; thus, the patients themselves provided the massage interventions.<sup>21,22</sup> Seventeen patients receiving adjuvant chemotherapy for breast cancer were trained to provide manual pressure to two acupoints on the extremities: the

**Table 4.** Acupressure Studies

<i>Study</i>	<i>Sample</i>	<i>Study Design</i>	<i>Interventionist and Assessor</i>
Dibble et al, 2000 <sup>21</sup>	Outpatient women receiving adjuvant chemotherapy for breast cancer ( $n = 17$ )	Randomized controlled Group 1 received self-administered acupressure at P6 or ST36 points daily for maximum 3 min plus as needed ( $n = 8$ ) Group 2 received usual care ( $n = 9$ )	Self-care provided by patients after 5 min of training by a research assistant (assessor not clear)
Shin et al, 2004 <sup>22</sup>	Inpatients with gastric cancer ( $n = 40$ )	Controlled, not random assignment (first 20 assigned usual care, next 20 assigned acupressure) Group 1 received usual care ( $n = 20$ ) Group 2 received 5 min of acupressure at P6 point before chemotherapy and mealtimes and anytime nausea was felt ( $n = 20$ )	Self-care provided by patient and family after research team members provided education and instruction booklet (research assistant performed assessment)

Table 5. Changes in Symptoms

Study	Modality	n	Pain			Fatigue			Anxiety			Nausea			Depression			
			A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	
Ahles et al, 1999 <sup>1</sup>	Swedish	34	1↔			1↔			8↕			8↔		1↕				9↔
Billhult et al, 2007 <sup>2</sup>	Swedish	39							2↔			10↔		2↕				10↔
Ferrell-Torry and Glick, 1993 <sup>4</sup>	Swedish	9	2↓						8↓									
Grealish et al, 2000 <sup>5</sup>	Swedish	87	2↓										2↓					
Hernandez-Reif et al, 2005 <sup>6</sup>	Swedish	58	6↕						8↕			11↔				7↕		11↕
Post-White et al, 2003 <sup>7</sup>	Swedish	164	1↓		3↔			7↔→				7↕↔		1↔			12↔	
Smith et al, 2002 <sup>8</sup>	Swedish	41			4↔							8↔						
Toth et al, 2003 <sup>9</sup>	Swedish	4			3↓							7→						
Weinrich and Weinrich, 1990 <sup>10</sup>	Swedish	28	2↕↔		2↕↔													
Wilkie et al, 2000 <sup>11</sup>	Swedish	29	1↕→		1↔													
Corner et al, 1995 <sup>12</sup>	Aroma	52									10↕↔							10↔
Hadfield, 2001 <sup>13</sup>	Aroma	8									10→							10→
Soden et al, 2004 <sup>14</sup>	Aroma	42	2→		2↕→ 5→							10→						10→
Wilkinson et al, 1999 <sup>15</sup>	Aroma	87							8↔			8↔						
Wilkinson et al, 2007 <sup>16</sup>	Aroma	288			15↔			15↔				8↕ 17↔↕			15↔			14↔ 17↔↕
Quattrin et al, 2006 <sup>17</sup>	Reflexology	30	2↕						8↕		8↓							
Ross et al, 2002 <sup>18</sup>	Reflexology	17										10↔						10↔
Stephenson et al, 2000 <sup>20</sup>	Reflexology	23	2→→ 6↕→→						2↓									
Stephenson et al, 2003 <sup>19</sup>	Reflexology	36	1↕		1↔													
Dibble et al, 2000 <sup>21</sup>	Acupressure	17												1↕ 13↕ 16↔				

Table 5. Continued

Study	Modality	n	Pain			Fatigue			Anxiety			Nausea			Depression		
			A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
Shin et al, 2004 <sup>22</sup>	Acupressure	40										18↕	13↕				
												13↕					
Cassileth and Vickers, 2004 <sup>3</sup>	Multiple modalities	1290	1↓	1↓		1↓	1↓		1↓	1↓		1↓	1↓		1↓	1↓	

A = immediate (symptom assessed within ≤ 30 minutes of massage); B = intermediate (within > 30 minutes and ≤ 48 hours of massage); C = longer term (> 48 hours postmassage).

Solid arrow indicates within-group (pre-post) comparison: increase in symptom (↑), decrease (↓), no significant change (→).

Solid block arrow indicates subjects as their own control group: increase in symptom (⬆), decrease (⬇), no significant change (➡).

Outline block arrow indicates results of between-group comparison: increase in symptom (⬆), decrease (⬇), no significant change (↔).

