

Complementary and Alternative Medicine Use in African Americans With Rheumatoid Arthritis

ASHUTOSH TAMHANE,¹ GERALD MCGWIN JR.,¹ DAVID T. REDDEN,¹ LAURA B. HUGHES,¹ ELIZABETH E. BROWN,¹ ANDREW O. WESTFALL,¹ DOYT L. CONN,² BETH L. JONAS,³ EDWIN A. SMITH,⁴ RICHARD D. BRASINGTON,⁵ LARRY W. MORELAND,⁶ S. LOUIS BRIDGES JR.,¹ AND LEIGH F. CALLAHAN³

Objective. Racial/ethnic differences with regard to complementary and alternative medicine (CAM) use have been reported in the US. However, specific details of CAM use by African Americans with rheumatoid arthritis (RA) are lacking.

Methods. Data were collected from African Americans with RA enrolled in a multicenter registry regarding the use of CAM, including food supplements, topical applications, activities, and alternative care providers. Factors associated with CAM use by sex and disease duration were assessed using *t*-test, Wilcoxon's rank sum test, chi-square test, and logistic regression analyses.

Results. Of the 855 participants, 85% were women and mean age at enrollment was 54 years. Overall, ever using any of the CAM treatments, activities, and providers was 95%, 98%, and 51%, respectively (median of 3 for number of treatments, median of 5 for activities, and median of 1 for providers). Those with longer disease duration (>2 years) were significantly more likely (odds ratio ≥ 2.0 , $P < 0.05$) to use raisins soaked in vodka/gin, to take fish oils, or to drink alcoholic beverages for RA treatment than those with early disease. As compared to men, women were significantly ($P < 0.05$) more likely to pray/attend church, write in a journal, and use biofeedback, but were less likely to smoke tobacco or topically apply household oils for treatment of RA.

Conclusion. CAM use was highly prevalent in this cohort, even in individuals with early disease. Health care providers need to be aware of CAM use as some treatments may potentially have interactions with conventional medicines. This could be important within this cohort of African Americans, where racial disparities are known to affect access to conventional care.

INTRODUCTION

Rheumatoid arthritis (RA) is a chronic multisystem autoimmune disease associated with severe morbidity if untreated. Despite early detection and availability of treatments to slow disease progression, no definitive cure

exists for RA. Current treatment modalities often have side effects that may affect quality of life (1). Additionally, RA also has a significant impact on emotional and social well-being (2). These factors are potential contributing factors to use of treatments in place of (alternative) or in addition (complementary) to conventional medications.

In the US, complementary and alternative medicine (CAM) use has been increasing in general and for arthritis,

Presented in part at the 75th Annual Scientific Meeting of the American College of Rheumatology, Chicago, IL, November 2011.

The views and contents expressed herein are solely the responsibility of the authors and do not necessarily represent the official views of the NIH.

Supported by the NIH (contract N01-AR-02247, grant P60-AR-48095 to the University of Alabama at Birmingham Multidisciplinary Clinical Research Center, and grant UL1-TR-000165 from the National Center for Advancing Translational Sciences and National Center for Research Resources).

¹Ashutosh Tamhane, MD, PhD, MSPH, Gerald McGwin Jr., PhD, David T. Redden, PhD, Laura B. Hughes, MD, Elizabeth E. Brown, PhD, Andrew O. Westfall, MS, S. Louis Bridges Jr., MD, PhD: University of Alabama at Birmingham;

²Doyt L. Conn, MD: Emory University, Atlanta, Georgia; ³Beth L. Jonas, MD, Leigh F. Callahan, PhD: University of North Carolina, Chapel Hill; ⁴Edwin A. Smith, MD: Medical University of South Carolina, Charleston; ⁵Richard D. Brasington, MD: Washington University at St. Louis, St. Louis, Missouri; ⁶Larry W. Moreland, MD: University of Pittsburgh, Pittsburgh, Pennsylvania.

Address correspondence to Ashutosh Tamhane, MD, PhD, MSPH, University of Alabama at Birmingham, 1665 University Boulevard, RPHB 514-A, Birmingham, AL 35294. E-mail: tamhane@uab.edu.

Submitted for publication November 6, 2012; accepted in revised form August 20, 2013.

Significance & Innovations

- Use of complementary and alternative medicine (CAM) is very common in chronic conditions such as arthritis, but little is known about its use in African American patients with rheumatoid arthritis (RA). This study describes specifics of CAM medications, activities, and providers, as well as factors associated with their use in a unique large cohort of African Americans with RA, with both early and longstanding disease.
- Our study found that CAM use was highly prevalent in this cohort, even in individuals with early disease. Significant sex differences were found with regard to specific CAM use. The majority of participants sought care from both conventional and CAM providers and used both conventional medicines and CAM treatments/activities to relieve RA-related symptoms, anxiety, and stress.
- These findings have important implications for delivery of health care for African Americans with chronic diseases.

including RA. The prevalence of CAM use in RA patients has been reported to vary from 20% to 86% (3–6). The 2007 National Health Interview Survey (NHIS) (3) reported that 4 of 10 US adults had used CAM therapy in the past 12 months. Between 2002 and 2007, the relative increase in CAM use (including prayer for health reasons) was 14.2% (4).

The 2002 and 2007 NHIS revealed a clear pattern of CAM use among different racial/ethnic groups, with non-Hispanic whites and Asian Americans being more likely to use CAM than African Americans and Hispanics (3–5). With regard to prayer, African Americans were more likely to pray for health reasons than non-Hispanic whites. However, such details regarding CAM use in African Americans with RA are lacking due to low representation of African Americans in RA studies. Also, much of the CAM research in arthritis has been focused on individuals with longstanding disease (7–9) and data on those with early disease are lacking.

The results regarding sex differences with regard to CAM use in RA patients have been mixed. Some studies report higher CAM use by women (6,10,11), while others report no significant sex differences (7,12). Arcury et al (8) reported that women were less likely to drink liquor (whiskey) and more likely to use religion as a remedy for their arthritis-related symptoms. Such sex differences, which could be due to differential disease activity, are of clinical significance, reflecting sex-specific health behaviors.

The purpose of this study was to describe the prevalence of CAM use with regard to various treatments, activities, and providers using a cohort of African Americans with RA from the southern US. The study also examined potential differences by sex and disease duration with regard to overall and specific CAM use.

