



An Integrated Mind–Body Approach to Arthritis: A Pilot Study

Krista Prusak¹, Keven Prusak², Jack Mahoney¹

¹2365 Mountain Vista Lane Ste. 2, Provo, Utah 84606, 801-310-9987,

²249 H SFH, Department of Teacher Education, Brigham Young University, Provo, Utah 84602, 801-422-1560, USA.

ABSTRACT

Arthritis affects both the physical and psychological abilities of people in all walks of life. There are currently no recommended effective ‘disease-modifying’ remedies. Therapists and physicians are therefore exploring possible benefits from non-conventional therapeutic approaches. The purpose is to assess the changes in fitness and psychosocial outcomes of six doctor-referred patients as a result of participating in the I Can Move Again (ICMA) program. Six female participants diagnosed with arthritis were recruited from a local family practitioner. The subjects participated in a series of daily classes for 12 weeks including massage, mindfulness, bounce-back chairs, resistance chairs, aerobic and anaerobic training, rebounders, and whole body vibration platform Tai Chi. Demographic, psychosocial, and physical data were collected at the ICMA and at Y-Be-Fit (Provo, UT). Significant pre to post mean differences were found for sit-ups ($F(1,8) = 5.42$ $P = 0.048$), chair stand ($F(1,10) = 6.622$ $P = 0.028$), arm curl ($F(1,10) = 14.379$ $P = 0.004$), six-minute walk test distance ($F(1,9) = 19.188$ $P = 0.002$), and speed ($F(1,8) = 13.984$ $P = 0.006$), and rotation right ($F(1,10) = 8.921$ $P = 0.014$) and left ($F(1,10) = 11.373$ $P = 0.007$), in 27 of the 61-item questionnaire. The preliminary data on the six subjects lacked sufficient statistical power to detect the significant differences that could exist, thus committing a Type II error, but it is important to note an overall, substantial trend in improvement in the patients’ physical outcomes and psychosocial perceptions associated with improvements in activities of daily living.

Key words: Arthritis, Complementary alternative medicine, Exercise, Meditation, Tai Chi

INTRODUCTION

Arthritis is a disease that affects both the physical (e.g. walking, standing, and other activities of daily living or ADLs) and psychological (i.e. well-being, self-image, and productivity) abilities of people in all walks of life. Persons suffering from arthritis experience symptoms ranging from mild inconvenience and discomfort to complete debilitation due to joint immobility and pain caused by joint inflammation and cartilage degeneration (as in osteoarthritis). The etiology of joint inflammation may be due to factors such as, autoimmune disease or traumatic injury. Regardless of the cause, arthritis can impose severe re-

strictions on one’s quality of life. It is estimated that 50 million^[1] Americans are living with some form of arthritis, and of those, 27 million^[2] are suffering from osteoarthritis (OA). The cost to the US^[3] is estimated to be nearly \$128 billion — some \$81 billion in medical care expenditure and an additional \$47 billion in lost earnings. Despite these massive medical-related costs (virtually everyone intended to mitigate the symptoms rather than cure arthritis) there are currently no recommended effective ‘disease-modifying’ remedies.^[4] Therapists and physicians are therefore exploring the possible benefits of non-conventional therapeutic approaches, both pharmacological and non-pharmacological.

Correspondence to:

Miss. Krista Prusak, 2365 Mountain Vista Ln Ste. 2, Provo, Utah, USA 801-310-9987. E-mail: krista.prusak@icanmoveagain.com

DOI: 10.4103/2225-4110.124364

The American College of Rheumatology report, the 2012 Recommendations for the Use of Non-pharmacologic and Pharmacologic Therapies in Osteoarthritis of the Hand, Hip and Knee,^[5] suggests the following non-pharmacological interventions: Emphasis on muscular strength and aerobic exercise (for example, Tai Chi [TC], land- or aquatic-based activities) in combination with manual or modality therapies, weight management, self-management skills, and psychosocial interventions. The report's pharmacological recommendations include over-the-counter (OTC) nonsteroidal anti-inflammatory drugs (NSAIDs) in the topical or oral variety, acetaminophen, or corticosteroid injections.^[5]

Complementary alternative medicine

The current conventions for treating OA include physical therapy, pharmacological interventions, and complementary alternative medicine (CAM) (non-mainstream approaches [e.g. acupuncture, dietary supplements, massage, meditation, Tai Chi,^[6] etc.] used in conjunction with conventional medical treatment [e.g. physical therapy, NSAIDs, and corticosteroid injections]). In developed countries, it is estimated that approximately 30-70% of the people with OA use CAM.^[7] More pertinent to this study, the following forms of CAM will be discussed in depth.

