



# Trends in integrative medicine and health consults: differences between cancer survivors and patients without cancer

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Received: 25 June 2020 / Accepted: 6 October 2020 / Published online: 14 October 2020  
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## Abstract

**Objectives** The objectives were to compare patients with and without cancer who sought an integrative health (IH) consult and reasons for seeking a consult.

**Design** Descriptive cross-sectional study that employed a secondary analysis of an integrative health database supplemented by a retrospective medical record review.

**Setting/location** Integrative Medicine and Health program in a Southwestern United States academic medical center.

**Subjects** Eight hundred thirty-nine adults over the age of 18 seeking IH consultation.

**Results** The number of complementary therapies reported prior to consult were not significantly different between groups. The most reported complementary therapies used by cancer survivors were multivitamins, exercise, and turmeric. Patients without cancer reported significantly higher pain levels than cancer survivors. Cancer survivors reported significantly higher energy, sleep levels, overall health, spiritual wellbeing, and significantly better relationships compared to patients without cancer. Cancer survivors reported fatigue and cancer as the top reasons for IH consult.

**Conclusion** Participants without cancer reported higher levels of pain and lower levels of energy, sleep, overall health, spiritual wellbeing, and relationships compared to cancer survivors. However, cancer survivors still reported levels of unmanaged symptoms. Complementary therapy use prior to IMH consult was similar between groups; however, IMH providers recommended more treatments for patients without cancer. Our results highlight that more evidence is needed to guide IMH recommendations, especially for cancer survivors who may still be in treatment. Additionally, our results support evidence-based recommendations that all cancer survivors should be assessed for complementary therapy use and provided counseling by qualified providers on their advantages and limitations.

**Keywords** Integrative health · Complementary and alternative medicine · Symptoms · Physician referrals · Cancer

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## Introduction

It is estimated that 30–50% of cancer survivors are using complementary therapies to treat symptoms and promote health [1, 2]. Similarly, about 38% of adults in the USA report using a complementary therapy [3]. The National Cancer Institute defines a cancer survivor as someone who has been diagnosed with cancer from time of diagnosis to the end of their life [4]. Factors contributing to underreporting by cancer survivors include their reluctance to share their complementary therapy use with their healthcare team and narrow definitions of complementary therapies used in many prevalence studies [5, 6]. The most frequently reported types of complementary therapies used by cancer survivors are botanical preparations and supplements [6, 7]. Cancer survivors may be unaware of potential interactions between their complementary therapy and current medical treatments. As many as 59% of cancer survivors who reported complementary therapy use were found to be at risk of their complementary therapy interacting with their conventional treatments [8]. Additionally, for cancer survivors during or after cancer treatment, there is conflicting and/or limited evidence for many of the complementary therapies [9–11].

Having an integrative medicine and health (IMH) team is one key strategy to help patients and cancer care providers navigate the complex world of complementary therapies. Integrative health (IH) is defined as incorporating evidence-informed complementary or non-Western healthcare therapies with traditional Western or mainstream therapies for the purpose of health and healing [12]. Integrative Medicine and Health (IMH) physician consultations include an in-depth review of the patient's health story, including their diet, movement practices, stress, spirituality, and preferences for integrative medicine modalities that culminate in specific multidisciplinary integrative health recommendations.

Research has identified that having cancer, being a woman, prior use of complementary therapies, higher rates of symptoms, younger age, increased physical activity, and receipt of adjuvant chemotherapy and/or multiple cancer treatment modalities predicted complementary therapy use [7, 13, 14]. Current evidence on cancer survivors who seek integrative health consults has shown that they are frequently women, middle-aged, have used complementary therapies, and had advanced stage cancer [15–18]. Often studies of IH consults did not assess why patients sought consultation and/or why they were referred for consultation [19, 20]. However, those that did found that oncology providers often referred for an IH consult for symptoms and QOL concerns [21, 22] and that cancer survivors wanted IH consults to address symptoms [22] and/or they were seeking integrative health services or had questions about diet, herbs, or supplements [17].

IH literacy of referring providers has been identified as a key barrier for growing IH practices [18]. In order to identify

ways in which to support patients' use of this valuable and limited resource, it is critical for IH providers to understand why patients seek and oncology providers refer to IH consults. Comparing cancer survivors to patients without cancer can help identify unique needs of cancer survivors and provide insight into opportunities that can enable us to meet their care needs. The purpose of this study was to (1) compare patients with and without cancer who sought an integrative health (IH) consult on demographics, reported symptoms, and QOL measures, and (2) compare reports of cancer survivors and referring providers on the reasons for an integrative health consult.

## Materials and methods

### Study design

This descriptive cross-sectional study employed a secondary analysis of information in the Baseline Integrative Medicine Intake Form database supplemented by clinical and demographic data from a retrospective medical record review. Participants were adults 18 years and older who sought integrative health consultation from an established IH service at an academic medical center in the Southwestern United States. To ensure fidelity in data collection, clear variable guidelines and abstraction tools were employed by chart reviewers. The local Institutional Review Board reviewed and approved this study.