PATIENTS AND METHODS

Study population. The data source for this analysis was the National Institute of Arthritis and Musculoskeletal and Skin Diseases–funded Consortium for the Longitudinal Evaluation of African Americans with Early Rheumatoid Arthritis (CLEAR) Registry. The registry enrolled self-declared African Americans with a diagnosis of RA as defined by the revised (1987) American College of Rheumatology classification criteria (9). The registry has 2 arms: longitudinal (CLEAR I, 2000–2005) and cross-sectional (CLEAR II, 2006–2012). In CLEAR I, patients with disease duration of ≤ 2 years were enrolled; in CLEAR II, patients with any disease duration were enrolled. In addition to the enrollment visit in CLEAR I, participants were followed at 36 months and at 60 months post–disease onset, while the CLEAR II participants had only 1 enrollment visit. Comprehensive demographic, clinical, and radiographic data were obtained at each visit. For this analysis, enrollment data from both CLEAR I and II were analyzed. The registry was approved by the Institutional Review Boards of the participating institutions: University of Alabama at Birmingham, Emory University (Atlanta, Georgia), Medical University of South Carolina (Charleston), University of North Carolina at Chapel Hill, and Washington University (St. Louis, Missouri). Further details of the registry can be found at <http://medicine.uab.edu/rheum/70918/>.

Outcome measures. The CLEAR registry database has self-reported data on 16 types of CAM treatments, 9 CAM activities, and 5 CAM providers (Tables 1, 2, and 3). The participants were asked about CAM use specific to the RA-related symptoms (treatments), anxiety, or stress (activities). In addition to the CAM providers, participants were also asked if they consulted conventional medical providers such as a rheumatologist, family doctor, orthopedist, occupational therapist, podiatrist, and others. At the enrollment visit, participants were asked about ever and recent (within the previous month) use of each CAM treatment and activity and ever and past 6 months consultation with CAM provider(s).

Statistical analysis. Specific CAM (treatment, activity, and provider) use was described as ever use versus never use. Additionally, overall CAM use was ascertained as follows: participants reporting ever using any of the 16 CAM treatments were categorized as “ever users” of treatment, while others were categorized as “never users.” Similar categorization was done for CAM activities (using any of the 9 activities) and CAM providers (consulting any of the 5 CAM providers). For disease duration the participants were stratified into those with early (≤ 2 years) versus those with longer (> 2 years) disease duration. The differences between the dichotomized groups (per disease duration and sex) were examined using percentages and chi-square tests. Corresponding univariate odds ratio (OR) and 95% confidence interval (95% CI) for ever versus never use of CAM was reported using logistic regression. Continuous variables were reported as means with SDs or medians with quartiles and compared using *t*-test or Wil-

| CAM treatment | Table 1. Specific CAM treatments used by African Americans with RA participating in the CLEAR Registry at enrollment* | | | | | | | | | |
|--|---|--------------------------------|-------------------------------|----------|-----------------------|--------------------|------------------|-------|----------------------------|--|
| | Disease duration | | | | | Sex | | | | |
| | Overall, (n = 855) | Longer, >2 yrs (n = 437) | Early, ≤2 yrs (n = 418) | P† | Crude OR (95% CI)† | Women (n = 726) | Men (n = 129) | P† | Univariate OR (95% CI)† | |
| Heat treatment | | | | | | | | | | |
| Ever use | 684 (80.3) | 84.4 | 75.9 | 0.002‡ | 1.7 (1.2–2.4)‡ | 81.9 | 71.3 | 0.01‡ | 1.8 (1.2–2.8)‡ | |
| Past month | 413 (48.6) | 47.2 | 50.0 | | | 50.3 | 39.1 | | | |
| Store-bought lotions, oils, creams | | | | | | | | | | |
| Ever use | 651 (76.3) | 78.7 | 73.8 | 0.09 | 1.3 (1.0–1.8) | 77.2 | 72.9 | 0.28 | 1.3 (0.8–1.9) | |
| Past month | 295 (34.6) | 33.7 | 64.4 | | | 35.3 | 31.0 | | | |
| Cold treatments (e.g., ice packs) | | | | | | | | | | |
| Ever use | 245 (28.7) | 31.4 | 25.9 | 0.08 | 1.3 (1.0–1.8) | 29.7 | 23.3 | 0.14 | 1.4 (0.9–2.2) | |
| Past month | 105 (12.4) | 12.7 | 12.0 | | | 12.9 | 9.3 | | | |
| Apple cider vinegar, cranberry juice/honey | | | | | | | | | | |
| Ever use | 242 (28.4) | 30.4 | 26.2 | 0.17 | 1.2 (0.9–1.7) | 28.3 | 29.5 | 0.78 | 0.9 (0.6–1.4) | |
| Past month | 159 (18.7) | 19.5 | 17.8 | | | 18.7 | 18.8 | | | |
| Special jewelry (e.g., copper chain) | | | | | | | | | | |
| Ever use | 231 (27.2) | 32.2 | 22.0 | 0.001‡ | 1.7 (1.2–2.3)‡ | 27.3 | 27.3 | 0.99 | 1.0 (0.7–1.5) | |
| Past month | 91 (10.7) | 10.8 | 10.6 | | | 11.1 | 8.5 | | | |
| Fish oils and/or omega-3 fatty acids | | | | | | | | | | |
| Ever use | 182 (21.3) | 27.7 | 14.7 | < 0.001‡ | 2.2 (1.6–3.1)‡ | 22.1 | 18.6 | 0.38 | 1.2 (0.8–2.0) | |
| Past month | 94 (11.0) | 14.4 | 7.5 | | | 11.3 | 9.3 | | | |
| Garlic | | | | | | | | | | |
| Ever use | 163 (19.2) | 22.6 | 15.7 | 0.01‡ | 1.6 (1.1–2.2)‡ | 20.2 | 14.0 | 0.10 | 1.6 (0.9–2.6) | |
| Past month | 110 (13.0) | 14.3 | 11.6 | | | 13.6 | 9.3 | | | |
| Store-bought herbal/plant oils/creams | | | | | | | | | | |
| Ever use | 163 (19.2) | 20.8 | 17.4 | 0.20 | 1.2 (0.9–1.8) | 20.3 | 14.7 | 0.14 | 1.5 (0.9–2.5) | |
| Past month | 95 (11.1) | 11.4 | 10.8 | | | 11.4 | 9.3 | | | |
| Glucosamine sulfate and/or chondroitin sulfate | | | | | | | | | | |
| Ever use | 160 (18.8) | 21.1 | 16.5 | 0.09 | 1.3 (1.0–1.9) | 19.3 | 16.3 | 0.42 | 1.2 (0.7–2.0) | |
| Past month | 59 (6.9) | 7.8 | 6.0 | | | 7.2 | 5.4 | | | |
| Gelatin/fruit pectin in grape/aloe vera juice | | | | | | | | | | |
| Ever use | 128 (15.1) | 18.5 | 11.5 | 0.005‡ | 1.7 (1.2–2.6)‡ | 15.8 | 13.2 | 0.45 | 1.2 (0.7–2.1) | |
| Past month | 58 (6.8) | 6.7 | 7.0 | | | 6.8 | 7.0 | | | |
| Household oils (e.g., WD-40 or turpentine) | | | | | | | | | | |
| Ever use | 125 (14.7) | 18.2 | 11.0 | 0.003‡ | 1.8 (1.2–2.7)‡ | 13.3 | 22.7 | 0.01‡ | 0.5 (0.3–0.8)‡ | |
| Past month | 26 (3.1) | 3.4 | 2.6 | | | 2.6 | 5.5 | | | |
| Other herbs or herbal drinks | | | | | | | | | | |
| Ever use | 118 (13.9) | 13.6 | 14.1 | 0.82 | 1.0 (0.6–1.4) | 13.6 | 16.3 | 0.41 | 0.8 (0.5–1.3) | |
| Past month | 70 (8.2) | 7.4 | 9.1 | | | 9.0 | 3.9 | | | |
| Homemade oils or other oils/lotion/rubs | | | | | | | | | | |
| Ever use | 96 (11.3) | 12.2 | 10.4 | 0.41 | 1.2 (0.8–1.8) | 11.5 | 11.8 | 0.91 | 1.0 (0.5–1.7) | |
| Past month | 53 (6.2) | 6.0 | 6.5 | | | 6.1 | 7.0 | | | |
| Magnets | | | | | | | | | | |
| Ever use | 90 (10.6) | 12.8 | 8.2 | 0.03‡ | 1.7 (1.1–2.6)‡ | 11.0 | 7.8 | 0.28 | 1.5 (0.7–2.9) | |
| Past month | 26 (3.1) | 2.5 | 3.6 | | | 3.3 | 1.6 | | (continued) | |

