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Association of complementary and alternative medicine use with symptoms and physical functional performance among adults with arthritis

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Abstract

Background—Research shows high prevalence of complementary and alternative medicine (CAM) use in individuals with arthritis. Little is known about CAM use and objectively measured physical functional performance.

Objective—The main objective was to determine if CAM use was associated with self-reported symptoms and physical functional performance in adults with arthritis.The secondary objectives were to describe the perceived helpfulness and correlates of CAM use.

Methods—We analyzed cross-sectional data from a self-administered questionnaire and objectively measured physical functional performance prior to randomization to a self-paced exercise program or control condition (n=401).We used the Fisher's exact test, analysis of variance, and general linear models to examine the association of CAM use with socio-demographic characteristics, symptoms and functional performance. Logistic regression computed the odds of perceiving CAM as helpful by level of use.

Results—Most respondents had used CAM (76%). Dietary supplements were the most-used (53.1%). Female gender and college education predicted greater number of modalities used. Compared to non-users, use of any CAM was associated with greater fatigue and lower grip strength; relaxation techniques with lower walk distance and gait speed; dietary change with greater pain and stiffness and lower walk distance; and yoga with lower pain and stiffness, greater walk distance, chair stands, seated reach and gait, but lower grip strength. Perceived help was positively associated with the number of modalities used.

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Conclusions—Associations between CAM and symptoms or functional performance were mixed.Only yoga showed positive associations; however, yoga practitioners were more physically active overall than non-practitioners.

Keywords

Complementary therapies; Arthritis; Physical functional performance

Introduction

Complementary and alternative medicine (CAM) encompasses diverse health care approaches developed outside of conventional Western medicine.[1] CAM modalities are derived from diverse and complex unconventional and non-western models of health and disease.A wide range of theories and proposed mechanisms of action for CAM therapies have been proposed, including those that fit within the conventional medical model, such as placebo effects, reduced inflammation, disruption of pain perception, and improved musculoskeletal function and those that do not fit within the western medical model, such as culturally-based systems of medicine, mind-body interactions, and bioenergetic models of the body.[1,2–5]CAM efficacy research has faced methodological challenges,[2] which has resulted in few definitive conclusions about the efficacy of CAM overall and for arthritis in particular.

CAM use is more prevalent among persons with arthritis than without.[6]National Health Interview Survey (NHIS) data revealed that among respondents with arthritis, 28% had used CAM for arthritis in the previous year.[6]In clinic samples, CAM use is high, with 63% to 91% of arthritis patients[7–9] and 83% to 90% of primary care patients with arthritis[7,10]reporting ever using CAMfor arthritis.

CAM users' perceptions of efficacy for arthritis vary widely in clinic-based studies.[9,10,11]Meta-analyses and systematic reviews ofCAM modalities for treating arthritis reveal a mixture of null findings, positive findings and inconclusive findings for multiple dependent variables, mainly pain, stiffness, fatigue, sleep, and depression and less often, measures of functional status.[3–5,12] Associations between CAM use and self-reported pain, joint stiffness, disability or functional status have been found in population-based and clinic samples with arthritis,[6,9,13] but cross-sectional data cannot support causality in either direction.

Given the high prevalence of CAM use among population-based and clinic-based samples of people with arthritis but the relatively few CAM studies with physical functional measures as dependent variables, this study provided a valuable opportunity to further describe these potential associations. The main objective of this study was to determine if any CAM use, as well as use of specific CAM modalities, was associated with self-reported severity of pain, stiffness, and fatigue or with observed physical functional performance in a community-based sample of adults with arthritis.The secondary objectives were to describe the perceived helpfulness of CAM for arthritis and the socio-demographic and health-related correlates of CAM use in this community-based sample.We hypothesized that respondents who had used CAM in the previous three months would report lower levels of pain, stiffness and fatigue in the past two weeks and demonstratebetter physical functional performance than those who had not.

