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REVIEW ON HEALTH SERVICES

# A critical review of complementary and alternative medicine use among people with arthritis: a focus upon prevalence, cost, user profiles, motivation, decision-making, perceived benefits and communication

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**Abstract** A critical review of complementary and alternative medicine (CAM) use among people with arthritis was conducted focusing upon prevalence and profile of CAM users as well as their motivation, decision-making, perceived benefits and communication with healthcare providers. A comprehensive search of peer-reviewed literature published from 2008 to 2015 was undertaken via CINAHL, Medline and AMED databases. The initial search identified 4331 articles, of which 49 articles met selection criteria. The review shows a high prevalence of CAM use (often multiple types and concurrent to conventional medical care) among those with arthritis which is not restricted to any particular geographic or social-economic status. A large proportion of arthritis sufferers using CAM consider these medicines to be somewhat or very effective but almost half do not inform their healthcare provider about their CAM use. It is suggested that rheumatologists and others providing health care for patients with arthritis should be cognizant of the high prevalence of CAM use and the challenges associated with possible concurrent use of CAM and conventional medicine among their patients.

**Keywords** Alternative therapies · Arthritis · Complementary and alternative medicine · Complementary therapies · Osteoarthritis · Rheumatic arthritis

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## Introduction

Arthritis is a leading cause of pain, disability and health services utilization in many countries with more than 21% of US adults (46.4 million persons) and 3.85 million Australians being doctor-diagnosed with arthritis [1, 2]. The National Center for Disease Control and Prevention estimates that 67 million people will be impacted by arthritis in the US by 2030 [3]. Arthritis, which comprises over 100 different diseases and conditions that affect joints, the surrounding and other connective tissues, has no simple cure. Osteoarthritis (OA) and rheumatoid arthritis (RA) are the two most common forms of arthritis and are the leading causes of disability among older adults [4, 5]. Arthritis not only limits physical function but affects emotional, social and spiritual well-being [6].

The use of complementary and alternative medicine (CAM)—incorporating a range of practices and products not traditionally associated with the medical profession or medical curriculum and including acupuncture, traditional Chinese medicine, naturopathy and massage among other modalities and treatments [7]—is extensive in many countries. CAM use is particularly popular for chronic disease patients [8–10]. Approximately 24% (1.3 million) of Australian adults with a chronic condition regularly employ CAM as part of their treatment [11], and coping with arthritis is among the top five most common reasons why US adults seek CAM treatment [12, 13].

There is emerging but still ad hoc, and in most cases low-level, evidence for the efficacy of various CAM in treating arthritis [6, 14]. Trials have shown statistically significant and clinically relevant benefits for people with OA and RA using acupuncture [15, 16]. Moreover, early work suggests herbal medicine use may result in improvement

in morning stiffness, walking time and joint swelling among RA patients [17], and use of Cat's Claw (*Uncaria tomentosa* and *Uncaria guianen*) extract appears to result in fewer painful joints compared to placebo among RA patients [18] as well as pain reduction and improved function [19]. Recently, a systematic review concluded that traditional Chinese herbal patches may improve effectiveness for OA [20]. Early pilot work on yoga use for OA shows possible reduction in pain and functional disability [21], and more recent research has provided encouraging evidence that some CAM (mind–body therapies such as Tai Chi) may confer benefits to people with chronic rheumatic conditions [6]. Nevertheless, further prospective trials are needed, and current evidence regarding efficacy of various CAM modalities for arthritis remains highly limited and inconsistent [22].

CAM use is a significant public health and health services research issue [23–25] and more recently has been identified as representing both important opportunities and challenges for the care of those with chronic illness including arthritis [26]. Yet, until recently there has been no coordinated program of public health and health services research focused upon CAM use for arthritis and the most contemporary review of this topic conducted in 2008 was restricted to examining only epidemiological studies [27]. Given the contemporary popularity and significance of CAM use among those with chronic illness such as arthritis, it is important that all up-to-date empirical findings on this topic be assessed with a view to helping inform safe, effective and coordinated care. In direct response to this research gap, this paper reports findings from a critical review of academic literature from the last seven years (2008–2015) with a focus upon key aspects of CAM use and users for arthritis.

## Method

### Search strategies

The review sought to identify all peer-review literature reporting CAM use in relation to a broad definition of arthritis including rheumatoid arthritis, osteoarthritis, gout, fibromyalgia and spondylarthritis. Three databases (MEDLINE, CINAHL and AMED) were searched employing the following keywords: ('arthritis' OR 'rheumatoid' OR 'osteoarthritis' OR 'fibromyalgia' OR 'spondylarthritis' OR 'gout') AND ('complementary and alternative medicine' OR 'CAM' OR 'complementary medicine' OR 'complementary therapy' OR 'alternative medicine' OR 'alternative therapy' OR 'acupuncture' OR 'homeopathy' OR 'osteopathy' OR 'traditional Chinese medicine' OR 'TCM' OR 'aromatherapy' OR 'naturopathy' OR 'massage' OR 'dietary supplement' OR 'meditation' OR 'herbal medicine' OR 'herbal' OR 'natural'). An additional search for relevant studies was undertaken using Google Scholar, as well as additional searches of bibliographic references in the literature already identified from the search.

