Complementary and Alternative Medicine Use for HIV Management in the State of Florida: Medical Monitoring Project

Natalie E. Kelso-Chichetto, MSW,¹ Chukwuemeka N. Okafor, PhD, MPH,¹ Jeffrey S. Harman, PhD,² Shantrel S. Canidate, MPH,³ Christa L. Cook, PhD, MSN,⁴ and Robert L. Cook, MD, MPH¹

Abstract

Objective: The aims of this study were to describe complementary and alternative medicine (CAM) use and to assess the relationships between CAM use and antiretroviral therapy (ART) adherence and human immunodeficiency virus (HIV) RNA viral load suppression among a sample of persons living with HIV (PLWH) engaged in care in the state of Florida.

Design: The Florida Medical Monitoring Project ($n=803$) collected repeated cross-sectional data for surveillance of clinical outcomes among PLWH from 2009 to 2010. Past-year CAM use specifically for the management of HIV was measured via self-report. Logistic regression models were conducted to assess the effect of CAM use on ART adherence and viral load suppression, controlling for demographic and clinical factors using backwards stepwise deletion of factors with a p -value of >0.25 .

Results: CAM use was reported in 53.3% ($n=428$). In bivariate analysis, CAM use was the highest among those 40–49 years of age (61%; $p<0.05$), males (56%; $p<0.01$), whites (61%; $p=0.001$), and those educated beyond high school (59%; $p<0.05$). Among those using CAM, 63% and 37% reported one and two or more CAM modalities, respectively. CAM modalities included biologically based therapies (89%), mind–body medicine/manipulative body-based therapies (30%), spiritual healing (23%), energy therapies (6%), and whole medical systems (6%). In multivariable analyses, any CAM use and number of CAM methods used were not associated with ART adherence. Any CAM use was not associated with detectable viral load (adjusted odds ratio [aOR] 0.81; 95% confidence interval [CI] 0.58–1.12; $p=0.20$). Those using two or more methods had significantly decreased risk for detectable viral load (aOR 0.60; 95% CI 0.39–0.92; $p<0.02$).

Conclusions: CAM use was not associated with negative effects on ART adherence. CAM users were less likely to have detectable viral load compared with non-users. Future research should focus on CAM use among PLWH not engaged in HIV care and the longitudinal patterns of CAM use and possible effects of long-term health outcomes.

Keywords: HIV, CAM, adherence

Introduction

WHILE DISPARITIES IN LIFE EXPECTANCY between persons living with human immunodeficiency virus (PLWH) and the general population are present, the gap has tended to close in recent years in developed countries,^{1,2}

making human immunodeficiency virus (HIV) a chronic illness. PLWH face a multitude of comorbid physical symptoms and psychosocial issues, typically related to living with a chronic illness. These comorbid issues may increase the use of complementary and alternative medicine (CAM).^{3,4} CAM is a group of health systems, therapies, and practices used

¹Department of Epidemiology, College of Public Health and Health Professions and College of Medicine; ³Social and Behavioral Sciences Program, College of Public Health and Health Professions and College of Medicine; ⁴Department of Family, Community, and Health System Science, College of Nursing; University of Florida, Gainesville, FL.

²Department of Behavioral Sciences and Social Medicine, College of Medicine, Florida State University, Tallahassee, FL.

either in conjunction with (i.e., complementary to) or in place of (i.e., alternative to) mainstream Western or conventional medicines/therapies.⁵ Categories of CAM include (1) mind-body medicine or manipulative/body-based therapies (e.g., yoga and exercise, massage, meditation, and chiropractic practices); (2) whole medical systems (e.g., homeopathy); (3) biologically based or natural products (e.g., vitamin/supplements, marijuana, and herbs); (4) energy therapies (e.g., acupuncture/acupuncture and biofeedback, magnets, and electric fields); and (5) spiritual healing.^{4,5} Similar to other chronic illnesses, CAM use among PLWH is common, with a prevalence ranging from 16% to >94%.^{3,6,7} The variability of CAM use prevalence is likely a result of different study populations, unstandardized definitions of CAM, and the inclusion/exclusion of specific types of therapies included in the assessment of CAM. Among PLWH, whites, men who have sex with men (MSM), and individuals with higher education and greater income reported a higher prevalence of any CAM use.⁸ Increased HIV-related symptomatology, duration of HIV infection, and acquired immune deficiency syndrome (AIDS) diagnosis are also associated with increased use of CAM.⁸

