Clin Orthop Relat Res (2009) 467:2705–2722
DOI 10.1007/s11999-009-0764-3

ORIGINAL ARTICLE

Use of Alternative Medicines by Patients with OA that Adversely Interact with Commonly Prescribed Medications

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Received: 3 August 2008 / Accepted: 13 February 2009 / Published online: 3 March 2009

Abstract Owing to the increasing prevalence, patient interest, and high risk of adverse effects associated with use of complementary and alternative medicine (CAM), investigation of this issue in an orthopaedic population is warranted. The objectives of this study were to (1) identify the prevalence of CAM use, (2) assess the level of communication between patients and physicians regarding CAMs, (3) uncover reasons for nondisclosure, and (4) identify potentially harmful interactions between CAMs and conventional therapy. We conducted a cross-sectional observational study among patients being treated in orthopaedic surgical clinics for osteoarthritis (OA). Of the 373 participants, 42.9% reported taking one or more CAMs, and 40.6% admitted their surgeons were unaware of their alternative therapy use. Reasons for nondisclosure included, the patient thought: (1) it was not important (29.7%); (2) the surgeon would not be interested (13.5%); and (3) their surgeon would not know about CAMs (8.2%). Twenty-two of 281 patients (7.8%) were taking alternative medicines that could interact with their blood pressure medication, 28.6% were taking anticoagulant/antiplatelet medication and also taking a CAM that could interact, and 5.9% were taking conventional pain medications along with a CAM that potentially could interact. Orthopaedic surgeons should make it part of their consultation to inquire about CAM use.

Level of Evidence: Level III, therapeutic study. See the Guidelines for Authors for a complete description of levels of evidence.

Each author certifies that he or she has no commercial associations (eg, consultancies, stock ownership, equity interest, patent/licensing arrangements, etc) that might pose a conflict of interest in connection with the submitted article.
Each author certifies that his or her institution has approved the reporting of this case report, that all investigations were conducted in conformity with ethical principles of research, and that informed consent for participation in the study was obtained.
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Introduction

In Canada, arthritis is one of the most common chronic conditions and is a leading cause of pain, physical disability, and use of healthcare services [3–6, 24, 30, 36]. There were approximately 58,714 total hip and knee arthroplasties performed in Canada in 2004 representing a 10-year increase of 87% and a 10% increase compared with 2003 [11]. The number of people with arthritis is expected to increase to 6.5 million by 2031 [5].

The term complementary and alternative medicine (CAM) encompasses many alternative therapies such as dietary supplements, herbs, megavitamins, homeopathic

medicines, acupuncture, and numerous other modalities [17]. The National Centre for Complementary and Alternative Medicine (NCCAM) defines CAMs as a group of medical and healthcare systems, practices, and products that currently are not considered part of conventional medicine [33].

CAMs currently are not regulated in North America. In Canada, they are referred to as natural health products and although they are in the process of becoming regulated, regulation will not be fully completed until 2010 [17]. Similarly, in the United States, CAMs are regulated as dietary supplements by the Food and Drug Administration, a category that does not require proof of safety by the manufacturer before marketing but is not permitted to make treatment-cure claims [44]. A recent study by Health Canada reported 71% of Canadians regularly take a natural health product [16].

CAMs can cause potential harmful interactions or side effects with conventional treatments [35, 38, 42, 46]. These include serious complications with anesthesia during surgery [18, 35, 43], an increase or decrease in heart rate and/or blood pressure [25, 26, 32, 34], harmful interactions if used concomitantly with anticoagulant or antiplatelet medications [7, 8, 10, 28, 37, 40], and certain herbal medications can produce harmful effects in patients taking NSAIDs or prescription pain medications [20, 21, 43, 45]. Many physicians are poorly informed about alternative therapies [2, 27]. Studies suggest greater than half of orthopaedic surgeons are unaware of their patients' CAM use [13, 27], and approximately 60% of patients who use CAMs do not disclose this information to their primary care providers [27, 38]. With the aging population, the increasing incidence of OA, the use of CAMs in this population, and the potential for serious adverse events when CAMs interact with traditional medications, physicians need to inquire and understand CAMs, to provide optimal patient care.

As a result of the increasing prevalence, patient interest, and high risk of adverse effects associated with CAM use, the primary objective of our study was to identify the prevalence of CAM use among patients with OA. The secondary objectives were to assess the level of communication between patients and physicians regarding CAM use, identify reasons for physician disclosure or nondisclosure, and identify any potentially harmful interactions related to CAM use and simultaneous conventional therapy.

Materials and Methods

We conducted a cross-sectional observational study among patients being treated for OA across three university-affiliated orthopaedic surgery clinics in Ontario, during a 1-year period (2004–2005). Eligible study participants were at least 16 years of age and able to read and write in English. We excluded patients if they did not have the cognitive capacity to provide consent for participation or were attending the clinic for treatment not related to OA.

We designed a survey consisting of closed-ended, multiple-choice, and fill-in-the-blank questions (Appendix 1). The questionnaire consisted of five sections: (1) demographic information; (2) general information about the patient's OA; (3) prevalence of and reasons for the use of CAMs and amount of money spent each month on CAMs; (4) a detailed list of the patient's prescription medications; and (5) detailed information regarding the patient's OA (this section completed by the orthopaedic surgeon). Questionnaire items were generated by reviewing the literature, searching naturopathy and holistic Internet web sites, and contacting experts in naturopathy, holistic medicine, and orthopaedic surgery. We used a "sample to redundancy" strategy by which we contacted experts until no new items for the questionnaire emerged. We pretested the questionnaire with an independent group of 10 community members and three orthopaedic surgeons to ascertain whether the survey adequately addressed CAM use among patients with OA. The community members and orthopaedic surgeons also assessed the clarity and comprehensiveness of the items contained in the questionnaire.