Methods

Design andprocedures

This study is a secondary analysis of baseline data collected from March 27, 2010 to October 15, 2011 among a community-based sample of 401 adults who were enrolled in a randomized controlled trial (RCT) of a self-directed exercise program.[14]The University of South Carolina's Institutional Review Board approved the study.We recruited residents of a southeastern metropolitan area via email listservs, newspapers, fliers and word-of-mouth.A telephone screening interview assessed eligibility.Sample size was determined through *a priori* power calculation, which indicated a need for 300 respondents to detect intervention effects ranging from .23 to .38(Cohen's *d*)[15] across outcomes for the parent study with 80% power.An additional 101 were enrolled to offset attrition.

Respondents were included if they answered "yes" to the question: "Have you ever been told by a doctor or other health care professional that you have some form of arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia?" This question is from the Centers' for Disease Control and Prevention validated case definition of arthritis for public health interventions, which has been used in the Behavioral Risk Factor Surveillance Survey (BRFSS) and the National Health Interview Survey (NHIS) since 1992.[16]

Inclusion criteria were age ≥18 years; not relocating; reads and writes English; and not participating in other research. One person per household could enroll.Exclusions were a serious fall in the past year; pregnant, breastfeeding, planning to become pregnant; diabetic taking insulin; could not walk > 3 minutes without rest, stand unassisted > 2 minutes, or sit in an armless chair > 5 minutes; physically active (aerobic activities ≥3 days/week for ≥30 minutes/day or strength training ≥2 days/week for ≥20 minutes/day); unable to safely participate in physical activity;[17] or uncontrolled hypertensive (≥160/100).

Respondents completed a mailed questionnaire and brought it to the measurement session. Along with the questionnaire, the participants received an informed consent form, a cover letter, and a map with directions in the mailed packet.The cover letter instructed participants to review the consent form and complete the questionnaire prior to the session. The letter described the expectations and procedures for the session, including the opportunity to ask questions about the study prior to signing the consent form. Staff persons answered questions, and once informed consent was obtained, reviewed the questionnaire for completeness and obtainedand administeredthe measures. Physical therapy doctoral students conducted the physical functional performance assessments. Respondents received $20 for their time.

Measures

CAM questions

The wording of the CAM questions was adapted from the National Physical Activity and Weight Loss questionnaire.[18]CAM modalities (i.e., types) were selected for inclusion based on prevalence data from the 2002 NHIS regarding CAM use among persons with arthritis, the most current population-based, published data available at the time of this study.[2]We included modalities that at least 1% of NHIS respondents had used in the previous year, combining some categories and omitting "healing rituals."

Participants responded to the following questions: "During the past three months, have you used any of the following methods to help your arthritis?(yes, no option for each) a) Yoga; b) Acupuncture; c) Massage; d) Supplements (vitamins, minerals, herbs, Chinese medicines); e) Chiropractic; f) Relaxation techniques (meditation, visualization, breathing exercises); g) Homeopathy; h) Changes to your diet (avoiding or adding certain foods);

If you said 'yes' to any of the methods listed above, do you think that any of them helped your arthritis? (Yes, a lot; Yes, a little; Not sure; No, did not help). If you said 'yes' which one do you think helped the most? (check only one): Yoga, Acupuncture, Massage, Supplements, Chiropractic, Relaxation techniques, Homeopathy, Changes to your diet."

Pain, Stiffness, Fatigue

Respondents used visual numeric scales (VNS) to rate their symptomsin the past 2 weeks ona scale ranging from 0 (no symptoms) to 10 (severe symptoms) .Separate items assessed generalized pain, stiffness and fatigue. Shaded bars above each number provided a visual cue for symptom intensity. The VNS pain scale was highly correlated with a Visual Analog Scale (VAS) (r=.85), while having higher correlations with two health measures and resulting in fewer coding errors and missing data than the VAS.[19] It was sensitive to measuring change in an arthritis self-management course.[19]