### Selection criteria

All identified articles were imported into EndNote X7 with duplicated results removed. The search was limited to peer-reviewed literature with abstracts published from 2008 to 2015 and which reported new empirical findings regarding aspects of CAM use among those with arthritis. Articles identified as editorials, correspondences, commentaries, case reports and writings that did not adopt systematic research design or data reporting procedures, as well as those reporting results from clinical studies (including clinical trial designs), were all excluded (Fig. 1).

### Search outcomes

Forty-nine articles meet the inclusion criteria and were divided into two categories (Table 1): those papers reporting from studies with a large sample size of 500 or above and those reporting from studies with a small sample size below 500 subjects.

### Quality appraisal

In order to appraise the quality of the review articles, a quality scoring system (Table 2) previously employed to assess CAM use literature for neck pain [28], among cancer patients [29, 30], headache and migraine patients [31] and women with menopause [32] was adopted.

## Results

The data reported in the 49 reviewed articles were extracted, grouped and summarized using a critical review approach. The data extracted were synthesized into five themes: 'prevalence and cost of CAM use,' 'the profile of CAM users,' 'type and timing of CAM use,' 'motivations, information sources and perceived benefits of CAM use' and the 'relationship and communication with healthcare providers regarding CAM use.'

### Prevalence and cost of CAM use

This review identified 49 papers reporting CAM use among people with arthritis from 2008 to 2015 in 12 countries. A wide variety of different types of CAM use have been reported among people with arthritis, with CAM

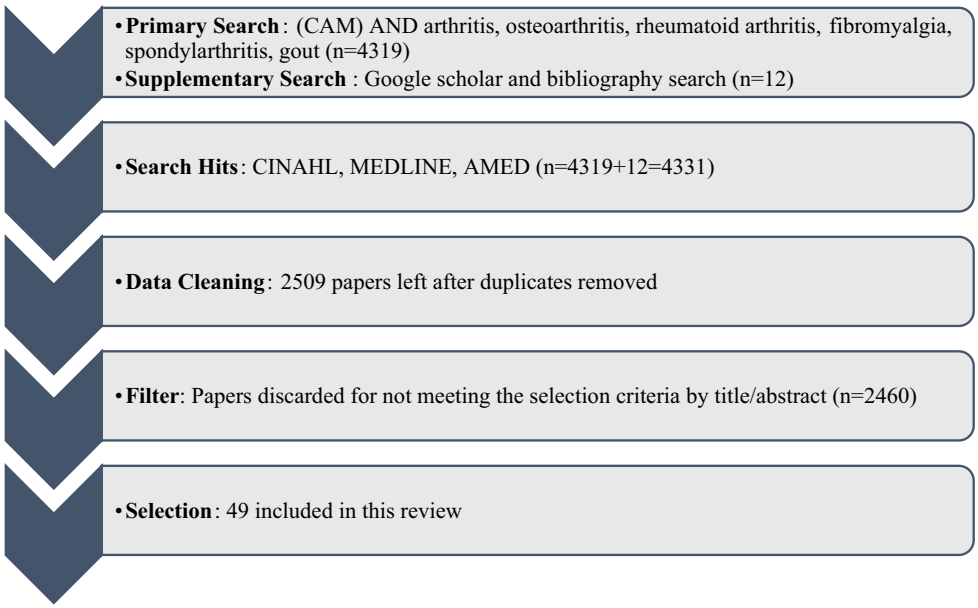


**Fig. 1** Flowchart of the literature search process. *CAM, complementary and alternative medicine

supplements (such as glucosamine/chondroitin, methylsulfonylmethane (MSM), S-Adenosyl methionine, herbs, vitamins) and massage therapy the most popular among people with OA [33–38]. Thirty-one of the 49 articles reported the prevalence of CAM use among people with arthritis, including 14 articles reporting the prevalence of CAM use among people with only OA, and eight articles reported the prevalence of CAM use among people with only RA. Fifteen articles drew upon large samples ($n \geq 500$) to report prevalence rates for CAM use [7.5–95%] (mean, 53.0%; median, 46%). Meanwhile, the prevalence rates reported in another 16 articles drawing upon small samples ($n < 500$) ranged from 23.9 to 82% (mean, 55.1%; median, 57%).

The reviewed literature shows the costs of CAM use among people with arthritis vary between countries. In Korea, the mean total spending on CAM post-RA diagnosis was US$1907 within 12 months [39]. Meanwhile, CAM use expenses accounted for 3% of the total healthcare cost among people with OA in the US [40] and results from a New Zealand longitudinal observational study showed the total costs at baseline related to gout therapy as higher among CAM users when compared to non-CAM users (mean [SD] cost per month NZ$35.7 [NZ$69.0] vs. NZ$7.1 [NZ$22.8]) [41]. This same study showed that for those participants reporting CAM use, the mean expenditure on CAM treatments was NZ$29.10 (US$23.27) per patient per month. Meanwhile, a study in Canada showed the majority of patients with OA (45.4%) who use CAM spend less than CAN$25 per month, 25.9% spend CAN$25–$50 per month, 15.7% spend CAN$50–100 per month and 12.9% spend greater than CAN$100 per month on CAM [36].

## The profile of CAM users

While some studies report higher CAM use by women with arthritis compared to men with arthritis either as an exclusive treatment or concomitantly with conventional medicine [33–35, 42–47], other research reported no significant gender differences in arthritis-focused CAM consumption [37, 48–50] and one paper reported higher CAM use by men with gout [41]. With regard to overall CAM use for arthritis, the literature suggests specific treatments and activities may vary among women and men. For example, a US study found women with RA had tried more types of CAM (ever use) than men [51], and in the same study, women were more likely to use heat treatments and less likely to consult a chiropractor than men participants [51].