The research assistant approached patients, who either were existing patients of the surgeon with a confirmed diagnosis of OA or were new patients referred to the surgeon for suspicion of OA, while they were in the waiting room for consultation with the orthopaedic surgeon. On completion of the consultation, the surgeon documented the severity of OA. After providing informed consent, patients were asked to complete the survey while waiting for their consultation. The research assistant was available to answer questions, check for completeness, and clarify any uncertain, illegible, or confusing responses with the patient, and then collect the completed surveys. If patients were uncertain about any of the CAMs or prescription medications they were taking, the research assistant called them at home and completed these sections over the phone.

To determine sample size, we assumed, based on reported findings, approximately 30% of patients surveyed would be CAM users. We wanted to have sufficient power to provide a 95% confidence interval with a width of no more than 5% around our estimate of CAM use. According to our calculation, 320 completed questionnaires were needed to have sufficient certainty regarding our estimate of CAM use.

We approached 422 patients; 373 (88.3%) patients completed the survey; there were 219 female and 154 male

Table 1. Patient characteristics

Characteristic	Proportion (N = 373)
Males	154 (41.4%)
Age (years)	63.2 ± 12.1
	(range, 25.0–90.7)
Race/ethnicity	N = 359
White	294 (81.9%)
Asian	3 (0.8%)
Black	2 (0.6%)
Native American	19 (5.3%)
Middle Eastern	1 (0.3%)
Other	37 (11.1%)
Education	N = 366
Did not complete high school	104 (28.4%)
High school graduate	110 (30.1%)
College diploma or Bachelor's degree	117 (32.0%)
Masters, Doctorate, or professional degree	35 (9.6%)
Gross income	N = 307
Less than $20,000	59 (19.2%)
$20,000–$39,999	77 (25.1%)
$40,000–$59,999	76 (24.8%)
$60,000–$79,999	48 (15.6%)
Over $80,000	47 (15.3%)
Smoking status	N = 369
Never smoked	165 (44.7%)
Smoked, but quit	158 (42.8%)
Current smoker	46 (12.5%)
Employment status	N = 371
Retired	215 (58.0%)
Employed	108 (29.1%)
Disability	33 (8.9%)
Stay-at-home parent	8 (2.2%)
Unemployed/student	7 (1.9%)
Comorbidities	N = 373
Cardiovascular	
Hypertension	179 (48.0%)
Angina/heart disease	26 (7.0%)
Congestive heart failure	9 (2.4%)
Other heart condition	43 (11.5%)
Previous myocardial infarction	16 (4.3%)
Previous stroke	63 (16.9%)
Asthma/emphysema	41 (11.0%)
Sciatica	72 (19.3%)
Diabetes	53 (14.2%)
Rheumatoid arthritis	158 (42.4%)
Any cancer	34 (9.1%)
Depression/anxiety	69 (18.5%)
Other	81 (21.7%)

Table 2. Participant characteristics associated with OA

OA characteristic	Proportion
Duration of OA	N = 363
Less than 1 year	24 (6.6%)
1–5 years	129 (35.6%)
Longer than 5 years	192 (52.8%)
Do not remember	18 (5.0%)
Joint affected by OA	N = 366
Knee	310 (84.7%)
Hip/pelvis (sacroiliac joints)	159 (43.5%)
Hand/wrist/elbow	150 (40.9%)
Spine (neck and back)	105 (28.7%)
Shoulder girdle	98 (26.8%)
Foot/ankle	78 (21.3%)
Grade OA*	N = 319
0 = no osteophytes	8 (2.5%)
1 = doubtful osteophytes	10 (3.1%)
2 = minimal osteophytes	79 (24.8%)
3 = moderate osteophytes	86 (27.0%)
4 = severe, large osteophytes	136 (42.6%)
Previous treatments for OA	N = 351
Arthroplasty	190 (54.1%)
NSAIDs	180 (51.3%)
Corticosteroid injection	145 (41.3%)
Arthroscopy (knee scope)	135 (38.5%)
Hyaluronic acid injection	70 (19.9%)
Other medications	66 (18.8%)
Osteotomy	15 (4.3%)
Soft tissue procedure	13 (3.7%)

*According to the Kellgren-Lawrence radiographic scale.

patients with a mean age of 63 years. The majority of participants were white (81.9%), had a high school education or greater (71.6%), and currently were retired (58%). Approximately half of the participants (52.8%) had OA greater than 5 years with the most common joint affected being the knee (84.7%), followed by the hip and pelvis (43.5%), and the hand, wrist, or elbow (40.9%) (Tables 1 and 2).

The primary analysis was descriptive. We calculated the proportion of patients using CAMs with a 95% confidence interval around this estimate. Secondary analyses included the relative frequency of reasons for patients not disclosing CAM use to their physicians, the percentage of patients who disclose CAM use to their physicians, the frequency of the persons or places that referred them to CAMs, and frequency of patients who are using CAMS that may be harmful given their condition.