Table 1. (Cont'd)

| CAM treatment | Disease duration | | | | Sex | | | | |
|---|-----------------------|---------------------------------|--------------------------------|-------|-----------------------|--------------------|------------------|------|----------------------------|
| | Overall, (n = 655) | Longer, > 2 yrs (n = 437) | Early, ≤ 2 yrs (n = 418) | P† | Crude OR (95% CI)† | Women (n = 726) | Men (n = 129) | P‡ | Univariate OR (95% CI)† |
| | | Ever use | Past month | | | | | | |
| Other food/drink, including home remedies | 57 (6.7) | 7.4 | 6.0 | 0.43 | 1.2 (0.7–2.1) | 6.8 | 6.2 | 0.81 | 1.1 (0.5–2.4) |
| Ever use | 34 (4.0) | 3.9 | 4.1 | | | 4.1 | 3.1 | | |
| Past month | | | | | | | | | |
| Raisins soaked in vodka or gin | 30 (3.5) | 5.0 | 1.9 | 0.02‡ | 2.7 (1.2–6.2)‡ | 3.6 | 3.1 | 0.78 | 1.2 (0.4–3.4) |
| Ever use | 9 (1.1) | 1.4 | 0.7 | | | 1.1 | 0.8 | | |
| Past month | | | | | | | | | |

* Values are the number (percentage) or the percentage unless indicated otherwise. Reference category is "never use." Wherever applicable, participants with "unknown" and "refused to answer" responses were excluded from calculating percentages. CAM = complementary and alternative medicine; RA = rheumatoid arthritis; CLEAR = Consortium for the Longitudinal Evaluation of African Americans with Early Rheumatoid Arthritis; OR = odds ratio; 95% CI = 95% confidence interval.

† By logistic regression.

‡ Statistically significant at the 0.05 level.

coxon's rank sum (nonparametric) test. Statistical significance was set at 0.05 (2-tailed).

RESULTS

Of the 855 participants included in the analysis, 85% were females and 418 (48.9%) had early disease (Table 4). Data on self-reported comorbidities were available for 814 participants; 23.7% reported having diabetes mellitus, 13.0% heart disease, 67.2% hypertension, and 5.0% stroke. Significant differences were found between those with longer duration versus those with early disease duration, age at RA onset and enrollment ($P < 0.001$), marital status ($P = 0.02$), pain ($P = 0.03$), median tender joints ($P = 0.01$), radiographic erosions of the hands/feet ($P < 0.001$), radiographic joint space narrowing of the hands and feet ($P < 0.001$), comorbidity (self-reported diabetes mellitus, hypertension, heart disease, or stroke) count ($P = 0.001$), and medication use ($P < 0.001$) (Table 4). There were significant differences between men and women with regard to educational level ($P < 0.001$), marital status ($P = 0.004$), smoking ($P < 0.001$), alcohol use ($P < 0.001$), obesity ($P < 0.001$), Health Assessment Questionnaire score ($P = 0.04$), joint tenderness ($P = 0.002$), and number of swollen joints ($P = 0.02$).

Overall CAM use. Of the 855 participants, 849 participants (99%) had used at least 1 of the CAMs (treatment or activity or provider) with the following distribution: 95% ever used any of the 16 treatments, 98% ever used any of the activities, and 51% ever used a CAM provider (Table 5). When prayer was excluded from the analyses, the prevalence of ever use of activity was 97%. Past-month use (indicating recent/current use) of any of the treatments was reported by 73% of participants and use of any of the activities by 97% of participants (95% for without prayer).

Of the 855 participants, 438 (51%) had ever sought care from a CAM provider, while 417 did not (Table 5). Of the 438 participants who had ever sought care from a CAM provider, 99.5% had also used various treatments and/or activities, and almost all ($n = 437$) had also consulted other medical providers for their arthritis-related symptoms. Similarly, of the 417 participants who had not ever sought care from a CAM provider, 98.6% had also used various treatments and/or activities, and 99.0% had also consulted other medical providers. Overall, the participants had tried (ever use) medians of 3 CAM treatments, 5 CAM activities, and 1 CAM provider. Average past-month use of treatments and activities were 1 and 4, respectively. Similarly, the median number of CAM providers consulted in the past 6 months was lower (median 0).

Specific CAM use. Among the treatments, heat treatment (e.g., pads, hot baths, and paraffin) was the most common (80%), followed by store-bought lotions/oils/creams (76%) (Table 1). Praying or attending church services (92%) was the most common activity followed by talking to a friend or family member (83%) (Table 2). Among the CAM providers, the most common provider was a pastor, priest, rabbi, or other church leader (32%), followed by a chiropractor (23%) (Table 3).