Examining the relationship between CAM use and health status among PLWH is imperative. The most common uses of CAM reported by PLWH were for general well-being, to increase immune function, to reduce side-effects of ART, and to address comorbid disorders.^{9,10} Generally, PLWH have reported various benefits from CAM use, and health risks associated with the majority of CAM treatment options have been relatively rare.¹¹ Patients have also reported that CAM helped them cope with their HIV diagnosis, increased their feeling of control, and improved HIV treatment outcomes.¹² Furthermore, dietary supplements have been associated with increased CD4+ T cell count and decreased HIV RNA viral load.^{13,14} One large study found that PLWH (in India) who used CAM found it highly effective (69%) and were satisfied with CAM treatments (69%).¹⁵ Conversely, some findings have suggested interactions between specific types of CAM, particularly herbal supplements such as St. John's wort, that may lead to suboptimal effectiveness of ART.¹⁶

While many PLWH report using CAM in combination with ART, some report taking vitamins or dietary supplements in place of some or all of their HIV medications, making the use of CAM a controversial option among HIV care providers. A study conducted in two HIV clinics found lower ART adherence among PLWH who use CAM.¹⁷ Conversely, in a large multicenter longitudinal study of women living with HIV, those who used CAM were less likely to use illicit drugs, a behavior that has been well-established as a risk factor for poor ART adherence.¹⁸ Currently, it is unclear if there is an association between CAM use and ART adherence and HIV RNA viral load suppression. While some studies have been conducted to assess the prevalence of CAM, and the association with viral load, these studies have been limited by small samples that may not be representative of those receiving HIV-related care. In fact, a recent meta-analysis on the concurrent use of CAM and ART concluded that data are insufficient regarding the impact of CAM on HIV management.¹⁹

The objectives of this analysis were (1) to describe CAM use, including the frequencies of different CAM modalities, and (2) to determine the relationships between CAM use and ART adherence and viral load suppression among a sample of PLWH who were engaged in care in the state of Florida.

Materials and Methods

Participants

Data for this analysis come from the Florida Medical Monitoring Project (MMP), a multi-site national supplemental HIV surveillance system funded by the U.S. Centers for Disease Control and Prevention to monitor clinical and behavioral characteristics of HIV-infected adults receiving medical care in the United States.²⁰ Detailed methods of the MMP have been described previously.²¹ Briefly, the MMP uses a three-stage probability-based sampling method to obtain representative, annual, cross-sectional adult samples of PLWH who receive medical care for HIV in the United States. In the first stage, U.S. states and territories were sampled to participate. In the second stage, eligible facilities providing HIV care were selected to participate. In the final stage, PLWH within the participating facilities were sampled. Participant eligibility criteria included: confirmed HIV diagnosis, aged ≥ 18 years, ability to complete a survey in English or Spanish, ability to complete an informed consent, and a HIV primary-care visit at one of the sampled facilities within the year of data collection. Data were collected via face-to-face interviews with sampled participants and a linked medical record chart abstraction. For the present analysis, data from the 2009 and 2010 MMP data collection cycle for the state of Florida were used, as questions regarding CAM use were removed at subsequent data collection cycles.

Ethical considerations

The National Center for HIV, Viral Hepatitis, STD, and TB Prevention's Office of the Associate Director for Science at the Centers for Disease Control and Prevention (CDC) has determined the MMP to be a non-research, public health surveillance activity used for disease control program and policy.²² As such, MMP is not subject to human subjects regulations. However, participating states or territories and facilities obtained local Institutional Review Board approval to conduct MMP if required locally. The present analysis was approved by the Institutional Review Board at the University of Florida.

Measures: dependent variables

The primary dependent variables of interest were (1) ART adherence and (2) detectable HIV RNA viral load.

ART adherence. Among participants who reported ART use, additional questions using the AIDS Clinical Trials Group measures²³ for adherence were asked about each medication that the participant was currently prescribed, how often the participant was supposed to take the specific ART (i.e., prescribed dose), and how often they missed taking a dose yesterday, the day before yesterday, and 3 days ago. The proportion of ART doses taken within the past 3 days was computed from the prescribed dose. Optimal ART adherence was defined as taking $\geq 95\%$ of prescribed ART doses, as this has previously been associated with sustained viral suppression.^{24,25} Those without optimal ART adherence were considered as non-optimal adherence. Depending on the type of ART, viral suppression is possible at $\geq 80\%$ adherence.²⁶ However, because this study was interested in durable (sustained) viral load suppression, the standard definition of ART

adherence that is associated with sustained viral suppression was used, regardless of the type of ART treatment.