Massage

Massage has been used as a pain modality for years. In a study conducted by Perlman,^[8] massage was found to be a beneficial treatment for OA. A meta-analysis conducted in 2011, found several studies on the benefits of massage for management of pain associated with knee OA.^[9]

Topical aids

Topical aids (e.g. celadrin, capsaicin, menthol, NSAIDs, etc.) have been used for the treatment of arthritis. Some of the ingredients most salient to this study are first, celadrin, a COX 2 inhibitor, used to improve range of motion (ROM) and function during activity in the arthritic joints.^[10,11] Next, methylsulfonylmethane (MSM), organic sulfur, was shown to be effective in OA model mice,^[12] by decreasing the degeneration of the cartilage at the knee's joint surfaces. MSM used in humans, Debbi, *et al.*,^[13] demonstrated a decrease in pain (via the Visual Analog Scale; [VAS]) and an increase in physical function (via the Western Ontario and McMaster University Osteoarthritis Index; [WOMAC]) compared to a placebo. Capsaicin is a neuromodulator and has been recommended as 'an add-on therapy for patients with persistent local pain and inadequate response or intolerance to other treatments'.^[14] Lastly, Arnica is commonly recommended for external use for rheumatic muscle and joint problems, inflammation, and for symptomatic relief in OA of the hands^[15] and knees.^[16,17]

Vitamins and minerals

Diets deficient in trace minerals, such as zinc, magnesium, selenium, and copper, may lead to joint disease and arthritis.^[18] Ross,^[17] argues that proper nutrition should always be the focus when combating inflammation in the body. Eating foods that contain anti-inflammation properties can give you a proper balance of macronutrients (e.g. omega-3 fatty acids), which in turn are effective in fighting inflammation.^[17] Ross advocates that,

'nutritional supplementation in addition to eating high-quality food helps build a strong foundation for optimal health,'^[17] including a high-potency multiple vitamin/mineral formula and an antioxidant complex of nutrients (including Vitamin C and E), and Omega-3 fatty acids (fish oil with EPA/DHA).^[17]

Tai Chi

Wang^[4] suggests that Tai Chi has both physical and mental components that combine to decrease pain and increase strength, cardiovascular health, and balance. Yan,^[19] states that, "Tai Chi is a low-impact physical activity with slow and gentle movements associated with health benefits, including increased flexibility and lower extremity muscle strength, improved fitness and cardiovascular health, better gait, balance, functional performance, and decreased arthritic symptoms, for a variety of conditions, including OA." Tai Chi is especially helpful for OA patients, because it is easy and gentle on the body. The fluid and graceful motions of Tai Chi require muscular strength, joint mobility, and overall body balance from participants, without worsening the OA symptoms.^[20] Hence, this may be an ideally suited OA intervention.

Meditation

Davidson^[21] found that meditation (i.e. altering one's level of consciousness to achieve a specific benefit, such as pain reduction or psychological well-being) produced positive effects in the body's immune functions. The effects of mindfulness (a western, non-sectarian, research-based form of meditation, as a means of increasing awareness of both the sick toward or the healthy to maintain optimal health and well-being) have been shown to mitigate the pain and barriers to psychological well-being for persons who suffer from various rheumatic conditions, including OA.^[22]

Exercise

Exercise is often recommended as the first intervention against OA. There are several forms of exercise that are possible. For example, Golightly^[23] found that, "strong evidence supports that aerobic and muscle strengthening exercise programs are beneficial for improving pain and physical function in adults with mild-to-moderate knee and hip OA." On account of the correlation between cardiovascular disease and arthritis (perhaps due to weight reduction), it may also be beneficial to focus on low impact interval training to work the cardiovascular system as well.^[24]

Adopting an integrated approach

With no clear evidence that arthritis can be cured, physicians are recommending one or more therapies or medicines hoping to find some relief for their patients. This trial-and-error approach can be lengthy and expensive. It may be prudent to take an integrated approach, by combining many of the recommended treatments with CAM treatments into one comprehensive treatment protocol.

The I Can Move Again (ICMA) Wellness Center has created a 12-week program that combines both medical-practitioner recommended and CAM treatments, to help provide therapeutic and psychosocial benefits to individuals with arthritis. The program includes massage, heat modalities, mindfulness and visualization, stretching, daily supplements, and topical aids (ingredients in the nutritional supplements and topical aids are listed in the appendix).

Exercise routines include aerobic exercise (i.e. bounce back chair, a rebounder, and stationary biking), strength training (resistance bands), low-impact anaerobic interval training (stationary bike), core training, and a Tai Chi routine on a whole body vibration platform.

The purpose of this pilot study is to assess the changes in health-related fitness (HRF) (comprising of body composition, cardiovascular endurance, muscle strength and endurance, and flexibility) and psychosocial outcomes of six doctor-referred arthritis patients, as a result of participating in the 12-week, ICMA program. The researchers hypothesized that the participants would experience positive changes in muscular strength and endurance, flexibility, body composition, and cardiovascular endurance along with a positive change in the psychosocial perceptions (including perceived decrease in pain) about their arthritis condition, after participation in the program.