### Sample

The convenience sample consisted of 839 adult Integrative Health patients who sought initial integrative health consultations with the Integrative Medicine and Health program at Mayo Clinic, Arizona, and completed the Baseline Integrative Medicine Intake Form between 2013 and 2017. The Integrative Medicine and Health program offers services such as Integrative Medicine physician consultations, acupuncture, massage, and yoga. This program serves patients with cancer and patients without cancer. Participants were eligible for inclusion if they were  $\geq 18$  years old and had completed the Baseline Integrative Medicine Intake Form. The study excluded patients who were deceased or reported that they did not intend to have an IH consult.

### Measures

The Baseline Integrative Medicine Intake Form, completed by patients prior to consult, captured self-reported demographics, reason for consultation, diagnosis, and referral source. Numeric rating scales from 0 to 10 anchored with 0 ("as bad as it can be") and 10 ("as good as it can be") were used to assess stress level, pain level, energy level, and anxiety level,

which has been shown to be a reliable measure of symptoms [23]. Quality of diet, relationships, spiritual wellbeing, sleep, and overall health were captured on a Likert scale (1 = Excellent, 5 = Poor). Average physical activity level was also captured on a Likert scale (1 = Sedentary, 4 = Highly Active). This measure was chosen and implemented by the Integrative Medicine physicians prior to the study to meet their clinical practice needs.

Participant demographics were collected from the electronic health record (EHR), including gender; marital status; type of cancer diagnosis; time from cancer treatment; if referred to Integrative Medicine and Health (IMH); reason listed on consult order; length of time since diagnosis of cancer until the integrative health consult; any previous and/or current use of IH interventions such as herbs, massage, acupuncture, and/or yoga reported at IH consult and documented in their IMH progress note; and medications at time of IH consult.

### Data analysis

Descriptive statistics were used to summarize patient responses and to identify differences between the two groups (cancer vs. other). Differences between the two groups were determined by using Pearson chi-square and Student's *t* tests, as appropriate. *p* values < 0.05 were considered significant. All of the Baseline Integrative Medicine Intake Form scales, except energy level, were reverse scored for analysis purposes. Variables with expected cell counts less than 5 were excluded from analysis [24]. Statistical analysis was performed using IBM SPSS Statistics version 23.

### Results

The sample included 839 patients who sought an IH consult at an academic medical center in the Southwest between July 2013 and October 2017. Demographic and clinical characteristics of the total sample and the subgroups of participants with and without cancer are presented in Table 1. The average age was 51 (SD = 15.4), 66.9% married, the majority (80.1%) were female, 25.2% diagnosed with cancer, 16.6% reported a diagnosis of fibromyalgia, 6.2% reported a diagnosis of heart disease, 75.6% had prior experience with integrative health, and 76.4% were referred by their provider (Table 1).

The sample included 212 patients who had a diagnosis of cancer at the time of their consult. Breast (37.4%), gastrointestinal (10.9%), and hematologic (17%) cancers were the top three types of cancer diagnoses (Table 1). As a group, those with a history of cancer were older at the time of IH consult than the group that did not have a history of cancer (57.7 years, SD = 12.8 and 49.3 years, SD = 15.6,  $p < 0.001$ , respectively). The majority (56.6%) were post-treatment cancer survivors with a mean of 1.47 (SD = 3.1) years from completion of

treatment. At the time of consult, 10.8% of cancer survivors were on adjuvant hormone treatment. Cancer survivors were primarily treated with surgery (72.2%), chemotherapy (57%), and radiation (46.2%).

### Complementary therapy usage

Prior complementary therapy use for the entire sample was 75.6%. Cancer survivors reported their prior complementary therapy use as 78.8%, which was not significantly different from the patients without cancer (74.5%). The number of complementary therapies reported prior to consult was not significantly different between groups with an average of 1.56 (SD = 1.8) reported for the entire sample (Table 2). Multivitamins (22.1%), exercise (17.3%), and vitamin D (12.5%) were the top three complementary therapies reported prior to consult (Table 2). The most reported complementary therapies used by cancer survivors were multivitamins (23.6%), exercise (20.3%), and turmeric (15.6%). Significantly, more cancer survivors reported higher prior use of turmeric (15.6%) compared to patients without cancer (6.2%,  $p < 0.001$ ). Prior use of mindfulness was found to be used more frequently in cancer survivors compared to those without cancer (9.4% vs. 4.3%,  $p < 0.006$ ). Otherwise, use of complementary therapies did not significantly differ between groups.

### Integrative health recommendations

Integrative medicine and health (IMH) physicians recommended significantly more complementary therapies for patients without cancer ( $\bar{x} = 6.11$ , SD = 3.1) compared to cancer survivors ( $\bar{x} = 5.63$ , SD = 2.5,  $p = .041$ ) (Table 3). The majority of patients received recommendations of exercise (64.7%), breathing exercises (57.7%), and mindfulness (57.2%). Compared to cancer survivors, IMH physicians recommended significantly more often that patients without cancer use cognitive behavioral therapy (14.2% vs. 26.3%,  $p < 0.001$ ), Coenzyme Q10 (COQ10) (1.9% vs. 5.1%,  $p = 0.046$ ), magnesium (23.1% vs. 35.2%,  $p = 0.001$ ), and mindfulness (49.1% vs. 60%,  $p = 0.006$ ). Significantly, more cancer survivors were recommended to use massage (21.7% vs. 15.3%,  $p = 0.032$ ), turmeric (45.3% vs. 21.4%,  $p < 0.001$ ), and yoga (46.7% vs. 38.4%,  $p = 0.034$ ) compared to patients without cancer. The top three recommendations for cancer survivors who reported fatigue were exercise (66.3%), breathing exercises (62.7%), and yoga (51.8%) (Table 4).