Table 2. Specific CAM activities used by African Americans with RA participating in the CLEAR Registry at enrollment*

| CAM activity | Disease duration | | | | | Sex | | | |
|--|----------------------|------------------------------|-------------------------------|----------|-----------------------|--------------------|------------------|----------|-----------------------|
| | Overall (n = 855) | Late disease (n = 437) | Early disease (n = 418) | P† | Crude OR (95% CI)† | Women (n = 726) | Men (n = 129) | P† | Crude OR (95% CI)† |
| | | | | | | | | | |
| Pray/attend church services | | | | | | | | | |
| Ever use | 785 (92.2) | 93.1 | 91.3 | 0.33 | 1.3 (0.8–2.1) | 93.9 | 82.9 | < 0.001‡ | 3.2 (1.8–5.5)‡ |
| Past month | 735 (87.2) | 88.4 | 86.0 | | | 89.1 | 76.6 | | |
| Talk to a friend/family member | | | | | | | | | |
| Ever use | 718 (84.3) | 82.2 | 86.5 | 0.08 | 0.7 (0.5–1.0) | 85.6 | 77.3 | 0.02‡ | 1.7 (1.1–2.8)‡ |
| Past month | 685 (81.1) | 78.1 | 84.2 | | | 82.3 | 74.2 | | |
| Think or visualize something pleasant/positive | | | | | | | | | |
| Ever use | 672 (79.3) | 82.4 | 76.2 | 0.03‡ | 1.5 (1.0–2.0)‡ | 81.5 | 68.0 | 0.001‡ | 2.1 (1.4–3.2)‡ |
| Past month | 651 (77.4) | 79.9 | 74.8 | | | 79.6 | 65.1 | | |
| Do a favorite hobby | | | | | | | | | |
| Ever use | 522 (61.5) | 66.8 | 55.9 | 0.001‡ | 1.6 (1.2–2.1)‡ | 63.4 | 51.2 | 0.01‡ | 1.7 (1.1–2.4)‡ |
| Past month | 455 (54.0) | 56.0 | 52.0 | | | 56.1 | 42.6 | | |
| Meditate | | | | | | | | | |
| Ever use | 507 (59.5) | 62.6 | 56.3 | 0.06 | 1.3 (1.0–1.7) | 62.1 | 45.7 | 0.001‡ | 1.9 (1.3–2.8)‡ |
| Past month | 467 (55.2) | 57.8 | 52.4 | | | 57.8 | 40.6 | | |
| Smoke tobacco/other substance | | | | | | | | | |
| Ever use | 287 (33.8) | 36.9 | 30.7 | 0.06 | 1.3 (1.0–1.8) | 31.1 | 51.2 | < 0.001‡ | 0.4 (0.3–0.6)‡ |
| Past month | 217 (25.5) | 23.9 | 27.2 | | | 22.1 | 45.0 | | |
| Drink alcohol | | | | | | | | | |
| Ever use | 221 (26.0) | 32.3 | 19.3 | < 0.001‡ | 2.0 (1.5–2.7)‡ | 24.8 | 34.1 | 0.03‡ | 0.6 (0.4–0.9)‡ |
| Past month | 122 (14.3) | 15.8 | 12.7 | | | 12.9 | 22.5 | | |
| Use biofeedback | | | | | | | | | |
| Ever use | 157 (18.5) | 21.9 | 15.0 | 0.01‡ | 1.6 (1.1–2.3)‡ | 20.4 | 8.6 | 0.002‡ | 2.7 (1.4–5.2)‡ |
| Past month | 135 (15.9) | 18.6 | 13.0 | | | 17.6 | 6.3 | | |
| Write in a journal | | | | | | | | | |
| Ever use | 136 (16.0) | 15.7 | 16.3 | 0.79 | 1.0 (0.7–1.4) | 18.0 | 5.4 | < 0.001‡ | 3.2 (1.7–8.4)‡ |
| Past month | 93 (11.0) | 10.0 | 12.0 | | | 12.1 | 4.7 | | |

* Values are the number (percentage) or the percentage unless indicated otherwise. Reference category is “never use.” CAM = complementary and alternative medicine; RA = rheumatoid arthritis; CLEAR = Consortium for the Longitudinal Evaluation of African Americans with Early Rheumatoid Arthritis; OR = odds ratio; 95% CI = 95% confidence interval.

† By logistic regression.

‡ Statistically significant at the 0.05 level.

Table 3. Specific CAM providers used by African Americans with RA participating in the CLEAR Registry at enrollment*

| CAM provider | Disease duration | | | | | Sex | | | |
|--|----------------------|------------------------------|-------------------------------|-------|-----------------------|--------------------|------------------|-------|-----------------------|
| | Overall (n = 855) | Late disease (n = 437) | Early disease (n = 418) | P† | Crude OR (95% CI)† | Women (n = 726) | Men (n = 129) | P‡ | Crude OR (95% CI)† |
| | | | | | | | | | |
| Pastor, priest, or other church leader | | | | | | | | | |
| Ever seen | 270 (31.8) | 28.5 | 35.3 | 0.03‡ | 0.7 (0.5–1.0)‡ | 32.1 | 30.2 | 0.68 | 1.1 (0.7–1.6) |
| Seen in last 6 months | 227 (26.7) | 21.8 | 31.8 | | | 27.0 | 24.8 | | |
| Chiropractic doctor | | | | | | | | | |
| Ever seen | 195 (22.8) | 26.4 | 19.2 | 0.01‡ | 1.5 (1.1–2.1)‡ | 21.6 | 30.2 | 0.03‡ | 0.6 (0.4–0.9)‡ |
| Seen in last 6 months | 36 (4.2) | 3.9 | 4.6 | | | 3.7 | 7.0 | | |
| Massage therapist | | | | | | | | | |
| Ever seen | 72 (8.5) | 8.5 | 8.5 | 0.97 | 1.0 (0.6–1.6) | 8.8 | 7.0 | 0.50 | 1.3 (0.6–2.6) |
| Seen in last 6 months | 36 (4.3) | 3.9 | 4.6 | | | 4.2 | 4.7 | | |
| Acupuncturist | | | | | | | | | |
| Ever seen | 42 (4.9) | 5.5 | 4.3 | 0.43 | 1.3 (0.7–2.4) | 4.9 | 5.4 | 0.78 | 0.9 (0.4–2.0) |
| Seen in last 6 months | 8 (0.9) | 0.5 | 1.4 | | | 0.8 | 1.6 | | |
| Herbalist | | | | | | | | | |
| Ever seen | 36 (4.2) | 4.4 | 4.1 | 0.84 | 1.1 (0.5–2.1) | 4.2 | 4.7 | 0.80 | 0.9 (0.4–2.2) |
| Seen in last 6 months | 15 (1.8) | 1.4 | 2.2 | | | 1.7 | 2.3 | | |

* Values are the number (percentage) or the percentage unless indicated otherwise. Reference category is "never use." CAM = complementary and alternative medicine; RA = rheumatoid arthritis; CLEAR = Consortium for the Longitudinal Evaluation of African Americans with Early Rheumatoid Arthritis; OR = odds ratio; 95% CI = 95% confidence interval.
 † By logistic regression.
 ‡ Statistically significant at the 0.05 level.