MATERIALS AND METHODS

Participants and setting

This is a pilot study wherein six female participants (each was diagnosed with either OA or Rheumatoid Arthritis [RA]) were recruited from a local family practitioner. Each participant received a briefing on the ICMA program and signed a document of informed consent. The subjects were included in the pilot study based on the following criteria:

1. Diagnosis of OA or RA
2. Clearance from personal physician to participate
3. Willingness and ability to provide informed consent
4. Age \geq 19 years.

Subjects were excluded based on the following criteria:

1. Recent (less than six months) joint surgery
2. Other significant medical or psychiatric conditions, including other inflammatory conditions and epilepsy
3. Women who were pregnant or plan on becoming pregnant during the course of the study
4. Hypermobility or unstable disease that could compromise participation in the study.

The ICMA facility [Figures 1 and 2] is an activity space fitted with massage tables; bounce-back chairs, vibration platforms, and rebounders — five of each. There are also nine resistance chairs with

bike attachments, and two hand cycle ergometers. The room has six large screen TVs to display Tai Chi or other exercise routines.

Instrumentation

Program instrumentation included, the massage table, bounce-back chair, resistance chair, rebounder, WBV platform, Deep Healing CD, and Tai Chi routine video (see appendix for the specifications of each instrument). The testing instrumentation included a ruler, a 4 lb dumbbell, a 100 ft measuring tape, and a stopwatch. The testing was done according to Rikli and Jones' valid and reliable Senior Fitness Test Manual.^[25] The Y-Be-Fit instrumentation included a Precor Treadmill c90064 (Woodinville, WA 98072-4002), a seated Cybex chest press and seated leg press machine (Cybex International, Inc., Medway, MA 02053), and a BOD POD (COSMED USA, Inc.; Concord, Ca).

The ICMA questionnaire was based on the valid and reliable Health Assessment Questionnaire by the Stanford University School of Medicine that has been used since 1978.^[26,27] The questionnaire was slightly modified and additional items were added for more specificity. No evidence of validity or reliability for the modified version used in this study is available at this time.

Procedures

The subjects participated in a series of daily classes for each of the 12 weeks. The activities were prearranged in a consistent weekly rotation [Table 1]. The activities included: massage, relaxation, mindfulness, visualization, the use of bounce-back chairs for expansion and contraction of several joints in the body, the use of resistance chairs for strength training, core strengthening, aerobic and anaerobic training, the use of rebounders for the benefit of aerobic exercise with low impact on the joints, the use of whole body vibration platforms for strength and proprioception while doing Tai Chi.

Due to facility limitations, the class sizes were kept to a maximum of five participants. Each activity was tailored to the limitations of each participant including, modifications of bolsters, props, steps, chairs, and hand ergometers. The patients were able to choose to participate in each activity, and were not pressured to participate if they felt they did not want to or could not participate.

Participants came to the ICMA facility at the same time for one hour a day, five days a week. The daily schedule of activities



Figure 1. Exercise gym floor



Figure 2. Massage tables with music player

is listed in Table 1. Each day began with a mindfulness activity, while on a heated massage table, listening to relaxing music using headphones. The music was interlaced with subliminal messaging (Jonet Inc, 2010). The remainder of the activities varied daily [Table 1]. Each treatment session lasted one hour.

The other routines were conducted as follows: The bounce-back chair routine consisted of sitting on the chair and bouncing for the time allotted. The patient determined the bouncing rhythm and direction. Stretching on the bounce-back chair consisted of a light

stretching routine listed in Table 2. The warm-up routine on the resistance bike is also listed in Table 2. Each warm-up/stretching routine took approximately four minutes. The Monday, Wednesday, Friday warm-up/stretching routine was done on the bounce-back chair. The Tuesday, Thursday warm-up/stretching routine was done on the resistance chair.

The rebounder routine consisted of a gentle health bounce for the allotted time. The patients determined the bouncing rhythm, magnitude, and direction of their bouncing.

Table 1. Daily class activities

	Monday	Tuesday	Wednesday	Thursday	Friday
Activity 1	Massage and heat table with mindfulness recording	Massage and heat table with mindfulness recording	Massage and heat table with mindfulness recording	Massage and heat table with mindfulness recording	Massage and heat table with mindfulness recording
Time	17:30	17:30	17:30	17:30	17:30
Transition	2:30	2:30	2:30	2:30	2:30
Activity 2	Tai Chi on WBV	Resistance chair/bike warm-up	Tai Chi on WBV	Resistance chair/bike warm-up	Tai Chi on WBV
Time	19:30	5:00	19:30	5:00	19:30
Transition	0:30	0:00	0:30	0:00	0:30
Activity 3	Bounce-back chair routine	Strength training with resistance bands	Bounce-back chair routine	Strength training with resistance bands	Bounce-back chair routine
Time	6:00	15:00	6:00	15:00	6:00
Transition	0:00	0:00	0:00	0:00	0:00
Activity 4	Stretching on bounce-back chair	Interval training on resistance chair/bike routine (listed in table 3)	Stretching on bounce back chair	Interval training on resistance chair/bike routine (listed in table 3)	Stretching on bounce-back chair
Time	4:00	20:00	4:00	20:00	4:00
Transition	0:00		0:00		0:00
Activity 5	Rebounder routine (60-65% max HR)		Rebounder routine (60-65% Max HR)		Rebounder routine (60-65% max HR)
Time	10:00		10:00		10:00