Results

Of the 373 patients, 157 (42.9%; 95% CI, 37.9–48.0%) reported taking one or more CAMs, of which 19.8% (95% CI, 16.0–24.2%) said they currently visit with an alternative medicine practitioner (Table 3). Of those, 26.5% were taking an herbal medication specifically for their OA, and 6.8% (95% CI, 4.4–10.0%) visit an alternative practitioner to treat their OA. Seven people did not respond to this question. The majority of patients (83%) had been diagnosed with OA by a medical doctor (the remaining patients were diagnosed by an osteopathic doctor [12.8%], chiropractor [1.7%], or massage therapist [0.3%]). All patients who were taking CAMs specifically to treat their OA reported previously trying some form of conventional treatment. The three most common treatments included NSAIDs (53%), arthroscopy (43%), and arthroplasty or total joint arthroplasty (38%). The most popular CAMs taken by patients in the study were glucosamine (28.7%), chondroitin (16.1%), and omega-3 fatty acids (10.4%) (Table 4). The majority of people spent less than $25 per month on alternative medications (45.4%), whereas 25.9% spent $25 to $50 per month, 15.7% spent $50 to $100 per month, and 12.9% reported spending greater than $100 per month. The most common reasons for taking CAMs were to have control over their own health and to prevent future illness (Table 5).

Of the 192 patients who responded to the question asking whether they had communicated CAM use to their healthcare providers, 78 (40.6%; 95% CI, 33.9–47.7%) admitted their surgeon was not aware of which alternative therapies they currently were taking. Thirty-three of these patients (21.2%) said they would inform the surgeon only if he or she asked them. However, 21 patients (10.9%) were seeing the orthopaedic surgeon for the first time, of which 92.3% reported they intended to inform the surgeon of their alternative medicine use that day.

Reasons for not disclosing information about CAM use to the surgeon were the patient thought (1) it was not important (29.7%), (2) the surgeon would not be interested (13.5%), and (3) their surgeon would not know about alternative medicines (8.2%).

Two hundred eighty-one patients were taking prescription medications. More than half of these patients

Table 3. Prevalence of CAM practitioner use

Practitioner	Proportion, N = 363
Acupuncturist	3.0%
Chiropractor	11.8%
Herbalist	0.8%
Homeopath	0.6%
Massage therapist	9.1%
Naturopathic Doctor	1.1%
Shiatsu	0.3%
Spiritual healer	0.3%
Reikic	0.3%

Table 4. Prevalence of CAM use in our sample

CAM	Proportion	CAM	Proportion	CAM	Proportion	CAM	Proportion
Aloe vera	2.7%	Devil's claw	0.8%	Glucosamine	28.7%	Reiki	0.5%
Bee pollen	1.1%	DHEA	0.5%	Goldenseal	0.0%	Saw palmetto	2.5%
Belladonna	0.3%	Dong Quai	0.5%	Grape seed	0.8%	Seaweed	0.8%
Betel nut	0.0%	Echinacea	3.8%	Green tea	7.1%	Shark cartilage	2.2%
Bilberry	0.5%	Elder	0.0%	Guggul	0.0%	St. John's wort	1.1%
Black cohosh	0.5%	Ephedra	0.0%	Hawthorn	0.8%	Tea tree oil	1.9%
Black tea	2.7%	Essiac	0.0%	Horse chestnut	0.0%	Thyme	0.3%
Boron	0.3%	Eucalyptus oil	0.5%	Kava kava	0.3%	Thymus extract	0.0%
Boswellia	0.0%	Evening primrose	1.4%	Licorice root	0.5%	Tumeric	1.1%
Burdock	0.0%	Fenugreek	0.0%	Marshmallow	0.0%	Urtica diocia	0.0%
Capsicum	0.3%	Feverfew	0.0%	Milk thistle	0.8%	Valerian	0.0%
Chamomile	2.2%	Fish oil	0.0%	Mistletoe	0.8%	Vitamin E	1.1%
Chaparral	0.0%	Flax	1.6%	Niacin	0.5%	Wild yam	0.3%
Chondroitin	16.1%	Garlic	8.7%	Omega-3 fatty acids	10.4%	Witch hazel	0.0%
Coenzyme Q10	0.5%	Ginger	2.2%	Pennyroyal	0.0%	Wormwood	0.0%
Comfrey	0.0%	Ginkgo biloba	3.3%	Peppermint oil	0.5%	Yohimbe	0.0%
Curcumin	0.5%	Ginseng	2.7%	Picrorhiza kurroa	0.0%	Other	9.8%
Dandelion	0.0%	Globe artichoke	0.0%	Psyllium	1.4%		

Table 5. Patients' reasons for taking CAM

Reason	Proportion N = 181
I want to have control over my own health	79 (43.6%)
I want to prevent future illness	65 (35.9%)
Alternative therapies are less harmful to my body than prescription drugs	33 (18.2%)
At the suggestion of another physician (not orthopaedic surgeon)	33 (18.2%)
At the suggestion of my orthopaedic surgeon	23 (12.7%)
Prescription drugs are not effective or do not work	13 (7.2%)
I cannot take prescription drugs because of my health condition	8 (4.4%)
I have experienced dissatisfaction with conventional practitioners (ie, physicians)	7 (3.9%)
I do not trust the effectiveness of conventional medicine	4 (2.2%)
Cultural/traditional	1 (0.6%)
Other	66 (36.5%)

