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Changes in Complementary and Alternative Medicine Use Across Cancer Treatment and Relationship to Stress, Mood, and Quality of Life

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Objectives: Complementary and alternative medicine (CAM) use is prevalent, but specific use of CAM across cancer treatment is underinvestigated. The objectives of this study were to assess changes in CAM use across cancer treatment; specific reasons for and satisfaction with specific types of CAM used; and associations of CAM use with stress, mood, and quality of life (QOL) in women with newly diagnosed breast cancer.
Design and setting: Seventy-seven women with early-stage breast cancer who underwent active cancer treatment participated in the study. Data were collected three times: shortly after cancer diagnosis and 2 months and 6 months after the start of adjuvant cancer therapy.
Outcome measures: CAM Questionnaire, Impact of Event Scale (stress), Profile of Mood State (mood), and Functional Assessment of Cancer Therapy-Breast Cancer (QOL).
Results: Mean age was 52.4 years, and 94%–97% of women used on average five to six CAMs across three time points. Women largely started CAM use before cancer diagnosis and continued across cancer treatment. The five most common CAMs were prayer (88.3%), multivitamin use, massage, and vitamins E and C, followed by music, meditation, green tea, chiropractic care, and vitamin A, with little changes in types of CAM use across cancer treatment. Satisfaction was high, and satisfaction with prayer was the highest. Prayer, meditation, and music were used specifically for a feeling of control, whereas vitamins were used to improve the immune system, showing clear patterns. Stress, mood disturbance, and QOL declined significantly over time, $p < 0.001$–0.04, but the number of CAMs used was unrelated to these variables.
Conclusions: CAM use was highly prevalent with multiple CAMs and continued throughout cancer treatment. Prayer was the most common CAM; it had the highest satisfaction rating and the perception of being most helpful. The effect of long-term CAM use requires further investigation on psychological and biobehavioral outcomes with consideration of demographic and clinical characteristics.

Introduction

The use of complementary and alternative medicine (CAM) continues to grow, and boundaries between complementary and conventional medicine become less clear and change with time.[1] The 2007 National Health Interview Survey indicated that nearly 4 of 10 adults in the United States used CAM in the past year for various reasons.[2] CAM use is equally common in other countries[3–6] and across different populations. CAM use in cancer survivors was 43%–51% over the past year or since cancer diagnosis.[7,8] Common CAM types included herbal products, deep breathing, chiropractic care, meditation, and massage. Compared with noncancer controls, cancer survivors were more likely to use CAM for improving wellness and disease prevention, enhancing immune function, and controlling pain and insomnia.[7,9]

Among patients with cancer who have various solid tumors, about 75% reported using some type of CAM.[10,11] Patients with breast cancer seem to use CAM (84%) more than patients with other types of tumors (66%).[11] However, the types of CAM used and goal for using CAM among patients with cancer were similar, including nutritional therapy, massage, and herbal use with the primary goal of strengthening the immune system.[11] In addition, at the early stage of breast cancer treatment, about 57% of patients reported using CAM; taking vitamins was most prevalent.[12]

Although CAM use has been studied extensively, the role CAM plays in psychological and behavioral responses has not been fully examined. When stress and depression were assessed before cancer diagnosis, at cancer diagnosis, and after cancer treatment in female cancer survivors, CAM users had significantly higher stress than non-CAM users

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before cancer, but stress levels became similar at subsequent time points. Depression was significantly lower in CAM users than non-CAM users after cancer treatment, suggesting benefits of CAM use.[13] In contrast, other researchers found no association between CAM use and cancer-specific or general psychological distress in cancer survivors of more than 7 years.[14] CAM use was associated with lower quality of life (QOL) in patients with breast cancer[12] and more intrusive thoughts about cancer and poorer perceived QOL in colorectal cancer survivors.[10] CAM use also was associated with poorer functional QOL and worse fatigue and diarrhea,[8] showing mixed findings.

In a prospective clinical trial, however, a breast cancer group using CAM reported better QOL at 1-year follow-up than non-CAM users.[15] CAM user cancer survivors also reported less deterioration of perceived health from pre- to-post-cancer diagnosis than non-CAM users[16] and better QOL.[14] A systematic review also suggests that CAM interventions generally improve QOL in cancer survivors.[17] Although one study found no significant difference in QOL between CM users and nonusers over time,[13] most CAM use seems to contribute to better QOL over time.