### Patient-reported measures

Patient-reported measures did differ between groups (Table 5). The average pain level of patients without cancer

**Table 1** Demographics

	Cancer survivors n = 212	Patients without cancer n = 627	Total n = 839	Sig
	Mean (SD)	Mean (SD)	Mean (SD)	
Age	57.7 (12.8)	49.3 (15.6)	51.4 (15.4)	< 0.001 <sup>1</sup>
Time from treatment	1.47 (3.1)			
	<i>N</i> (%)	<i>N</i> (%)	<i>N</i> (%)	
Gender, female	167 (78.8)	505 (80.5)	672 (80.1)	0.577 <sup>3</sup>
Self-reported fibromyalgia		104 (16.6)		
Self-reported heart disease		39 (6.2)		
Prior IH use	167 (78.8)	467 (74.5)	634 (75.6)	0.121 <sup>2</sup>
Marital status				0.052 <sup>3</sup>
Divorced	13 (6.1)	28 (4.5)	41 (4.9)	
Married	158 (74.5)	403 (64.2)	561 (66.9)	
Single	33 (15.5)	166 (26.5)	199 (23.7)	
Other	8 (3.7)	30 (4.7)	38 (4.5)	
Referral source				0.024 <sup>3</sup>
Self-referral	22 (10.3)	62 (9.8)	84 (10.0)	
Physician	150 (70.6)	491 (78.3)	641 (76.4)	
Other	34 (16)	69 (11)	103 (12.3)	
Cancer type*	<i>N</i> (%)			
Brain	12 (5.7)			
Breast	79 (37.4)			
Gastrointestinal	23 (10.9)			
Genitourinary	16 (7.5)			
Gynecological	16 (7.6)			
Head and neck	14 (6.6)			
Hematologic	36 (17)			
Skin	12 (5.6)			
Other	7 (3.3)			
Cancer treatment				
Chemotherapy only	26 (12.3)			
Chemotherapy, radiation	13 (6.2)			
Chemotherapy, surgery	39 (18.5)			
Chemotherapy, surgery, radiation	43 (20.4)			
Radiation only	8 (3.8)			
Surgery only	37 (17.5)			
Surgery, radiation	34 (16.1)			
Other	11 (1.4)			
Completed treatment	120 (56.6)			
Current hormone treatment	23 (10.8)			

<sup>1</sup> *T* test<sup>2</sup> Fisher's exact<sup>3</sup> Chi-square

\* Participants may have more than 1 type of cancer

was 4.68 (SD = 2.9) while cancer survivors was 3.81 (SD = 3.2,  $p < 0.001$ ). Cancer survivors reported significantly better levels of energy ( $\bar{x} = 4.89$ , SD = 2.5 vs.  $\bar{x} = 4.07$ , SD = 2.4,  $p < 0.001$ ), sleep ( $\bar{x} = 2.51$ , SD = 1.1 vs.  $\bar{x} = 2.25$ , SD = 1.1,  $p = 0.002$ ), perceived overall health ( $\bar{x} = 2.82$ ,

SD = 1.1 vs.  $\bar{x} = 2.45$ , SD = 0.98),  $p < 0.001$ ), spiritual wellbeing ( $\bar{x} = 3.67$ , SD = 1.1 vs.  $\bar{x} = 3.38$ , SD = 1.0,  $p = 0.001$ ), and relationships ( $\bar{x} = 3.86$ , SD = 1.0 vs.  $\bar{x} = 3.60$ , SD = 1.0,  $p = 0.002$ ) compared to patients without cancer