Detectable viral load. HIV-1 RNA viral load results in the past 12 months were obtained via medical record abstraction. Durable viral suppression was defined as a HIV-1 RNA level that was undetectable or ≤ 200 copies/mL at every measurement in the past 12 months. Those without durable viral suppression were considered as having a detectable viral load.

Measures: independent variables

The primary independent variable was any CAM use in the past 12 months, assessed via self-report. Use of CAM was assessed by asking participants, "During the past 12 months, have you taken or used any of the following complementary or alternative therapies specifically for your HIV?" Participants reported the following CAM types as "yes" or "no": Traditional Chinese Medicine, including acupressure or acupuncture; vitamins, minerals, or herbs; yoga or massage; chiropractic; mind-body techniques, including relaxation, hypnosis, and visualization; spiritual healing by others; homeopathy; medicines from outside the United States; marijuana; energy healing such as biofeedback, magnets, or electric fields; other (specified). As recommended by the National Center for Complementary and Integrative Health (NCCIH),⁵ CAM types were categorized into specific CAM modalities. Modalities were defined as (1) biologically based therapies (marijuana, vitamins or minerals, medicine from outside the United States); (2) mind-body medicine/manipulative and body-based therapies (yoga or massage, relaxation/hypnosis/visualization, chiropractic, exercise); (3) spiritual healing; (4) energy therapies (acupressure/acupuncture, biofeedback/magnets/electric fields); and (5) whole medical systems (homeopathy). Use of any CAM (yes/no) and the number of CAM modalities reported by each participant were described.

Covariates

The Biopsychosocial Model of Health²⁷ was used to conceptualize the current analysis, particularly when choosing the following covariates to include in the models.

Sociodemographic characteristics. Sociodemographic variables assessed via self-report included: age (in years), sex, race/ethnicity (categorized as white, black, or Hispanic), educational attainment (<high school, high school diploma or equivalent, or >high school), and homelessness (defined as living on the street, in a shelter, a single-room occupancy hotel, or in a car) in the past 12 months.

Psychosocial factors. A modified 8-item version of the Patient Health Questionnaire depression scale (PHQ-9) was used to assess the level of current depressive symptomatology experienced in the past 2 weeks.²⁸ In the PHQ-8, the ninth question assessing suicidal or self-injurious thoughts was omitted. The PHQ-8 has been frequently used as a measure of current depressive symptomatology in previous studies and found to be acceptable.^{29,30} Items from the PHQ-8 were summed with a resulting range of 0 to 24. Scores <5 were categorized as none/minimal depressive symptoms, 5–14 as mild/moderate depressive symptoms, and ≥ 15 as moderately severe/severe depressive symptoms.³¹

Substance use. Participants self-reported alcohol, cigarette, and illicit drug use in the past 12 months. Alcohol use was operationalized³² as hazardous drinking (defined as ≥ 7 [14] drinks per week for women [men]), moderate use (≥ 1 and <7 [14] drinks/week for women [men]), or low to no alcohol use (<1 drink/week). Cigarette use was categorized as daily smoking, less than daily smoking, or no smoking. Recreational marijuana use in the past 12 months was dichotomized (any use or no use) as having used marijuana for reasons other than for management of HIV. Other illicit drug use was dichotomized (any use or no use) as having used any of the following substances in the past 12 months: cocaine, heroin, methamphetamines, hallucinogens, and/or other non-prescribed sedatives.

HIV-related factors. Duration of HIV infection was assessed via self-report as years since first positive test for HIV, and a three-level categorical variable was created: ≤ 5 years, 6–10 years, or >10 years. Participants who reported never or rarely using ART in the past 12 months were categorized as non-ART users; all others were considered ART users. Side effects related to ART were assessed by asking participants how often during the past 30 days they were troubled by side effects from their ART medication.

Data analysis

All data analyses were conducted using SAS v9.4 (SAS Institute, Cary, NC). Bivariate analyses of CAM use and demographic, psychosocial, and HIV-related factors were assessed using chi-square tests. While participants could have endorsed using up to five CAM modalities, no participant reported more than three modalities. Due to the low frequency of those reporting three CAM modalities (5%) among the sample, the number of CAM modalities was categorized as 0, 1, and ≥ 2 in the multivariable analyses. Frequencies, row percentages, and significance values are reported. Multiple imputation was used with a fully conditional specification method to handle missing values.³³ Ten imputed data sets were generated using the PROC MI procedures. Analyses were conducted on the 10 data sets, and model results were combined using PROC MIANALYZE. Multivariable logistic regression models were conducted to determine the associations between any CAM use and the number of CAM modalities used on (1) ART adherence and (2) detectable viral load. Backwards stepwise deletion was conducted, starting with each of the aforementioned covariates and keeping only variables in the model that remained significant at $p \leq 0.25$. Variables were considered statistically significant at the $p < 0.05$ level. All analyses accounted for the complex sampling design and unequal selection probabilities by using the PROC SURVEY.