Nevertheless, most CAM studies have been cross-sectional and conducted with cancer survivors. It is largely unknown how CAM use changes over active cancer treatment and exactly what specific CAM is used for what specific goals.[18] The association of CAM use with the patients' psychological and behavioral responses during active cancer treatment is also poorly understood.

With a prospective repeated-measures design, the current study sought to (1) describe the prevalence and specific types of CAM use, along with specific reasons for specific CAM use; (2) examine changes in CAM use across active cancer treatment; and (3) determine whether the number of CAMs used was associated with cancer-specific stress, mood, and QOL in women with newly diagnosed breast cancer.

Materials and Methods

Design

Data were collected three times across cancer treatment in women with newly diagnosed breast cancer: Shortly after diagnosis of breast cancer but before adjuvant therapy, at 2 months from the start of cancer adjuvant therapy, and 6 months from the start of this therapy.

Sample and setting

Seventy-seven women with newly diagnosed breast cancer participated in the study. Sample size was determined to provide a power of 0.80 at an α level of 0.05, estimating low correlations between CAM use and psychological responses. Participants were recruited from the university-affiliated Breast Cancer Clinic and Interdisciplinary Breast Clinic by posting flyers in the clinic waiting area, word of mouth, and invitations from research team members. Inclusion criteria were (1) newly diagnosed early-stage breast cancer, (2) no known psychiatric illness (e.g., schizophrenia), (3) no known uncontrolled serious medical conditions (e.g., HIV infection), (4) ability to speak and understand English, and (5) ability to understand and follow the instructions. The institutional review board approved the study protocol, and participants provided informed consent prior to data collection.

Data collection

Data were collected three times at designated timepoints—before, at the midpoint of, and toward the end of most cancer adjuvant therapy—by using standardized questionnaires.

CAM use. The CAM questionnaire included 57 items. Based on a comprehensive 41-item CAM questionnaire,[11] 16 items were added to include therapies suggested by the National Institutes of Health National Center for Complementary and Alternative Medicine. Items included alternative medical systems (e.g., acupuncture, homeopathy), biologically based therapies (e.g., herb use, vitamin therapy), manipulative and body-based methods (e.g., chiropractic, massage), mind–body medicine (e.g., meditation, yoga, prayer), and energy therapies (e.g., *qigong* and Reiki). Participants rated the frequency of use (0 = never; 4 = daily), when CAM use was started (1 = before diagnosis; 4 = after treatment), how helpful CAM was to maintain or improve health (0 = none; 4 = extremely), the level of satisfaction (0 = none; 4 = extremely), and the reason for using specific CAMs.

Stress. Cancer-specific stress was measured with the 15-item Impact of Event Scale. Two subscales include intrusion and avoidance about cancer-related thoughts. Participants rated the intensity and frequency of occurrence over the past 7 days on a rating scale: 0 = not at all, 1 = rarely, 3 = sometimes, and 5 = often.[19] The internal consistency of the scale was 0.78–0.91 in the authors' previous studies among patients with breast cancer.

Mood states. The patients' mood states were measured by the 37-item short version of the Profile of Mood States, which showed a greater than 0.95 correlation coefficient with the original scale.[20,21] Participants rated each item on a 5-point Likert scale ranging from 0 = not at all to 5 = extremely. The six dimensions are anxiety, depression, anger, fatigue, vigor, and confusion. Internal consistency reliability was 0.70–0.97 for all dimensions in the authors' previous studies in patients with breast cancer.

QOL. The patients' QOL was measured with the Functional Assessment of Cancer Therapy Scale–B, version 4 (FACT-B).[22,23] This 37-item questionnaire specifically targets patients with breast cancer receiving cancer treatment. FACT-B includes the following subscales: physical well-being, social/family well-being, emotional well-being, functional well-being, and additional concerns. The Cronbach α coefficients were 0.70–0.91 for subscales and total scale in the authors' previous studies in patients with breast cancer.

Demographic and clinical information. The patients' demographic and clinical characteristics were assessed for age, race, income, education, employment status, religion, cancer adjuvant therapy type, and others.

