



Real-world experiences with acupuncture among breast cancer survivors: a cross-sectional survey study

Jacqueline Zayas¹ · Kathryn J. Ruddy² · Janet E. Olson³ · Fergus J. Couch⁴ · Brent A. Bauer⁵ · Molly J. Mallory⁵ · Ping Yang³ · David Zahrieh³ · Arjun P. Athreya⁶ · Charles L. Loprinzi² · Elizabeth J. Cathcart-Rake²

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Abstract

Purpose The purpose of this study was to evaluate acupuncture use among breast cancer survivors, including perceived symptom improvements and referral patterns.

Methods Breast cancer survivors who had used acupuncture for cancer- or treatment-related symptoms were identified using an ongoing prospective Mayo Clinic Breast Disease Registry (MCBDR). Additionally, Mayo Clinic electronic health records (MCEHR) were queried to identify eligible participants. All received a mailed consent form and survey including acupuncture-related questions about acupuncture referrals, delivery, and costs. Respondents were also asked to recall symptom severity before and after acupuncture treatment and time to benefit on Likert scales.

Results Acupuncture use was reported among 415 participants (12.3%) of the MCBDR. Among MCBDR and MCEHR eligible participants, 241 women returned surveys. A total of 193 (82.1%) participants reported a symptomatic benefit from acupuncture, and 57 (24.1% of participants) reported a “substantial benefit” or “totally resolved my symptoms” (corresponding to 4 and 5 on the 5-point Likert scale). The mean symptom severity decreased by at least 1 point of the 5-point scale for each symptom; the percentage of patients who reported an improvement in symptoms ranged from 56% (lymphedema) to 79% (headache). The majority of patients reported time to benefit as “immediate” (34%) or “after a few treatments” (40.4%). Over half of the participants self-referred for treatment; 24.1% were referred by their oncologist. Acupuncture delivery was more frequent in private offices (61.0%) than in hospital or medical settings (42.3%). Twelve participants (5.1%) reported negative side effects, such as discomfort.

Conclusions Acupuncture is commonly utilized by patients for a variety of breast cancer-related symptoms. However, patients frequently self-refer for acupuncture treatments, and most acupuncture care is completed at private offices, rather than medical clinic or hospital settings.

Keywords Acupuncture · Breast cancer · Survivorship · Complementary and alternative medicine

✉ Jacqueline Zayas
Zayas.jacqueline@mayo.edu

¹ Mayo Clinic Graduate School of Biomedical Sciences, Mayo Clinic School of Medicine and the Mayo Clinic Medical Scientist Training Program, Rochester, MN 55905, USA

² Department of Medical Oncology, Mayo Clinic, Rochester, MN 55905, USA

³ Department of Health Sciences Research, Mayo Clinic, Rochester, MN 55905, USA

⁴ Department of Laboratory Medicine and Pathology, Mayo Clinic, Rochester, MN 55905, USA

⁵ Department of General Internal Medicine, Mayo Clinic, Rochester, MN 55905, USA

⁶ Department of Molecular Pharmacology and Experimental Therapeutics, Mayo Clinic, Rochester, MN 55905, USA

Background

Breast cancer survivors experience a number of symptoms from cancer and cancer-directed therapy, including hot flashes, arthralgias, fatigue, and neuropathy. Medications, from serotonin antagonists to opioids, are frequently prescribed to help manage these symptoms but may carry significant side effects. Acupuncture, which has been used to treat various ailments as a component of traditional Chinese medicine since 6000 BCE, is an appealing treatment because it carries few such side effects. Acupuncture research suggests that it is a promising therapy for a variety of cancer-related symptoms.

Acupuncture has been shown to be helpful in treating a number of breast cancer-related symptoms, most notably,

for aromatase inhibitor (AI)-induced arthralgias. A large, multi-institution trial found that pain scores significantly decreased by 2 or more points (on a 0–10 scale) in 58% of participants receiving true acupuncture, higher than the 33% of patients in the sham, and 31% of patients in the waitlist control arms [1].