List of activities during each class sessions for each day class was held. Time and transition for each activity is indicated in minutes; WBV: Whole body vibration; HR: Heart rate

Table 2. Warm up and stretching routines

Monday, Wednesday, Friday		Tuesday, Thursday	
Activity	Time	Activity	Number of repetitions and sets
Counter clockwise ankle rotations - both ankles	Each ankle 15 seconds for a total of 30 seconds	Shoulder shrugs: Each direction	Five repetitions and three sets each side
Clockwise ankle rotations - both ankles	Each ankle for 15 seconds for a total of 30 seconds	Striking cobra (front pump/triceps)	Four repetitions one set
Massage stick quadriceps muscles - both legs	1 Minute on each leg for a total of 2 minutes	Graceful bird (side wings)	Four repetitions one set
Anterior tibialis and anterior ankle stretch - both legs	Each leg 15 seconds for a total of 30 seconds	Grandchild's hug (reverse fly)	Four repetitions one set
Hamstring stretch - both legs	Each leg 15 seconds for a total of 30 seconds	Sunrise/sunset (triceps stretch)	Three repetitions one set each side
		Gentle breeze (chest fly)	Four repetitions one set
		Coiling snake (straight row)	Four repetitions one set
		Picking flowers in the meadow (back flex)	Three repetitions one set each side
		Beautiful woman waves farewell (sword draw)	Four repetitions one set each side

The Monday, Wednesday, Friday routine was done on the bounce-back chair, the Tuesday, Thursday routine was done on the resistance chair

The strength training routine consisted of an upper body resistance bands routine. The entire routine is listed in Table 3.

The bike or hand ergometer interval training routine consisted of a three-minute warm up followed by eight, 30-second sprints and eight, 90-second recovery periods. The participants determined their resistance and speed according to their target heart rate zones of 90-95% of maximum heart rate (HR_{max}), depending on their physician's recommendations. The researchers calculated the maximum heart rates, and therefore, the training zones, using four methods — the traditional ($220 - age$), the Miller ($217 - .85[age]$), the Londeree and Moeschberger ($206.3 - .711[age]$), and the Inbar ($205.8 - .685[age]$). The lowest, most conservative training zone from among all scales was chosen and communicated to the participants.

The Tai Chi routine on the whole body vibration (WBV) platform consisted of standing on the platform and following the video playing at the front of the room. The WBV platform was set at an oscillation rate of 30 Hz. Each participant was also given a home practice copy (DVD) of the Tai Chi routine and was encouraged to use it to learn the poses.

In addition to the one-hour session at the ICMA, the participants were instructed to develop a home practice of deep healing meditation at least once a week, which was provided via a CD during the baseline visit.

The subjects were encouraged to self-select whether to participate in any of the activities. Subjects also self-selected the resistance and repetitions of the activities each week and were then allowed to increase both the following week, as they wished, up to the maximum allowance of exercises for that week (e.g. for resistance training week one, only one sprint was allowed, week two, two were allowed etc.).

The subjects took a daily dose of a multivitamin, vitamin C with zinc, borage oil, Celadrin, fish oil, and a protein shake. In addition the subjects used the topical aids daily. Some participants were unable to take the fish oil and protein shakes because of contraindications. The participants were told to stop all other supplementations during the 12-week program, but were to continue their prescribed medications, unless otherwise directed by their physician.

Data collection

At the baseline, demographic and clinical data were collected via a computerized and in-person interview conducted by the same tester. The patient-reported outcomes were recorded via a questionnaire at both the baseline and end of the study. Physical measurements were also collected at the baseline and at the end of the study by the same tester at ICMA and also by an outside resource. Y-Be-Fit at Brigham Young University collected the physical measurement data on each individual at the baseline and within one week of the last class period. No other data were collected during the class periods.

Data analysis

Preliminary data on the six people lacked sufficient statistical power to detect the significant differences that could exist, thus committing a Type II error. Therefore, the data were analyzed as individual case studies as well as by means of a cohort. All data were imported into SPSS (SPSS 20 IBM Software) and analyzed.

RESULTS

Dependent variables

The descriptive data is listed in Table 4. Pre-to-post changes in the dependent variables are listed according to the components of HRF, namely body composition, muscular strength and endurance, cardiovascular health, and flexibility. It must be noted that inability to detect significance in these outcomes is likely due to lack of sufficient power on account of the low number of subjects. In such instances, we ask the reader to consider pre-to-post differences for each of the subjects as an individual case rather than as a part of the group mean. Significant group means will also be listed.

Body composition

There were no significant pre-to-post differences in the body fat percentages according to the Bod Pod measurements or waist-to-hip ratio.