Several studies report ethnic differences with respect to CAM use for arthritis [35, 52, 53]. According to a study from the US [35], African-Americans with OA were less likely to use CAM compared to non-Hispanic whites. Meanwhile, other US research [52] shows African-Americans with arthritis are more likely to use only conventional care rather than both CAM and conventional care. This study also identified those using only conventional medicine as more likely than those using both forms of health care to be African-American and less likely to be Asian or other (e.g., White), while those using neither form of care were more likely to be African-American, Asian or Hispanic. Moreover, African-Americans with knee OA were less likely to use either CAM alone or CAM and conventional treatments concurrently, compared to non-Hispanic white women and men with knee OA [35]. This result is also supported by a separate large population study which identified CAM as less likely to be used by

**Table 1** Research-based studies of CAM use for patients with arthritis 2008–2015

| Year | Country | Authors | Research focus | Arthritis types | CAM modality | Method | Sample size |
|---|---|---|---|---|---|---|---|
| 2008 | USA | Sleath and Callahan et al. | Prevalence, profile, frequency, disclosure | Arthritis (RA, fibromyalgia and OA) | Alternative health providers or therapists, special diets or food plans, vitamins, herbs or other supplements taken by mouth; rubs, lotions, copper bracelets or magnets or other body treatments used; movement activities; spiritual, relaxation or mind–body activities | Self-report questionnaire survey | 1063 |
| 2008 | USA | Sleath and Cahoon et al. | Prevalence, users' profile, concurrent use | OA | Vitamins or minerals; herbs, mixtures, or other supplements; rubs, lotions, liniments, creams, or oils; spiritual, relaxation, or mind–body activities; other body treatments; and movement activities | Self-report questionnaire survey | 557 |
| 2008 | USA | Barnes | Prevalence | Musculoskeletal problems—including back pain, neck pain, joint pain or stiffness or other joint condition, arthritis | 36 types of CAM, e.g., non-vitamin, non-mineral, natural products and chiropractic or osteopathic manipulation | Data from National Health Interview Survey | 31,044 |
| 2008 | Canada | Sirois Fuschia M. | Prevalence, Types of CAM, Concurrent use | Arthritis (RA, fibromyalgia and OA) | Chiropractic, massage therapy, natural/homeopathy, acupuncture, other CAM | Cross-sectional international survey | 140 |
| 2008 | Korea | Lee et al. | Prevalence, information sources, perceived benefits/effectiveness, types of CAM, disclosure and cost/expenditure | RA | Traditional Oriental medical treatment, plant- and animal-derived over-the-counter healthcare products, used manual therapies | Questionnaire interview | 153 |
| 2009 | USA | Callahan et al. | Prevalence, profile and types of CAM | Arthritis: OA, RA, fibromyalgia and chronic joint symptoms | Alternative providers, special diets, vitamins and minerals, supplements, ointments or topical rubs, body treatment, spiritual and mind–body therapies | Family medicine research network and musculoskeletal database survey | 2140 |
| 2009 | Canada | Marsh et al. | Prevalence, communication/disclosure, polypharmacy/concurrent use and reasons for CAM use, duration of disease, cost | OA | Herbal medication, alternative practitioner, osteopathic doctor, chiropractor, massage therapist | Cross-sectional observational, questionnaire survey | 373 |

**Table 1** continued

| Year | Country | Authors | Research focus | Arthritis types | CAM modality | Method | Sample size |
|---|---|---|---|---|---|---|---|
| 2009 | Mexico | Alvarez-Nemegyei et al. | Prevalence, profile, types of CAM | Rheumatic disease: RA, systemic lupus erythematosus, fibromyalgia, knee OA | Biologically based practices, food supplements, mind–body medicine, whole medical systems, manipulative and body-based practices and energy medicine | Personal interview survey | 445 |
| 2009 | Sweden | Klingberg et al. | Prevalence, types of CAM, users' profile | Inflammatory rheumatic diseases: polyarthritis, spondyloarthritis, systemic rheumatic diseases, vasculitis and miscellaneous. Rheumatoid arthritis. Osteoarthritis, gout and tendonitis | Biologically based practices, food supplements, mind–body medicine, whole medical systems, manipulative and body-based practices and energy medicine | Questionnaire survey | 200 |
| 2009 | UK | Hughes | Perceived benefits/effectiveness | RA | Acupuncture | In-depth interviews | 13 |
| 2010 | Turkey | Unsal and Gozum | Prevalence, profile, types of CAM, perceived benefits/effectiveness, type of arthritis, disease duration | Arthritis: OA, RA, ankylosing spondylitis, fibromyalgia, gout, systemic lupus erythematosus and/or other types of arthritis | Thermal therapies, oral herbal therapies, hot therapies, externally applied therapies, massage and cold therapies | Questionnaire | 250 |
| 2010 | USA | Efthimiou et al. | Prevalence, profile, types of CAM | RA | Mind–body techniques, martial arts, touch therapy, herbs and supplements | Longitudinal registry data analysis | 166 |
| 2010 | Australia | Adams et al. | Prevalence | Chronic conditions: arthritis (RA, OA, other arthritis), diabetes, asthma, etc. | Oral CAM | Telephone and written questionnaires | 648 |
| 2010 | USA | Weigel et al. | Prevalence of chiropractic use, types of CAM | The health conditions: arthritis, cancer, any heart condition, diabetes, lung disease, hip fracture, or hypertension | Chiropractic | Data from survey | 806 |
| 2011 | Australia | Armstrong et al. | Prevalence, profile, concurrent use | Chronic illness: asthma, diabetes, arthritis, osteoporosis, heart or circulatory condition | Vitamin/mineral supplements or natural/herbal remedies | National Health Survey Data | 7805 |
| 2011 | Australia | Sibbritt et al. | Prevalence | The conditions included arthritis, diabetes, heart disease, hypertension, low iron, asthma and cancer | Acupuncture | Questionnaire survey | 11,200 |