**Table 2** Prior complementary therapy use

	Cancer survivors n = 212	Patients without cancer n = 627	Total n = 839	Sig
	Mean (SD)	Mean (SD)	Mean (SD)	
Prior number of complementary therapies used	1.74 (1.8)	1.5 (1.7)	1.56 (1.8)	0.081 <sup>1</sup>
Number of IH physician recommendations	5.63 (2.5)	6.11 (3.1)	5.99 (2.9)	<0.001 <sup>1</sup>
	N (%)	N (%)	N (%)	
Prior complementary therapy use	167 (78.8)	467 (74.5)	634 (75.6)	0.121 <sup>2</sup>
Reported use (yes/no)				
Acupuncture	7 (3.3)	19 (3)	26 (3.1)	0.488 <sup>2</sup>
Breathing exercise	15 (7.1)	40 (6.4)	55 (6.6)	0.415 <sup>2</sup>
Calcium	13 (6.1)	28 (4.5)	41 (4.9)	0.212 <sup>2</sup>
Coenzyme Q10	14 (6.6)	41 (6.5)	55 (6.6)	0.542 <sup>2</sup>
Exercise	43 (20.3)	102 (16.3)	145 (17.3)	0.110 <sup>2</sup>
Fish oil	29 (13.7)	73 (11.6)	102 (12.2)	0.215 <sup>2</sup>
Magnesium	21 (9.9)	82 (13.2)	103 (12.3)	0.136 <sup>2</sup>
Massage	11 (5.2)	26 (4.1)	37 (4.4)	0.320 <sup>2</sup>
Melatonin	10 (4.7)	36 (5.7)	46 (5.5)	0.356 <sup>2</sup>
Mindfulness	20 (9.4)	27 (4.3)	47 (5.6)	0.006 <sup>2</sup>
Multivitamin	50 (23.6)	135 (21.5)	185 (22.1)	0.297 <sup>2</sup>
Prayer	18 (8.5)	34 (5.4)	52 (6.2)	0.078 <sup>2</sup>
Probiotic	21 (9.9)	46 (7.3)	67 (8.0)	0.148 <sup>2</sup>
Turmeric	33 (15.6)	39 (6.2)	72 (8.6)	<0.001 <sup>2</sup>
Vitamin B12	14 (6.6)	37 (5.9)	51 (6.1)	0.410 <sup>2</sup>
Vitamin D	29 (13.7)	76 (12.1)	105 (12.5)	0.314 <sup>2</sup>
Yoga	18 (8.5)	55 (8.8)	73 (8.7)	0.514 <sup>2</sup>

<sup>1</sup> *T* test<sup>2</sup> Fisher's exact

(Table 5). Other patient-reported measures like stress, anxiety, and physical activity did not differ.

### Reasons for consult

Cancer survivors' reasons for consults were primarily symptom-related. A majority of patients reported their IH consult reasons included fatigue (59.4%) and pain (51.5%). Fatigue (51.9%), stress (38.2%), and cancer (76.4%) were the top three consult reasons reported by cancer survivors. Patients were able to identify more than one reason for their consult. Patients without cancer, when compared to cancer survivors, significantly more often reported that their reason for consult included pain (58.4% vs. 31.1%,  $p < 0.001$ ), fatigue (61.9% vs. 51.9%,  $p = 0.008$ ), gastrointestinal (GI) symptoms (17.2% vs. 6.1%,  $p < 0.001$ ), and anxiety (43.7% vs. 34%,  $p = 0.006$ ).

The top three reasons for referring provider referrals for IH consult were cancer (14%), fatigue (15.6%), and pain (11.7%). Referring provider consult reasons of fatigue (14.7% vs. 0.9%,  $p < 0.001$ ), pain (14.1% vs. 4.0%,  $p <$

0.001), GI symptoms (10.5% vs. 0.9%,  $p < 0.001$ ), and sleep (7.1% vs. 0%,  $p < 0.001$ ) were significantly higher for patients without cancer compared to cancer survivors.

There was little agreement between cancer survivors' reasons for an IH consult compared with referring provider referral reasons. Reasons of migraines had the highest agreement with a moderate Cohen's *K* of 0.493 ( $p < 0.001$ ). Neurological and GI reasons both had significant fair agreement between cancer survivors and referring provider with Cohen's *K* of 0.231 ( $p = 0.003$ ) and 0.342 ( $p < 0.001$ ), respectively. Furthermore, 35.3% of patients with a provider referral and cancer reported sleep as a reason for consult, but there were no provider consults for sleep for these patients (Cohen's *K* = 0). All other agreements were  $< 0.167$  or had a slight non-significant agreement. Additionally, 50.7% of cancer survivors who had a provider referral reported fatigue as a reason for consult and only 0.9% had fatigue as a physician consult reason (Cohen's *K* = 0.444,  $p = 0.143$ ). However, this was not statistically significant.