Self-reported physical activity

The 42-item, validated Community Health Activities Model Program for Seniors (CHAMPS) measured hours per week of moderate- to vigorous-intensity, leisure-time physical activity (LT MVPA; excludes household activities, excludes yoga) in a typical week during the past 4 weeks.[20,21] LT MVPA is based on metabolic equivalent (MET) values ≥ 3.0[22], adjusted per the CHAMPS developers' recommendations. [20]

Arthritis medication use

We created a dichotomous variable to indicate current use (on at least one of the past seven days) of ≥1 of any of the following drugs (1=yes, 0=no):non-steroidal anti-inflammatories, COX-2 inhibitors, oral steroids, narcotic pain relievers, DMARDS, or any other over-the-counter and prescription medications for arthritis.

Functional exercise capacity—The 6-minute walk test of functional exercise capacity has been validated in patients with fibromyalgia and osteoarthritis of the hip and knee.[23–25]It has shown construct validity for pain and function through confirmatory factor analysis (factor loadings=.74 for pain and −.84 for function),[25] concurrent validity compared to a fibromyalgia impact questionnaire (r=−.494),[24] andtest-reliability (intraclass correlation coefficients (ICCs)=.91, .98 and .94).[23,25] Standard implementation involved a 38-meter course marked with cones on a level, carpeted hallway.Respondents walked as quickly as possible without running for six minutes. Assistive devices were allowed. Respondents could reduce speed, stop or rest as needed.A staff member called out the time every minute (e.g., “you have 3 minutes to go”) and used standardized encouragement with one of two phrases, “you are doing well” or “keep up the good work.”

Lower body flexibility

For the seated reach test, respondents sat without shoes on a raised mat with legs extended, knees straight, and feet positioned against a box.With arms outstretched, hands overlapping, and middle fingers even, respondents bent forward, reaching as far forward as possible toward the toes and pushing a marker forward. With two practice and three test trials, the score was the greatest of three distances the marker forward, to the nearest .5 cm (higher score = better flexbility).[26]Lemmick and colleagues found correlations between the seated reach test and goniometer-assessed hamstring flexiblity of .74 for older men and .57 for older women; however correlations with lower back flexibility were low (r=.13 and .31, respectively) for older men and women).[27]

Upper body strength

A calibrated dynamometer measured grip strength (kg) in the dominant hand (Jamar®, Lafayette Instruments, Lafayette, IN).[28,29] Across multiple studies, the instrument has shown high inter-instrument reliability (ICCs =.87 to .99),[29,30] concurrent validity to known weights (r’s >.99)[29,30] and test-retest reliability (ICC = .91 to .95).[28]Respondents stood with the dominant arm adducted(not touching the body), elbow bent to 90 degrees, wrist in the neutral position, and thumb superior. On the observers’ signal, respondents squeezed the dynamometer with as much force as possible.After one practice test, the score was the best of three trials, per standard procedures.[30]

Lower body strength

The 30-second chair stand is a modified version of the validated original chair stand protocol, designed to measure people with a wider range of abilities.[31,32] It has test-re-test reliability in community-dwelling older men and women (ICCs =.84 and .94, respectively) and criterion validity compared to weight-adjusted leg press (r=.78 and .71, respectively).The test’s ability to detect significant performance differences among agegroups (p<.01) and physical activity levels (p<.0001) provided evidence of discriminant validity.[32]To perform the 30-second chair stand test, respondents sat in the middle of a standard chair with back straight, feet flat on the floor, and hands on the opposite shoulders, with arms crossed. On the observer’s signal, respondents rose to a full stand and returned to a fully seated position, without using the arms for assistance. After one to three practice tests, the score was the number of unassisted stands in a 30-second trial.[31.32]

