

Evaluation of Arthritis Foundation Exercise Program

Studies have shown that people with arthritis can safely participate in exercise programs to improve their cardiovascular fitness, muscular strength, psychological outlook and physical function. The People with Arthritis Can Exercise (PACE) program – now called the Arthritis Foundation Exercise Program – is a land-based course that promotes self-management of arthritis through exercise.

What Problem Was Studied?

For successful widespread dissemination of the Program, solid evidence-based data to show its efficacy is needed. To attain such evidence-based data, a randomized controlled trial was conducted that measured short-term and long-term effects of the Program on symptoms, function, physical activity and a set of psychosocial measures. This study was not funded by the Arthritis Foundation, but by the Centers for Disease Control and Prevention through a grant from the Association of American Medical Colleges.

What Was Done in the Study?

A total of 346 people with arthritis participated in the study; none were frequent exercisers, and all had some limitation in their normal activities because of arthritis. The participants were separated into an intervention group and a control group.

For this study, participants carried out most of the movements standing or from a chair. No floor exercises were performed. In practice, the Arthritis Foundation Exercise Program classes are given at an intensity level appropriate to the people taking the class. The exercise program consisted of twice-weekly, one-hour sessions for eight weeks.

All participants completed assessments at baseline and at the end of the Program. After the eight-week assessment, the control group received the intervention. Pain, stiffness and fatigue were measured using visual scales. Physical function was assessed with self-report and performance measures. Physical activity was scored according to type of activity,

frequency and duration. Self-efficacy, depression and helplessness were assessed using various questionnaires.

What Were the Study Results?

Those participants who attended at least nine of the 16 classes showed improvement in pain, fatigue and stiffness, in some arm and leg strength and in self-confidence that they could manage their arthritis. Six months after completing the Program, pain and fatigue were still better than at baseline, but disability and self-efficacy measures were not. However, the subset of participants that continued exercising at home maintained improvement in all symptoms and declined only in self-efficacy for physical activity – which is defined as the knowledge that you have the ability and self-motivation to exercise.

What Does this Mean for People with Arthritis?

The authors conclude that the Arthritis Foundation Exercise Program (formerly known as PACE) “modestly improves symptoms and strength but does not improve function, increase exercise endurance, or increase physical activity.” They go on to suggest, “For more substantial benefits, frequency and intensity may need to be increased.” **RU**

Callahan LF, Mielenz T, Freburger J, et al. A randomized controlled trial of the People with Arthritis Can Exercise Program: symptoms, function, physical activity, and psychosocial outcomes. Arthritis Care Res 2008;59:92-101.

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Exercise and Education for Fibromyalgia

Fibromyalgia is characterized by widespread chronic pain and point tenderness and often is accompanied by fatigue, sleep disturbance, depression, cognitive difficulty and exercise intolerance. Although pregabalin (*Lyrica*) has recently been approved to treat fibromyalgia, drug therapy is often insufficient for people with the disorder.

What Problem Was Studied?

To determine the most effective nonpharmacologic management techniques to accompany medication therapy, a team of Boston researchers from Beth Israel Deaconess Medical Center, Brigham and Women's Hospital and Harvard Medical School designed a study to evaluate and compare four common self-management interventions. Daniel S. Rooks, ScD – recipient of an Arthritis Foundation Investigator Award – and team measured functional status, symptom severity and self-efficacy before and after the interventions.

Psychology Basics

Self-efficacy: The belief that one has the ability to manage a situation. Self-efficacy beliefs determine how people feel, think, motivate themselves and behave.

What Was Done in the Study?

A total of 207 women with fibromyalgia were recruited from physician practices and randomly assigned to one of four groups. Group 1 participated in aerobic and flexibility exercises; group 2 participated in strength training, aerobic and flexibility exercises; group 3 attended the Arthritis Foundation Fibromyalgia Self-Help Course (FSHC); and group 4 attended the FSHC and participated in strength training, aerobic and flexibility exercises. Groups 1 and 2 met twice weekly on different days of the week for their exercise classes. Each session involved approximately 60 minutes of activity, and participants were given instructions to perform a third day of exercise on their own. The FSHC group attended the seven-session program; each session lasted approximately two hours and met every-other week.

