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Health-related Quality of Life among US Adults with Cancer: Potential Roles of Complementary and Alternative Medicine for Health Promotion and Well-being

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Abstract

Objectives: We estimated prevalence of complementary and alternative medicine (CAM) use by reason for use (treatment, wellness, or both) among non-institutionalized adults with cancer in the U.S. We also examined health-related quality of life (HRQOL) outcomes among adults with cancer who used CAM.

Methods: We used data from the 2012 National Health Interview Survey (NHIS), which represents non-institutionalized adults with cancer (n=2,967 unweighted). Using a cross-sectional design with survey sampling techniques, we estimated past year prevalence of CAM use. We ran multivariable logistic regression analyses to investigate the odds of perceived benefits of CAM.

Results: 35.1% of adults with cancer reported using some form of CAM in the past 12 months. Among CAM users, 56.0% used CAM for both treatment and wellness, and 32.4% used CAM for wellness only. Only 11.6% used CAM for treatment only. Regardless of reason for use, the most commonly used CAM types in the past year were: herbal therapies (56.8%), chiropractic (27.1%), and massage (24.9%). Among CAM users, those using CAM for wellness only and for a combination of treatment and wellness reported significantly higher odds of “a better sense of controlling health” and “improved overall health and feeling better” compared to treatment only users. Similar patterns were found in other HRQOL outcomes, but they were not statistically different.

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Ethical approval statement: Our study was exempted from the Institutional Review of Board at the University of Minnesota.

Patient consent statement: All survey participants provided informed consent to participate in NHIS.

Conflict of Interest: None.

Conclusion: CAM is widely used among adults with cancer for wellness only or a combination of treatment and wellness. Given improved HRQOL outcomes, CAM may be a promising approach for enhancing health promotion and well-being among adults with cancer.

Keywords

Complementary and alternative medicine (CAM); Cancer; Health promotion; Wellness; Well-being

INTRODUCTION

In 2016, it is estimated that the number of U.S. cancer survivors exceeded 15.5 million.¹ Due in part to early detection and treatment, as well as aging of the population, the number of cancer survivors in the U.S. continues to grow,^{1,2} and will reach a projected 20.3 million by 2026.¹ Further, comorbidities among older cancer survivors are highly burdensome.³ The existing literature demonstrates that adults with a history of cancer have unique medical profiles, such as additional chronic conditions and psycho-social needs, which may require further attention of primary care providers for years after their initial cancer diagnosis.^{1,4-6}

Apart from a higher comorbidity burden, cancer survivors' quality of life may also be significantly lower than their cancer-free counterparts.^{1,7} For example, cancer survivors were twofold more likely to report poorer physical and mental health-related quality of life (HRQOL) than cancer-free population norms in the U.S.⁷ Furthermore, one systematic review reported that long-term cancer survivors (> 5 years) continue to suffer from a fear of recurrence.^{8,9} To address these issues, an emphasis has been placed on promoting cancer survivors' overall well-being by disseminating national and professional guidelines related to diet plans, physical activities, and weight control.¹⁰

In addition to aforementioned interventions, many U.S. adults with cancer also use diverse forms of complementary and alternative medicine (CAM). CAM consists of diverse healthcare practices or products that are not considered Western medicine, and can be classified as: (1) alternative medical systems (e.g., acupuncture and naturopathy), (2) biologically-based therapies (e.g., chelation and herbal therapies), (3) manipulative body therapies (e.g., chiropractic and massage), (4) mind-body therapies (e.g., biofeedback and Tai Chi), and (5) energy therapies (e.g., craniosacral therapies).^{11,12} Despite a limited evidence base for CAM therapies in general, one systematic review and meta-analysis study revealed that nearly a half of adults with cancer (40%) are current users of CAM in Western countries.¹³ In the same study, Horneber and his colleagues reported that U.S. adults with cancer have the highest prevalence rate of using CAM (50%).¹³