Results

The study included 803 PLWH who received HIV care in Florida between 2009 and 2010. Sample demographics are shown in Table 1. More than half (53%; $n=428$) of the sample reported any CAM use in the past 12 months. The prevalence of CAM modality and the types in each modality used are shown in Table 2. Among CAM users, 63%, 25%, and 12% reported one, two, and three CAM modalities, respectively. Biologically based therapies were the most endorsed CAM modality (86%); the most endorsed CAM

TABLE 1. BIOPSYCHOSOCIAL FACTORS OF 803 PLWH IN FLORIDA, OVERALL AND BY CAM USE

Characteristics	Total (n=803)	Any CAM (n=428)	No CAM (n=375)	p-Value
Row frequency (%)				
Age (years)				0.015
18–29	68 (9)	29 (43)	39 (57)	
30–39	124 (15)	63 (51)	61 (49)	
40–49	314 (39)	190 (61)	124 (39)	
≥50	295 (37)	146 (49)	149 (51)	
Sex				0.005
Male	518 (65)	292 (56)	226 (44)	
Female	277 (35)	134 (48)	143 (52)	
Race				0.001
White	241 (32)	148 (61)	93 (39)	
Black	414 (52)	193 (47)	221 (53)	
Hispanic	134 (16)	76 (57)	58 (43)	
Health insurance status				0.894
Uninsured	102 (12)	53 (52)	49 (48)	
Medicaid	347 (43)	182 (52)	165 (48)	
Private	353 (45)	192 (54)	161 (46)	
Education				0.015
<High school	195 (24)	85 (44)	110 (56)	
High school	233 (29)	121 (52)	112 (48)	
>High school	375 (47)	222 (59)	153 (41)	
Years since HIV diagnosis ^a				0.070
≤5	171 (24)	83 (48)	88 (52)	
6–10	179 (25)	101 (56)	78 (44)	
10+	369 (51)	216 (59)	153 (41)	
Depression in past 2 weeks				0.186
None–minimal	433 (53)	221 (51)	212 (49)	
Mild–moderate	283 (36)	163 (58)	120 (42)	
Severe	82 (11)	44 (54)	38 (46)	
Alcohol use [†]				0.148
None	288 (35)	144 (50)	144 (50)	
Low to moderate	382 (48)	204 (53)	178 (47)	
Hazardous	132 (17)	80 (61)	52 (39)	
Cigarette use				0.349
None	484 (60)	249 (51)	235 (49)	
<Daily	62 (8)	36 (58)	26 (42)	
Daily	257 (32)	143 (56)	114 (44)	
Recreational marijuana use*				<0.001
No	628 (78)	287 (46)	341 (54)	
Yes	173 (22)	140 (81)	33 (19)	
Other illicit substance use				0.556
No	709 (88)	382 (54)	327 (46)	
Yes	94 (12)	46 (49)	48 (51)	
ART use				0.492
No	84 (11)	43 (51)	41 (49)	
Yes	715 (89)	384 (54)	331 (46)	
ART side effects**				0.495
Never/rarely	585 (82)	312 (53)	273 (47)	
More than half the time	125 (18)	71 (57)	54 (43)	
ART adherence (%) ^{b**}				0.698
<95% adherent	101 (15)	53 (52)	48 (48)	
≥95% adherent	597 (85)	323 (54)	274 (46)	
CD4+ T cell count				0.019
<200	115 (13)	44 (38)	71 (62)	
200–499	323 (38)	143 (44)	180 (56)	
≥500	417 (49)	215 (52)	202 (48)	
Durable viral suppression ^{c**}				0.063
≤200 copies/mm ³	419 (62)	245 (58)	174 (42)	
>200 copies/mm ³	215 (34)	108 (50)	107 (50)	

Statistically significant values are shown in bold.

*Excludes those who reported using marijuana as CAM.

**Among those on ART (N=715).

[†]Past 12 months.

Note: Missing values shown for >5% of total: ^aMissing=84, ^bMissing=105, ^cMissing=81.

PLWH, people living with HIV; CAM, complementary and alternative medicine; ART, antiretroviral therapy.