Gait speed

The GAITRite® (CIR Systems, Havertown, PA), a portable walking mat with sensors and software, measured gait speed in meters/second.[33,34] Concurrent validity among knee replacement patients was established using a three-dimensional motional analysis (Vicon-512®) as the criterion. Speed and other walking variables were highly associated between the two measures (ICCs =.92 to .99), and repeatability coefficients (RCs) ranged from 1.0% to 5.9% of mean values.Step length and step time variables showed agreement at both comfortable and fast speeds (ICCs =.91 to.99); RCs were between 2.6% and 7.8%; and individual step values were within 1.5 cm and 0.02 s on 80–94% of occasions.[33] Concurrent validity among healthy adults, comparing GAITRite® to theClinical Stride Analyzer®, showed ICCs of .99 for gait speed, stride and cadence.Test-retest reliabilities at preferred and fast speeds were good for speed, cadence and stride length (ICCs= .92 to .97).[34]

Respondents walked on the GAITRite® walkway without shoes at a normal walking pace. Sufficient distance was provided in front of the walkway's start and beyond the walkway's end to ensure normal walking speed.Participants completed three timed trials, with a usual assistive device if applicable. Gait speed was the average across trials.

Statistical analyses—We used the Statistical Analysis System, v. 9.3 (SAS Institute, Cary, NC), with statistical significance set at .05. We collapsed nominal and ordinal categories of socio-demographic variables based on frequency distributions for age group, employment status, household income, education and marital status. We computed frequencies and means to describe participant characteristics. We used Fisher's exact test to test bivariate associations between socio-demographic variables and the use of CAM (none, ≥ 1 modality). Analysis of variance (ANOVA) compared the mean number of CAM modalities among categories of socio-demographic variables and compared yoga users to non-users on physical activity level.

Because only 3.5% of the sample had used acupuncture (n=14) and 3% homeopathy (n=12), we did not compute models for these modalities. General linear models assessed the association of any CAM use in the past three months (none, ≥1 modality) and the use of each of the six remaining modalities (used, did not use in the past three months) with symptom severity for pain, stiffness and fatigue during the previous two weeks, while controlling for arthritis medication use (any, none). The same approach analyzed associations with functional performance measures of gait speed, upper body strength, lower body strength, lower body flexibility and functional exercise capacity at baseline. Logistic regression computed the odds of perceiving CAM as helpful by level of CAM use (number of modalities used).

Results

Sample characteristics

Of 1112 telephone inquiries, 923 people completed eligibility screening and 555 met inclusion criteria. Reasons for exclusion were as follows: regular exerciser, medical contraindications, no arthritis diagnosis or symptoms, pregnancy, enrollment in other research, plans to relocate, enrolled household member, and eligible but declined. Of the 555 eligibles, 408 signed informed consent and attended the baseline measurement session, while seven had medical contraindications and were excluded, resulting in 401 participants (72% of eligibles).

Table 1 displays sample characteristics. Respondents were mainly women (85.8%), middle-aged (56.3 years), and married or partnered (61%). The majority were white or African American, college educated and employed.

CAM use

Of the 401 respondents, 76.1% (n=305) had used CAM for arthritis during the previous three months (mean=1.6, SD=1.5, median=1.0); 31.2% had used one modality, 20.5% had used two modalities, and 24.4% had used three or more modalities. Proportions of respondents who had used each modality were as follows: supplements, 53.1%; massage, 28.5%; dietary changes, 27.9%; relaxation techniques, 20.3%; chiropractic, 17.0%; yoga, 10.3%; homeopathy, 3.5% and acupuncture, 3.0%.

Socio-demographic characteristics and CAM use

Compared to non-users, Fisher's exact tests revealed that use of one or more CAM modalities for arthritis was not statistically significantly associated with age group, gender, employment, income, education, marital status, having seen a specialist or a general health care professional, or body mass index (all P values ≥.09). Only female gender (P=.03) and college education (P=.0002) were positively associated with greater CAM modalities used.

CAM use and arthritis symptom severity

Only yoga, diet changes and any CAM use were significantly associated with one or more of the three symptoms of pain, stiffness, or fatigue. Data for massage, chiropractic, relaxation techniques and supplements models therefore are not shown in Table 2.