**Table 1** continued

| Year | Country | Authors | Research focus | Arthritis types | CAM modality | Method | Sample size |
|---|---|---|---|---|---|---|---|
| 2011 | India | Jadhav et al. | Prevalence, types of CAM, disclosure, reasons for CAM use, effectiveness | OA and RA | Ayurveda, massage, yoga asana, homeopathy | Observational questionnaire interview | 60 |
| 2011 | Nigeria | Obalum and Ogo | Prevalence and profile, types of CAM use, reasons of CAM use | OA | Herbal products, local embrocation and massage, spiritual methods | Descriptive questionnaire Interview | 164 |
| 2011 | USA | Rispler et al. | Prevalence and disclosure | OA | Herbal, nutritional and megavitamin supplementation | Questionnaire survey | 50 |
| 2012 | Lebanon | Alaaeddine et al. | Prevalence, arthritis status, concurrent use and effectiveness/perceived benefits | RA and OA | Herbal medicine, exercise, massage, acupuncture, yoga and dietary supplement | Cross-sectional questionnaire-based interviews | 250 |
| 2012 | Turkey | Ulusoy et al. | Prevalence, profile, information sources, motivation, perceived benefits | Rheumatic disease: osteoarthritis, fibromyalgia, chronic low back pain, and neck pain, rheumatoid arthritis, spondyloarthropathies, connective tissue diseases, vasculitis, and familial Mediterranean fever | Acupuncture; biofeedback; dietary modifications; body-based practices; magnetic or copper devices; behavioral methods | Face-to-face questionnaire interview | 318 |
| 2012 | UK | Asprey et al. | Qualitative study, Effectiveness/perceived benefits | Knee OA | Acupuncture | Semi-structured open questions interview | 16 |
| 2012 | UK | Brien et al. | Qualitative study, Effectiveness/perceived benefits | RA | Homeopathy consultation | In-depth face-to-face interview | 16 |
| 2012 | USA | Cheung Corjena | Profile, types of CAM use, concurrent use, reasons of CAM use, perceived benefits, information sources, communication | Arthritis | Nutritional supplements, self-help modalities including plant-based creams and ointments, chiropractic, acupuncture, massage therapy, mind–body interventions such as prayer | Face-to-face audio recording discussion meeting | 27 |
| 2012 | USA | Wallen and Brooks | Information sources, disclosure | Rheumatic disease: OA, RA, arthritis, other | CAM practitioner consultation | Face-to-face interview | 109 |
| 2012 | USA | Hoerster et al. | Prevalence, and profile, concurrent use | Adults with provider-diagnosed arthritis—excluding those with only fibromyalgia, gout, lupus or rheumatoid arthritis | Natural products, deep breathing exercises, chiropractic or osteopathic manipulation, meditation, massage, yoga, progressive relaxation, diet-based therapies | National Health Interview Survey Data | 3850 |

**Table 1** continued

| Year | Country | Authors | Research focus | Arthritis types | CAM modality | Method | Sample size |
|---|---|---|---|---|---|---|---|
| 2012 | USA | Lapane, Sand et al. | Prevalence, profile, types of CAM, concurrent use | Knee OA | Alternative medical system; biologically based therapies; manipulative and body-based therapies; mind–body therapies; and energy healing therapies | Interview questionnaire survey | 2679 |
| 2012 | USA | Jawahar et al. | Prevalence, profile, types of CAM | Knee OA | Alternative medical systems, mind–body interventions, manipulation and body-based methods, energy therapies, and biologically based therapies | Data from Osteoarthritis Initiative survey | 2679 |
| 2012 | The Netherlands | Hoogeboom et al. | Prevalence | Hip or knee OA | Alternative medicine, supplement use | Questionnaire | 1002 |
| 2012 | USA | Zodet & Stevans | Prevalence of Chiropractic use | Health indicators (Arthritis, high blood pressure, stroke, etc.) | Chiropractic | Data from the Medical Expenditure Panel Survey | 5062 |
| 2012 | USA | Gore et al. | Prevalence, profile, cost | OA and chronic low back pain | Acupuncture, hydrotherapy, massage, physical therapy, heat/cold application, chiropractic, osteopathic | Data from the LifeLink™ Health Plan Claims Database | 112,951 |
| 2012 | USA | Yang et al. | Prevalence, profile, types of CAM | Knee OA | Alternative medical systems, mind–body interventions, manipulation and body-based methods, energy therapies and three types of biologically based therapies | Interview survey | 3850 |
| 2012 | Denmark | Poulsen et al. | Prevalence | Knee OA | Chiropractic | Patient records | 2000 |
| 2013 | Australia | Yen et al. | consultations with CAM practitioners by older Australians | Chronic conditions: arthritis, etc. | CAM practitioner consultation | Survey | 520 |
| 2013 | India | Bhalerao et al. | Prevalence, profile, communication, reasons for CAM use, satisfaction | Chronic disease: epilepsy, HIV, RA and diabetes mellitus (DM) | Ayurveda, massage, yoga asana, homeopathy | Cross-sectional questionnaire-based interview | 650 |
| 2013 | USA | Lapane et al. | Prevalence, profile, types of CAM use, effectiveness/perceived benefits | Knee OA | Alternative medical systems, mind–body interventions, manipulation and body-based methods, energy therapies, biologically based supplements biologically based diet | Data from the Osteoarthritis Initiative | 2675 |