CAM use and disease duration. When late versus early disease groups were compared, no significant differences were found with regard to CAM treatment, while statistically significant results were found for CAM activity (Table 5). No significant differences were found with regard to ever consulting with a CAM provider, while those with late disease were significantly less likely to have consulted a CAM provider in the last 6 months as compared to those with early disease (Table 5). Those with longer disease duration had a higher number of treatments ever used than those with early disease (median 4 versus 3; $P < 0.001$).

Those with longer disease duration were significantly more likely to have ever used raisins soaked in vodka/gin (OR 2.7, 95% CI 1.2–6.2) and fish oils and/or omega-3 fatty acids (OR 2.2, 95% CI 1.6–3.1) than those with early disease (Table 1). Similar significant associations were observed for using household oils, gelatin, or fruit pectin in grape/aloe vera juice, heat treatment, wearing special jewelry, wearing magnets, and eating garlic (Table 1). Those with longer disease duration were significantly more likely to drink alcoholic beverages to relieve RA-related anxiety and stress than those with early disease (OR 2.0, 95% CI 1.5–2.8) (Table 2). Similar positive associations were observed for doing a favorite hobby, using biofeedback, and thinking/visualizing something pleasant/positive (Table 2). With regard to consulting a CAM provider, those with longer disease duration were more likely to consult a chiropractor (OR 1.5, 95% CI 1.1–2.1) but less likely to consult a religious leader (OR 0.7, 95% CI 0.6–1.0) than those with early disease (Table 3).

CAM use and sex differences. No significant sex differences were found with regard to ever use of CAM treatment, activity, or provider (Table 5). Women had (ever use) tried more CAM activities than men (median 5 versus 4; $P = 0.003$). Women were significantly more likely to use heat treatments (OR 1.8, 95% CI 1.2–2.8) while less likely to use household oils (OR 0.5, 95% CI 0.3–0.8); no significant differences were found for other types of treatments (Table 1). Significant sex differences were found with regard to all the activities. Women were significantly more likely to use various CAM activities for RA treatment than men, except for smoking and drinking alcoholic beverages (Table 2). With regard to CAM providers, women were less likely to consult a chiropractor than men (OR 0.6, 95% CI 0.4–0.9) (Table 3). No significant differences were found with regard to other providers, including pastor/priest.

DISCUSSION

In this study, prevalence of ever CAM use was found to be higher than that reported in other RA/arthritis studies (20–90%) (4,6,7,10–15), even in patients with early disease duration and after excluding prayer as

Table 4. Sociodemographic and clinical characteristics of African Americans with RA participating in the CLEAR Registry at enrollment*

| Characteristic | Overall (n = 855) | Disease duration | | Sex | |
|---------------------------------------|----------------------|--------------------------------|-------------------------------|--------------------|------------------|
| | | Longer, >2 yrs (n = 437) | Early, ≤2 yrs (n = 418) | Women (n = 726) | Men (n = 129) |
| Age at RA onset, mean ± SD years | 47.3 ± 13.3 | 44.2 ± 12.7 | 50.5 ± 13.3 | 47.1 ± 13.5 | 48.1 ± 12.2 |
| Age at enrollment, mean ± SD years | 54.3 ± 12.7 | 57.0 ± 11.6 | 51.5 ± 13.2 | 54.3 ± 12.9 | 54.3 ± 11.9 |
| Early disease (≤2 years), % | 48.9 | – | – | 48.3 | 51.9 |
| Women, % | 84.9 | 85.8 | 84.0 | – | – |
| Education (≥ high-school degree), % | 75.3 | 76.0 | 74.6 | 77.7 | 62.0 |
| Married, % | 29.2 | 25.6 | 32.9 | 27.3 | 39.8 |
| Poverty level, % | 34.1 | 35.9 | 32.2 | 34.8 | 29.9 |
| Ever smoker, % | 51.7 | 51.3 | 52.2 | 48.1 | 72.1 |
| Ever drank alcohol, % | 66.6 | 67.1 | 66.1 | 64.1 | 80.5 |
| Obese (BMI ≥30 kg/m ²), % | 52.4 | 53.1 | 51.6 | 55.1 | 37.3 |
| DAS28-CRP, mean ± SD | 3.9 ± 1.4 | 3.7 ± 1.4 | 3.9 ± 1.5 | 3.9 ± 1.4 | 3.7 ± 1.5 |
| HAQ score, median (Q1,Q3) | 1.4 (0.8, 1.9) | 1.4 (0.8, 1.9) | 1.4 (0.8, 1.9) | 1.4 (0.8, 1.9) | 1.1 (0.8, 1.8) |
| Pain score (0–10), median (Q1,Q3) | 7 (4, 8) | 7 (5, 8) | 6 (4, 8) | 7 (4, 8) | 7 (5, 9) |
| Fatigue score (0–10), median (Q1,Q3) | 6 (3, 8) | 6 (4, 8) | 6 (3, 8) | 6 (3, 8) | 5 (3, 8) |
| Helplessness score, median (Q1,Q3)† | 2.8 (2.0, 3.6) | 2.8 (2.0, 3.4) | 2.8 (2.0, 3.6) | 2.8 (2.0, 3.6) | 2.8 (2.0, 3.6) |
| Tender 28 joints, median (Q1,Q3) | 4 (1, 11) | 4 (1, 9) | 5 (2, 13) | 5 (2, 11) | 4 (0, 9) |
| Tender 28 joints (>0), % | 83.3 | 82.3 | 84.2 | 85.0 | 73.6 |
| Swollen joints, median (Q1,Q3) | 4 (1, 9) | 4 (1, 9) | 3 (1, 8) | 4 (1, 9) | 3 (0, 7) |
| Swollen joints (>0), % | 76.8 | 76.6 | 77.0 | 78.2 | 69.0 |
| Erosion, median (Q1,Q3) | 0 (0, 5) | 2 (0, 14) | 0 (0, 1) | 0 (0, 4.5) | 0 (0, 5) |
| Erosion (>0), % | 42.8 | 56.0 | 28.2 | 41.9 | 47.4 |
| Narrowing, median (Q1,Q3) | 0 (0, 10) | 6 (0, 26) | 0 (0, 0) | 0 (0, 9.5) | 0 (0, 10.5) |
| Narrowing (>0), % | 42.1 | 61.6 | 20.7 | 41.0 | 48.3 |
| Comorbidity (≥1), %‡ | 71.1 | 65.4 | 76.5 | 71.2 | 70.7 |
| Ever use DMARDs, % | 90.7 | 96.8 | 84.4 | 90.2 | 93.8 |
| Ever use methotrexate, % | 74.1 | 83.1 | 64.7 | 74.4 | 72.7 |
| Ever use steroids, % | 89.8 | 94.1 | 83.4 | 90.3 | 86.1 |