(56.6%) were taking prescription medications for a heart condition. Twenty-two of the 281 patients (7.8%) were taking an alternative medicine that interacts with their blood pressure medication, a combination that has been noted to increase heart rate and blood pressure [43], therefore making the prescription drug less effective. Forty-nine of the 281 patients (17.4%) were taking anticoagulant or antiplatelet medications, of which 14 patients (28.6%) simultaneously were taking a natural health product that would affect their international normalized ratio (INR) and/or platelet function [43]. Eight of the 14 patients (57.1%) had a previous myocardial infarction or stroke, placing them at an even greater risk of having an additional heart attack or stroke in the future. Among the 169 patients (60.5%) taking conventional pain medications, 10 (5.9%) also were taking an interacting CAM. Eight of the 10 patients were taking ginkgo biloba, one was taking bee pollen, and the other was taking glucosamine, all simultaneously with an NSAID or pain killer. In all 10 cases, the combination of the pain medication with the CAM has the potential to make the prescription drug less effective [43].

Discussion

Owing to the increasing popularity of complementary and alternative medicines, and evidence suggesting CAM use potentially can cause harmful interactions or side effects with conventional treatments [35, 38, 42, 46], this study addressed the prevalence of CAM use among patients with OA. Secondary objectives were to assess the level of communication between patients and physicians regarding CAM use, uncover reasons for physician disclosure or nondisclosure, and identify any potentially harmful interactions related to CAM use and simultaneous conventional therapy.

Our study is limited as we do not know the proportion of patients surveyed who actually experienced an adverse reaction or complication while simultaneously taking an herb with a prescription medication. Although we cannot be certain if any of the patients have experienced or will experience these complications, we do know they are at an increased risk of having such an adverse event in the future. In addition, the use of CAMs was self-reported, and therefore has not been validated. Also, our study included a predominantly white population, which may not be representative of populations in other practices. A national survey reported the prevalence of CAM use is equally common among white, black, Latino, Asian, and Native American populations [29]. One previous study also suggested variation in CAM use among different ethnic groups. After controlling for other variables, Katz and Lee found whites and Hispanics were considerably less likely to use CAM therapy than blacks [23]. Finally, the list of herbal medications we provided to patients was not exhaustive. There are numerous alternative medications that potentially could interact with prescription medications, and although no participants in this study reported taking other CAMs, these potentially dangerous herbs are available to patients. Although the study design used a convenience sample, and therefore limited the generalizability of the results, a strength of this study is it was a large, multicenter survey, which included patients with a broad spectrum of OA severity.

Our data suggest 42.9% of patients with OA, who were being treated by an orthopaedic surgeon, used some form of CAM. However, many physicians remain poorly informed regarding alternative therapies and therefore avoid discussing CAM use with their patients [2, 27]. Two studies suggest greater than half of orthopaedic surgeons are unaware of their patients' CAM use [13, 27], and approximately 60% of patients who use CAMs do not disclose this information to their primary care providers [27, 38]. Similarly, 78 (40.6%) of our study patients admitted their orthopaedic surgeon was not aware of which alternative therapies they currently were taking. Unfortunately, this lack of communication may put the patient at an increased risk of side effects. Despite the purported benefit offered by some alternative medicines, occasionally the use of these products can cause harmful interactions or side effects with conventional treatments [35, 38, 42, 46].

Complementary and alternative medicines also may cause harmful interactions with prescription medications,

Table 6. Important interactions between prescription medications and CAMs

Heart/Blood pressure	Anticoagulant/Antiplatelet	NSAIDs/Pain
Belladonna	Alfalfa	Beeswax
Black tea*	Capsicum	Bee pollen
Capsicum	Coenzyme Q10	Boron
Chromium*	Chondroitin	Chromium
Coenzyme Q10	Devil's claw	Ginkgo biloba
Devil's claw	Dong Quai	Licorice root
DHEA†	Evening primrose	St. John's wort
Ginger	Fenugreek	
Ginkgo biloba‡	Fish oil	
Ginseng	Flax	
Green tea§	Garlic	
Hawthorne§	Ginger	
Kava kava	Ginkgo biloba	
Licorice root	Ginseng	
Mistletoe	Glucosamine	
St. John's wort	Grape seed	
	Green tea	
	Saw palmetto	
	St. John's wort	
	Tumeric	
	Vitamin E	

* May be most problematic with beta blockers; †may be most problematic with calcium channel blockers and angiotensin II receptor antagonists; ‡may be most problematic with beta blockers and calcium channel blockers; §may be most problematic with calcium channel blockers.

particularly among patients taking medications for heart conditions. In our study, 56.6% of patients taking medication for a heart condition also were taking a CAM that potentially could interact with that medication (Table 6) [43]. When taken concurrently with prescription medications, some CAMs either can increase or decrease heart rate and/or blood pressure, which could progress to a myocardial infarction or stroke [25, 26, 32, 34], and therefore should not be taken by patients receiving blood pressure medication or with a history of cardiac problems.