**Table 1** continued

| Year | Country | Authors | Research focus | Arthritis types | CAM modality | Method | Sample size |
|---|---|---|---|---|---|---|---|
| 2013 | USA | Yang et al. | Prevalence, profile, concurrent use, types of CAM | Knee OA | Alternative medical systems or energy therapies, mind–body interventions, manipulation and body-based therapies, biologically based diet, biologically based topical agents, biologically based supplements | Survey | 1121 |
| 2014 | China | Xu et al. | Prevalence, cost | RA | Traditional Chinese medicine | Data from Interview | 829 |
| 2014 | Switzerland | Simoes-Wust et al. | Prevalence | Chronic disease: migraine, arthritis, depression, and constipation, etc. | Acupuncture, homeopathy, phytotherapy, Shiatsu/food reflexology, autogenic training/hypnoses, neural therapy, TCM, anthroposophic medicine, bio-resonance, Indian medicine, osteopathy | Self-reported data | 3333 |
| 2014 | Taiwan | Chen et al. | Prevalence, profile and types of CAM | OA | Chinese herbal medicine | Medical record from National Health Insurance Research Dataset | 20,059 |
| 2014 | Turkey | Tokem et al. | Prevalence, profile and types of CAM | RA | Herbs taken orally, nutritional supplements, mind–body therapies | Descriptive cross-sectional questionnaire | 594 |
| 2014 | Australia | Basedow et al. | Prevalence, beliefs | OA | Fish/krill/omega oil, glucosamine, vitamin, chondroitin, minerals, herbal medicines | Survey questionnaire | 650 |
| 2014 | USA | Tamhane et al. | Prevalence, profile, types of CAM | RA | Food supplements, topical applications, activities, alternative care providers | Database registry analysis | 855 |
| 2014 | Canada | Sirois Fuschia M. | Prevalence, profile and effectiveness | Inflammatory bowel disease or arthritis (any forms) | Manipulative and body-based practices, energy medicine, and whole medical systems | Survey | 170 |
| 2014 | New Zealand | Chan et al. | Prevalence, profile, cost, effectiveness | Gout | Dietary supplements, herbal medicines, acupuncture, heat treatment, massage, spiritual healer, tropical ointments, aromatherapy, naturopathy, homeopathy, ayurvedic medicine | questionnaire | 276 |
| 2014 | USA | Cheung et al. | Prevalence, profile, reasons for CAM use, motivation, perceived benefits, disclosure | Arthritis | Orally ingested, mental/spiritual, topical applications, movement based, practitioner based | Descriptive qualitative using data collected from focus group method | 50 |

**Table 1** continued

| Year | Country | Authors | Research focus | Arthritis types | CAM modality | Method | Sample size |
|---|---|---|---|---|---|---|---|
| 2015 | USA | Geisler et al. | Information sources, communication, decision-making | Arthritis | 44 different kinds including orally ingested supplements, herbs and juices; mental/spiritual practices, topical applications; movement-based therapies, and practitioner-based modalities (e.g., acupuncture, energy healing, reflexology, massage). | Qualitative and quantitative, survey, data analysis | 50 |
| 2015 | India | Jaiswal et al. | Information sources, effectiveness, perceived benefits | Chronic illness: arthritis, etc. | Ayurveda, homeopathy, manual healing, acupuncture | Questionnaire-based survey | 100 |
| 2015 | Taiwan | Huang et al. | Prevalence, profile, TCM types | RA | Traditional Chinese medicine | National Health Insurance Research Database | 25,263 |

African-Americans with knee OA compared to Caucasian Americans with knee OA [53].

A number of the reviewed papers report significant differences with regard to educational level among arthritis sufferers who use or do not use CAM. A US study [35] showed adults with OA with at least a college education were twice as likely to report CAM supplement use compared to those with a high school education or less. This finding appears consistent with other studies conducted in the US [42, 54] as well as studies in Sweden, Lebanon, Nigeria, Turkey and Canada [37, 43, 49, 50, 55]. In addition, a Canadian study [56] showed respondents with arthritis who had some college or university education were twice as likely to use CAM, and those who had a post-graduate education were almost three and a half times as likely to use CAM. On the other hand, two studies [48, 52] found that CAM users with arthritis in Turkey and the US, respectively, were more likely to have lower levels of formal education.