Acupuncture has also been reported to improve hot flashes in breast cancer survivors. Two large, multi-center trials have reported that hot flash severity is significantly lower among patients receiving acupuncture, when compared with those receiving the usual care [2, 3]. A recent meta-analysis, including 10 randomized controlled trials—five of which included solely breast cancer patients—reported a significant improvement in fatigue among patients receiving acupuncture, when compared with control arms of sham acupuncture or typical care [4]. Non-randomized studies have suggested a benefit in using acupuncture for chemotherapy-induced neuropathy [5–7].

Larger sample sizes and multi-center design would help to definitively determine the benefits of acupuncture in treating many symptoms faced by cancer survivors, but acupuncture is gaining national recognition as a viable strategy for cancer symptom management. Acupuncture was the subject of a National Cancer Institute symptom control symposium, and acupuncture use is recommended by the National Comprehensive Cancer Network guidelines for a number of symptoms [8]. Furthermore, approximately 10% of patients with cancer have used acupuncture to help mitigate cancer-related symptoms [9].

Despite increasing visibility and data to support the use of acupuncture in the literature, it is unclear whether oncology providers and their patients with breast cancer are using acupuncture to help mitigate their symptoms and how this practice is being adopted. The purpose of the current study was to evaluate whether real-world acupuncture use among patients with breast cancer is aligned with scientific evidence, patient-perceived benefits of acupuncture for a variety of symptoms, and barriers to adoption of acupuncture use among breast cancer survivors.

Despite increasing visibility and data to support the use of acupuncture, it is unclear how this practice is being adopted. The purpose of the current study was to evaluate the perceived benefit of acupuncture for cancer-related symptoms among breast cancer survivors, as well as to describe patterns of acupuncture use, referral, and delivery. This information will allow for an improved understanding as to whether real-world acupuncture use among patients with breast cancer is aligned with scientific evidence.

Materials and methods

Eligible participants

This study was approved by the Mayo Clinic Institutional Review Board (IRB). Breast cancer survivors who had used

acupuncture were identified using an ongoing prospective Mayo Clinic Breast Disease Registry (MCBDR). MCBDR is a clinic-based registry that enrolls and follows patients with newly diagnosed breast cancer, including both participants on active treatment and those who have completed treatment for their breast cancer. Participants in the MCBDR were contacted and asked to complete questionnaires, to provide permission to allow review of their medical records, and to allow access to tumor tissue when available. Questionnaires, given to participants at baseline and in follow-up, ask patients to report breast cancer information and various breast cancer-related symptoms and treatments, including the use of acupuncture. The first follow-up surveys were mailed to MCBDR participants in 2016; subsequent follow-up surveys were mailed to all participants annually. Patients who reported using acupuncture were eligible subjects for this study.

Additional patients were identified using Mayo Clinic electronic health records (MCEHR). Patients who had been treated with acupuncture for the indications of a primary, secondary, or tertiary diagnosis of breast cancer were distinguished by ICD-9 and ICD-10 codes. Also, Mayo Clinic's Advanced Cohort Explorer, a database that allows for text-based queries of clinical notes, was used to identify unique patients with clinical documentation of a personal history of breast cancer within acupuncture procedure notes.

Living breast cancer survivors with a history of acupuncture utilization, gleaned by the above described sources, were eligible for inclusion in this study and received a mailed consent form and a survey which asked acupuncture-related questions.

Data collection

Between the data collection period of August 2018 to January 2019, participants were asked to fill out a 19-question survey related to their experience with acupuncture post-cancer diagnosis including but not limited to symptoms for which they received the acupuncture, number of treatments, adverse reactions, and out-of-pocket costs (per session and total). Participants that indicated that they never used acupuncture, only used acupuncture prior to their cancer diagnosis, or used acupuncture for symptoms unrelated to their breast cancer were excluded from subsequent analyses. Participants were asked whether acupuncture helped their symptoms, overall, on an investigator-created 5-point Likert scale, with responses ranging from “it did not provide any benefit” (corresponding to 1 on the scale) to “it totally resolved my symptoms” (corresponding to 5 on the scale). Respondents were also asked to recall the severity of each of their symptoms: arthralgias, myalgias, post-surgical pain, hot flashes, nausea/vomiting, fatigue, depression, anxiety, insomnia, lymphedema, headache, and neuropathy on an investigator-created Likert scale from 1 to 5 (1 = mild, 5 = severe) before and after acupuncture

treatment. Only participants that provided both pre-and post-severity scores were included in statistical analyses of these questions.