Some CAMs also are capable of producing arrhythmias [43] that can cause blood clots to pool in the heart. If these clots are passed through the heart or to the brain, a heart attack or stroke may result. Still other herbs like ginseng may cause elevated blood pressure as a side effect, negating the effects of some antihypertensives [12, 30, 43]. One case report deemed ginseng responsible for reducing the diuretic effect of furosemide [30]. The herbal licorice (0.5%) may elevate blood pressure, negating the effects of antihypertensive therapy [41, 43]. As a result of its mineralocorticoid activity, licorice may antagonize effects of spironolactone, minimizing its diuretic effect. Pseudoaldosteronism accompanied by weight gain, hypokalemia, hypertension, and metabolic alkalosis has been reported [30, 41, 43].

Some CAMs potentially can interact with certain liver enzymes responsible for metabolism of commonly prescribed heart and blood pressure medications [9, 14, 15, 31]. The metabolism of a drug can be altered by another drug or foreign chemical and such interactions can be clinically important. A family of enzymes called cytochrome P450 (CYP) enzymes are involved in the metabolism of numerous xenobiotics and in numerous interactions between drugs and food, herbs, and other drugs [9, 14, 15, 31]. The observed induction and inhibition of CYP enzymes by natural products in the presence of a prescribed drug has led to the general acceptance that natural therapies can have adverse effects. For example, Devil's claw (used by 0.8% of our patients), ginkgo (3.3% of patients), ginseng (2.7% of patients), and St John's wort (1.1% of patients), are substrates for CYP 2D6. These herbs specifically compete for activation and therefore time to effectiveness with medications such as beta blockers, antiarrhythmics, oxycodone, and amitriptyline [9, 14, 15, 31].

Some CAMs produce complications by interacting with anesthesia during surgery [1, 18, 19, 22, 35, 39, 43]. For example, glucosamine, used by 28.7% of study participants, should be stopped 2 to 3 weeks before surgery because it may lead to fainting and delayed recovery after anesthesia [18, 43]. Other CAMs being taken by patients in our study should be stopped 2 to 3 weeks before surgery to avoid complications [18, 43], including myocardial infarction, stroke, bleeding, inadequate oral anticoagulation, prolonged or inadequate anesthesia, organ transplant rejection, and interference with medications crucial for patient care [18, 35, 43], like chondroitin (16.1%), echinacea (3.8%), ginkgo biloba (3.3%), ginseng (2.7%), and garlic supplements (8.7%). St John's wort, which was used by four patients in this study, can cause cardiovascular collapse during anesthesia [18, 43], and evening primrose oil, taken by six patients in this study, also has the potential to interact with anesthesia during surgery [18, 43].

In addition, certain CAMs can cause harmful interactions as a result of being used concomitantly with anticoagulant or antiplatelet medications [7, 8, 10, 28, 37, 40]. Anticoagulants prevent the production of vitamin K-producing factors that are involved in the formation of blood clots. These medications are responsible for normalizing the INR. Coenzyme Q10 (used by 0.5% of our patients), for example, is chemically similar to vitamin K and promotes clotting [43]. Antiplatelets, like aspirin and Plavix (Sanofi-Aventis Canada Inc, Laval, Quebec, Canada), however, work by preventing platelets in the blood from clumping together. Garlic (used by 8.7% of our patients) increases the side effects of antiplatelets, including ulcers in the stomach,

abdominal pain, ringing in the ears, and hemorrhagic stroke [7, 8, 10, 28, 37, 40, 43].

Finally, certain herbal medications can produce harmful effects in patients taking NSAIDs or prescription pain medications. For example, St John's wort (1.1% of our patients), an herb commonly taken for depression, can interact with narcotic pain killers [43] such as Percocet (Bristol-Myers Squibb Canada Inc, Montreal, Quebec, Canada), OxyContin (Purdue Pharma, Pickering, Ontario, Canada), or Tylenol #3 (Janssen-Ortho, Toronto, Ontario, Canada) and cause worsening of side effects such as an increase in narcotic-induced sleep time [21, 43, 45]. Although these medications typically are not prescribed for patients with OA, they commonly are prescribed postsurgery and for patients with severe unresponsive pain.

It also is possible for a reverse interaction to occur in which the prescription medication decreases the effect of the CAM [20, 43]. For example, glucosamine commonly is taken specifically to alleviate OA symptoms and was the most popular herb being consumed by our study patients (28.7%). However, glucosamine may be less effective in patients simultaneously taking acetaminophen [20, 43]. When acetaminophen is metabolized, it uses up sulfur, which is a requirement for glucosamine to work; therefore, simultaneous use can decrease the effect of glucosamine [20, 43].

Discontinuing herbal use also can be harmful. For example, if a patient has been taking an anticoagulant such as warfarin and an herb that interacts with warfarin, the patient's INR will have been titrated to the desired range. This means the herb's effect on the blood and INR already is accounted for; if the patient suddenly stops taking the herb, it consequently could result in an increased risk of bleeding and/or clots by affecting the INR.

Two of the most common CAMs used by patients in our study were glucosamine (28.7%) and chondroitin (16.1%). Pharmaceutical companies that manufacture these products claim there are no harmful interactions associated with these treatments, however, studies investigating the safety of these products were conducted over a relatively short time (16 weeks to 1 year), and therefore did not have the potential to capture any long-term adverse events [43].

Our data highlight the need for open communication regarding CAM use between patients and healthcare providers. Many patients with OA are using some form of CAM, and consequently orthopaedic surgeons and other healthcare providers should make it part of their consultation to inquire about CAM use. Many alternative medications can be helpful to patients, but they also can be extremely harmful when not taken with appropriate supervision. When using CAMs, patients need to be consistent with their consumption and keep their healthcare providers well informed of which products and medications they are taking.