* Wherever applicable, “unknown” data were excluded. RA = rheumatoid arthritis; CLEAR = Consortium for the Longitudinal Evaluation of African Americans with Early Rheumatoid Arthritis; BMI = body mass index; DAS28-CRP = Disease Activity Score based on tenderness and swelling of 28 joints with C-reactive protein (CRP); HAQ = Health Assessment Questionnaire; Q1,Q3 = first quartile, third quartile; DMARDs = disease-modifying antirheumatic drugs (including biologic agents).
† Using Rheumatology Attitudes Index.
‡ Self-reported (diabetes mellitus, hypertension, heart disease, stroke).

CAM. Higher CAM use found in this study could be due to the number and/or type of CAM modalities asked in our questionnaire, which differed from other studies. As CAMs are constantly changing, developing a standard questionnaire for CAM use is difficult. For example, the number of therapies listed in the 2007 NHIS (3) questionnaire increased to 36 compared to 27 used in the 2002 NHIS questionnaire. Thus, the definition of CAM varies across studies and can change over time, with some CAM modalities included in “usual” care of RA patients. Furthermore, it has been reported that patients typically do not disclose the use of CAM to their health care providers for various reasons (4,6,13–15). Therefore, it is possible that the estimates in various studies could underestimate the “true” prevalence of CAM use.

Racial/ethnic differences with regard to CAM use have been reported in the US. The 2002 and 2007 NHIS found that when prayers were excluded from the definition of CAM, non-Hispanic whites had a higher prevalence of using at least one CAM compared to Asian Americans, African Americans, and Hispanics (4). However, when prayer was included in the CAM definition, African Amer-

icans had the highest CAM prevalence. The previous US national surveys have also found higher CAM prevalence among non-Hispanic whites than other races/ethnicities (16–18). In RA patients as well, Herman et al (6) found that non-Hispanic whites were significantly more likely to use CAM than Hispanics. In other studies that included a mix of various types of musculoskeletal syndromes such as RA, osteoarthritis, and fibromyalgia, results have been mixed. Mikuls et al (7) found that non-Hispanic whites were more likely to use CAM than African Americans, while Arcury et al (8) and Katz and Lee (19) found that African Americans were more likely to use CAM than non-Hispanic whites. In contrast, Rao et al (12) did not find race/ethnicity to be significantly associated with regular use of CAM. The current study was an exclusive cohort of African Americans and, therefore, racial/ethnic comparison could not be done. Nevertheless, prevalence of CAM use found in this study is higher than found in other studies.

We did not specifically query activities such as going to a place of pilgrimage or praying to specific entities (e.g., specific representations of a benevolent god or a holy saint). Most of the participants were from an area of the

Table 5. CAM use by African Americans with RA participating in the CLEAR Registry at enrollment*

| CAM use | Disease duration | | | | Sex | | | | |
|---------------|----------------------|--------------------------------|-------------------------------|-------|----------------------------|--------------------|------------------|------|----------------------------|
| | Overall (n = 855) | Longer, >2 yrs (n = 437) | Early, ≤2 yrs (n = 418) | P† | Univariate OR (95% CI)† | Women (n = 726) | Men (n = 129) | P† | Univariate OR (95% CI)† |
| Treatment‡ | | | | | | | | | |
| Ever | 812 (95.0) | 418 (95.7) | 394 (94.3) | 0.35 | 1.3 (0.7–2.5) | 692 (95.3) | 120 (93.0) | 0.27 | 1.5 (0.7–3.3) |
| Past month | 626 (73.2) | 322 (73.7) | 304 (72.7) | | | 541 (74.5) | 85 (65.9) | | |
| Activity§ | | | | | | | | | |
| Ever | 839 (98.1) | 434 (99.3) | 405 (96.9) | 0.01¶ | 4.6 (1.3–16.4)¶ | 714 (98.4) | 125 (96.9) | 0.28 | 1.9 (0.6–6.0) |
| Past month | 830 (97.1) | 430 (98.4) | 400 (95.7) | | | 707 (85.2) | 123 (95.4) | | |
| Provider# | | | | | | | | | |
| Ever | 438 (51.2) | 223 (51.0) | 215 (51.4) | 0.91 | 1.0 (0.8–1.3) | 371 (51.1) | 67 (51.9) | 0.86 | 1.0 (0.7–1.4) |
| Past 6 months | 274 (32.0) | 119 (27.2) | 155 (37.1) | | | 233 (32.1) | 41 (31.8) | | |

* Values are the number (percentage) unless indicated otherwise. CAM = complementary and alternative medicine; RA = rheumatoid arthritis; CLEAR = Consortium for the Longitudinal Evaluation of African Americans with Early Rheumatoid Arthritis; OR = odds ratio; 95% CI = 95% confidence interval.
† By logistic regression.
‡ Used at least 1 of the 16 treatments.
§ Used at least 1 of the 9 activities.
¶ Statistically significant at the 0.05 level.
Consulted at least 1 of the 5 CAM providers.

country where there are not significant numbers of Roman Catholics, particularly in the African American community. Similarly, meditation was used frequently in almost 60% of our participants. We were unable to determine from our data more detailed information on this; it is unclear based on our questionnaire whether patients were instructed on meditation or self-taught, whether it was part of yoga or prayer, or whether meditation was part of an independent set of activities. Similarly, we did not ask about spa treatments. Approximately one-third of our participants met criteria for the poverty level, so we speculate that going to a spa would not have been common among this group of subjects.