Demographics, breast cancer clinical information, and breast cancer treatment information were self-reported among patients in the MCBDR cohort, as patients in this database receive a majority of their treatment at other facilities, and abstracted from the medical record for patients in the MCEHR cohort.

Statistics

The analyses were retrospective, and thus descriptive statistics, such as means/medians and percentages, were primarily utilized to generate hypotheses. Although these analyses were exploratory, inferential statistics were evaluated to facilitate the identification of statistically noteworthy findings that could be highlighted for the assessment of clinical importance and whether such might be worthy of further study. Associations between the baseline characteristics and overall perceived benefit were assessed using the chi-squared test. The significance of symptom severity differences (for the 13 symptoms queried) was determined by the Wilcoxon signed rank test. *P* values are two-sided, and a Bonferroni correction was applied to adjust for multiple comparisons, with a *P* value cutoff of 0.003 (i.e., 0.05/13). Data obtained from participants who did not provide pre- and post-severity scores remained missing.

Results

Participant demographics and clinical features

Current or past acupuncture use was reported among 415 participants of the total 3379 MCBDR enrollees (12.3%). The numbers of eligible participants from each cohort and number of completed surveys are illustrated in Fig. 1. The mean age of diagnosis was 50.4 (SD 9.7) with the mean age at survey completion being 58.9 (SD 10.1). Participants in the MCEHR cohort had mean of 2.3 ± 1.6 years between date of last acupuncture therapy at Mayo Clinic and date of survey; three participants in this cohort had a recent acupuncture visit, within 6 months of the survey. Patient characteristics are noted in Table 1. The majority of participants (59.6%) reported they had enough money for special things; 34.9% reported they did not have enough money for bills or had little money to spare after bills; and 5.5% did not respond to this query.

Acupuncture utilization in breast cancer survivors

The most common symptoms that prompted acupuncture were joint pain, muscle pain, hot flashes, fatigue, and neuropathy (Table 2). Referrals to acupuncture clinics were most frequently

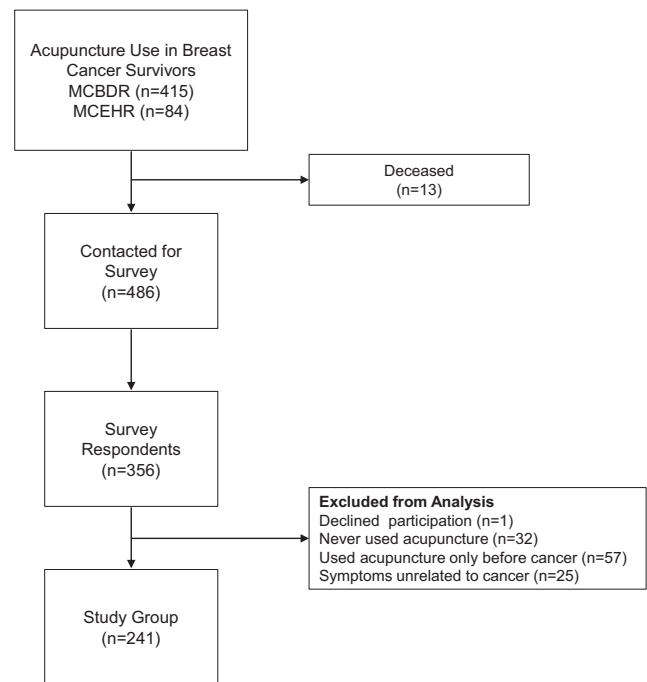


Fig. 1 Schematic of participant selection. There were 486 living breast cancer survivors with previous acupuncture usage that were contacted for this study. A total of 356 responses were received, and 241 met inclusion criteria of having used acupuncture for breast cancer or cancer treatment-related symptoms