Using nationally representative data, limited studies were performed to understand the patterns of CAM use among adults with cancer in the U.S. In one study, John and her colleagues concluded that more than 70% of U.S. cancer survivors used one or more vitamins/minerals and other types of CAM in the past year, which was significantly higher than that of cancer-free adults (68%).¹⁴ Another study conducted by Mao and his colleagues¹⁵ showed the similar finding that cancer survivors used CAM more frequently than cancer-free adults. The study, however, is outdated as they used the data in 2002. To

date, relatively little is known about reasons for CAM use and how health-related quality of life (HRQOL) outcomes may be differed by reason for use among adults with cancer.

Furthermore, relatively little is known about whether HRQOL outcomes vary by reason for CAM use (treatment, wellness, or both) in adults with cancer. If CAM is used for treatment only (e.g., chiropractic for pain management) and therefore improves HRQOL in adults with cancer, healthcare providers could potentially consider CAM as an integrative approach when treating adults with cancer. On the other hand, if CAM is used for wellness only (e.g., yoga for improving flexibility), CAM could be applied as part of an integrative psycho-social intervention in adults with cancer. To our knowledge, however, no study has yet investigated these patterns using nationally representative data.

We sought to answer the following research questions: 1) What are the prevalence rates of CAM use among adults with cancer in the U.S.? 2) Do these rates differ by reason for CAM use (treatment, wellness, or both) in adults with cancer? And, 3) What are the perceived benefits of CAM use? Do these benefits differ when used for wellness only compared with treatment only? Answering these questions fills existing gaps in the literature, and will help both clinicians and policymakers understand potential roles for CAM use in patient-centered care among U.S. adults with cancer.

METHODS

Data Source

We used data from the 2012 National Health Interview Survey (NHIS), which was prepared by the National Center for Health Statistics (NCHS) of the Centers for Disease Control and Prevention (CDC).¹⁶ The NHIS is an annual cross-sectional in-person interview survey with the most up-to-date population-based data on healthcare, which demonstrates healthcare trends among U.S. non-institutionalized civilians.¹⁶ Sponsored by the National Center for Complementary and Integrative Health (NCCIH) of the National Institutes of Health (NIH), the NHIS collects extensive information about healthcare trends related to CAM, including patterns of use and reasons for use every five years.¹⁷ The 2012 NHIS data set contains the most recent data for CAM use. The survey response rate was 61.2% in 2012.¹⁸ Our study was exempted from the Institutional Review of Board at the University of Minnesota, as we used publicly available de-identified data from the CDC.

Study Sample

We included all sampled adults (n=3,118 unweighted) with a self-reported history of cancer from the 2012 NHIS, categorized based on their response to: "Have you ever been told by a doctor or other health professional that you had cancer or a malignancy of any kind?" (yes/no).¹⁹ Our final analytic sample included adults ages 18 or older with cancer history, and had complete data for all covariates (n=2,967 unweighted). Of the sample, we further elicited those who used CAM in the past year (n=1,042 unweighted).

Measures

Use of CAM.—The NHIS specifically asks about the use of 36 different CAM types during the past year. Based on previous CDC technical reports,¹¹ we categorized these CAM types into five groups: (1) alternative medical systems (e.g., acupuncture, Ayurveda, and Naturopathy); (2) biologically-based therapies (e.g., chelation and herbal therapies); (3) manipulative body therapies (e.g., chiropractic and massage); (4) mind-body therapies (e.g., meditation and yoga); and (5) energy healing therapies. We also created a binary variable (yes/no) for each group and the overall use of any CAM in the past 12 months.