As shown in Table 2, respondents who had practiced yoga reported less pain (P=.0434) and stiffness (P=.0362) compared to those who had not used yoga. Respondents who had made dietary changes reported greater pain (P=.0143) and stiffness (P=.0303) compared to those who had not changed their diet. Users of one or more CAM modalities in the past three months reported greater fatigue in the past two weeks than non-users (P=.0361).

CAM use and physical functional performance

Only any CAM use, yoga, relaxation techniques, and dietary changes were associated with one or more of the five functional measures. Therefore, data for the massage, chiropractic, and supplements models are not shown in Table 3.

As shown in Table 3, F statistics indicate that respondents who had used any CAM (one or more) in the past three months had lower grip strength compared to those who had not used CAM (P=.0208), but use of any CAM was not associated with the other functional performance measures. Respondents who had practiced yoga in the past three months had lower grip strength (P=.0203), but better performance on the 6-minute walk test (P=.0150), chair stands (*P*=.0298), seated reach (*P*<.0001), and gait speed (*P*=.0111) compared to those who had not practiced yoga. Respondents who had used relaxation techniques in the past three months had significantly poorer performance on the 6-minute walk test (*P*=.0020) and gait speed (*P*=.0463) than non-users, but there was no association with the other functional performance measures.Respondents who had made dietary changes in the past three months had significantly poorer performance on the 6-minute walk test than those who had not made dietary changes (*P*=.0457), but there was no association with the other functional performance measures.

Because yoga was the only CAM modality for which users had lower pain and stiffness and better physical function than non-users on four of five measures, we explored whether yoga practitioners were more physically active than non-practitioners by comparing them on LT MVPA.A Fisher's exact test showed that yoga use was significantly associated with performance of any LT MVPA (>0 hours per week), *P*=.0003.Among yoga practitioners, 85.4% reported at least some LT MVPA, while only 56.7% of non-practitioners had done so.

Perceived helpfulness of CAM used to for arthritis

Respondents who had used at least one type of CAM (n=305) indicated how helpful using CAM had been for arthritis. Among the 303 respondents, 8.3% perceived no help; 32.3% were not sure; 39.9% perceived a little help; and 19.4% perceived a lot of help. Perceived helpfulness of CAM ("a little/a lot" versus "no help/not sure") was strongly associated with the number of modalities used. Compared to users of one modality, users of two modalities had three times the odds (OR=3.2, CI= 1.8, 5.7) and users of three or more modalities had nine times the odds (OR=8.9, CI=4.6, 17.0) of reporting that CAM had helped.

CAM users who reported a little or a lot of help (n=180) were asked to choose which of the eight modalities had helped the most. Among 174 respondents, the proportions selecting each modality were as follows: supplements, 26.4%;massage, 24.7%;changes to the diet, 15.5%; chiropractic, 13.2%;yoga, 10.9%;relaxation techniques, 4.6%;acupuncture, 3.5%;and homeopathy, 1.2%.

Discussion

This study adds to existing observational evidence for an association between use of some types of CAM among adults with arthritis and pain, joint stiffness, disability or functional status. [6,9,13] The use of functional performance measures rather than self-report is a strength of the study.Further, we found a strong association between the perceived helpfulness of CAM use for arthritis and the number of different CAM modalities used in the previous three months, which warrants further exploration.The majority of respondents had used CAM in the previous three months, with dietary supplements being the most popular choice.As in other CAM studies, women and those with a college education were more likely to be users.

The hypothesis that CAM use in the previous three months would be positively associated with lower pain, stiffness and fatigue and better physical functional performance was consistently supported only among yoga users for pain, stiffness and four of five functional performance measures, and for seated reach among users of any CAM modality.Our data did not allow us to explorecausalmechanisms, however we found that yoga users in this sample were more likely to engage in leisure-time physical activity than non-users, suggesting potentially important differences between users and non-users that could be associated with symptom severity.Yoga, and other physical activities, may have reduced pain and stiffness and improved physical function; alternatively, people with relatively lower pain and stiffness may have been more willing to practice yoga.