Muscular strength and endurance

Assessment in each of the six tests associated with muscle strength and endurance indicated notable, but non-significant pre-to-post improvements for chest press, leg press, and push-ups.

Table 3. Strength training routine

Start time		Activity	Handle
15:00	7:30	Front pump	Overhead
14:30	7:00	Side wing	
14:00	6:30	Front triceps	
13:30	6:00	Side sampson	
13:00	5:30	Hi five	Shoulder hook
12:30	5:00	Push up	
12:00	4:30	Press up	
11:30	4:00	Chest fly	
11:00	3:30	Sit up	
10:30	3:00	Side lift	Seat hook
10:00	2:30	Curls	
9:30	2:00	Front raise	
9:00	1:30	Straight row	Pedal hook
8:30	1:00	Down row	
8:00	0:30	Reverse fly	

Resistance training was done with the upper body with the resistance bands attached to the resistance chair and bike

Table 4. Descriptive data

Subject	Gender	Age	Height (In)	Physical activity level	
1	Female	47	64.4	3	Moderately active
2	Female	51	62	2	Light active
3	Female	57	62	3	Moderately active
4	Female	53	61.8	2	Light active
5	Female	63	62	2	Light active
6	Female	67	64.6	2	Light active
		M=56.33	M=62.8	M=2.33	
		SD=7.55	SD=1.32	SD=0.52	

Data for all participants. Mean and standard deviation listed under each variable

Significant pre-to-post mean differences were found for sit-ups, chair stands, and arm curls. Results are shown in Table 5.

Cardiovascular

Assessment in each of the three tests associated with cardiovascular endurance indicated notable, but non-significant pre-to-post improvements for VO₂. Significant pre-to-post mean differences were found for Six Minute Walk Distance and Six Minute Walk Test Speed. Results can be found in Table 6.

Flexibility

Assessment in each of the ten tests associated with flexibility indicated notable, but not significant pre-to-post improvements for middle fingertip to floor test, lateral flexion right thigh, lateral flexion left thigh, chair sit and reach, calf flexibility right, calf flexibility left, back scratch right, and back scratch left. Significant pre-to-post mean differences were found for rotation right and rotation left. Results are shown in Table 7.

One-way analysis of variance

Results from the repeated measures One-way Analysis of Variance (ANOVA) revealed significant differences across time (baseline to post testing) for 27 items of the following psychosocial

Table 5. Strength pre-to-post improvements

Exercise	Minimum		Maximum		Mean		F	P
	Lbs or reps	%	Lbs or reps	%	Lbs or reps	%		
Chest press	9	13	20	100	14	36		
Leg press	10	10	84	56	52.4	35		
Push-ups	2	25	7	233	5	136		
*Sit-ups	4	20	50	50	19	35	(1,8)=5.42	0.048
*Chair stands	3	55	16	300	10.8	150	(1,10)=6.622	0.028
*Arm curls	5	39	19	317	12.2	139	(1,10)=14.379	0.004

Minimum, maximum and means of each exercise. F statistic and P value included for statistically significant data

Table 6. Cardiovascular pre-to-post improvements

Test	Minimum		Maximum		Mean		F	P
	ml/kg/ Min, ft or mph	%	ml/kg/ Min, ft or mph	%	ml/kg/ Min, ft or mph	%		
VO ₂	-2.3	-10	7.84	30	2.52	9		
*Six minute walk distance	300	17	920	64	528	33	(1,9)=19.188	0.002
*Six minute walk speed	0.57	17	1.74	64	1.1	37	(1,8)=13.984	0.006

Minimum, maximum and means of each test. F statistic and P value included for statistically significant data

measurement via the ICMA questionnaire, [Table 8]: Dress and grooming, grip, eating, arising, walking and activities, and psychosocial. All other comparisons were found to be non-significant at the P ≤ 0.05 level.

Mindfulness meditation

In addition to the mindfulness meditation routine in the daily classes, each participant self-reported doing one hour or more of deep healing meditation per week at home with the provided CD. The majority of the participants reported doing it every day.

DISCUSSION

Arthritis affects both the physical and psychological abilities of people in all walks of life. There are currently no recommended effective ‘disease-modifying’ remedies with American traditional medicine.^[4] The authors are therefore exploring possible benefits of non-conventional therapeutic approaches including complementary medicine.