**Table 3** Integrative Medicine and Health (IMH) physician recommendations

	Cancer survivors n = 212	Patients without cancer n = 627	Total n = 839	Sig
	Mean (SD)	Mean (SD)	Mean (SD)	
Number of IH recommendations	5.63 (2.5)	6.11 (3.1)	5.99 (2.9)	0.041 <sup>1</sup>
IMH physician recommendations	<i>N</i> (%)	<i>N</i> (%)	<i>N</i> (%)	
Acupuncture	60 (28.3)	142 (22.6)	202 (24.1)	0.096 <sup>3</sup>
Aroma therapy	15 (7.1)	72 (11.5)	87 (10.4)	0.069 <sup>3</sup>
Biotherapy	28 (13.2)	110 (17.5)	138 (16.4)	0.141 <sup>3</sup>
Breathing exercise	112 (52.8)	372 (59.3)	484 (57.7)	0.098 <sup>3</sup>
Calcium	16 (7.5)	37 (5.9)	53 (6.3)	0.394 <sup>3</sup>
Coenzyme Q10	4 (1.9)	32 (5.1)	36 (4.3)	0.046 <sup>3</sup>
Cognitive behavioral therapy	30 (14.2)	165 (26.3)	195 (23.2)	< 0.001 <sup>3</sup>
Exercise	139 (65.6)	404 (64.4)	543 (64.7)	0.766 <sup>3</sup>
Fish oil	87 (41)	292 (46.6)	379 (45.2)	0.162 <sup>3</sup>
Ginger	19 (9)	83 (13.2)	102 (12.2)	0.100 <sup>3</sup>
Guided imagery	23 (10.8)	43 (6.9)	66 (7.9)	0.062 <sup>3</sup>
Magnesium	49 (23.1)	221 (35.2)	270 (32.2)	0.001 <sup>3</sup>
Massage	46 (21.7)	96 (15.3)	142 (16.9)	0.032 <sup>3</sup>
Mindfulness	104 (49.1)	376 (60)	480 (57.2)	0.006 <sup>3</sup>
Multivitamins	35 (16.5)	87 (13.9)	122 (14.5)	0.347 <sup>3</sup>
Melatonin	24 (11.3)	89 (14.2)	113 (13.5)	0.289 <sup>3</sup>
Nutmeg	11 (5.2)	58 (9.3)	69 (8.2)	0.063 <sup>3</sup>
Prayer	20 (9.4)	76 (12.1)	96 (11.4)	0.288 <sup>3</sup>
Probiotic	18 (8.5)	71 (11.3)	89 (10.6)	0.247 <sup>3</sup>
Progressive muscle relaxation	20 (9.4)	44 (7)	64 (7.6)	0.252 <sup>3</sup>
Tai chi	81 (38.2)	276 (44)	357 (42.6)	0.139 <sup>3</sup>
Turmeric	96 (45.3)	134 (21.4)	230 (27.4)	< 0.001 <sup>3</sup>
Vitamin B12	7 (3.3)	25 (4)	32 (3.8)	0.652 <sup>3</sup>
Vitamin D	14 (6.6)	33 (5.3)	47 (5.6)	0.463 <sup>3</sup>
Yoga	99 (46.7)	241 (38.4)	340 (40.5)	0.034 <sup>3</sup>

<sup>1</sup> *T* test<sup>2</sup> Fisher's exact<sup>3</sup> Chi-square

## Discussion

Our results demonstrated a high use of complementary therapies in our total sample with 75.6% reporting prior use. Additionally, our finding that 78.8% of cancer patients reported prior complementary therapy use was higher than previous studies [1, 2, 25]. We found that complementary therapy use was not significantly higher in cancer survivors compared to patients without cancer, which differs from research that found cancer was a significant predictor for complementary therapy use [14]. We may have seen higher complementary therapy use than national datasets due to the potential bias towards use by those who would choose or agree to an integrative health consult. There is also the potential that

participants were referred for an IH consult due to their complementary therapy interest and use. However, this was not specifically documented in referral orders.

In our study, we found that participants without cancer reported higher levels of pain. Additionally, cancer survivors reported significantly higher levels of energy, sleep, overall health, spiritual wellbeing, and significantly better relationships compared to patients without cancer. This differs from previous research that found cancer survivors were more likely to report symptoms of anxiety, such as feeling sad or nervous, than non-cancer patients [14] and chronic pain [26]. These differences may be due to differences in the sample of cancer survivors and non-cancer subjects included. Our cancer survivors may not be representative of a national sample since

**Table 4** IMH recommendations for cancer survivors by symptom

Symptom	N (%)	Prior use	Turmeric	Massage	Mindfulness	Acupuncture	Fish oil	Breathing exercise	Yoga	Magnesium	Exercise	Tai chi
Fatigue	110 (51.9)	82 (74.5)	52 (47.3)	24 (21.8)	54 (49.1)	36 (32.7)	45 (40.9)	69 (62.7)	57 (51.8)	19 (17.3)	73 (66.3)	49 (44.5)
Stress	81 (38.2)	61 (75.3)	39 (48.1)	17 (21)	49 (60.5)	23 (28.3)	36 (44.4)	52 (64.2)	39 (48.1)	21 (25.9)	57 (70.3)	33 (40.7)
Pain	67 (31.6)	49 (73.1)	25 (37.3)	16 (23.9)	28 (41.8)	28 (41.8)	24 (35.8)	36 (53.7)	31 (46.2)	15 (22.4)	41 (61.2)	26 (38.8)

Cancer survivors could report more than one symptom

more than 78% of our cancer survivors were women and more than 56% of the cancer survivors were post-treatment with an average of 1.47 years from cancer treatment. This distance from cancer treatment may improve symptoms like anxiety or pain and/or there may have been a response shift or normalization of the symptoms that would explain these findings. Additionally, our comparison group was not age-matched controls and about 23% of the comparison group reported having fibromyalgia or heart disease. Our comparison group may demonstrate that patients who seek an integrative health consultation have a high symptom burden regardless of diagnosis. Also, our sample was taken from cancer survivors who were seeking IH consult which may represent that they are more focused on doing things to improve their health than a national sample. In addition, these differences could reflect the high use of complementary therapies seen in the cancer survivors and that their complementary therapy use has resulted in improved patient-reported measures.