TABLE 2. CAM USE MODALITIES AMONG MMP PARTICIPANTS WHO REPORTED ANY CAM USE (N=428)

CAM modality/type	N (%)
Number of CAM modalities used ^a	
1	270 (63)
2	108 (25)
3	50 (12)
Biologically based therapies	382 (89)
Marijuana ^b	125 (29)
Vitamins	305 (71)
Medicines outside the United States	9 (2)
Mind–body medicine/manipulative and body-based therapies	127 (30)
Yoga or massage	78 (18)
Relaxation/hypnosis/visualization	66 (15)
Chiropractic	30 (7)
Exercise	4 (<1)
Spiritual healing	98 (23)
Energy therapies	25 (6)
Acupressure/acupuncture	18 (4)
Biofeedback/magnets/electric fields	13 (3)
Whole medical systems	27 (6)

^aRepresents the number of CAM modalities endorsed among CAM users and not individual types within modalities.

^bMarijuana use to treat HIV infection; recreational use not included. MMP, Medical Monitoring Project.

type within this was vitamin use (71%), followed by marijuana use (29%) for treatment of HIV. Mind–body medicine and manipulative body-based therapies were reported by 30% of the sample, with yoga or massage having the highest prevalence (18%) within this modality. Spiritual healing was reported among 23%. Whole medical systems (6%) and energy therapies (6%) were the least-reported CAM modalities. Biologically based therapy (86%; $n=232$) was the most endorsed modality among those using only one CAM modality. Among those who reported two or more modalities, the use of mind–body and biologically based therapies was the most common combination (35%; $n=56$). Among the whole sample, men endorsed using biologically based (44.2% vs. 36.3%; $p<0.05$) and mind–body therapies (16% vs. 9%; $p<0.01$) significantly more frequently than women did. Women were slightly more likely to endorse the use of spiritual healing (13% vs. 9.1%; $p=0.06$; Fig. 1).

In bivariate analyses, CAM use was the highest among those aged 40–49 years (Table 1; 61%; $p<0.05$), males (56%; $p<0.01$), whites (61%; $p=0.001$), and those educated beyond high school (59%; $p<0.05$). CAM users were also significantly less likely to have CD4+ T cell counts <200 (any use 38%; no use 62%), and were more likely to have CD4+ T cell counts ≥500 (any use 52%; no use 48%) than those who did not report any CAM use. In the multivariable analyses (Table 3), any CAM use and the number of CAM methods used were not associated with non-adherence to ART. Female sex (adjusted odds ratio [aOR] 2.06; 95% confidence interval [CI] 1.31–3.34; $p<0.01$), African American/black race (compared with white; aOR 1.97; 95% CI 1.12–3.34; $p<0.05$), moderate (compared with low/no use; aOR 1.84; 95% CI 1.00–3.38; $p<0.05$), and hazardous (aOR 2.44; 95% CI 1.30–4.60; $p<0.01$) alcohol use, recreational marijuana

FIG. 1. Complementary and alternative medicine use modalities of entire sample ($N=803$) by sex.
 $*p < 0.05$; $**p < 0.01$.

TABLE 3. MULTIVARIABLE LOGISTIC REGRESSION OF CAM USE AND COVARIATES ON NON-ADHERENCE TO ART AMONG PERSONS LIVING WITH HIV

	Adjusted odds ratio	95% confidence interval	p-Value
Age, years (ref=18–29)			
30–39	0.71	0.25–2.02	0.52
40–49	0.50	0.20–1.25	0.14
≥50	0.56	0.19–1.63	0.28
Sex			
Female (ref= male)	2.06	1.31–3.34	0.002
Race (ref= white)			
Black	1.97	1.12–3.46	0.02
Hispanic	0.84	0.33–2.13	0.71
Education (ref= <high school)			
High school	0.57	0.28–1.15	0.12
>High school	0.84	0.44–1.60	0.60
Insurance status (ref= private)			
Uninsured	0.57	0.27–1.17	0.13
Medicaid	0.79	0.52–1.22	0.29
Depressive symptoms (ref= none)			
Moderate	1.51	0.89–2.57	0.13
Severe	2.34	0.97–5.66	0.06
Alcohol use (ref= none)			
Moderate	1.84	1.00–3.38	0.05
Hazardous	2.44	1.30–4.60	0.006
Recreational marijuana use (ref= No)	2.02	1.21–3.38	0.007
Experience ART side effects (ref= no)	2.43	1.38–4.28	0.002
Any CAM use (ref= no)	0.82	0.46–1.48	0.51
Number of CAM methods used ^a (ref= none)			
1	0.71	0.35–1.47	0.36
≥2	1.03	0.55–1.93	0.93

Statistically significant values are shown in bold.