Reasons for CAM Use.—Among NHIS respondents who used CAM in the past year, they were asked about their top three CAM types used for treating one or more specific health problems, symptoms or conditions in the past 12 months. We classified these responses as CAM use for treatment. NHIS respondents were also asked whether they used each of their top three CAM types for: improving energy, general wellness, enhancing immune function, improving athletic/sports performance, or improving memory in the past 12 months. We classified these responses as CAM use for wellness. Finally, based on these two indicator variables, we created a categorical variable to classify reasons for CAM use (i.e., treatment only, wellness only, and a combination of both treatment and wellness).

Health-Related Quality of Life (HRQOL).—Among survey respondents who used CAM in the past year, they were asked whether or not CAM use provided specific benefits, such as: (1) a better sense of control over health; (2) reduced stress/relaxation; (3) better sleep; (4) feeling better emotionally; (5) made it easier to cope with health problems; (6) improved overall health/feeling better; and (7) improved relationships with others. These questionnaire items were only asked in the top three CAM types used, and we created seven indicator variables to represent seven perceived benefits of CAM use in the past year using these questionnaire items.

Covariates.—We selected socio-demographic and health-related covariates based on the socio-behavioral wellness model, which suggests that, “a health-promoting lifestyle is a function of the predisposition to engage in healthy lifestyles, factors which enable or hinder a healthy lifestyle, a perceived need for healthy lifestyle, and personal health practices.”^{20–22(p. 37)} We included predisposing factors: age, gender, race/ethnicity, marital status, and educational attainment. We included the following enabling factors: employment status, health insurance coverage, geographic region, and poverty status. For need factors, we included: self-reported health status, moderate mental distress using the K6 scale,²³ multiple chronic conditions,²⁴ and functional limitations. Lastly, we constructed a healthy behavior index (i.e., weight, regular exercise, alcohol use, and smoking status)²² to represent personal health practices. To keep our conceptual model and analyses consistent, these covariates were applied to all adults with cancer, regardless of CAM use status.

Data Analysis

First, we examined the extent to which predisposing, enabling, need factors, and personal health practices differed by CAM use and reasons for CAM use among U.S. adults with cancer. Second, we estimated the prevalence of past year CAM use by type and reason for

use. We used cross-tabulations and design-based F -tests to investigate the differences by reason for use. Third, we investigated patterns of reporting for each of the seven perceived benefits, and ran seven independent multivariable logistic regression models to estimate the odds of each perceived benefit by reason for use. We adjusted for all covariates above in each multivariable logistic regression model. We conducted all analyses using Stata 13.1 (College Station, Texas),²⁵ and accounted for NHIS' complex survey sample design (e.g., unequal probability of selection, clustering, and stratification).¹⁶

RESULTS

Characteristics of the study sample

Supplemental table 1 presents the distribution of cancer sites and years since diagnosis by gender among adults with cancer. In female adults with cancer, the most common cancer sites were skin (28.2%), breast (23.1%), and cervix (10.0%). 43.0% of female adults with cancer had their cancer diagnosis for at least 10 years. Among male adults with cancer, the most common cancer sites were skin (33.1%), prostate (23.4%), and melanoma (8.9%). 36.5% of male adults with cancer had their cancer diagnosis for at least 10 years.

Overall, 35.1% of U.S. adults with cancer used some form of CAM in the preceding 12 months (see supplemental table 2). Among the past year CAM use, 11.6% was for treatment only, 32.4% was for wellness only, and 56.0% was for a combination of both treatment and wellness. Characteristics of CAM users were significantly different from those who did not use CAM in all of the predisposing and enabling factors, except marital status and health insurance coverage. More than 80% of CAM users were aged 45 or older, female (61.3%), non-Hispanic Whites (89.1%), and 40.7% had a bachelor's degree or higher, which was significantly different from those who did not use CAM (23.9%) ($p<0.001$). Most CAM users were from either the South or West (61.1%) regions of the U.S., and had a 400% or higher federal poverty level (50.7%). In regard to need factors, only self-reported health status was significantly different by CAM use status ($p=0.015$). In personal health practices, 47.2% who used CAM had 3 or more healthy behaviors, which was significantly higher than that of non-CAM users (39.9%) ($p=0.020$). All of the socio-demographic and health-related characteristics did not differ by reason for CAM use among CAM users in adults with cancer.