Key to measures used: 1 = numeric rating scale; 2 = visual analogue scale; 3 = Brief Pain Inventory<sup>23</sup>; 4 = combined numeric rating scale and Likert scale; 5 = Memorial Pain Assessment Card<sup>24</sup>; 6 = McGill Pain Questionnaire Short-Form<sup>25</sup>; 7 = Profile of Mood States<sup>28</sup>; 8 = State Trait Anxiety Inventory<sup>29</sup>; 9 = Beck Depression Inventory<sup>34</sup>; 10 = Hospital Anxiety and Depression Scale<sup>27</sup>; 11 = Symptom Checklist 90-R<sup>30</sup>; 12 = brief nausea inventory; 13 = Rhodes Index of Nausea, Vomiting, and Retching<sup>32</sup>; 14 = Centers for Epidemiological Studies–Depression<sup>35</sup>; 15 = European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire<sup>26</sup>; 16 = chemotherapy problem checklist; 17 = shortened version of the Structured Clinical Interview<sup>31</sup>; 18 = daily log of nausea experience.

Significance level  $p \leq .05$  except two articles in which analyses did not include tests of significance: Cassileth and Vickers<sup>3</sup> and Toth et al.<sup>9</sup>

P6 point located on the anterior forearm proximal to the wrist crease and the ST36 point located distal to the knee and lateral to the tibia.<sup>21</sup> Forty patients undergoing adjuvant chemotherapy for gastric cancer were instructed to self-administer manual pressure to the P6 point.<sup>22</sup> Acupressure was applied for a brief period daily and as needed for nausea.

Studies used a spectrum of control conditions. In three studies, participants served as their own control.<sup>5,7,20</sup> Several studies employed usual care as a control group within a two-group design<sup>11,16,18,21–23</sup> or as one of three groups.<sup>6,12,14</sup> Others controlled for attention by providing control group participants time with a member of the research team.<sup>7,8,10</sup> Active comparisons were also used, including aromatherapy massage as the experimental intervention compared with massage without scented oil as the control<sup>12,14,15</sup> and reflexology as the experimental intervention compared with foot massage as the control.<sup>19</sup> In some cases, conclusions about the effects of massage were based on within-group (pre-post) results rather than between-group comparison to the control group despite use of a controlled design.<sup>11,14,18</sup>

Blinding was the exception rather than the rule across the studies reviewed. Double blinding, in which participants and assessors were blind to participants' treatment allocation, was incorporated in a minority of studies.<sup>14,18</sup> Assessors collecting outcomes data sometimes included the interventionists.<sup>10,11</sup> In several studies, it was not clear who performed the outcomes assessments (see Table 5).

No serious adverse events were reported. However, few studies indicated including a procedure for capturing the adverse effects of study participation. In one study that included interviews, about a quarter of the participants indicated that they had experienced concerns prior to their first study massage about who would provide the massage, the degree of disrobing that might be required, or other matters; however, these concerns did not prevent their participation.<sup>12</sup> One study of foot reflexology specifically inquired about the adverse effects of the interventions and found that foot discomfort was reported by 6 of 7 participants receiving reflexology and 2 of 10 participants receiving foot massage.<sup>19</sup> The same study also reported many positive comments about both interventions from participants and concluded that participants in both groups generally enjoyed the interventions.

## Discussion

Several preliminary studies, mostly with small sample sizes, and a limited number of more rigorous studies have now been carried out on massage in relation to symptoms of cancer and its treatment. Effects of massage varied as a function of several study characteristics and were not universal. Impressive decreases in symptoms were documented following massage in several studies; however, these effects were much larger and more consistent for within-group comparisons than for controlled comparisons. In the absence of a control group, the attribution of

improvement to massage may be partially or even completely incorrect since symptoms may improve owing to the passage of time, regression to the mean, nonspecific interpersonal or environmental aspects of the intervention aside from massage, or other variables. Reporting within-group (pre-post) results instead of between-group results in studies using a between-group design, as was found in some cases, runs the risk of contributing to an inflated perception of the efficacy of massage, as has been noted previously in a critical review of the pediatric massage research literature.<sup>36</sup>

Our review suggests that massage can lead to decreased anxiety for some cancer patients. This is consistent with the results of a meta-analysis of massage effects on state anxiety across a broad range of patient and nonpatient samples, suggesting a relatively reliable effect of massage on anxiety.<sup>37</sup> An ability to reduce anxiety is of clinical significance to cancer patients, for whom anxiety can arise in response to receiving a cancer diagnosis, awaiting further diagnostic test results, anticipating treatment, fear of pain and other symptoms, facing disease recurrence, and, at other times, interfering with quality of life.<sup>38</sup> Future research should target the integration of massage therapy into optimal prevention and control of anxiety in cancer patients. Further, cancer patients at increased risk of developing clinically significant anxiety, such as those with a history of elevated anxiety prior to cancer diagnosis or experiencing higher levels of anxiety about cancer treatment, may be a group for whom massage could be a particularly relevant clinical intervention to study.<sup>39</sup>