^aSeparate model, controlling for all of the above variables.

use (aOR 2.02; 95% CI 1.21–3.38; $p < 0.01$), and experience of ART side effects (aOR 2.43; 95% CI 1.38–4.28; $p < 0.01$) were associated with non-adherence to ART.

While any CAM use was not associated with detectable viral load (Table 4; aOR 0.81; 95% CI 0.58–1.12; $p = 0.20$), the number of CAM methods used had a significant effect. Those using two or more methods had significantly lower odds for detectable viral load (aOR 0.60; 95% CI 0.39–0.92; $p = 0.02$). African American/black race (compared with white; aOR 1.84;

TABLE 4. MULTIVARIABLE LOGISTIC REGRESSION OF CAM USE AND COVARIATES ON DETECTABLE VIRAL LOAD AMONG PERSONS LIVING WITH HIV

	Adjusted odds ratio	95% confidence interval	p-Value
Age (ref= 18–29)			
30–39	0.37	0.14–0.97	0.04
40–49	0.59	0.25–1.36	0.21
≥50	0.45	0.19–1.06	0.07
Race (ref= white)			
Black	1.84	1.18–2.88	0.008
Hispanic	1.58	0.89–2.80	0.12
Homelessness (ref= no)	3.30	1.74–6.26	0.0003
Smoking status (ref= no)			
<Daily	1.09	0.46–2.58	0.85
Daily	1.68	1.08–2.60	0.02
Experience ART side effects (ref= no)	1.51	0.89–2.54	0.12
ART adherence (ref= <95% adherent)	0.40	0.23–0.70	0.002
CD4+ T cell count (ref= <200)			
200–499	0.55	0.32–0.95	0.03
≥500	0.20	0.12–0.33	<0.0001
Any CAM use (ref= no)	0.81	0.58–1.12	0.20
Number of CAM methods used ^a (ref= none)			
One	0.94	0.65–1.37	0.75
Two or more	0.60	0.39–0.92	0.02

Statistically significant values are shown in bold.

^aSeparate model, controlling for all of the above variables.

95% CI 1.18–2.88; $p < 0.01$), homelessness (aOR 3.30; 95% CI 1.74–6.26; $p < 0.001$), and daily smoking status (compared with no smoking; aOR 1.68; 95% CI 1.08–2.60; $p < 0.05$) were associated with increased odds for detectable viral load. Being in the 30–39 years age group (compared with 18–29 years; aOR 0.37; 95% CI 0.14–0.97; $p < 0.05$), $\geq 95\%$ adherent to ART (aOR 0.40; 95% CI 0.23–0.70; $p < 0.01$), and having CD4 T cell count 200–499 (compared with < 200 ; aOR 0.55; 95% CI 0.32–0.95; $p < 0.05$) or ≥ 500 (aOR 0.20; 95% CI 0.12–0.33; $p < 0.0001$) were associated with lower odds for detectable HIV viral load.

Discussion

In this sample of PLWH who were engaged in care in Florida, CAM use was very common, with more than half of the sample reporting at least one modality of CAM therapy specifically for HIV in the past year. The most commonly used CAM modality was biologically based therapy, followed by mind–body medicine and spiritual healing. Prevalence estimates of CAM use among PLWH from previous studies have varied widely, as prior reports on rates of CAM use have ranged from 16%⁶ to 94%.⁷ The differences in rates of CAM use in PLWH are in part a result of different definitions of CAM. This study reports prevalence estimates from a rich sample that included men and women and a diverse mix of racial/ethnic groups living with HIV who are engaged in care, while using the NCCIH definitions of CAM to ensure reliable estimates of CAM use. Neither general CAM use nor number of CAM modalities used was associated with negative effects on ART adherence. While there was no association between any CAM use and detectable viral load, an increased number of CAM modalities was associated with a protective effect on viral load, with those using two or more modalities having lower odds for detectable viral load. This may suggest that there is a direct effect of embracing a holistic lifestyle on HIV management that does not work merely through ART adherence.