made by participants themselves (50.2%), rather than healthcare providers, and the majority of acupuncture was performed at private offices (61.0%; Table 2). Sixty-six participants (27.4%) used acupuncture before and after their cancer diagnosis, and approximately half of participants self-referred for treatment. Treatment frequency was variable; 32.8% were treated 2–3 times per month, 23.2% were treated once per week, and 17.8% were treated once per month. The number of acupuncture treatments was also variable (median, 10; mean, 19.5 (SD 32.6); and range, 1–300). The median cost for participants with an out-of-pocket expense was \$60 per treatment and \$500 for a total treatment course.

Perceived benefits of acupuncture for breast cancer-related symptoms

A total of 193 (82.1%) participants retrospectively reported a symptomatic benefit from acupuncture overall. Specifically, 57 (24.1%) participants reported substantial improvement or complete resolution of symptoms, corresponding to scores of 4 or 5 out of 5 on the 5-point Likert scale, 81 (33.6%) reported moderate improvement (score of 3), and 54 (22.4%) reported a “little bit” of improvement (score of 2); 42 (17.5%) reported no benefit (score of 1). Neither level of education, stage of disease, chemotherapy usage, endocrine therapy usage, nor radiation treatment was associated with perceived benefit. There was a non-significant trend for participants that had undergone a breast cancer-related surgery (with or without lymph node dissection)

Table 1 Participant demographics and breast cancer treatments

Demographics	<i>n</i> (%)
Sex	
Female	241 (100)
Male	0 (0)
Race	
White	226 (93.8)
Asian Chinese	3 (1.2)
Asian Indian	1 (0.4)
African American	1 (0.4)
American Indian/Alaskan Native	1 (0.4)
Other	4 (1.7)
Ethnicity	
Not Hispanic	223 (92.5)
Choose not to disclose/unknown	18 (7.5)
Education	
High School graduate or GED	22 (9.1)
Vocational School	9 (3.7)
Some college of 2-year degree	54 (22.4)
4-year college degree	70 (29.0)
Post-graduate	81 (33.6)
Unknown	5 (2.1)
Religion	
Christian	175 (72.6)
Protestant	85 (35.3)
Catholic	66 (27.4)
Other	24 (10.0)
Jewish	4 (1.7)
Hindu	1 (0.4)
No religious affiliation	28 (11.6)
Unknown/prefer not to disclose	33 (13.7)
Breast cancer clinical information	
Stage	
0	30 (12.4)
1	82 (34.0)
2	88 (36.5)
3	28 (11.4)
4	10 (4.1)
Unknown	3 (1.2)
Estrogen receptor positive	
Yes	208 (86.3)
No	32 (13.3)
Unknown	1 (0.4)
Progesterone receptor positive	
Yes	178 (73.9)
No	61 (25.3)
Unknown	2 (0.8)
HER2 Amplified	
Yes	38 (15.8)
No	174 (72.2)
Unknown	28 (11.6)
Breast cancer treatments	<i>n</i> (%)
Endocrine therapy	
Yes	178 (74.2)
No	62 (25.7)
Unknown	1 (0.4)
Chemotherapy	
Yes	136 (56.4)
No	105 (43.6)
Radiation	
Any	146 (60.6)
Breast	142 (58.9)
Other	8 (3.3)
Surgery	
Any	237 (98.3)
Breast	230 (95.4)
Lymph node	214 (88.8)
Reconstruction	116 (48.1)