Prevalence of CAM use by reason

Table 1 shows the prevalence rates of CAM use in the preceding 12 months by type and reason among adults with cancer. Regardless of the reason for CAM use (see the total column), the five most commonly used CAM types were herbal therapies (56.8%), chiropractic (27.1%), massage (24.9%), yoga (18.7%), and meditation (9.6%) in adults with cancer. Except for energy therapies, the four major types of CAM were significantly different by the reason for use ($p<0.05$). Among adults with cancer who used CAM for treatment only, manipulative body therapies (63.8%) were the most commonly used type. By individual CAM type, chiropractic (52.8%), herbal therapies (37.3%), and massage (20.6%) were the most commonly used for those who used CAM for treatment only. Biologically-based therapies (53.6%) were the most commonly used type for those who used for wellness

only. Besides herbal therapies, yoga (25.3%) and massage (24.0%) were the most commonly used types for those who used CAM for wellness only.

Multivariable logistic regression analyses

Table 2 presents perceived benefits of CAM use by reason, and the results of a series of multivariable logistic regression models, which estimate the odds of reporting a perceived benefit by reason for CAM use in the past year. Typically, both those who used CAM for wellness only and for the combination of treatment and wellness had higher proportions of reporting benefits. Except for better sleep, coping with health problems, and improved relationships with others, the perceived response for each benefit was significantly different by reason for CAM use ($p<0.05$).

In the multivariable logistic regression models, controlling for all covariates, those who used CAM for wellness only or for a combination of both treatment and wellness had significantly higher odds of reporting a better sense of control over health and improved overall health and feeling better. Those who used CAM for wellness only had 2.1 times higher odds of reporting improved overall health and feeling better than those who used CAM for treatment only ($p=0.011$). A similar pattern was found for those who used CAM for the combination of treatment and wellness ($p=0.004$).

DISCUSSION

Our study is one of the first population-based studies to investigate the patterns of CAM use by reason for use (treatment, wellness, or both), and its associations with HRQOL outcomes. We found CAM use among adults with cancer is common, but there is high variability in reasons for CAM use. Further, HRQOL outcomes differed by reason for CAM use among adults with cancer in the U.S. This study provides insights into the adoption and associated benefits of CAM use in a population with high comorbidity burden relative to the general US population.

In our study, more than one third of adults with cancer used some form of CAM in the preceding 12 months. The estimate is lower than that of two previous studies,^{14,15} which reported that the CAM use is 43.3% and 79% among adults with cancer, respectively. Such differences may be due to inclusion and exclusion criteria that construct CAM use. Our criteria for CAM is identical to previous studies,^{11,12,22,26,27} which did not include the use of minerals and vitamins, for example. Our study estimates, however, are similar to those of Sohl and her colleagues (33.4%),²⁸ and Fouladbakhsh and Stommel (39%).²⁹

Of those who reported CAM use, more than half of them used it for a combination of both treatment and wellness followed by wellness only. However, we were unable to compare our findings directly to previous studies.^{28,30} In Sohl and her colleagues' study,²⁸ they constructed and estimated reasons for CAM use as: stress relief (28%), treatment or prevention of cancer (21%), relief of cancer-related symptoms (18%), or dealing with another condition (18%), using a different data source. Similarly, in Mao and his colleagues' study,³⁰ they constructed and estimated reasons for CAM use as: general disease prevention, immune enhancement, and pain, using the 2007 NHIS data source. As a result, it is possible

that variations in reasons for CAM use and its rates between our findings and previous studies^{28,30} may exist depending on definitions of reason for CAM use (i.e., inclusion/exclusion criteria), sample size, and population-based sampling strategies. Our study adds to the literature because we used more recent data, and the classification of CAM use is identical to that of CDC and NCCIH.