The readers should keep the limitations of the current analysis in mind. As this study utilized a repeated cross-sectional data collection for surveillance, it is not possible to infer whether the findings reported here are causal. Furthermore, individuals were not randomized to CAM use. Thus, it is possible that individuals who used CAM were different from non-CAM users on unmeasured factors that were also related to the study outcomes. In addition, CAM use and ART adherence were assessed via self-report over a period of 12 months, and data may be subject to misclassification. The questions inquiring about CAM use were not from a standardized questionnaire. In general, reliability and validity of self-reported use of CAM among PLWH has not been consistently reported in previous research.³⁴ However, the MMP asks about specific types of CAM used within the past 12 months, which is likely more reliable than asking about CAM use in general (any vs. no use) during a non-specific time frame (ever vs. never). Further, the present findings are limited to the CAM types inquired about, which could have led to an underestimation of CAM use. For example, Curanderismo is one particular CAM type that could have been used among Hispanic participants; it is possible that use of Curanderismo was reported as a type of spiritual healing. However, the limits of the data are such that the extent of use of this particular type is unknown. Specific CAM methods may

infer positive or negative effects on HIV management. The CAM methods reported in the current sample were often not exclusively used, making it impossible to assess the effect of any particular method. Because the majority of the sample was on ART, these results describe CAM use in conjunction with ART use, and not necessarily CAM use as an alternative treatment of HIV infection.

Conclusions

CAM was reported in more than half of the sample, with biologically based therapies being the most reported modality. While there is speculation and concern regarding CAM use and ART adherence, findings from the current analysis suggest that there is no detrimental effect of CAM use on ART adherence or viral load suppression. In fact, CAM use trended toward having a protective effect on HIV management. Women were generally less likely to use CAM, and were less likely to use forms that have been suggested in the literature to have health benefits (biologically based and mind–body therapies). Further, women were more likely to have suboptimal ART adherence. Women's health within the context of HIV infection should be a particular research focus when considering the effect of CAM use on successful HIV management. Future research should focus on CAM use among PLWH not engaged in HIV care, the effects of specific CAM modalities on HIV management, and the longitudinal patterns of CAM use and effects on long-term health outcomes.

Acknowledgments

The authors thank the Florida Department of Health HIV/AIDS Supplementary Surveillance Program and the MMP participants for their efforts. Funding: Kelso, NIAAA F31 AA024064; Okafor, NIDA F31 DA039810.

Author Disclosure Statement

No competing financial interests exist.

References

1. Wandeler G, Johnson LF, Egger M. Trends in life expectancy of HIV-positive adults on antiretroviral therapy across the globe: comparisons with general population. *Curr Opin HIV AIDS* 2016 May 31 [Epub ahead of print].
2. Marcus JL, Choa CR, Leyden WA, et al. Narrowing the gap in life expectancy between HIV-infected and HIV-uninfected individuals with access to care. *J Acquir Immune Defic Syndr* 2016;73:39–46.
3. Shedlin MG, Anastasi JK, Decena CU, et al. Use of complementary and alternative medicines and supplements by Mexican-origin patients in a U.S.–Mexico border HIV clinic. *J Assoc Nurses AIDS Care JANAC* 2013;24:396–410.
4. Lorenc A, Robinson N. A review of the use of complementary and alternative medicine and HIV: issues for patient care. *AIDS Patient Care STDS* 2013;27:503–510.
5. Complementary, Alternative, or Integrative Health: What's In a Name? NCCIH. Online document at: <https://nccih.nih.gov/health/integrative-health>, accessed February 24, 2016.
6. Josephs JS, Fleishman JA, Gaist P, et al. Use of complementary and alternative medicines among a multistate, multisite cohort of people living with HIV/AIDS. *HIV Med* 2007;8:300–305.