“Traditional Medicine is the sum total of the knowledge, skills, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in the prevention, diagnosis,

Table 7. Flexibility pre-to-post improvements

Exercise	Minimum		Maximum		Mean		F	P
	Inches	%	Inches	%	Inches	%		
Middle finger tip to floor	-1.8	32	7	175	3	92		
Lateral flexion right thigh	-2	-13	7	26	1.8	7		
Lateral flexion left thigh	-1.3	-8	6	22	1.9	8		
Chair sit and reach	-6.6	-200	6.5	200	0.7	58		
Calf flexibility right	-1.8	-32	2	67	1.2	26		
Calf flexibility left	-0.1	-3	2.5	71	0.7	23		
Back scratch right	-4.3	33	6	133	0.2	92		
Back scratch left	-4.5	37	11	150	1.3	67		
*Rotation right	2.5	10	20	469	12	155	(1,10)=8.921	0.014
*Rotation left	6.8	43	21	586	12	156	(1,10)=11.373	0.007

Minimum, maximum and means of each test. F statistic and P value included for statistically significant data

Table 8. Significant pre-to-post differences on the disability questionnaire

	Item number	Question	F statistic	DF (1,10)	P value
Dressing and grooming	4	Shampooing hair, washing back of shoulders, drying body, etc.?	5.299		0.044
Gripping	13*	Shaking hands with others (no pain or discomfort)?	7.481		0.021
Eating	15	Open a new milk carton?	7.336		0.022
Reach	19	Bend down to pick up clothing from the floor?	8.167		0.017
Arising	22	Bending, kneeling or stooping?	8.464		0.016
	29	Climb or descend five steps without using railing?	5		0.049
	30	Climb or descend one flight of stairs?	7.264		0.022
Walking and activities	32	Moderate activities such as moving a table, bowling, golf, vacuuming, etc.?	5.73		0.038
	36	Walking several hundred yards?	6.435		0.03
	37	Walking more than one mile?	12.288		0.006
Psychosocial	41	Cut down the amount of time spent on work?	8.182		0.017
	42	Cut down the amount of time spent on social/personal activities?	8		0.018
	43	Accomplished less than you would like?	6.667		0.027
	44	Were limited in the kind of work you could perform?	15		0.003
	45	Were limited in the kind of social/personal activities you could perform?	6.798		0.026
	46	Had difficulty performing work?	16.897		0.002
	47	Had difficulty performing social/personal activities?	8.366		0.016
	48	Cut down the amount of time spent on work?	11.25		0.007
	49	Cut down the amount of time spent on non-work/social/personal activities?	9.308		0.012
	50	Accomplished less than you would like?	5.548		0.040
	51	Were limited in the kind of work you could perform?	13.852		0.004
	52	Were limited in the kind of non-work/social/personal activities you could perform?	7.857		0.19
	53	Had difficulty performing work?	11.415		0.007
	54	Had difficulty performing non-work/social/personal activities?	6.639		0.028
55	How much joint pain have you had in the last four weeks?	13.158		0.005	
56	Compared to one year ago, how would you rate your health in general now?	6.757		0.027	
61	Considering all the ways that your joint pain affects you, rate how joint pain affects your life	35.588		0.000	

List of questions that were significantly different from the baseline to post ($P \leq 0.05$). *An asterisk denotes questions that were added to the ICMA questionnaire that did not originate from the health assessment questionnaire; ICMA: I can move again; DF: Degrees of freedom

improvement or treatment of physical and mental illness.^{28]} Traditional medical practices in American culture include recommendations such as emphasis on muscular strength and aerobic exercise, in combination with manual or modality therapies, weight management, self-management skills, and psychosocial interventions, OTC or topical prescription or oral NSAIDs, acetaminophen, and supplements including glucosamine, or corticosteroid injections.^{51]} This can become expensive and has varying success among persons suffering from arthritis. Many persons who suffer continue looking for other treatment options, including complementary medicine. “Complementary medicine, also sometimes referred to as non-conventional or parallel medicine, is used to refer to the broadest of healthcare practices that are not part of a country’s own tradition, or not integrated into its dominant healthcare system.^{28]} I Can Move Again has created an intervention program that embodies both traditional and comple-

mentary medical practices to help arthritis sufferers. The traditional medicine approach includes exercise, nutritional supplements, and topical aids. The complementary medicine approach includes massage, mindfulness and meditation. The combination of both traditional and complementary medicine has proven effective in several health-related fitness components.

The authors grouped fitness outcomes into HRF components, namely body composition, muscular strength and endurance, cardiovascular health, and flexibility.

Body composition

This is not a weight loss program, because there is no nutritional component. although excess weight aggravates arthritis^{51]} the measured body composition measurements were the same pre-to-post. Therefore, any improvements cannot be attributed to changes in body composition. There were some non-significant

trends in changes to lean body mass. Had there been a nutritional component, decreases in weight and body fat may have resulted in amelioration of arthritis.

The authors are recommending additional diet-modification components, to make the most of the ICMA program. Not only would diet modification increase nutrients to the joint, but also a weight reduction would decrease the load on the joints. The authors believe that, had a nutritional component been introduced the results would have been more dramatic.

Cardiovascular component

Even though there was a cardiovascular component, it was insufficient to elicit significant changes in the VO_2 Max. The authors believe this was due to the lack of power as there was a significant difference in the six-minute walk test distance and speed.