The use of chiropractic or similar practitioners of non-traditional medicine deserves further comment. According to the 2007 NHIS (3), approximately 8.6% of adults in the US had received chiropractic or osteopathic manipulation in the 12 months prior to the interview. A study by Shelke and Brook (20) analyzed data from the RAND Corporation Health Insurance Experiment and found that of the 5,279 people enrolled, 7.5% sought chiropractic care. A study by Feuerstein et al (21) examined the 1997 National Medical Expenditure Survey and found that 9% of the population had used physical therapy. A review by Lawrence and Meeker (22) of chiropractic use for chronic low back pain and other conditions reported a prevalence ranging from 6–12%. Other surveys (16,18,23–26) found that the annual prevalence of chiropractic use ranges from 6.8–16% in the US population. This range could be attributed in part to differences in racial/ethnic groups, time periods under study, or differences in study designs. The NHIS figures of acupuncture use are similar to the prevalence reported in our study.

Geographic location has also been cited as one of the reasons for disparity; national studies among general populations have found higher CAM use in the western region compared to other regions of the US (6,15,17). The current

study participants were from Alabama, Georgia, Missouri, North Carolina, and South Carolina, and no differences in CAM use by site were found. The study populations in the current and other RA studies (6,11–13,27) did not differ with regard to health care setting, as the participants were recruited from university-based clinics. Of note, however, is that the other studies' participants were predominantly non-Hispanic whites and arthritis-related studies have reported higher use of CAM among African Americans than non-Hispanic whites (8,19). As the studies differ in their definitions of CAM and overall study population, comparison between the studies should be made with caution.

Current evidence regarding efficacy of various CAM modalities is limited and inconsistent. A recent systematic review (28) identified 218 CAM modalities used in rheumatic diseases. However, randomized clinical trials of RA were available for only 18 CAMs and produced inconsistent results. Only borage seed oil and thunder god vine trials were positive; the review did not include fish oil (omega-3 polyunsaturated fatty acid) as another meta-analysis (29) had shown its beneficial effect in reducing pain, duration of morning stiffness, and number of tender/swollen joints. Another review by Efthimiou and Kukar (30) concluded that acupuncture, herbal medicines, dietary omega-3 polyunsaturated fatty acid, vitamins, and pulsed electromagnetic field showed "promising" efficacy in reducing pain. While some of the beneficial CAMs such as fish oils were used by the study participants, potentially harmful remedies such as WD-40 and turpentine were also used. Furthermore, some remedies could have interactions with conventional medicines or could lead to deferral of effective therapies (8,30–33). Although CAMs are generally considered safe, serious side effects have been reported. Therefore, it is important for a physician to be knowledgeable of the safety profile and mechanism of action of the used CAM.

On average in this study, patients tried 3 treatments, 5

activities, and consulted at least 1 CAM provider. Various treatments and some activities, such as biofeedback, would incur some out-of-pocket financial expenditure. Although this study did not specifically examine this issue, financial costs associated with CAM use are escalating. It is estimated that in 1990, US patients spent approximately \$13.7 billion on various CAM modalities, which increased to \$21.2 billion in 1997. A total of \$5.1 billion was spent on herbal medicines, and out-of-pocket expenses on CAMs totaled \$12.2 billion (18).

Being aware of CAM use, health care providers can advise patients regarding potentially beneficial, harmful, or ineffective treatments. This would also help in overall management and could address the issues of treatment adherence and outcomes. While it has been reported that patients typically do not disclose the use of CAM to their health care providers (6,12,18,34,35), a high proportion of (self-reported) CAM use in this study indicates willingness of the patients to disclose the practices regarding CAM use for research purposes.

This study did not find significant sex differences for overall CAM use, although women tried more CAM activities than men (median 5 versus 4). The tendency to use more activities could indicate that women have more RA-related anxiety and stress than men. Studies regarding sex differences in CAM use have produced mixed results; some report higher CAM use by women (6,10,11), while others report no significant sex differences (7,12). Although no significant sex differences were found in this study with regard to overall CAM use, specific treatments and activities did vary among men and women. Women were significantly less likely to use household oils, smoke, or drink alcoholic beverages for RA treatment, but they were more likely to use heat treatments, pray, write in a journal, and participate in hobby activities. Arcury et al (8) also found that women were less likely to drink alcoholic beverages and were more likely to pray or attend church services.

There are several limitations to our study. The cross-sectional study design precluded definitively establishing a cause and effect relationship. We could not conduct multivariable analyses due to high prevalence of CAM use leading to highly unbalanced groups of CAM users versus nonusers. Another limitation of the study was that the CAM practices were self-reported. However, self-report is likely the most feasible and appropriate way of collecting data on CAM. Our study forms had specific close-ended questions regarding CAM use and no open-ended questions or "other" practices were asked. It is possible that the patients could have used other CAM modalities not covered in the study form, which is a limitation of this study. However, there is no standard questionnaire regarding CAM use and the items included in our study forms were based on previous work and covered major areas/categories of CAM use. Given the high prevalence of CAM use reported in this study and the wide range of items queried, we expect that prevalence of "other" CAM modalities would have been small compared to the items included in the forms.

This is the first study of an exclusively African American cohort with RA. Our sample size of African Americans

is much larger than other studies, which have typically included a small proportion of African Americans. Our results are likely specific to African Americans and not to RA patients of other races/ethnicities. Unlike other studies (7,10,13,14,36,37), the cohort was exclusively of RA patients rather than a mix of rheumatic conditions (e.g., osteoarthritis, fibromyalgia). Quandt et al (10) noted that most published studies fail to differentiate whether the individual's CAM use is arthritis-related or for other purposes, which makes it difficult for clinicians to understand which therapies are chosen for arthritis. In this study, we reported CAM use specifically for RA-related symptoms or associated anxiety and stress.

In conclusion, CAM use was high in this cohort of African Americans with RA. Health care providers should be cognizant of CAM use as some treatments could interact with conventional medicines and have a differential impact on African Americans, where racial disparities are known to affect access to conventional care.

AUTHOR CONTRIBUTIONS

All authors were involved in drafting the article or revising it critically for important intellectual content, and all authors approved the final version to be submitted for publication. Dr. Tamhane had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study conception and design. Tamhane, McGwin, Brown, Smith, Brasington, Bridges, Callahan.

Acquisition of data. Tamhane, Conn, Jonas, Smith, Brasington, Moreland, Bridges, Callahan.

Analysis and interpretation of data. Tamhane, McGwin, Redden, Hughes, Brown, Westfall, Smith, Moreland, Bridges.