The perceived helpfulness of CAM for arthritis was strongly associated with the number of modalities used.Users of multiple modalities may have felt a strong financial and emotional investment in CAM.Further, heavier CAM users may have perceived psychological or social benefits, which were not measured. Future research should assess other potential benefits besides clinical outcomes.

There are limitations to this study.CAM use was reported for the past three months, physical symptoms for the past two weeks (i.e., retrospectively), and functional performance measured at baseline.This question wording implied a feasible time period for CAM effects to accrue; nevertheless the study was cross-sectional andtherefore neither positive nor inverse associations can be interpreted to imply causality.

Not all symptoms and physical functional outcomesmeasured may be equally salient to all types of arthritis, nor do all of the CAM modalities have equally plausible, if untested, mechanisms for potential benefits.Further, this is a secondary analysis of the data, and the study was not powered to detect associations between specific CAM modalities and symptoms or physical function.Self-report of behavior during the past three months is subject to misreporting, and we have no data on the dose or frequency of CAM use.Valid measurement of CAM use remains an unresolved challenge in CAM research because of varying definitions of CAM and the lack of a feasible, unobtrusive and non-reactive means to compare self-reported CAM use to an objective criterion.Our approach was based on the best information at hand when the study was conducted.Validation strategies using cognitive interviews, expert panel review, and attention to cultural and linguistic relevance across populations represent advances in CAM measurement development.[35–37]

Conclusions

CAM use was common among adults with arthritis.With medication use in the statistical models, some of the CAM modalities used were associated with symptoms and functional performance measures. The direction of associations between CAM use and both arthritis symptoms and functional measures was inconsistent.The study contributes to the literature by using functional performance measures and describing perceived helpfulness of CAM within a community-based sample of adults with arthritis.Future intervention research of CAM efficacy would also benefit from inclusion of both objectively measured functional performance outcomes and more extensive attention to users' perceived benefits and how those benefits may accrue.

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Table 1.

Characteristics of a community-based sample of adults with arthritis (n=401), South Carolina.

Characteristic	n	%*
Gender		
Women	344	85.8
Men	57	14.2
Race		
White	256	63.8
Black or African American	141	35.2
American Indian or Alaska Native	2	0.5
More than one race	1	0.2
Missing	1	0.2
Ethnicity		
Hispanic/Latino	4	1.0
Education		
Less than high school	6	1.5
High school graduate	46	11.5
Some college	105	26.2
College graduate	243	60.6
Missing	1	0.2
Employment status		
Employed for wages	258	64.3
Retired	90	22.4
Self-employed	15	3.7
Out of work	14	3.5
Unable to work	12	3.0
Homemaker	7	1.7
Student	3	0.7
Missing	2	0.5
Marital status		
Married	234	58.4
Divorced	62	15.5
Never married	50	12.5
Widowed	36	9.0
Separated	9	2.2
Unmarried couple	8	2.0
Missing	2	0.5
Annual household income		
$0–19,999	30	7.5

Characteristic	n		%*
$20,000–39,999	75		18.7
$40,000–59,999	85		21.2
$60,000–79,999	71		17.7
$≥80,000	124		30.9
Missing	16		4.0
Arthritis medication use in past seven days (yes)	341		85.0
Health care, past 12 mo.			
Saw a specialist (e.g., rheumatologist, orthopedist)	186		46.4
Saw health care provider (doctor, nurse practitioner, physician assistant)	390		97.3
	n	**mean (SD)**	**range**
Age (years)	401	56.3 (10.7)	19.0, 87.0
Body mass index (weight in kg/height in m^2)	401	33.1 (8.3)	15.8, 60.7
Self-rated health (1=excellent to 5=poor)	400	2.9 (0.8)	1.0, 5.0
Arthritis-related symptoms			
Pain (0=none to 10=severe)	401	4.7 (2.3)	0.0, 10.0
Stiffness (0=none to 10=severe)	401	5.3 (2.6)	0.0, 10.0
Fatigue (0=none to 10=severe)	401	5.0 (2.7)	0.0, 10.0
Physical functional performance			
Grip strength (kg.)	401	27.1 (10.2)	4.5, 74.0
Six-minute walk distance (m.)	399	494.1 (91.2)	151.5, 721.6
Seated reach (cm.)	399	21.7 (9.9)	−11.5, 49.5
Chair stands (no.)	401	10.0 (3.5)	0.0, 24.0
Gait speed (m./sec.)	397	108.8 (21.5)	42.8, 172.0

Abbreviations: SD=standard deviation, min=minimum value, max=maximum value.