Acknowledgments We thank Dr. Jason Busse for advice regarding complementary and alternative medicines. We also thank the participating orthopaedic surgeons for allowing us access to their clinics and patients: Dr. Robert Bourne, Dr. Steven MacDonald, Dr. Doug Naudie, Dr. Richard McCalden (London Health Sciences Centre), Dr. Robert Litchfield and Dr. Robert Giffin, (Fowler Kennedy Sports Medicine Clinic), and Dr. Justin DeBeer (Hamilton Health Sciences Centre).

Appendix 1

Alternative Therapies Survey

Patient Study ID Number ☐ ☐☐☐☐ **Patient Initials** ☐☐

Surgeon # **Patient #** **F L**

Complementary and Alternative Medicine Survey

Section A

Please read and answer the following questions about your personal information.

1. What is your sex? ☐ Female ☐ Male

2. What is your date of birth? Day ☐☐ Month ☐☐ Year ☐☐☐☐

3. What is your race/ethnicity? Please check only one response.

☐ Native American ☐ Asian ☐ Caucasian ☐ African-American ☐ Hispanic

☐ Middle Eastern ☐ South-East Asian ☐ Mixed (specify) _____

☐ Other (specify) _____

4. What is your highest level of education completed? Please check only one response.

☐ Did not complete High School ☐ Graduated High School ☐ Graduated College

☐ Bachelor's Degree ☐ Master's Degree ☐ Doctorate Degree

☐ Professional Degree (e.g. MD, DDS etc.) Specify: _____

5. What is your gross (before taxes) household income? Please check only one response.

☐ Under $20,000 ☐ $20,000-$39,999 ☐ $40,000-$59,999 ☐ $60,000-$79,999

☐ $80,000-$99,999 ☐ Over $100,000

6. Have you ever smoked cigarettes? Please check only one response.

☐ No

☐ Yes, quit; Age began? _____ Packs per day? _____ Age quit? _____

☐ Yes; How long (years)? _____ Packs per day? _____

7. On <u>average</u>, how many standard alcoholic drinks do you consume per day? (Standard drink = 12 oz beer, 5 oz glass of wine or 1.5 oz liquor)

☐ 0 ☐ 1-2 ☐ 3-4 ☐ 5-6 ☐ 6 or more

8. In an average week, do you consume more than 5 standard drinks in any given sitting? ☐ Yes ☐ No

Alternative Therapies Survey

Patient Study ID Number ☐ ☐☐☐☐ **Patient Initials** ☐☐

Surgeon # **Patient #** **F L**

9. What is your primary current employment? Please check only one response.

☐ Employed (specify occupation) _____ ☐ Unemployed

☐ Retired ☐ Disability ☐ Student ☐ Stay-at-home Parent

10. Has a doctor ever told you that you had: (Please check all that apply)

☐ Hypertension or high blood pressure

☐ Angina pectoris or coronary artery disease

☐ Congestive heart failure

☐ A myocardial infarction or heart attack

☐ Other heart conditions, such as problems with heart valves or the rhythm of your heartbeat; specify: _____

_____

☐ Emphysema or asthma, or COPD (Chronic Obstructive Pulmonary Disease)

☐ Crohn's disease, ulcerative colitis, or inflammatory bowel disease

☐ Sciatica (pain or numbness that travels down your leg to below your knee)

☐ Diabetes, high blood sugar, or sugar in the urine

☐ Liver disease, hepatitis, cirrhosis or gallbladder problems

☐ Rheumatoid arthritis, other inflammatory arthritis or arthropathies

☐ A substance abuse problem

☐ Any cancer (other than skin cancer)

☐ Psychiatric problems (e.g. depression, anxiety, obsessive compulsive disorder, etc.)

☐ Any eye disorder

☐ A stroke

☐ Other(s) (specify) _____

Alternative Therapies Survey

Patient Study ID Number ☐ **Surgeon #** ☐☐☐☐ **Patient #** **Patient Initials** ☐☐ **F L**

Section B

Please answer the questions below about your Osteoarthritis.

11. a) When did you receive a diagnosis of Osteoarthritis? Please check only one response

☐ Less than 1 year ago ☐ Between 1 and 2 years ago ☐ Between 3 and 5 years ago

☐ Between 5 and 10 years ago ☐ Over 10 years ago ☐ Do not remember

b) Who made the diagnosis?

☐ Acupuncturist ☐ Massage Therapist ☐ Reiki Practitioner

☐ Chiropractor ☐ Medical Doctor (MD) ☐ Shiatsu Therapist

☐ Herbalist ☐ Naturopathic Doctor (ND) ☐ Spiritual Healer

☐ Homeopath ☐ Osteopathic Doctor (OD) ☐ Other, specify: _____

12. What joint(s) are affected by your Osteoarthritis? Refer to the skeleton figure for guidance. Please check all that apply.