Similar to previous research, we found that the most frequently used IH therapies by cancer survivors were nutritional and botanical therapies such as multivitamins, turmeric, and vitamin D [6, 7]. These findings are concerning since current Society of Integrative Oncology evidence-based recommendations have tempered support for the use of natural products [9–11, 27]. Additionally, there is conflicting information regarding the use of vitamin D supplementation [28–30]. Conflicting information and limited evidence in cancer survivor population highlights the need for patients and oncology providers to leverage integrative health providers to help assess risks and benefits of using these products. A small portion of the cancer survivors in our study reported using evidence-based complementary therapies including exercise (20.3%) and mind-body therapies like massage (5.2%) and acupuncture (3.3%) [9–11, 27]. The top three recommendations for cancer survivors who reported fatigue were exercise, breathing exercises, and yoga. IMH physicians recommended significantly more complementary therapies for patients without cancer compared to cancer survivors. This may be a result of the differing patient needs, as evidenced by the differences in patient-reported measures between patients without cancer and cancer survivors.

Our result that the most reported reason by cancer survivors for IH consultation was cancer (76.4%) differs from previous research that found symptoms like fatigue, emotional/spiritual relief, and gastrointestinal symptoms were the most reported reason [21, 22]. However, similar to previous research, we found that fatigue (51.9%) and stress (38.2%) were the next most reported consult reasons reported after cancer. These consultation reasons highlight that cancer survivors are seeking IH to help manage their cancer and cancer-related symptoms. Somewhat similar to previous research that found oncology providers referred to IH for symptoms and QOL concerns [21, 22], we found

**Table 5** Patient-reported measures

	Cancer survivors n = 212 Mean (SD)	Patients without cancer n = 627 Mean (SD)	Total n = 839 Mean (SD)	T (df)	Sig <sup>1</sup>
Anxiety	4.68 (2.7)	4.80 (2.6)	4.77 (2.6)	− 0.55 (796)	0.585
Energy level	4.89 (2.5)	4.07 (2.4)	4.28 (2.5)	4.13 (804)	< 0.001
Pain	3.81 (3.2)	4.68 (2.9)	4.46 (2.9)	− 3.56 (781)	< 0.001
Stress	4.70 (2.5)	5.04 (2.4)	4.96 (2.4)	− 1.77 (802)	0.078
Diet	3.19 (0.97)	3.12 (1.0)	3.14 (1.0)	0.862 (818)	0.389
Relationships	3.86 (1.0)	3.60 (1.0)	3.67 (1.0)	3.06 (813)	0.002
Spiritual wellbeing	3.67 (1.1)	3.38 (1.0)	3.45 (1.1)	3.19 (810)	0.001
Sleep	2.51 (1.1)	2.25 (1.1)	2.31 (1.0)	3.04 (825)	0.002
Overall health	2.82 (1.1)	2.45 (0.98)	2.55 (1.0)	4.45 (809)	< 0.001
Physical activity	2.60 (0.83)	2.48 (.88)	2.51 (0.87)	1.69 (804)	0.090
Relaxation technique use	2.16 (1.4)	2.29 (1.3)	2.26 (1.4)	− 1.15 (810)	0.250

<sup>1</sup> T test

that the top three reasons for referring provider referrals for IH consult were cancer (14%), fatigue (15.6%), and pain (11.7%). Similar to previous studies, we found that there was very little agreement between cancer survivors' reason for consult and their referring provider referral reasons for an IH consult [22]. This may represent a difference in communication styles between cancer survivors, who are focused on symptoms, and referring providers, who are often focused on medical diagnosis, as opposed to a true mismatch. Additionally, this may highlight an opportunity for IH providers to enhance communication between oncology providers and cancer survivors, as this lack of agreement could be due to a limited understanding of the role the IMH provider can play during a patient's cancer journey. Evidence-based guidelines recommend that all cancer survivors are assessed for complementary therapy use and provided counseling by qualified providers on their advantages and limitations [9–11]. IMH provider can aid both the cancer team and cancer survivor through navigation of the complex world of IH by identifying appropriate supportive treatments during and after cancer treatment, guiding to trusted products, resources and services, and assessing for potential interactions with medical treatments.

## Limitations

Limitations of the secondary analysis include the inability to determine causation as well as the limitations of only being able to use what was captured either in the dataset and/or electronic health record. Additionally, future research should use a prospective design and assess the cancer survivors'

satisfaction with IH consults and perceptions of complementary therapies' efficacy and relationship to overall health.

## Conclusion

Participants without cancer had higher levels of pain compared to cancer survivors. Cancer survivors reported significantly higher levels of energy, sleep, overall health, spiritual wellbeing, and significantly better relationships compared to patients without cancer. However, cancer survivors still reported levels of unmanaged symptoms. Complementary therapy use prior to IMH consult was similar between groups. However, IMH providers recommended more treatments for patients without cancer. Our results highlight that more evidence is needed to guide IMH recommendations, especially for cancer survivors who may still be in treatment. Additionally, our results support the evidence-based recommendation that all cancer survivors should be assessed for complementary therapy use and provided counseling by qualified providers on their advantages and limitations.