Data analysis

Descriptive statistics were used to describe the prevalence, specific types, and reasons for CAM use and other variables related to CAM use. Changes over time were tested with a general linear model for repeated measures. Correlations were assessed with Pearson correlation coefficients. Data

were analyzed using IBM SPSS Statistics 19 (Research Triangle Park, NC).

Results

Patient characteristics

The mean patient age (±standard deviation) was 52.4±10.4 years, and all participants had early-stage breast cancer. Most patients were white, married, and Christian, and most had some college education. Nearly half (48.1%) of the participants were working full-time. Participants received various adjuvant therapies but most frequently chemotherapy alone (Table 1).

Number and types of CAM use

Ninety-seven percent of participants (75 of 77) reported using CAM at baseline, 95.5% (68 of 71) at 2 months of cancer adjuvant therapy, and 93.8% (61 of 65) at 6 months of cancer adjuvant therapy. The average numbers of CAMs used were 5.9±4.7, 5.5±4.8, and 5.3±4.5 across the three time points, respectively. The number of CAMs used per participant ranged widely, from 0 to 23. The two most frequent numbers of CAMs used were 3 and 4 different types.

Table 1. Characteristics of Participants ($N=77$)

Characteristic	*Data*
Mean age±SD (range) (y)	52.4±10.4 (32–69)
Education	
Less than high school	4 (5.2)
High school	17 (22.1)
Some college or bachelor's degree	37 (48.1)
Graduate school	17 (22.1)
Work	
Not working	29 (37.7)
Part time	11 (14.3)
Full time	37 (48.1)
Ethnicity	
Black	9 (11.7)
White	66 (85.7)
Native American	2 (2.6)
Religion	
Christian	62 (80.5)
Other	15 (19.5)
Marital	
Single	3 (3.9)
Married	56 (72.7)
Other	21 (23.4)
Adjuvant therapy	
Surgery or hormone only	16 (20.8)
Radiotherapy	11 (14.3)
Chemotherapy	22 (28.6)
Radiochemotherapy	14 (18.2)
Unknown	14 (18.2)
Taxol	
Yes	21 (27.3)
No	42 (54.5)
Unknown	14 (18.2)
Hormone therapy	
Yes	24 (31.2)
No	39 (50.6)
Unknown	14 (18.2)

Unless otherwise noted, values are the number (percentage) of patients.
SD, standard deviation.

The most common CAM used was prayer (reported by 89.6% of the participants), followed by multivitamin use (61.0%) at baseline. The rest of the top 10 most commonly used CAM types were massage, vitamin E and C use, music therapy, meditation, drinking green tea, chiropractic treatment, and vitamin A use at baseline (Table 2). Additional CAM types, used by about 10%–15% of the participants, included yoga, aroma therapy, herbal use, garlic and aloe vera use, and art therapy.

Changes in CAM use across cancer treatment

At 2 months, 34 patients (47.9%) reported no change, and 37 reported addition or discontinuation of some therapies. A few failed to report. Most commonly stopped were massage, chiropractic treatment, vitamin C, and green tea; those added were sporadic, including ginseng, music, and aloe. At 6 months, 33 (50.8%) indicated no change, and 32 either discontinued or added some specific types of CAM. Several participants discontinued massage, prayer, vitamins, and yoga, while others added yoga.

Although many participants reported some changes in specific types of CAM use at 2 and 6 months, the top 10 common CAMs remained nearly the same across all three time points (Table 2). The only change was that yoga replaced chiropractic treatment in the top 10 practices at 6 months. The number of CAMs used per participant remained highly correlated across three time points ($r=0.71$—0.81; $p<0.001$).

Reasons for using specific CAMs and helpfulness

Most of the CAMs in the top 10 were used daily by most participants except for massage and chiropractic therapies, which were used weekly to yearly. Most participants reported starting using the top 10 CAMs before cancer diagnosis. The most common reasons for using CAM were divided into three discrete patterns according to specific types of CAM: (1) Prayer, music, and meditation were primarily used to provide a feeling of control over life; (2) vitamins and green tea were used to improve the immune system; and (3) massage and chiropractic therapies were used to control pain. Helpfulness of a given CAM use ranged from 1.46 to 3.45 (out of 4), and satisfaction ranged from 1.71 to 3.60 (out of 4). Prayer consistently showed the highest ratings for both categories, followed by meditation and music. Green tea use and massage were rated least helpful (Table 3).