In addition, we found that those who used CAM for wellness only or for a combination of both treatment and wellness reported significant higher odds of reporting “a better sense of controlling over health” and “improved overall health and feeling better,” when compared to those who used CAM for treatment only. This finding is similar to a previous study,²² which was conducted among middle-aged and older U.S. adults. Among other perceived benefits (e.g., stress reduction and better sleep), we found that those who used CAM for wellness only or for a combination of both treatment and wellness also reported higher odds of reporting such benefits; however, these findings were not statistically different from those who used it for treatment only. Most commonly used CAM therapies among adults with cancer were: herbal therapies, chiropractic, and massage. Yoga was also one of popularly used CAM types for those who used CAM for either wellness only or for a combination of both treatment and wellness. This finding is similar to previous studies.^{12,22,26} However, it is important to note that our study does not specify if adults with cancer used CAM specifically for their cancer status.

CONCLUSION

Given our findings of improved HRQOL outcomes, CAM maybe a promising approach for enhancing health promotion and well-being among adults with cancer. Conventional healthcare providers, CAM practitioners and policymakers should consider integrating CAM into the conventional medicine in order to meet diverse needs (e.g., a better sense of controlling health) among adults with cancer. Through collaborating with National Cancer Institute, NCCIH, and other national and community agencies, CAM should be considered part of survivorship programming development to meet needs in adults with cancer.

Study limitations

We have several limitations in our study. First, the nature of the study design is a cross-sectional, as we relied on the NHIS survey design. As a result, no causal relationship can be made. Rather, our study focuses on descriptive patterns of reasons and HRQOL outcomes for CAM use among U.S. adults with cancer. Second, CAM use, the reasons for CAM use, and HRQOL outcomes for CAM use were all self-reported among survey respondents. There may be a potential recall bias and/or a placebo effect, as mentioned elsewhere.²² Our research findings should be carefully interpreted with these limitations.

Clinical implications

To our knowledge, this is the first population-based study to assess CAM use by reason for use, and its HRQOL outcomes among adults with cancer using the most up-to-date nationally representative data. One important clinical practice implication is that healthcare providers (e.g., physicians and pharmacists) should acknowledge that more than one third of

adults with cancer are exposed to various types of CAM. Healthcare providers must actively engage with their adult patients with cancer to capture CAM use in order to avoid potential harms (e.g., adverse drug events due to chemical products, such as Chinese herbal therapies, and drug-drug interactions with other prescribed medications). Because previous studies^{26,31,32} suggest that patients often do not discuss their CAM use with their healthcare providers due to physicians' disapproval or stigma, and the increasing CAM use,¹¹ future research will also need to build evidence-based medicine surrounding CAM use, especially in terms of efficacy, effectiveness and safety issues, to inform care for patients with cancer.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Joint Acknowledgment/Disclosure Statement:

Dr. Rhee conceived the study, acquired data, analyzed and interpreted the data, led the writing of the manuscript, and oversaw every aspect of the study. Drs. Parsons and Pawloski interpreted data and co-led the writing of the manuscript.

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Table 1. Prevalence (column %) of past year CAM use by reason for use among adults with cancer, 2012 NHIS.