## Type and timing of CAM use

A number of the reviewed papers show many people with OA only [33, 36, 37, 54], RA only [49] and broad definitions of arthritis [46, 47, 52] concurrently use both conventional medicine and CAM (prevalence between 16 and 63%) with CAM supplements being the most popular among study participants in many countries [33–37, 49, 50, 58–60]. Moreover, the multiple use of different types of CAM (more than one CAM used by the same patient) appears common among people with OA only [33, 34, 36, 54], RA only [51, 61] and broad definitions of arthritis [50, 56–59], with the average number of different CAM used per person for arthritis being of 1.52 in Canada [56] and $2.2 \pm 1.5$ in Mexico [59].

The literature provides limited information regarding when people with arthritis seek CAM in the context of their illness journey. A study from the Netherlands examining 1002 participants with early hip or knee OA reported 10% of participants used CAM in the earliest stage of the disease, and supplements were identified as the only healthcare type to have increased in use over the 2-year follow-up data among all participants groups [62]. A study describing longitudinal patterns of CAM use among 1121 older adults with OA showed the proportion of CAM use for people with OA decreased slightly from 51.8 to 47.6% at year 2 and to 47.1% at year 4 [33]. In terms of how long people use CAM to treat their arthritis, one Korean study shows most patients used CAM (for RA) within 12 months of the onset of RA (75%), half used CAM for 12 months or less (49%), 23% used CAM for 12–36 months and 28% used CAM for over 36 months [39]. Specifically, a large-scale study of traditional Chinese medicine (TCM) use among

**Table 2** Description of quality scoring system for the CAM papers reviewed

| Dimensions of quality assessment | Points awarded[a] |
|---|---|
| Methodology | |
| A. Representative sampling strategy | 1 |
| B. Sample size > 500 | 1 |
| C. Response rate > 75% | 1 |
| D. Low recall bias (prospective data collection or retrospective data collection within the past 12 month) | 1 |
| Reporting of participants' characteristics | |
| E. Status, types of arthritis | 1 |
| F. Age | 1 |
| G. Ethnicity | 1 |
| H. Indicator of socioeconomic status (e.g., income, education) | 1 |
| Reporting of CAM use | |
| I. Definition of CAM or modalities provided to participants | 1 |
| J. Participants can name CAM therapies/modalities used (open question) | 1 |
| K. Use of CAM modalities assessed | 1 |

Data adapted from Peng et al. [32]

*CAM* complementary and alternative medicine

[a] The maximum score is 11 points

25,263 patients with RA revealed that the interval between the confirmed diagnosis of RA and the first TCM visit was 23.4 month in Taiwan [63].

### Motivations, information sources and perceived benefits of CAM use

One US study shows a range of factors may have important bearing upon arthritis sufferers' decision-making around CAM use including: a willingness by patients to take control of their health care; a desire of patients to try everything available; pressure from mass media and a perception that CAM is risk-free [61]. Meanwhile, a Korean study identified most CAM users as motivated by: expectations of CAM as providing complete recovery after several uses (42%); friends and family members (37%) and in belief the CAM could potentially reduce acute pain levels (16%). An Indian study of 60 patients with RA or OA identified 58% of participants who used CAM as reporting pain control as the most common reason for using CAM [57]. Similarly, a study of 279 Turkish patients with RA [60] emphasized that 96% of patients used CAM due to their pain, followed by morning stiffness (17.2%) and exhaustion and fatigue (15.4%). Research aimed at determining the pattern of CAM use among 164 OA patients in Nigeria [37] found a range of reasons for CAM use—a majority of CAM users (54.5%) expected a permanent cure which they perceived conventional medicine could not deliver, 48.5% perceived CAM as less expensive than prescribed medicine and 45.5% claimed CAM had no side effects.

A Korean study showed the most important sources of information guiding arthritis sufferers to use CAM were friends, family members and other relatives (49%); the patients' own opinion (30%); other patients (15%); mass media and books (6%); and medical specialist (4%) [36]. Furthermore, results from a study in Turkey [48] showed 49.2% of those with arthritis who used CAM heard about CAM from family members or relatives, neighbors or friends (31.6%), people with the same disease (20.8%), health professionals (12.8%) or media (4%). Finally, a study assessing information resources for CAM use among rheumatic disease patients in Turkey showed only 13.6% used CAM with the recommendation of their physician, while most were encouraged toward CAM use by their relatives (41.5%) and mass media (12.9%) [50].

In terms of the perceived benefits of CAM use among arthritis sufferers, 49% of a sample of Korean users considered CAM to be somewhat or very effective [39]. Likewise, a study focusing on CAM use among 250 Turkish people with arthritis [48] indicated that 50% of the CAM interventions used were reported to be somewhat or very effective, with heat therapies attracting the highest rate (79.2%), followed by massage (64.8%) and cold therapies (58.3%). Similarly, another study [43] examining CAM use among 200 Sweden patients with inflammatory rheumatic diseases showed that 66% of patients with experience of CAM use expressed positive benefit for their health. Moreover, in a study comprising of 250 people with RA or OA in Lebanon, patients perceived CAM as able to alleviate their symptoms and improve their disease status concerning pain, sleep and level of activity [49]. High patient

satisfaction of effectiveness of CAM use is also reported in a US study comprising 27 older women with arthritis [58]. Furthermore, a study conducted in India with 60 patients with OA (10) and RA (50) observed that patients with RA who frequently use CAM had an improved quality of life (QOL) and those using CAM alongside conventional therapy had better QOL as compared to those not using CAM [57]. Meanwhile, a study in Turkey showed only 26.5% of arthritis patients using CAM were satisfied with the outcomes of such use [50].