7. Owen-Smith A, McCarty F, Hankerson-Dyson D, et al. Prevalence and predictors of complementary and alternative medicine use in African-Americans with acquired immune deficiency syndrome. *Focus Altern Complement Ther* 2012;17:33–42.
8. Littlewood RA, Venable PA. Complementary and alternative medicine use among HIV+ people: Research synthesis and implications for HIV care. *AIDS Care* 2008;20:1002–1018.
9. Braun LA, Forrester CA, Rawlins MD, et al. Complementary medicine use by people living with HIV in Australia—a national survey. *Int J STD AIDS* 2016;27:33–38.
10. A Practical Guide to Complementary Therapies for People Living with HIV. Canadian AIDS Treatment Information Exchange 2004. Online document at www.catie.ca/pdf/PG_CAM/CAM_rvsd_05_ENG_web.pdf, accessed January 11, 2016.
11. Littlewood RA, Venable PA. The relationship between CAM use and adherence to antiretroviral therapies among persons living with HIV. *Health Psychol* 2014;33:660–667.
12. Sparber A, Wootton JC, Bauer L, et al. Use of complementary medicine by adult patients participating in HIV/AIDS clinical trials. *J Altern Complement Med* 2000;6:415–422.
13. Kaiser JD, Campa AM, Ondercin JP, et al. Micronutrient supplementation increases CD4 count in HIV-infected individuals on highly active antiretroviral therapy: a prospective, double-blinded, placebo-controlled trial. *J Acquir Immune Defic Syndr* 2006;42:523–528.
14. Hurwitz BE, Klaus JR, Llabre MM, et al. Suppression of human immunodeficiency virus type 1 viral load with selenium supplementation: a randomized controlled trial. *Arch Intern Med* 2007;167:148–154.
15. Bhalerao MS, Bolshete PM, Swar BD, et al. Use of and satisfaction with complementary and alternative medicine in four chronic diseases: a cross-sectional study from India. *Natl Med J India* 2013;26:75–78.
16. Stolbach A, Paziana K, Heverling H, et al. A review of the toxicity of HIV medications II: Interactions with drugs and complementary and alternative medicine products. *J Med Toxicol* 2015;11:326–341.
17. Ekwunife OI, Ore C, Ubaka CM. Concurrent use of complementary and alternative medicine with antiretroviral therapy reduces adherence to HIV medications. *Int J Pharm Pract* 2012;20:340–343.
18. Merenstein DJ, Hu H, Robison E, et al. Relationship between complementary/alternative treatment use and illicit drug use among a cohort of women with, or at risk for, HIV infection. *J Altern Complement Med* 2010;16:989–993.
19. Hoogbruin A. Complementary and alternative therapy (CAT) use and highly active antiretroviral therapy (HAART): current evidence in the literature, 2000–2009. *J Clin Nurs* 2011;20:925–939.
20. Frankel MR, McNaghten A, Shapiro MF, et al. A probability sample for monitoring the HIV-infected population in care in the U.S. and in selected states. *Open AIDS J* 2012;6:67–76.
21. McNaghten AD, Wolfe MI, Onorato I, et al. Improving the representativeness of behavioral and clinical surveillance for persons with HIV in the United States: the rationale for developing a population-based approach. *PloS One* 2007;2:e550.
22. Distinguishing Public Health Research and Public Health Nonresearch. CDC: Centers for Disease Control and Prevention 2010. Online document at: www.cdc.gov/od/science/integrity/docs/cdc-policy-distinguishing-publichealth-research-nonresearch.pdf, accessed March 13, 2015.
23. Chesney MA, Ickovics JR, Chambers DB, et al. Self-reported adherence to antiretroviral medications among participants in HIV clinical trials: the AACTG adherence instruments. Patient Care Committee & Adherence Working Group of the Outcomes Committee of the Adult AIDS Clinical Trials Group (AACTG). *AIDS Care* 2000;12:255–266.
24. Low-Beer S, Yip B, O'Shaughnessy MV, et al. Adherence to triple therapy and viral load response. *J Acquir Immune Defic Syndr* 2000;23:360–361.
25. Paterson DL, Swindells S, Mohr J, et al. Adherence to protease inhibitor therapy and outcomes in patients with HIV infection. *Ann Intern Med* 2000;133:21–30.
26. Bangsberg DR. Less than 95% adherence to nonnucleoside reverse-transcriptase inhibitor therapy can lead to viral suppression. *Clin Infect Dis* 2006;43:939–941.
27. Engel GL. The need for a new medical model: a challenge for biomedicine. *Science* 1977;196:129–136.
28. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med* 2001;16:606–613.
29. Balderson BH, Grothaus L, Harrison RG, et al. Chronic illness burden and quality of life in an aging HIV population. *AIDS Care* 2013;25:451–458.
30. Kroenke K, Strine TW, Spitzer RL, et al. The PHQ-8 as a measure of current depression in the general population. *J Affect Disord* 2009;114:163–173.
31. Spitzer RL, Kroenke K, Williams JB. Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. Primary Care Evaluation of Mental Disorders. Patient Health Questionnaire. *JAMA* 1999;282:1737–1744.
32. Helping Patients Who Drink Too Much: A Clinician's Guide. NIAAA: National Institute of Alcohol Abuse and Alcoholism 2005. Online document at <http://pubs.niaaa.nih.gov/publications/Practitioner/CliniciansGuide2005/guide.pdf>, accessed March 17, 2015.
33. Lee KJ, Carlin JB. Multiple imputation for missing data: fully conditional specification versus multivariate normal imputation. *Am J Epidemiol* 2010;171:624–632.
34. Owen-Smith A, DePadilla L, DiClemente R. The assessment of complementary and alternative medicine use among individuals with HIV: A systematic review and recommendations for future research. *J Altern Complement Med* 2011;17:789–796.

Address correspondence to:
 Natalie E. Kelso-Chichetto, MSW
 University of Florida, CTRB 4233
 P.O. Box 100231
 Gainesville, FL 32610
 E-mail: kelsona@phhp.ufl.edu