Table 2 Acupuncture utilization

	<i>n</i> (%)
Timing of acupuncture	
Only after diagnosis	175 (72.6)
Before and after diagnosis	66 (27.4)
Learned of acupuncture from	
Friend or relative	107 (44.4)
Medical professional	111 (46.1)
Internet	17 (7.1)
Other	30 (12.4)
Treatment location(s) ^a	
Private office	147 (61.0)
Hospital or medical setting	102 (42.3)
Spa	7 (2.9)
Other	15 (6.2)
Referral to acupuncture	
Oncologist	58 (24.1)
Primary care or family physician	13 (5.4)
Other healthcare providers	44 (18.3)
Self-referred	121 (50.2)
Frequency	
Once	26 (10.8)
Once per month	43 (17.8)
2–3 times per month	79 (32.8)
Once per week	56 (23.2)
2–3 times per week	16 (6.6)
Other	46 (19.1)
Symptoms prompting acupuncture ^b	
Joint pain	87 (36.1)
Muscle pain	83 (34.4)
Post-surgical pain	45 (18.7)
Hot flashes	80 (33.2)
Nausea/vomiting	42 (17.4)
Fatigue	76 (31.5)
Low mood/depression	39 (16.2)
Anxiety	49 (20.3)
Insomnia	41 (17.0)
Lymphedema	20 (8.3)
Headache	35 (14.5)
Neuropathy	61 (25.3)
Other	30 (12.4)
Number of symptoms prompting acupuncture	
1	73 (30.3)
2	50 (20.7)
3	43 (17.8)
4	24 (10.0)
5	18 (7.5)
> 5	25 (10.4)
Did not answer	8 (3.3)

^a Participants asked to mark all that apply

^b Includes participants that did not indicate the symptom severity

to perceive an increased benefit with acupuncture in comparison with those that did not have surgery ($p = 0.05$). Participants who had tried acupuncture prior to cancer were more likely to perceive an increased benefit from acupuncture after cancer ($p \leq 0.01$).

Patients retrospectively reported both pre- and post-acupuncture symptom severity scores, shown in Fig. 2a. All symptoms had at least 50% of participants reported a change in severity score of at least 1. Lymphedema had the smallest proportion of patients reporting improvement at 56%, whereas headache and “other symptoms” (such as constipation and focal areas of pain, i.e., back pain, leg pain) had the largest proportion of patients reporting improvement at 79%. In addition, mean symptom severity scores decreased from before to after acupuncture by at least 1 point for all queried symptoms (Fig. 2b). There was a perceived improvement in muscle pain, post-surgical pain, hot flashes, nausea/vomiting, low mood/depression, anxiety, lymphedema, and neuropathy ($p \leq 0.01$).

Most participants reported time-to-benefit as immediate (34.4%) or after a few treatments (40.2%); few reported benefit after the final treatment (2.1%) or never (19.9%). Twelve participants (5.1%) reported negative side effects, including discomfort.