*Some percentages may not sum to 100 because of rounding.

Table 2.

CAM use in the past three months and symptom severity in the past two weeks among adults with arthritis (n=401).

CAM use, past 3 months	n*	Unadjusted mean (SD)	Least squares mean (SE)	Full model† *F* statistic(*P* value)	CAM use‡ *t* statistic(*P* value)
		Pain, past 2 weeks (0, none to 10, severe)			
No CAM	305	4.3 (2.3)	4.0 (.25)	6.1 (.0024)	−1.6 (.1045)
Used ≥1 CAM	96	4.8 (2.3)	4.5 (.18)		
No yoga	359	4.8 (2.3)	4.4 (.17)	7.2 (.0009)	2.0 (.0434)
Used yoga	41	4.0 (2.3)	3.7 (.38)		
No diet change	289	4.5 (2.3)	4.2 (.17)	7.9 (.0004)	−2.5 (.0143)
Changed diet	112	5.2 (2.4)	4.8 (.25)		
		Stiffness, past 2 weeks (0, none to 10, severe)			
No CAM	305	4.9 (2.6)	4.6 (.28)	6.4 (.0019)	−1.5 (.1305)
Used ≥1 CAM	96	5.4 (2.5)	5.0 (.19)		
No yoga	359	5.4 (2.5)	5.0 (.18)	7.8 (.0005)	2.1 (.0362)
Used yoga	41	4.5 (2.6)	4.1 (.41)		
No diet change	289	5.1 (2.5)	4.8 (.19)	7.6 (.0006)	−2.2 (.0303)
Changed diet	112	5.8 (2.7)	5.4 (.27)		
		Fatigue, past 2 weeks (0, none to 10, severe)			
No CAM	305	4.5 (3.9)	4.1 (.29)	6.8 (.0013)	−2.1 (.0361)
Used ≥1 CAM	96	5.2 (2.5)	4.8 (.20)		
No yoga	359	5.1 (2.7)	4.7 (.19)	5.3 (.0056)	1.4 (.1720)
Used yoga	41	4.5 (2.6)	4.1 (.43)		
No diet change	289	4.8 (2.7)	4.5 (.29)	5.9 (.0029)	−1.7 (.0954)
Changed diet	112	5.4 (2.5)	5.0 (.29)		

Abbreviations: CAM=complementary and alternative medicine, SD=standard deviation, SE=standard error

*Total n does not sum to 401 for each model because of missing data.

†Overall *F* statistic and *P* value for each full model shown, which include a CAM use variable and arthritis medicine use (0, ≥1).

‡*t* statistic and *P* value for each CAM use variable shown.

Table 3.

CAM use in the past three months and functional performance among adults with arthritis (n=401), South Carolina, USA, 2010–2011.