Changes in stress, mood, and QOL across cancer treatment and correlations with CAM use

Stress, mood disturbance, and QOL significantly decreased across cancer adjuvant therapy ($p<0.001$ for all) (Table 4). Overall stress and mood disturbance levels were the highest at baseline and declined over time. Despite the reduction in stress and mood disturbance, QOL also declined significantly. Subscales of stress (intrusive and avoidance thoughts on cancer), mood disturbance (anxiety, depression, lack of vigor, confusion), and QOL (physical, emotional, function, and social well-being) showed identical

Table 2. Top 10 Most Frequently Used Complementary and Alternative Medicines over Time

Rank	*CAM used before adjuvant therapy (N=77)*	*Patients,* n *(%)*	*CAM used at 2 months (N=71)*	*Patients,* n (%)	*CAM used at 6 months (N=65)*	*Patients,* n (%)
1	Prayer	69 (89.6)	Prayer	63 (88.7)	Prayer	58 (89.2)
2	Multivitamin	47 (61.0)	Multivitamin	43 (60.6)	Multivitamin	39 (60.0)
3	Massage	38 (49.4)	Massage	29 (40.8)	Massage	35 (53.8)
4	Vitamin E	35 (45.5)	Vitamin E	26 (36.6)	Vitamin E	26 (40.0)
5	Vitamin C	31 (40.3)	Vitamin C	25 (35.2)	Vitamin C	24 (36.9)
6	Music	29 (37.7)	Meditation	21 (29.6)	Music	23 (35.4)
7	Meditation	27 (35.1)	Music	20 (28.2)	Meditation	22 (33.8)
8	Green tea	26 (33.8)	Green tea	19 (26.8)	Yoga	19 (29.2)
9	Chiropractic	20 (26.0)	Vitamin A	15 (21.1)	Green tea	18 (27.7)
10	Vitamin A	17 (22.1)	Chiropractic	14 (19.7)	Vitamin A	14 (21.5)

CAM, complementary and alternative medicine; *N*, represents the total sample size; *n*, represents the subsample size.

changes with the overall scores over time. The number of CAMs used, however, was not associated with stress, mood disturbance, or QOL at any time point, except that the number of CAM use at 6 months was significantly and negatively correlated with the level of stress ($r = -0.29$; $p = 0.02$) (Table 5).

CAM use by demographic and clinical factors

The number of CAMs used did not differ by cancer treatment type, paclitaxel use, hormone use, education level, income level, ethnicity, or marital status. The only difference in the number of CAMs used was seen in employment status: 3.9 CAMs for those not working, 5.3 for those working part time less than 20 hours per week, 6.4 for those working part time more than or equal to 20 hours per week, and 7.5 for full-time workers ($F[3,73] = 3.52$; $p = 0.019$), indicating more CAMs used with increasing hours of employment.

Discussion

Prevalence and types of CAM used

Over 94% of women diagnosed with new breast cancer reported using some types of CAM across active cancer treatment. The average number of CAM use was 5 to 6 different types(range, 0–23, showing wide variability). The most frequently used CAMs were prayer, multivitamin use, massage, vitamin E and C use, music therapy, meditation, green tea, chiropractic treatment, and vitamin A use at baseline.

Table 3. Helpfulness and Satisfaction with Top 10 Complementary and Alternative Medicines at Baseline

Rank	*Specific CAM*	*Mean helpfulness score*	*Mean satisfaction score*
1	Prayer	3.45	3.60
2	Multivitamin	2.07	2.42
3	Massage	1.86	2.54
4	Vitamin E	2.03	2.26
5	Vitamin C	2.19	2.33
6	Music	3.18	3.18
7	Meditation	3.12	3.23
8	Green tea	1.46	1.71
9	Chiropractic	2.60	3.00
10	Vitamin A	2.57	2.60

Rating scale: 0 = none, 1 = a little, 2 = moderately, 3 = quite a bit, 4 = extremely.