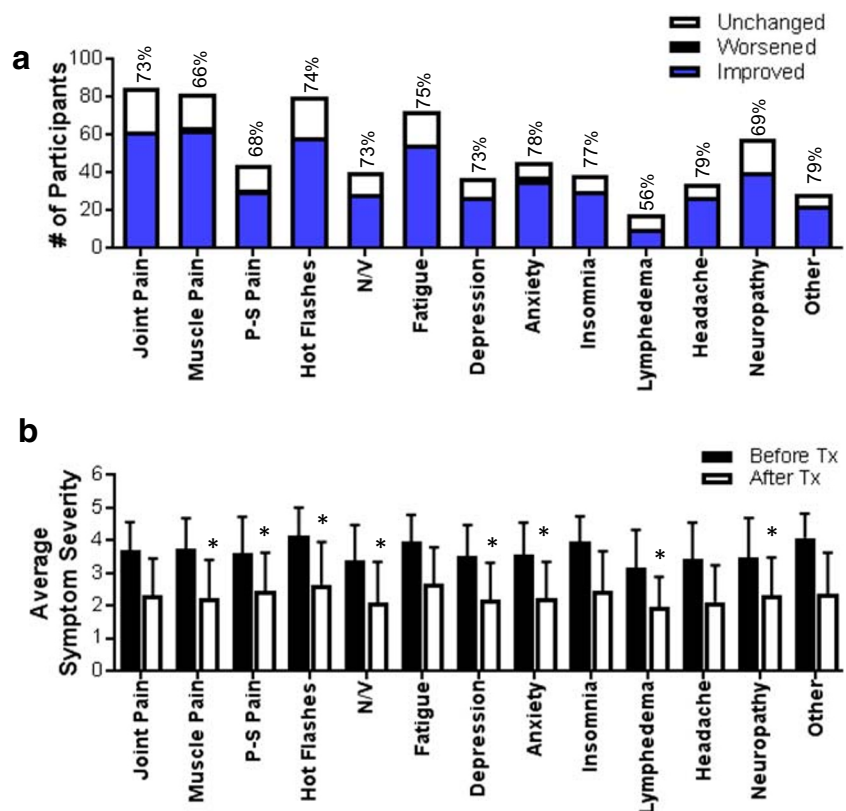
Discussion

Acupuncture use is pervasive among cancer survivors to help mitigate cancer-related symptoms; the frequency and characteristics of real-world acupuncture use among patients in this study was even higher than 1 in 10, which was previously

reported in the literature [9]. The strength of data supporting the use of acupuncture to manage symptoms related to cancer and cancer-directed therapies is variable, ranging from large, randomized, placebo-controlled clinical trials (AI-induced arthralgias) to small, conflicting studies (neuropathy) [1].

Prior to this study, characteristics of real-world acupuncture use among patients with cancer have not previously been well described [9, 10]. Despite patient enthusiasm for pursuing acupuncture treatments, and acupuncture gaining national prominence as an efficacious treatment for cancer-related symptoms, fewer than a quarter of patients reported that their healthcare providers referred them for acupuncture; the majority of patients self-referred to acupuncture and received acupuncture in a private office. Perhaps this is because the randomized controlled trial data on acupuncture are relatively new: the largest trial of acupuncture for AI-induced arthralgias was reported in 2017. In addition, pre-existing physician attitudes toward acupuncture may not be enthusiastic. One study surveyed over 1500 practitioners as to how likely they would be to recommend a complementary medicine treatment after reading a vignette reporting its efficacy [11]. Conventional medicine physicians who read a vignette describing the efficacy of glucosamine were significantly more likely to say they would recommend it, compared with those who read the same vignette describing the efficacy of acupuncture. The authors posited that physician attitudes were shaped by physician education and experience with glucosamine, as compared with acupuncture.

Fig. 2 Perceived benefit of acupuncture in breast cancer survivors. **a** Symptoms prompting acupuncture. Change in severity score is represented in blue as an improvement in severity, in black as worsening severity, and in white as no change. Above each bar indicates the percentage of patients that reported symptom improvement (change in severity score of at least 1). **b** Mean change in symptom severity score before and after acupuncture (mean \pm SD). P-S pain = post-surgical pain; N/V = nausea/vomiting; TX = treatment. * p value < 0.01



Further studies investigating the efficacy of acupuncture may help to improve physician familiarity and knowledge, allowing for data from acupuncture clinical trials to permeate further into conventional medicine practices. The study's retrospective design and potential for recall bias limit conclusions about the degree of symptom improvement provided by acupuncture. For instance, as the average time between breast cancer diagnosis and survey was 8 years (mean time between last acupuncture treatment and survey was 2 years), interpretations of patient-reported details of symptom improvement should be made with caution. Studies of acupuncture use among cancer survivors at other academic institutions and community sites would help to better clarify the ways in which acupuncture is being utilized in a variety of settings, and the use of larger validated instruments would help to supplement the current study's survey data. However, it is encouraging that nearly all participants reported benefits of acupuncture with minimal side effects. Patient characteristics, such as gender, ethnicity, or BMI, may be associated with positive responses from acupuncture and deserve future study. The data from the present study support that placebo-controlled clinical trials evaluating acupuncture efficacy for symptoms such as fatigue and post-surgical pain are needed.

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Compliance with ethical standards

Conflict of interest CLL has a consulting/advisory role with Pled Pharma, Disarm Therapeutics, Metys, and Asahi Kasei. KRJ inherited and then sold Merck and Pfizer stock in February 2018.

Research involving human participants and/or animals This study was approved by Mayo Clinic Institutional Review Board (IRB) (IRB nos 181504 and 18006395) in accordance with ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

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