### Communication with healthcare providers regarding CAM use

Most of the reviewed studies report that communication between people with arthritis and healthcare providers (HCP) can be affected by the relationship with HCP, HCP unsupportive attitudes and lack of knowledge about CAM as well as time-limited clinic visits [39, 44, 45, 49, 54, 64–66]. Studies report that patients may sometimes perceive CAM as topic not appropriate for discussion with a HCP [57, 58] even though a significant percentage of patients with arthritis (39.5–48%) expect to receive CAM information and to talk about CAM in consultation with their physician [50, 65].

It is worth noting that arthritis patients who are female, who use more types of CAM or who have higher levels of education have all been found to be significantly more likely to report telling their conventional health practitioners about their CAM use [35, 42, 54]. A study conducted in Canada, which assessed the level of communication regarding CAM use between people with OA and physicians, showed 40.6% of patients did not inform their orthopedic surgeon of their current CAM use [36]. Similar findings have been identified in other studies—39.6% of RA/OA sufferers who use CAM inform their physicians about their CAM use [49], only 28% of Korean OA patients who used CAM informed their doctor about such use [36] and 71% of arthritis patients from a study in India failed to inform their physician about their CAM use [57].

### Appraisal outcomes

Forty-nine articles included in the review were assessed via the quality scoring system. Table 3 shows that the quality of research to date on this topic is constrained by some methodological limitations. According to the items listed in this quality assessment tool (Table 2), 25 articles did not report a response rate, and nine articles reported data collection subject to recall bias. Meanwhile, the sample sizes of 22 articles reporting quantitative research findings were less than 500, only six papers reported response rates and noted recall bias, and only one study included a sample size higher than 500 and a response rate of 75% or higher.

## Discussion

This paper reports findings from the world's first comprehensive review of the literature focusing upon different aspects of CAM use among people suffering from arthritis. The review reveals a recent growth and intensification of research focus upon this topic (with 35 of the 49 articles identified published over the past 5 years) as well as a number of key findings of significance to arthritis sufferers and those managing and delivering their care including rheumatologists.

The empirical research identified in our review suggests substantial levels of CAM use among people with arthritis, with prevalence rates reported from 23.9 to 95%; this is a finding in line with the results of earlier work on this topic [13, 72] and highlights CAM use as a pertinent arthritis health services and health services research issue. However, disparities in research design, methodology (especially the inconsistencies of CAM definitions) and populations examined (all conditions/OA/RA) among the different studies were all challenges to the review process. For example, the definition of CAM differs among the studies and can change over time with some CAM modalities included in 'usual' care of arthritis patients. Therefore, it is possible that the estimates in various studies may have underestimated the prevalence of CAM use. Our review is confined to English language publications.

The review indicates high levels (≥50%) of satisfaction with CAM among those with arthritis who use these practices and medicines. This situation could be attributed to several factors including a frustration with conventional treatment among patients with regard to addressing their symptoms and patient perceptions of CAM as safer [49]. However, there is a need to further investigate the reasons for and duration of CAM use among arthritis' sufferers. Unfortunately, the majority of reviewed literature fails to specify whether reported CAM use is directly arthritis-related, and further research on this topic needs to provide more in-depth, precise examination of CAM use exclusively for arthritis.

Our review highlights that while many arthritis patients seek and gain information on CAM from non-professional sources, nearly half do not inform their doctor about their CAM use. Contemporary literature highlights a number of possible reasons for such a lack of disclosure regarding CAM use among arthritis patients including unsupportive HCP attitudes, HCP's lack of knowledge about CAM, time-limited clinic visits, as well as patient perceptions of the topic of CAM as inappropriate for discussion with a HCP [39, 44, 45, 49, 54, 57, 58, 64–66]. Meanwhile, given the high prevalence of CAM use among people with arthritis, it is imperative that conventional providers including rheumatologists be aware of CAM use [73] and enquire about such use within their routine consultations [74] in order to