A previous review indicates that CAM use in patients with cancer ranged from 11% to 95%,[24] and patients with breast cancer tended to show greater CAM use than patients with other types of cancer.[10,11] Others report that CAM use in patients with early-stage breast cancer was around 60% a month after surgery or during and after adjuvant therapies.[12,25] Similarly, 86% of cancer survivors of 7 to 8 years reported using CAMs, suggesting that CAM use continues into survivorship.[14] The prevalence of CAM use in the current study is equivalent to the highest among the earlier studies, in part because of the characteristics of the participants and the way CAM was measured. It is well known that younger age, particularly the age group of 30–60 years, female sex, white race, and higher income and education have been associated with higher CAM use.[2,3,8–10,12,26–28] The current participants shared many of these characteristics. Furthermore, a 57-item comprehensive CAM instrument offered more choices. CAM use may also vary by culture or health conditions. In Austrian patients with cancer, for example, only 24.4% reported using CAM.[27] In Malaysian breast cancer survivors, about 51% used CAM;[29] in stroke survivors, 46% reported using CAM in the preceding year.[30]

Despite variations in prevalence of CAM use among different populations, the types of CAM used were similar: vitamins, spiritual and stress reducing activities, herbal medicine, chiropractic care, and relaxation techniques.[27,29,30] Because this study was conducted at a Bible-Belt geographic location, it was not surprising to find prayer being the most commonly used CAM. Other CAMs in the top 10 were vitamins, green tea, music, meditation, massage, and chiropractic therapy, which were also similar among cancer survivors.[7,10,14] Vitamin use and stress-reducing therapies were among the most common CAMs in breast cancer populations.[12,25] Some specific cultural preference, however, was noted: More than 74% of German women with breast or gynecologic malignancies used mistletoe,[16] and Taiwanese breast cancer survivors often read books, ate grains, and chose a vegetarian diet as CAM.[6] In the general population, the most common types of CAM were nonvitamin,

Table 4. Changes in Psychobehavioral Responses Across Adjuvant Therapy

Variable	*Possible score range*	*Mean score before adjuvant therapy*	*Mean score at 2 months*	*Mean score at 6 months*	F-*Value*	p-*Value*
Stress (total)	0–75	30.3 ± 14.8	22.6 ± 15.2	19.8 ± 15.7	12.1	< 0.001
Intrusion	0–35	14.6 ± 8.4	10.4 ± 7.9	8.9 ± 8.3	12.8	< 0.001
Avoidance	0–40	15.6 ± 8.3	12.1 ± 9.0	10.9 ± 9.3	7.4	0.001
Mood (total)	0–148	45.2 ± 27.2	35.7 ± 25.3	32.6 ± 26.6	8.7	< 0.001
Anxiety	0–24	8.8 ± 5.9	4.9 ± 4.7	4.5 ± 5.3	24.7	< 0.001
Depression	0–32	6.1 ± 6.1	4.6 ± 5.7	4.1 ± 6.2	4.1	0.02
Anger	0–28	4.6 ± 5.9	4.0 ± 5.7	3.6 ± 5.4	1.6	0.21
Lack of vigor	0–24	13.0 ± 5.4	10.3 ± 6.3	9.3 ± 6.5	9.1	< 0.001
Fatigue	0–20	7.1 ± 5.7	7.9 ± 6.1	7.2 ± 6.0	.65	0.53
Confusion	0–20	5.6 ± 4.4	4.1 ± 3.8	3.9 ± 4.3	7.2	0.001
Quality of life (total)		90.2 ± 25.4	82.1 ± 29.9	77.1 ± 40.4	7.7	0.001
Physical	0–28	15.2 ± 9.7	14.6 ± 8.9	13.2 ± 10.2	3.3	0.04
Emotional	0–24	13.4 ± 6.2	13.4 ± 6.2	11.9 ± 8.5	4.9	0.009
Functional	0–28	18.8 ± 6.4	16.4 ± 8.5	16.7 ± 9.1	4.3	0.02
Social	0–28	22.7 ± 4.4	19.8 ± 7.9	18.5 ± 9.2	10.7	< 0.001
Additional	0–40	20.1 ± 7.7	18.1 ± 8.5	16.6 ± 9.9	8.1	0.001