**Funding** This work was funded by the Jonas Center for Nursing Excellence, Mayo Clinic Nursing Research Steering Committee, and Oregon Health & Science University Presidential Scholarship. The content is the sole responsibility of the authors and does not reflect the views of any of the funders.

## Compliance with ethical standards

The Mayo Clinic Institutional Review Board reviewed and approved this study.

**Conflict of interest** The authors declare that they have no conflict of interest.



## References

- Adams M, Jewell AP (2007) The use of complementary and alternative medicine by cancer patients. *Int Semin Surg Oncol* 4:10. <https://doi.org/10.1186/1477-7800-4-10>
- Horneber M, Bueschel G, Dennert G, Less D, Ritter E, Zwahlen M (2012) How many cancer patients use complementary and alternative medicine: a systematic review and metaanalysis. *Integr Cancer Ther* 11(3):187–203. <https://doi.org/10.1177/1534735411423920>
- Barnes PMBB, Nahin R (2008) CDC National Health Statistics Report #12. Complementary and alternative medicine use among adults and children: United States, 2007. National Health Statistics Report, vol 12. United States Department of Health and Human Services. Centers for Disease Control and Prevention
- National Cancer Institute (n.d.) NCI Dictionary of Terms: Survivor. <https://www.cancer.gov/publications/dictionaries/cancer-terms/def/survivor>. Accessed Dec 2 2019
- Berretta M, Pepa CD, Tralongo P, Fulvi A, Martellotta F, Lleshi A, Nasti G, Fisichella R, Romano C, De Divitiis C, Taibi R, Fiorica F, Di Francia R, Di Mari A, Del Pup L, Crispo A, De Paoli P, Santorelli A, Quagliarriello V, Iaffaioli RV, Tirelli U, Facchini G (2017) Use of Complementary and Alternative Medicine (CAM) in cancer patients: an Italian multicenter survey. *Oncotarget* 8(15)
- Zavery B, Appleton L, Sandiford K, Wong H, Hughes J (2013) Complementary and alternative medicine use amongst oncology patients attending a large cancer centre in England. *Prog Palliat Care* 18(2):89–93. <https://doi.org/10.1179/096992610x12624290276548>
- Loquai C, Dechent D, Garzarolli M, Kaatz M, Kaehler KC, Kurschat P, Meiss F, Micke O, Muecke R, Muenstedt K, Stein A, Nashan D, Stoll C, Schmidtman I, Huebner J (2017) Use of complementary and alternative medicine: a multicenter cross-sectional study in 1089 melanoma patients. *Eur J Cancer* 71:70–79. <https://doi.org/10.1016/j.ejca.2016.10.029>
- Firkins R, Eisfeld H, Keinki C, Buentzel J, Hochhaus A, Schmidt T, Huebner J (2018) The use of complementary and alternative medicine by patients in routine care and the risk of interactions. *J Cancer Res Clin Oncol* 144(3):551–557. <https://doi.org/10.1007/s00432-018-2587-7>
- Deng GE, Frenkel M, Cohen L, Cassileth BR, Abrams DI, Capodice JL, Courneya KS, Dryden T, Hanser S, Kumar N, Labriola D, Wardell DW, Sagar S (2009) Evidence-based clinical practice guidelines for integrative oncology: complementary therapies and botanicals. *J Soc Integr Oncol* 7(3):85–120. <https://doi.org/10.2310/7200.2009.0019>
- Deng GE, Rausch SM, Jones LW, Gulati A, Kumar NB, Greenlee H, Pietanza MC, Cassileth BR (2013) Complementary therapies and integrative medicine in lung cancer: diagnosis and management of lung cancer, 3rd ed: American College of Chest Physicians evidence-based clinical practice guidelines. *Chest* 143(5 Suppl):e420S–e436S. <https://doi.org/10.1378/chest.12-2364>
- Greenlee H, DuPont-Reyes MJ, Balneaves LG, Carlson LE, Cohen MR, Deng G, Johnson JA, Mumber M, Seely D, Zick SM, Boyce LM, Tripathy D (2017) Clinical practice guidelines on the evidence-based use of integrative therapies during and after breast cancer treatment. *CA Cancer J Clin* 67(3):194–232. <https://doi.org/10.3322/caac.21397>
- National Center for Complementary and Integrative Health (2018) Complementary, alternative, or integrative health: what's in a name? <https://nccih.nih.gov/health/integrative-health>. Dec 2 2019
- Strizich G, Gammon MD, Jacobson JS, Wall M, Abrahamson P, Bradshaw PT, Terry MB, Teitelbaum S, Neugut AI, Greenlee H (2015) Latent class analysis suggests four distinct classes of complementary medicine users among women with breast cancer. *BMC Complement Altern Med* 15:411. <https://doi.org/10.1186/s12906-015-0937-4>