	All U.S. adults (%)		Among CAM users with cancer, CAM used for... (%)			<i>†</i> P-value
	Any CAM use	Treatment only	Wellness only	Both	Total	
Alternative medical systems	4.0	15.7	8.6	15.3	13.2	0.034
Acupuncture	1.5	7.2	2.0	6.6	5.2	0.005
Ayurveda	0.2	0.0	0.4	0.7	0.5	0.558
Naturopathy	0.7	0.2	1.4	3.6	2.4	0.031
Herbal therapies	2.1	6.6	5.0	8.3	7.0	0.300
Traditional healers	0.4	1.8	0.5	0.6	0.7	0.237
Biologically-based therapies	16.6	37.3	53.6	63.0	56.8	<0.001
Chelation	0.0	0.0	0.4	0.3	0.3	0.789
Herbal therapies	16.6	37.3	53.6	63.0	56.8	<0.001
Manipulative body therapies	15.4	63.8	37.9	46.0	45.5	<0.001
Chiropractic	8.9	52.8	17.7	27.0	27.1	<0.001
Massage	8.3	20.6	24.0	26.4	24.9	0.514
Movement therapies	1.5	0.0	3.9	4.0	3.5	0.145
Mind-body therapies	10.9	11.2	33.2	26.0	26.6	0.001
Meditation	2.9	1.9	9.8	11.3	9.6	0.021
Yoga	8.5	5.6	25.3	17.6	18.7	0.003
Tai chi	1.0	0.6	3.9	4.0	3.6	0.174
Qi gong	0.3	0.0	1.6	0.9	1.0	0.280
Biofeedback	0.1	0.4	0.5	0.0	0.2	0.168
Others ^{a)}	2.0	3.3	6.2	8.5	7.1	0.183
Energy therapies^{b)}	0.8	1.0	2.0	3.0	2.4	0.242
Any past year CAM use[€]	35.1	100.0	100.0	100.0	100.0	-
Sample Size						
Unweighted sample	33,611	121	338	583	1,042	
Weighted population	228,745,806	835,874	2,248,430	3,775,478	6,859,782	

[€] Survey respondents can report more than one CAM type.

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compares a difference in CAM use by reason for CAM use.
includes guided imagery, progressive muscle relaxation and hypnosis; and
includes energy healing and craniosacral therapies.

Table 2.

Odds of perceived benefit of using CAM by reason for use among adults with cancer, who used CAM in the past year (n=1,042), 2012 NHIS.

	Reporting a benefit of CAM		Odds of reporting each benefit			
	%	<i>P</i> -value ^{a)}	AOR ^{b)}	95% CI		<i>P</i> -value ^{c)}
Gave sense of control over health						
Treatment only	16.5		1.0			
Wellness only	30.7	0.021	2.0	0.97,	4.05	0.061
Both treatment and wellness	31.7		2.2	1.12,	4.21	0.022
Helped to reduce stress to relax						
Treatment only	22.1		1.0			
Wellness only	37.3	0.021	1.9	1.04,	3.43	0.038
Both treatment and wellness	29.1		1.3	0.74,	2.31	0.358
Helped to sleep better						
Treatment only	20.2		1.0			
Wellness only	27.0	0.511	1.5	0.77,	2.87	0.240
Both treatment and wellness	25.7		1.2	0.67,	2.31	0.478
Made to feel better emotionally						
Treatment only	15.3		1.0			
Wellness only	31.0	0.028	2.3	1.08,	5.01	0.030
Both treatment and wellness	26.7		1.8	0.87,	3.64	0.113
Made it easier to cope with health problems						
Treatment only	25.6		1.0			
Wellness only	22.9	0.179	0.8	0.39,	1.47	0.414
Both treatment and wellness	30.4		1.1	0.64,	2.02	0.671
Improved overall health and feeling better						
Treatment only	39.1		1.0			
Wellness only	56.8	0.017	2.1	1.18,	3.60	0.011
Both treatment and wellness	55.6		2.0	1.26,	3.29	0.004
Improved relationships with others						
Treatment only	6.4		1.0			
Wellness only	16.0	0.072	2.4	0.91,	6.42	0.077
Both treatment and wellness	13.4		1.9	0.80,	4.67	0.140

Note: Results of 8 separate logistic regression models. Each model is adjusted for aforementioned socio-demographic covariates.

^{a)} compares a difference in reasons for CAM use in each perceived benefit;

^{b)} stands for adjusted odds ratio; and

^{c)} represents significance from each multivariable logistic regression model.