Mean values are expressed with standard deviations.

nonmineral, and natural products, such as fish oil or omega-3 and glucosamine.[2]

Reasons for and satisfaction with CAM

Specific reasons for using specific CAMs revealed three distinctive patterns: First, prayer, music, and meditation were used predominantly for a feeling of control over life; second, vitamins and green tea were used to improve the immune system; and third, massage and chiropractic therapies were used to control pain. Participants generally thought that CAMs were helpful and were satisfied with the CAM use. In particular, prayer was thought to be very helpful, and users were highly satisfied with prayer. Meditation and music were the next highly praised CAMs in terms of helpfulness and satisfaction. In contrast, green tea use and massage were rated least helpful among the top 10 common CAMs, but users still rated them to be a little to moderately helpful.

In previous studies, overall reasons for taking CAMs have included strengthening the immune system, improving emotional or physical well-being, improving the body's capacity to perform daily activities,[11,29,31] reducing psychological stress and physical symptoms, and gaining a feeling of control over treatment, but a distinctive pattern for specific CAM types and specific reasons was not clearly apparent.[32,33] In terms of satisfaction, most users were satisfied with perceived benefits of CAM,[29,32] but lack of improvement in expected goal was the most common reason for dissatisfaction.[31]

Table 5. Correlations Between Number of Complementary and Alternative Medicines Used and Psychobehavioral Responses

Variable	*CAMs used at baseline (T1)*	*CAMs used at 3 months (T2)*	*CAMs used at 6 months (T3)*
Stress			
T1	−0.05	−0.05	0.02
T2	−0.16	−0.10	−0.07
T3	0.03	0.05	−0.29[a]
Moods			
T1	−0.04	−0.08	−0.06
T2	−0.13	−0.01	−0.16
T3	0.06	0.04	−0.18
Quality of Life			
T1	−0.02	0.17	0.09
T2	0.03	0.15	0.09
T3	0.09	0.21	0.05

[a] $p = 0.02$.

CAM associations with psychosocial and behavioral factors

Stress, mood disturbance, and QOL significantly decreased over a 6-month cancer treatment period, but the number of CAMs used was not associated with these levels. Previous studies have shown mixed findings. Patients with breast cancer treated with both CAM and conventional treatment reported better QOL than patients treated only with conventional treatment at 1-year follow-up.[15] CAM-using patients reported less deterioration of perceived health from pre- to postcancer diagnosis.[16] Women who consulted an alternative service in the prior year tended to have reduced stress and depression over time.[13] Others, however, found no difference in psychological disturbance or social support between CAM users and nonusers,[27] and CAM use was associated with lower QOL in patients with breast cancer.[12] Furthermore, CAM use was associated with more intrusive thoughts on cancer, low perceived level of social support, and poorer perceived QOL in colorectal cancer survivors.[10] However, most of these latter studies were correlational studies, suggesting that people with higher stress and poorer QOL are more likely to seek CAM. Future investigations should focus on randomized clinical trials and prospective longitudinal data collection to clarify the effect of CAM use on psychosocial and behavioral responses.

Limitations

Limitations of this study include the single-institution setting and enrollment only of patients with breast cancer. The sample size was relatively small, and the follow-up period was limited to 6 months. Participants were largely English-speaking white women with relatively high education and sufficient resources. Despite these limitations, this was a rare prospective longitudinal study with simultaneous assessments of psychological and QOL factors in patients actively undergoing cancer adjuvant therapies. The findings of the study may contribute substantially to the knowledge base of CAM and indicate the CAM use across active cancer treatment.

Conclusion

CAM use is highly prevalent and continues across cancer treatment with nearly the same types of CAMs. Future investigations should focus on which specific CAMs are most efficacious for which specific purpose so that tailored recommendations can be made to target specific concerns of the patients. For this purpose, there should be open communication between health care providers and recipients with the follow-up evaluation on the efficacy of prescribed CAM using rigorous research methods. Incorporation of biomarkers will further contribute to the objective assessment of the efficacy of CAM. Concerns on potential interactions between CAM and conventional therapy must be assessed to guide evidence-based recommendation for integrating conventional and complementary therapies.[34]

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