- Anderson JG, Taylor AG (2012) Use of complementary therapies for cancer symptom management: results of the 2007 National Health Interview Survey. *J Altern Complement Med* 18(3):235–241. <https://doi.org/10.1089/acm.2011.0022>
- Frenkel M, Cohen L, Peterson N, Palmer JL, Swint K, Bruera E (2010) Integrative medicine consultation service in a comprehensive cancer center: findings and outcomes. *Integr Cancer Ther* 9(3):276–283. <https://doi.org/10.1177/1534735410378663>
- Lopez G, Liu W, McQuade J, Lee RT, Spelman AR, Fellman B, Li Y, Bruera E, Cohen L (2017) Integrative oncology outpatient consultations: long-term effects on patient-reported symptoms and quality of life. *J Cancer* 8(9):1640–1646. <https://doi.org/10.7150/jca.18875>
- Lopez G, McQuade J, Cohen L, Williams JT, Spelman AR, Fellman B, Li Y, Bruera E, Lee RT (2017) Integrative oncology physician consultations at a comprehensive cancer center: analysis of demographic, clinical and patient reported outcomes. *J Cancer* 8(3):395–402. <https://doi.org/10.7150/jca.17506>
- Grant SJ, Marthick M, Lacey J (2019) Establishing an integrative oncology service in the Australian healthcare setting—the Chris O'Brien Lifehouse Hospital experience. *Support Care Cancer* 27(6):2069–2076. <https://doi.org/10.1007/s00520-018-4460-2>
- Ben-Arye E, Schiff E, Raz OG, Samuels N, Lavie O (2014) Integrating a complementary medicine consultation for women undergoing chemotherapy. *Int J Gynecol Obstet* 124:51–54. <https://doi.org/10.1016/j.ijgo.2013.07.019>
- Ben-Arye E, Kruger D, Samuels N, Keinan-Boker L, Shalom T, Schiff E (2014) Assessing patient adherence to a complementary medicine treatment regimen in an integrative supportive care setting. *Support Care Cancer* 22:627–634. <https://doi.org/10.1007/s00520-013-2016-z>
- Samuels N, Ben-Arye E, Maimon Y, Berger R (2017) Unmonitored use of herbal medicine by patients with breast cancer: reframing expectations. *J Cancer Res Clin Oncol* 143(11):2267–2273. <https://doi.org/10.1007/s00432-017-2471-x>
- Samuels N, Schiff E, Lavie O, Raz OG, Ben-Arye E (2015) Expectations from an integrative medicine consultation in breast cancer care: a registry protocol-based study. *23:317–324*. <https://doi.org/10.1007/s00520-014-2361-6>
- Paice J, Cohen FL (1997) Validity of a verbally administered numeric rating scale to measure cancer pain intensity. *Cancer Nurs* 20(2):88–93
- Siegel S, Castellan NJ (1988) Nonparametric statistics for the behavioral sciences, 2nd edn. McGraw-Hill Book Company, New York
- Kim K, Kim SH, Ok ON, Kim IR, Lee S, Kim SH, Kim WS, Ryu MH, Lee MH (2018) Use of complementary and alternative medicine by lymphoma survivors in South Korea. *Eur J Oncol Nurs* 33:91–96. <https://doi.org/10.1016/j.ejon.2018.01.012>
- Sanford NN, Sher DJ, Butler SS, Xu X, Ahn C, Aizer AA, Mahal BA (2019) Prevalence of chronic pain among cancer survivors in the United States, 2010–2017. *Cancer* 125(23):4310–4318. <https://doi.org/10.1002/ncr.32450>
- Greenlee H, Balneaves LG, Carlson LE, Cohen M, Deng G, Hershman D, Mumber M, Perlmutter J, Seely D, Sen A, Zick SM, Tripathy D, Society for Integrative O (2014) Clinical practice guidelines on the use of integrative therapies as supportive care in patients treated for breast cancer. *J Natl Cancer Inst Monogr* 2014(50):346–358. <https://doi.org/10.1093/jncimonographs/lgu041>
- Vernieri C, Nichetti F, Raimondi A, Pusceddu S, Platania M, Berrino F, de Braud F (2018) Diet and supplements in cancer prevention and treatment: clinical evidences and future perspectives.

- Crit Rev Oncol Hematol 123:57–73. <https://doi.org/10.1016/j.critrevonc.2018.01.002>
29. Manson JE, Cook NR, Lee IM, Christen W, Bassuk SS, Mora S, Gibson H, Gordon D, Copeland T, D'Agostino D, Friedenberg G, Ridge C, Bubes V, Giovannucci EL, Willett WC, Buring JE, Group VR (2019) Vitamin D supplements and prevention of cancer and cardiovascular disease. *N Engl J Med* 380(1):33–44. <https://doi.org/10.1056/NEJMoa1809944>
30. Chandler P, Chen WY, Ajala O, Hazra A, Cook N, Bubes V, Lee I-M, Giovannucci EL, Buring J, Manson JE, Group VR (2020) Vitamin D supplements and marine omega-3 fatty acids and development of advanced cancer. 38(15\_suppl):1510-1510. [https://doi.org/10.1200/JCO.2020.38.15\\_suppl.1510](https://doi.org/10.1200/JCO.2020.38.15_suppl.1510)

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