REFERENCES

1. Fries J, Williams C, Ramey D, Bloch D. The relative toxicity of alternative therapies for rheumatoid arthritis: implications for the therapeutic progression. *Semin Arthritis Rheum* 1993;23 Suppl 1:68–73.
2. Lawrence R, Helmick C, Arnett F, Deyo R, Felson D, Giannini E, et al. Estimates of the prevalence of arthritis and selected musculoskeletal disorders in the United States. *Arthritis Rheum* 1998;41:778–99.
3. Barnes P, Bloom B. Complementary and alternative medicine use among adults and children: United States, 2007. *Nat Health Stat Rep* 2008;12:1–24.
4. Su D, Li L. Trends in the use of complementary and alternative medicine in the United States: 2002–2007. *J Health Care Poor Underserved* 2011;22:296–310.
5. Barnes P, Powell-Griner E, McFann K, Nahin R. Complementary and alternative medicine use among adults: United States, 2002. *Sem Int Med* 2004;2:54–71.
6. Herman C, Allen P, Hunt W, Prasad A, Brady T. Use of complementary therapies among primary care clinic patients with arthritis. *Prev Chronic Dis* 2004;1:A12.
7. Mikuls T, Mudano A, Pulley L, Saag K. The association of race/ethnicity with the receipt of traditional and alternative arthritis-specific health care. *Med Care* 2003;41:1233–9.
8. Arcury T, Bernard S, Jordan J, Cook H. Gender and ethnic differences in alternative and conventional arthritis remedy use among community-dwelling rural adults with arthritis. *Arthritis Care Res* 1996;9:384–90.
9. Arnett FC, Edworthy SM, Bloch DA, McShane DJ, Fries JF, Cooper NS, et al. The American Rheumatism Association 1987 revised criteria for the classification of rheumatoid arthritis. *Arthritis Rheum* 1988;31:315–24.

10. Quandt S, Chen H, Grzywacz J, Bell R, Lang W, Arcury T. Use of complementary and alternative medicine by persons with arthritis: results of the National Health Interview Survey. *Arthritis Rheum* 2005;53:748–55.
11. Jacobs J, Kraaijaat FW, Bijlsma JW. Why do patients with rheumatoid arthritis use alternative treatments. *Clin Rheumatol* 2001;20:192–6.
12. Rao J, Mihaliak K, Kroenke K, Bradley J, Tierney W, Weinberger M. Use of complementary therapies for arthritis among patients of rheumatologists. *Ann Intern Med* 1999;131:409–16.
13. Callahan L, Wiley-Exley E, Mielenz T, Brady T, Xiao C, Currey S, et al. Use of complementary and alternative medicine among patients with arthritis. *Prev Chronic Dis* 2009;6:A44.
14. Kaboli P, Doebbeling B, Saag K, Rosenthal G. Use of complementary and alternative medicine by older patients with arthritis: a population-based study. *Arthritis Rheum* 2001;45:398–403.
15. Kestin M, Miller L, Littlejohn G, Wahlqvist M. The use of unproven remedies for rheumatoid arthritis in Australia. *Med J Aust* 1985;143:516–8.
16. Eisenberg D, Kessler R, Foster C, Norlock F, Calkins D, Delbanco T. Unconventional medicine in the United States: prevalence, costs and patterns of use. *N Engl J Med* 1993;328:246–52.
17. Astin J, Pelletier K, Marie A, Haskell W. Complementary and alternative medicine use among elderly persons: one-year analysis of a Blue Shield Medicare supplement. *J Gerontol A Biol Sci Med Sci* 2000;55:M4–9.
18. Eisenberg D, Davis R, Ettner S, Appel S, Wilkey S, van Rompay M. Trends in alternative medicine use in the United States, 1990–1997: result of a follow-up national survey. *JAMA* 1998;280:1569–75.
19. Katz P, Lee F. Racial/ethnic differences in the use of complementary and alternative medicine in patients with arthritis. *J Clin Rheumatol* 2007;13:3–11.
20. Shelke P, Brook R. A community-based study of the use of chiropractic services. *Am J Public Health* 1991;81:439–42.
21. Feuerstein M, Marcus S, Huang G. National trends in non-operative care for nonspecific back pain. *Spine J* 2004;4:56–63.
22. Lawrence D, Meeker W. Chiropractic and CAM utilization: a descriptive review. *Chiropr Osteopat* 2007;15:2.
23. Astin J. Why patients use alternative medicine: results of a national study. *JAMA* 1998;279:1548–53.
24. Barnes P. Complementary and alternative medicine use among adults: United States 2002. *Vital Health Stat* 2002;343:1–19.
25. Ni H, Simile C, Hardy A. Utilization of complementary and alternative medicine by United States adults: results from the 1999 National Health Interview Survey. *Med Care* 2002;40:353–8.
26. Paramore L. Use of alternative therapies: estimates from the 1994 Robert Wood Johnson Foundation National Access to Care Survey. *J Pain Symptom Manage* 1997;13:83–9.
27. Efthimiou P, Kukar M, MacKenzie R. Complementary and alternative medicine in rheumatoid arthritis: no longer the last resort! *HSS J* 2010;6:108–11.
28. MacFarlane G, El-Metwally A, De Silva V, Ernst E, Dowds G, Moots R. Evidence for the efficacy of complementary and alternative medicines in the management of rheumatoid arthritis: a systematic review. *Rheumatology (Oxford)* 2011;50:1672–83.
29. Goldberg R, Katz J. A meta-analysis of the analgesic effect of omega-3 polyunsaturated fatty acid supplementation for inflammatory joint pain. *Pain* 2007;129:210–23.
30. Efthimiou P, Kukar M. Complementary and alternative medicine use in rheumatoid arthritis: proposed mechanism of action and efficacy of commonly used modalities. *Rheumatol Int* 2010;30:571–86.
31. Angell M, Kassirer J. Alternative medicine: the risks of untested and unregulated remedies [editorial]. *N Engl J Med* 1998;339:839–41.
32. Coppes M, Anderson R, Egeleer R, Wolff J. Alternative therapies for the treatment of childhood cancer [letter]. *N Engl J Med* 1998;339:846–7.
33. Weisbord S, Soule J, Kimmel PL. Poison on line: acute renal failure caused by oil of wormwood purchased through the internet. *N Engl J Med* 1997;337:825–7.
34. Fetrow C, Avila J. Professional's handbook of complementary and alternative medicines. Springhouse (PA): Springhouse; 1999.
35. Astin J. Use of alternative medicine by women with breast cancer [letter]. *N Engl J Med* 1999;341:1156.
36. Feinglass J, Lee C, Rogers M, Temple L, Nelson C, Chang R. Complementary and alternative medicine use for arthritis pain in 2 Chicago community areas. *Clin J Pain* 2007;23:744–9.
37. Jordan J, Bernard S, Callahan L, Kincade J, Konrad T, DeFries G. Self-reported arthritis-related disruptions in sleep and daily life and the use of medical, complementary, and self-care strategies for arthritis: the National Survey of Self Care and Aging. *Arch Fam Med* 2000;9:143–9.