Massage effects on other symptoms were less robust than those on anxiety, consistent with previous research.<sup>37</sup> One possibility is that symptoms such as pain or fatigue are more multifactorial or variable than anxiety. For example, the causes and characteristics of cancer pain vary widely, from bone pain owing to metastases, to spinal cord compression, to plexopathies from infiltration or compression, to painful side effects of treatment, such as mucositis, chemotherapy-induced peripheral neuropathy, postsurgical pain (eg, persistent post-thoracotomy pain), postradiation pain, and others. Inclusion of participants with a variety of cancer diagnosis, treatment histories, and stages of disease may have hampered the ability to detect treatment effects on pain. Careful characterization of pain at baseline may improve interpretability of results with regard to the effects of massage on pain. Similarly, careful assessment of fatigue, which is so highly prevalent among cancer patients and survivors,<sup>40–42</sup> and selection of participants on the basis of this symptom may optimize detection of patterns of massage effects on fatigue. Another

possibility is that massage may have immediate, direct effects on anxiety and delayed or mediated effects on other symptoms.<sup>37</sup> For example, it could be that improved sleep after massage may mediate the longer-term effects of massage on pain,<sup>43</sup> fatigue, or depression, possibilities that could be tested in future research.

The methodologic weaknesses of many of the studies, such as lack of statistical power, lack of blinding, and lack of accounting for subject attrition using intention to treat analyses, limit interpretability of the results. Most studies lacked a rationale for the dose of massage provided. No study employing a comparison treatment appeared to include all of the forms of blinding that could potentially be included, such as blinding participants, assessors, and interventionists to participant assignment. Although it is obviously impossible to blind interventionists to the fact that they are providing an intervention, it could be possible to keep from them the experimental hypothesis about which intervention is expected to provide greater benefit. For example, one could compare usual care with reflexology provided by qualified reflexologists and with Swedish massage provided by qualified massage therapists and keep therapists blind to the investigator's hypothesis about which intervention is superior. Assessing the credibility of interventions and expectancies of participants, assessors, and interventionists could prove helpful where blinding is impossible.<sup>44</sup>

The issue of appropriate control groups for massage studies is debated.<sup>37,43–45</sup> Control groups must be dictated by the research aims. To attribute beneficial effects specifically to the experimental intervention being studied, structurally equivalent control groups are preferred.<sup>46</sup> In pragmatic trials seeking to demonstrate the efficacy of massage, the experimental modality could be tested under optimal conditions in which the subject pool and the intervention delivery are tightly controlled, compared with usual care. Replication by different investigators is also needed to establish efficacy. Following determination of efficacy, trials seeking to establish the effectiveness of massage can study its implementation into more externally valid, generalizable settings in which mediating and moderating factors can be identified.<sup>47,48</sup>

Improved reporting of study details is necessary. The parameters to incorporate are in most respects the same as those recommended for clinical trials generally, as delineated in the Consolidated Standards of Reporting Trials (CONSORT) statement, for example.<sup>49</sup> Expert consensus on additional parameters specific to massage trials should also be delineated, as has been done for reporting clinical trials of acupuncture.<sup>50</sup>



The scope of the current review was limited to studies of manually administered massage including patient-reported symptoms in which analyses were conducted for specific discreetly measured symptoms. As a result, many studies on the use of massage for cancer patients were not discussed, including reports on massage effects on combined symptoms such as overall mood or on quality of life, whether assessed through standardized questionnaires or qualitative interviews. Clearly, these are important areas worthy of a separate review. Nor did we include reports on massage effects on objectively measurable outcomes such as lymphedema, respiration rate, blood pressure, cortisol levels, time to engraftment, and others that have been studied. Given our focus on manually administered massage, we did not review articles on mechanical stimulation, such as use of pressure bands to stimulate acupressure points.<sup>51</sup> Finally, an important limitation of the current review is the varied methodologic quality of the studies from which we draw conclusions about the effects of massage on symptoms experienced by cancer patients.

## Conclusion

Massage therapy is now offered to patients at several major cancer centers around the United States and in many other countries around the world. The available data indicate that there are potential benefits to patients from receiving massage properly adapted to their medical condition. Future studies should incorporate clear conceptual models, a rigorous study design, adequate statistical power, appropriate analyses, assessment of adverse effects, and transparent reporting of study details. The results of several federally funded studies will be available in the near future, and these will no doubt help increase our understanding of massage research methodology and the effects of massage. Optimal symptom prevention and control for cancer patients are the goal, and this goal demands continued progress in research efforts.

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