☐ Shoulder girdle

☐ Foot/Ankle

☐ Hand/Wrist

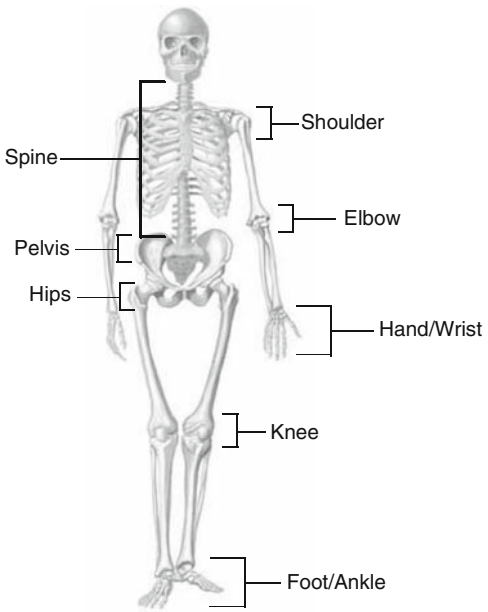
☐ Spine (neck and back)

☐ Elbow

☐ Hip

☐ Pelvis (si joints)

☐ Knee



Alternative Therapies Survey

Patient Study ID Number ☐ ☐☐☐☐ **Patient Initials** ☐☐

Surgeon # **Patient #** **F L**

13. a) Are you currently taking any prescription medications?

☐ No ☐ Yes, specify: _____

_____

_____

_____

_____

_____

_____

_____

☐ Not sure of medication names. Best time to be reached at home for clarification: _____

Please provide your home phone number: ☐☐☐ ☐☐☐ — ☐☐☐☐

13. b) Please check all treatments to date.

☐ Corticosteroid injection

☐ Hyaluronic acid injection (e.g. synvisc)

☐ Nonsteroidal Anti-Inflammatory Drugs (NSAIDs)

☐ Other drugs; specify: _____

☐ Arthroscopy; specify joint: _____

☐ Other soft tissue procedure; specify: _____

☐ Arthroplasty (specify Hemi or Full and joint) ☐ Hemi ☐ Full Joint: _____

☐ Implant revision

☐ Osteotomy

Alternative Therapies Survey

Patient Study ID Number ☐ ☐☐☐☐ **Patient Initials** ☐☐

Surgeon # **Patient #** **F L**

Section C

Please answer the following questions about complementary and alternative therapies.

14. Please check all therapies you are currently taking for any reason:

☐ Active Release	☐ Commercial diet	☐ Hydrotherapy	☐ Relaxation	☐ Reiki
☐ Acupuncture	☐ Energy Healing	☐ Hypnosis	☐ Self-help Group	☐ Tai Chi
☐ Aromatherapy	☐ Folk Remedies (e.g. copper bracelet)	☐ Imagery	☐ Self-prayer	☐ Vitamins
☐ Biofeedback	☐ Herbal Medicine	☐ Magnet Therapy	☐ Shiatsu	☐ Yoga
☐ Chiropractics	☐ Homeopathy	☐ Massage	☐ Spiritual Healing	

☐ Other (please describe) _____

☐ No, I am not currently taking any of these therapies

15. Pease check all the herbal medications you currently use:

☐ Aloe vera	☐ Comfrey	☐ Garlic	☐ Marshmallow	☐ Tea tree oil
☐ Bee pollen	☐ Curcumin	☐ Ginger	☐ Milk thistle	☐ Thyme
☐ Belladonna	☐ Dandelion	☐ Ginko biloba	☐ Mistletoe	☐ Thymus extract
☐ Betel Nut	☐ Devil's Claw	☐ Ginseng	☐ Niacin	☐ Tumeric
☐ Bilberry	☐ DHEA	☐ Globe Artichoke	☐ Omega-3 Fatty Acids	☐ Urtica diocia
☐ Black Cohosh	☐ Dong quai	☐ Glucosamine	☐ Pennyroyal	☐ Valerian
☐ Black Tea	☐ Echinacea	☐ Goldenseal	☐ Peppermint oil	☐ Wild Yam
☐ Boron	☐ Elder	☐ Grape seed	☐ Picrorhiza kurroa	☐ Witch Hazel
☐ Boswellia	☐ Ephedra	☐ Green tea	☐ Psyllium	☐ Wormwood
☐ Burdock	☐ Essiac	☐ Guggul	☐ Reiki	☐ Yohimbe
☐ Capsicum	☐ Eucalyptus oil	☐ Hawthorn	☐ Saw palmetto	☐ Others, specify:
☐ Chamomile	☐ Evening primrose	☐ Horse Chesnut	☐ Seaweed (kelp)	
☐ Chaparral	☐ Fenugreek	☐ Kava Kava	☐ Shark Cartilage	
☐ Chondroitin	☐ Feverfew	☐ Licorice root	☐ St. John's Wort	

☐ Not sure of medication contents; specify name(s): _____

☐ No, I am not currently taking any of these herbal medications

Alternative Therapies Survey

Patient Study ID Number ☐ ☐☐☐☐ **Patient Initials** ☐☐

Surgeon # **Patient #** **F L**

16. If any, which alternative therapies or medications are you taking specifically for your Osteoarthritis? Please refer to the previous page for a list of therapies and medications.

_____

_____

_____

_____

17. a) Do you currently visit with an alternative medicine practitioner? If so, approximately how often?

☐ Yes:

☐	Acupuncturist	Times per year ____	☐	Naturopathic Doctor	Times per year ____
☐	Chiropractor	Times per year ____	☐	Shiatsu	Times per year ____
☐	Herbalist	Times per year ____	☐	Spiritual Healer	Times per year ____
☐	Homeopath	Times per year ____	☐	Reiki	Times per year ____
☐	Massage Therapist	Times per year ____			
☐	Other; specify type _____	Times per year ____			

☐ No

b) If you answered 'Yes' to a), are you taking any or all of your chosen alternative therapies under the direction or supervision of an alternative practitioner?