CAM use, past 3 months	n*	Unadjusted mean (SD)	Least squares mean (SE)	Full model† *F* statistic (*P* value)	CAM use‡ *t*statistic (*P* value)
Grip strength (kg.)					
No CAM	96	29.3 (12.1)	30.1 (1.1)	4.5 (.0114)	2.3 (.0208)
Used ≥1 CAM	305	26.4 (9.4)	27.4 (0.8)		
No yoga	360	27.5 (2.3)	28.5 (0.7)	4.6 (.0111)	2.3 (.0203)
Used yoga	41	23.6 (8.8)	24.6 (1.7)		
No relaxation	320	27.6 (10.3)	28.4 (0.7)	3.3 (.0395)	1.7 (.0910)
Used relaxation	81	25.2 (9.3)	26.3 (1.3)		
No diet change	289	27.3 (10.2)	28.2 (0.8)	1.8 (.1594)	0.8 (.7901)
Changed diet	112	26.8 (10.3)	27.9 (1.1)		
Six-minute walk (m.)					
No CAM	96	497.7 (90.7)	506.4 (10.1)	2.5 (.0848)	0.3 (.7421)
Used ≥1 CAM	303	492.9 (91.5)	502.9 (7.0)		
No yoga	358	497.7 (92.3)	500.2 (6.5)	5.5 (.0046)	−2.4 (.0150)
Used yoga	41	526.5 (74.6)	536.5 (14.8)		
No relaxation	320	501.5 (87.0)	509.4 (6.5)	7.3 (.0007)	3.1 (.0020)
Used relaxation	79	463.9 (101.8)	474.1 (11.4)		
No diet change	287	500.2 (86.5)	508.9 (6.8)	4.5 (.0121)	2.0 (.0457)
Changed diet	112	478.4 (101.1)	488.6 (9.9)		
Seated reach (cm.)					
No CAM	95	19.9 (9.5)	19.7 (1.1)	2.1 (.1208)	−2.0 (.0486)
Used ≥1 CAM	304	22.2 (10.0)	22.0 (0.8)		
No yoga	358	21.0 (9.5)	20.7 (7.1)	9.3 (.0001)	−4.8 (<.0001)
Used yoga	41	27.8 (11.3)	27.5 (1.6)		
No relaxation	319	21.4 (9.8)	21.2 (0.7)	0.8 (.4494)	−1.1 (.2609)
Used relaxation	80	22.9 (10.2)	22.6 (1.3)		
No diet change	288	21.6 (9.8)	21.4 (.8)	0.2 (.8414)	−0.1 (.9164)
Changed diet	111	21.8 (10.3)	21.5 (1.1)		
Chair stands (no.)					
No CAM	96	9.8 (3.3)	10.2 (0.4)	2.5 (.0847)	−0.7 (.5090)
Used ≥1 CAM	305	10.0 (3.6)	10.4 (0.3)		
No yoga	360	9.9 (3.3)	10.2 (0.3)	4.7 (.0099)	−2.2 (.0298)
Used yoga	41	11.1 (4.5)	11.5 (0.6)		
No relaxation	320	10.1 (3.6)	10.4 (0.3)	2.4 (.0880)	0.6 (.5484)
Used relaxation	81	9.7 (3.0)	10.1 (0.4)		

CAM use, past 3 months	n*	Unadjusted mean (SD)	Least squares mean (SE)	Full model† *F* statistic (*P* value)	CAM use‡ *t* statistic (*P* value)
No diet change	289	10.1 (3.4)	10.5 (0.3)	3.2 (.0429)	1.3 (.1800)
Changed diet	112	9.6 (3.7)	10.0 (0.4)		
Gait speed (m./sec.)					
No CAM	95	1.1 (.21)	1.097 (.02)	1.6 (.1937)	1.8 (.0741)
Used ≥1 CAM	304	1.1 (.22)	1.107 (.02)		
No yoga	358	1.1 (.22)	1.095 (.02)	4.9 (.0083)	−2.6 (.0111)
Used yoga	41	1.2 (.22)	1.186 (.04)		
No relaxation	318	1.1 (.21)	1.113 (.02)	3.6 (.0286)	2.0 (.0463)
Used relaxation	81	1.0 (.24)	1.059 (.03)		
No diet change	288	1.1 (.20)	1.107 (.02)	1.6 (.1952)	0.4 (.7131)
Changed diet	112	1.1 (.26)	1.098 (.02)		

Abbreviations. CAM=complementary and alternative medicine. SD=standard deviation SE=standard error.

*Total n does not sum to 401 for each model because of missing data.

†Overall *F* statistic and *P* value for each full model, which includes the CAM use variable and arthritis medicine use (0, ≥1).

‡*t* statistic and probability value for each CAM use variable shown.