Muscular strength and endurance

Pre-to-post improvements were found in several variables. This is beneficial to improve overall physical function, mobility and lessen pain.^[29]

Flexibility indicators

Pre-to-post improvements were found in several of the variables. Joint flexibility is important to persons with OA. Joint lubrication occurs as the joint moves and expands and contracts the fluid throughout the joint. This delivers nutrients and provides waste removal.^[30]

Questionnaire

The questionnaire was based on the validated instrument of the Health Assessment Questionnaire.^[27] Nine of the original 49 questions were modified for specificity purposes for this study (e.g. questions 29 and 30 added the words “or descend” to the original questions; questions 46 and 47 are the result of splitting a single, compound question into two individual questions). The goal of the researchers was to achieve greater specificity, while maintaining the integrity of the original questionnaire. The authors recommend caution in the interpretation of the results from these specific nine questions, but it is important to note an overall, substantial trend in improvement in patient perceptions associated with improvements in ADLs.

Preliminary data on the six subjects lacked sufficient statistical power to detect significant differences that could exist, thus committing a Type I error, but it is important to note an overall, substantial trend in improvement in patient physical outcomes and psychosocial perceptions associated with improvements in ADLs. Out of the 96 variables, tested, 86 (89.6%) saw a mean improvement, four (4.2%) of the variables saw no mean improvement, and six (6.2%) had a slight mean decline in outcome. Therefore, the authors recommend the ICMA program, because it seems to produce positive results for its OA and RA patients, in both physical and psychosocial outcomes.

REFERENCES

1. Arthritis Foundation. Get the Facts. Available at: www.arthritis.org/conditions-treatments/understanding-arthritis/. Accessed June 2013.
2. Fouladbakhsh J. Complimentary and alternative modalities to relieve osteoarthritis symptoms: A review of the evidence on several therapies often used for osteoarthritis management. *Orthop Nurs* 2013;31:115-21.
3. (CDC) Cfde. FAQ (Data Related) Costs Analysis. Atlanta 2003.
4. Wang C, Schmid CH, Hibberd PL, Kalish R, Roubenoff R, Roncs R, *et al.* Tai Chi is effective in treating knee osteoarthritis: A randomized controlled trial. *Arthritis Rheum* 2009;61:1545-53.
5. Hochberg M, Altman R, April K, ALE. American College of Rheumatology 2012. Recommendations for the use of nonpharmacological and pharmacological therapies in osteoarthritis of the hand, hip and knee. *Arthritis Care Res* 2012;64:465-74.
6. (NCCAM) Tncfcaam. Complementary, alternative, or integrative health: What's in a name? Gaithersburg, MD 208982013.
7. Soeken KL. Selected CAM therapies for arthritis-related pain: The evidence from systematic reviews. *Clin J Pain* 2004;20:13-8.
8. Perlman AI, Sabina A, Williams AL, Njike VY, Katz DL. Massage therapy for osteoarthritis of the knee: A randomized control trial. *Arch Internal Med* 2006;166:2533-8.
9. Yuan W, Bannuru R, Kong L, Cheng Y, Mcalindon T, Fang M, *et al.* A massage therapy on pain relief for knee osteoarthritis: A systematic review and meta-analysis. *Osteoarthr Cartil* 2012;20:S281.
10. Kraemer WJ, Ratamess NA, Maresh CM, Anderson JA, Volek JS, Tiberio DP, *et al.* A cetylated fatty acid topical cream with menthol reduces pain and improves functional performance in individuals with arthritis. *J Strength Cond Res* 2005;19:475-80.
11. Hesslink R Jr, Armstrong D 3rd, Nagendran MV, Sreevatsan S, Barathur R. Cetylated fatty acids improve knee function in patients with osteoarthritis. *J Rheumatol* 2002;29:1708-12.
12. Ezaki J, Hashimoto M, Hosokawa Y, Ishimi Y. Assessment of safety and efficacy of methylsulfonylmethane on bone and knee joints in osteoarthritis animal model. *J Bone Miner Metab* 2013;31:16-25.
13. Debbi EM, Agar G, Fichman G, Ziv YB, Kardosh R, Halperin N, *et al.* Efficacy of methylsulfonylmethane supplementation on osteoarthritis of the knee, a randomized controlled study. *BMC Complement Altern Med* 2011;11:50.
14. Richards BL, Whittle SL, Buchbinder R. Neuromodulators for pain management in rheumatoid arthritis. *Chochrane Database Syst Rev* 2012;1:CD008921.
15. Widrig R, Suter A, Saller R, Melzer J. Choosing between NSAIDs and arnica for topical treatment of hand osteoarthritis in a randomized double-blind study. *Rheumatol Int* 2007;27:585-91.
16. Knuesel O, Weber M, Suter A. Arnica Montana gel in osteoarthritis of the knee: An open, multicenter clinical trial. *Adv Ther* 2002;19:209-18.
17. Ross S. Osteoarthritis of the knee: An integrative therapies approach. *Holist Nurs Pract* 2011;25:327-31.
18. Goggs R, Vaughn-Thomas A, Clegg PD, Carter SD, Innes JF, Mobasheri A, *et al.* Nutraceutical therapies for degenerative joint diseases: A critical review. *Crit Rev Food Sci Nutr* 2005;45:145-64.
19. Yan JH, Gu WJ, Sun J, Zhang WX, Li BW, Pan L. Efficacy of Tai Chi on pain, stiffness and function in patients with osteoarthritis: A meta-analysis. *Plos One* 2013;8.
20. Zhuo DH. Preventive geriatrics- An overview from traditional Chinese medicine. *Am J Chin Med* 1982;10:32-9.
21. Davidson RJ, Kabat-Zinn J, Schumacher J, Rosenkranz M, Muller D, Santorelli SF, *et al.* Alterations in brain and immune function produced by mindfulness meditation. *Psychosom Med* 2003;65:564-70.
22. Hawtin H, Sullivan C. Experiences of mindfulness training in living with rheumatic disease: An interpretive phenomenological analysis. *Br J Occup Ther* 2011;74:137-42.
23. Golightly YM, Allen KD, Caine DJ. A comprehensive review of the effectiveness of different exercise programs for patients with osteoarthritis. *Phys Sportsmed* 2012;40:52-62.
24. Ong KL, Wu BJ, Cheung BM, Barter PJ, Rye KA. Arthritis: Its Prevalence, risk factors, and association with cardiovascular disease in the United States, 1999-2008. *Ann Epidemiol* 2013;23:80-6.
25. Rikli R, Jones J. Senior fitness test manual. Champaign, IL: Human Kinetics; 2001.
26. Ramey D, Fries J, Singh G. The Health Assessment Questionnaire