☐ No ☐ Yes, some; specify practitioner(s) _____

☐ Yes, all; specify practitioner(s) _____

c) Are you visiting an alternative practitioner specifically for your Osteoarthritis?

☐ No ☐ Yes; specify type of practitioner(s) _____

NOTE:

If you are not taking any therapies, herbal medications, or visiting with an alternative practitioner, and answered 'No' to questions 14, 15 and 17a), you may stop filling out the survey now and return it to the resident or research assistant.

If you are making use of complementary or alternative therapies or medicines, please continue with the survey, as all remaining questions concern alternative medicine use.

Alternative Therapies Survey

Patient Study ID Number ☐ ☐☐☐☐ **Patient Initials** ☐☐

Surgeon # **Patient #** **F L**

18. Why are you taking alternative therapies? Please check all that apply.

- ☐ I want to have control over my own health
- ☐ I wish to prevent future illness
- ☐ I cannot take prescription drugs because of my health condition
- ☐ Alternative therapies are less harmful to my body than prescription drugs
- ☐ Prescription drugs are not effective or do not work
- ☐ I do not trust the effectiveness of conventional medicine
- ☐ I have experienced dissatisfaction with conventional practitioners (i.e. physicians)
- ☐ Cultural/Traditional
- ☐ At the suggestion of my Orthopaedic Surgeon
- ☐ At the suggestion of another physician
- ☐ Other, please explain _____

19. How do you feel that the alternative therapies you are currently taking are helping you? (Please check all that apply)

- ☐ Pain relief ☐ Reduces swelling ☐ Reduces nausea ☐ Speeds healing ☐ Cure
- ☐ Weight loss ☐ Reduces stress ☐ More energy ☐ Improved overall health
- ☐ Other, please describe _____
- ☐ No, I do not feel they are helping

20. Approximately how much do you spend on alternative therapies or medications per month?

- ☐ Less than $25 ☐ $25-$50 ☐ $50-$100 ☐ $100-$150
- ☐ $150-$200 ☐ $200-$250 ☐ More than $250

Alternative Therapies Survey

Patient Study ID Number ☐ **Surgeon #** ☐☐☐☐ **Patient #** **Patient Initials** ☐☐ **F L**

21. a) Does your surgeon know what alternative therapies you are taking?

☐ No

☐ Yes; I have previously informed my surgeon

☐ Today is the first visit with my surgeon ⇨ ☐ Intend to inform my surgeon

☐ Do not intend to inform my surgeon

b) If you answered 'No' to a), or if this is your first visit and you do not intend to inform your surgeon, what are your reasons for not telling him about your alternative therapy use?
Please check all that apply, and place the number 1 beside your primary reason in the line provided.

☐ I don't think it's important _____

☐ I think my surgeon will not be interested _____

☐ I think my surgeon will not approve _____

☐ I feel uncomfortable speaking about it to my surgeon _____

☐ I think my surgeon will not know a lot about alternative therapies _____

☐ I do not know _____

☐ Other, please describe _____ _____

_____

c) If you have not yet told your surgeon about your alternative therapy use, do you intend to tell him today?

☐ No ☐ Yes ☐ Only if he asks ☐ Not applicable - I have already told him on a previous occasion

22. How did you find out about the alternative therapies you are taking? Please check all that apply.

☐ Alternative medicine practitioner ☐ Internet

☐ Book or Magazine ☐ Orthopaedic Surgeon

☐ Chiropractor ☐ Other Physician

☐ Friend or Family ☐ Religious Leader

☐ Health Food Store Employee ☐ Television or Radio

☐ Other, please describe _____

Alternative Therapies Survey

Patient Study ID Number ☐ ☐☐☐☐ **Patient Initials** ☐☐

Surgeon # **Patient #** **F L**

23. Have there been any complications due to treatment which required medical intervention?

☐ No

☐ Yes

☐ a. Reflex Sympathetic Dystrophy (RSD)

☐ b. Nerve Injury

☐ c. Excessive Stiffness

☐ d. Excessive Pain

☐ e. Deep Infection (requiring surgery and antibiotics)

☐ f. Superficial Wound Infection

☐ g. Deep Venous Thrombosis (DVT; Blood Clot)

☐ h. Pulmonary Embolism (PE; Blood Clot in Lungs)

☐ i. Implant failure (requiring revision)

☐ j. Painful hardware

☐ k. Ulcers or GI Bleeds

☐ l. Malalignment

☐ m. Fracture

☐ n. Kidney Failure

☐ o. Blood Transfusion

☐ p. Other: _____

_____

_____

Thank you for completing this questionnaire!!
Please return it to the resident or research assistant who gave it to you.

OFFICE USE ONLY

1. Please specify the location(s) of the Osteoarthritis: _____

2. What is the patient's grade of Osteoarthritis according to the Kellgren-Lawrence radiographic scale?

☐ 0; No osteophytes

☐ 1; Doubtful osteophytes

☐ 2; Minimal osteophytes, possibly with narrowing cysts and sclerosis

☐ 3; Moderate or definite osteophytes with moderate joint space narrowing

☐ 4; Severe with large osteophytes and definite joint space narrowing

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