**Table 3** Quality score of studies on CAM use among people with arthritis (2008–2015)

| First author/year | Dimensions of quality assessment | | | |
|---|---|---|---|---|
| | Methodology | Reporting of participants' characteristics | Reporting of CAM use | Total score |
| Lee et al. [44] | 2 (C, D) | 3 (E, F, H) | 3 (I, J, K) | 8 |
| Sleath et al. [57] | 3 (A, B, D) | 4 (E, F, G, H) | 2 (I, K) | 9 |
| Sirois [43] | 1 (D) | 4 (E, F, G, H) | 1 (K) | 6 |
| Sleath et al. [66] | 2 (A, B) | 4 (E, F, G, H) | 1 (I) | 7 |
| Alvarez-Nemegyei et al. [59] | 2 (A, D) | 2 (E, F) | 2 (J, K) | 6 |
| Callahan et al. [47] | 2 (B, D) | 3 (E, F, H) | 3 (I, J, K) | 8 |
| Marsh et al. [37] | 2 (C, D) | 4 (E, F, G, H) | 3 (I, J, K) | 9 |
| Klingberg et al. [48] | 2 (A, D) | 2 (E, F) | 3 (I, J, K) | 7 |
| Ünsal, Gözüm [53] | 2 (C, D) | 3 (E, F, H) | 3 (I, J, K) | 8 |
| Efthimiou, Kukar [67] | 1 (D) | 2 (F, H) | 3 (I, J K) | 6 |
| Rispler et al. [50] | 2 (C, D) | 4 (E, F, G, H) | 3 (I, J, K) | 9 |
| Jadhav et al. [42] | 1 (D) | 3 (E, F, H) | 2 (I, K) | 6 |
| Obalum, Ogo [39] | 1 (D) | 2 (E, H) | 3 (I, J, K) | 6 |
| Armstrong et al. [52] | 3 (A, B, D) | 3 (E, F, H) | 1 (I) | 7 |
| Hoerster et al. [55] | 2 (B, D) | 3 (F, G, H) | 2 (I, K) | 7 |
| Lapane et al. [36] | 2 (B, D) | 4 (E, F, G, H) | 2 (I, K) | 8 |
| Jawahar et al. [35] | 3 (A, B, D) | 4 (E, F, G, H) | 3 (I, J, K) | 10 |
| Alaaeddine et al. [38] | 2 (C, D) | 3 (E, F, H) | 3 (J, K) | 8 |
| Cheung [33] | 1 (D) | 4 (E, F, G, H) | 3 (J, K) | 8 |
| Wallen, Brooks [63] | 2 (C, D) | 4 (E, F, G, H) | 3 (I, J, K) | 9 |
| Brien et al. [68] | 2 (A, D) | 2 (E, F) | 2 (I, J) | 6 |
| Gore et al. [45] | 2 (B, D) | 1 (F) | 2 (I, K) | 5 |
| Ulusoy [40] | 0 (0) | 3 (E, F, H) | 1 (I) | 4 |
| Yang et al. [56] | 2 (B, D) | 4 (E, F, G, H) | 3 (I, J, K) | 9 |
| Yang et al. [34] | 2 (B, D) | 4 (E, F, G, H) | 2 (I, K) | 8 |
| Cheung et al. [65] | 1 (D) | 3 (E, F, H) | 2 (I, J) | 6 |
| Sirois [58] | 1 (D) | 3 (F, G, H) | 3 (I, J, K) | 7 |
| Xu et al. [69] | 1 (B) | 2 (F, H) | 1 (I) | 4 |
| Chen et al. [70] | 1 (B) | 1 (F) | 0 (0) | 2 |
| Chan et al. [46] | 1 (D) | 3 (E, F, G) | 2 (J, K) | 6 |
| Tokem et al. [41] | 1 (B) | 3 (E, F, H) | 2 (J, K) | 6 |
| Tamhane et al. [54] | 1 (B) | 3 (E, F, G) | 3 (I, J, K) | 7 |
| Basedow et al. [71] | 2 (B, C) | 3 (E, F, H) | 2 (I, J) | 7 |
| Geisler, Cheung [64] | 1 (C) | 3 (F, G, H) | 2 (I,J) | 6 |
| Huang et al. [62] | 2 (A, B) | 3 (E, F, H) | 3 (I, J, K) | 8 |

Hughes 2009 [76]; Hoogeboom, et al. [62]; Adams et al. 2010 [75]; Simões-Wüst et al. 2014 [77]; Weigel et al. 2010 [78]; Sibbritt et al. 2011 [79]; Barnes & Bloom 2008 [80]; Poulsen et al. 2012 [81]; Lapane et al. 2013 [82]; Asprey et al. 2012 [83]; Bhalerao et al. 2013 [44]; Yen et al. 2013 [84]; Jaiswal et al. [46]; Zodet & Stevans 2012 [85] do not focus solely upon CAM use for arthritis and, as such, the criteria 'reporting of CAM use for arthritis' do not apply to these 14 studies. As a result, these papers were not assessed via the quality scoring system outlined

A. Representative sampling strategy; B. Sample size > 500; C. Response rate > 75%; D. Low recall bias (prospective data collection or retrospective data collection within the past 12 month); E. Status, types of arthritis; F. Age; G. Ethnicity; H. Indicator of socioeconomic status (e.g., income, education); I. Definition of CAM or modalities provided to participants; J. Participants can name CAM therapies/modalities used; K. use of CAM modalities assessed

ensure safe, effective care. Early small-scale work on this topic suggests the regular application of a specific tool to identify CAM use among patients may lead to more accuracy and communication around CAM use [45], and this early work sets the foundations for further in-depth examination of this issue.

There are some limitations for this study. The first limitation is the definition of arthritis we have employed, we

have used a broad definition (including everything within musculoskeletal pain) in order to capture as much relevant arthritis literature as possible. Secondly, this research has focused exclusively upon English language databases and there is potential for future work to explore literature that may be available in language other than English. Our review reveals a number of gaps on this topic. There remains no quality, national data on CAM use among people with arthritis, and further enquiry is also needed to examine the finer details of CAM-related communication and disclosure among arthritis patients and their healthcare providers. Furthermore, the data identified in the literature for our review did not report doses of CAM treatments, and this is another area where further research can focus.

## Conclusions

This review reveals wide and frequent CAM use among patients with arthritis, who perceive such use to be beneficial. Potential use of CAM, often concurrent to conventional medical care, is certainly an issue with which all providers including rheumatologists need to be cognizant, and there is a need for further research in this area to help to inform effective care and management for those with arthritis which is free from potential direct and indirect risks associated with CAM use.

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**Compliance with ethical standards**

**Conflict of interest** Lu Yang, David Sibbritt and Jon Adams declare that they have no conflict of interest.

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