- 1995– Status and review, 2nd ed. Philadelphia: Lippincott- Raven Publishers; 1996.
27. Fries JF, Spitz P, Kriaines RG, Holman HR. Measurement of patient outcome in arthritis. *Arthritis Rheum* 1980;23:137-45.
 28. WHO Traditional Medicine Strategy: 2002-2005. The WHO Essential Medicines And Health Products Information Portal. Geneva: World Health Organization; 2002. p. 70.
 29. Flint-Wagner HG, Lisse J, Lohman TG, Going SB, Guido T, Cussler E, *et al.* Assessment of a sixteen-week training program on strength, pain, and function in rheumatoid arthritis patients. *J Clin Rheumatol* 2009;15:165-71.
 30. Amiel D, Abel MF, Kleiner JB, Lieber RL, Akeson WH. Synovial-fluid nutrient delivery in the diarthral joint- An analysis of knee ligaments. *J Orthop Res* 1986;4:90-5.

APPENDIX

Supplementation and topical aids

Ingredients In The Various Supplements, Shakes And Topical Aids Include: Vitamins A, C, D, E, K, B-1, B-2, B-6, B-12, Niacin, Folic Acid, Celadrin, Omega-3 Fatty Acids, Ecosapentaenoic Acid (EPA), Docosahexaenoic Acid (DHA), Borage Oil, Gamma Linolenic Acid (GLA), Botin, Pantothenic Acid, Calcium, Iodine, Choline, Inositol, Para-Aminobenzoic Acid, Bioflavonoid Complex, Betaine HCL, Rutin, Citrus Bioflavonoids, Zinc, Glucosamine Sulfate, MSM, Trimethylglycine (TMG), Hyaluronic Acid, Alpha Lipoic Acid (ALA), Boron: Citrate, Calcium: Carbonate, Chromium, Copper, Iodine, Magnesium, Manganese, Molybdenum, Potassium, Selenium, Silica, Bromelain, Curcumin, Grape Seed Extract, Green Tea Extract, Boswellia, Devil’s Claw, And White Willow Bark.

Instrumentation

Thermal Jade Stone Massage Bed with Music (Xiamen Comebest Electronics Technology Co, LTD; Tongan, Xiamen Fu-

jian 360000 China). The Bounce-back Chair was the Bounce-back Fitness Chair (Allfit Enterprises, LLC; Provo, Ut 84601). The Resistance Chair with Bike was the VQ Actioncare Freedom Flex II Resistance Chair with Exercise Cycle (VQ Actioncare, LLC; South Irvine CA 92614-6007). The Ergonometer used was the Colorado Cycle (Rand-Scot, Inc.; Fort Collins CO 80524). The Whole Body Vibration Platform used was the Soloflex 10-Inch by 40-Inch Board (Soloflex, Inc. Hillsboro, or 97124). The WBV Platforms are Flush-Mounted to the floor. The Rebounders used were the Reboundair Rebounders with Parallel Bars on each side and were also Flush-Mounted to the floor (Reboundair, Inc. Springville, Ut 84663). The Massage Stick was (RPI of Atlanta, Atlanta, GA). The Heart Rate Monitors were Polar Monitors FT7 with Watch and Chest Band (Polar Electro Inc., Lake Success, NY). The Healing CD And Tai Chi Routine used were our own copy righted Meditation and Healing CDs Called “Deep Healing, Music And Messages” (Jonet Inc, 2010). The statistical analysis software we used was SPSS 20 IBM Software (IBM North America New York, NY 10022.