Participants in group 4 exercised with group 2 and attended the FSHC with group 3.

What Were the Study Results?

Of the 207 women recruited, 135 completed the 16-week intervention period and underwent a follow-up assessment. The group that combined the FSHC and the strength training-aerobic-flexibility exercise class demonstrated the greatest increases in outcome scores. The group that attended only the FSHC showed the least improvement. Both of the structured exercise programs improved physical, emotional and social function, key symptoms and self-efficacy in women with fibromyalgia. When the exercise program was combined with self-management education, the benefits were enhanced.

What Does This Mean for People with Fibromyalgia?

The authors conclude in their article published in the *Archives of Internal Medicine*, “The present study suggests that progressive walking, simple strength training movements, and stretching activities are effective at improving physical, emotional and social function, key symptoms, and self-efficacy in women with fibromyalgia who are being actively treated with medication. Furthermore, the benefits of exercise are enhanced when combined with targeted self-management education.” **RU**

Rooks DS, Gautam S, Romeling M, et al. Group exercise, education, and combination self-management in women with fibromyalgia: A randomized trial. Arch Intern Med 2007;167:2192-2200.

Although the Fibromyalgia Self-Help Course is no longer available, the Arthritis Foundation Self-Help Program offers similar education and empowerment training, and has been proven in studies to be effective. It is a group education program designed to complement the care provided by the participants' health-care team and allows them to share experiences with others. Trained volunteers, many of whom have arthritis or fibromyalgia, lead the courses. To find a course near you, contact your local Arthritis Foundation chapter.

Controlling Bone Loss When Taking Steroids

Many people with inflammatory diseases take glucocorticoids, such as prednisone, to control the inflammation. Unfortunately, long-term glucocorticoid (steroid) use can lead to several unwanted side effects, including bone density loss and osteoporosis. In fact, the most common cause of secondary osteoporosis is steroid use.

What Problem Was Studied?

Current international guidelines recommend bisphosphonate medications for people who already have or are at risk for developing steroid-induced osteoporosis. However, another drug currently in use to reduce risk of fracture for people with osteoporosis is teriparatide – a recombinant human parathyroid hormone. While bisphosphonates work by preventing the absorption of bone, teriparatide works by stimulating bone formation.

Endocrinology Basics

Recombinant human parathyroid hormone: A synthetic form of the naturally occurring parathyroid hormone, which is the primary regulator of calcium metabolism in bone and kidney. It controls bone formation and resorption, reabsorption of calcium in kidneys, and calcium absorption in intestines. Daily injections of the recombinant form stimulates new bone formation.

An international team of scientists, led by Kenneth G. Saag, MD, of the University of Alabama at Birmingham, designed and carried out a randomized clinical trial comparing teriparatide (*Forteo*) with alendronate (*Fosamax*; a commonly used bisphosphonate) for the treatment of steroid-induced osteoporosis. Although Dr. Saag has received several Arthritis Foundation research grants unrelated to this particular project, this trial was sponsored by Eli Lilly, the maker of *Forteo*. In the *New England Journal of Medicine* article, Dr. Saag assures readers of the independence of the findings, “All authors

participated in the interpretation of the data and the decision to publish the findings, had unrestricted access to the data, were not limited by the sponsor with regard to statements made, and vouch for the veracity and completeness of the data.”

What Was Done in the Study?

A total of 428 people with established steroid-induced osteoporosis participated in the trial. They were randomly assigned to receive either 20 micrograms of teriparatide via injection plus an oral placebo tablet or 10 milligrams of oral alendronate plus an injectable placebo. All participants also received calcium and vitamin D supplements. Bone mineral density (BMD) was determined via dual-energy X-ray absorptiometry (DEXA) at baseline and at one, three, six, 12 and 18 months.

What Were the Study Results?

People with steroid-induced osteoporosis in the teriparatide group had an increase in BMD twice the increase found in the alendronate group. Lumbar spine density increased by 7.2 percent in the teriparatide group compared with 3.4 percent in the alendronate group. There were fewer spine fractures in those receiving teriparatide. Adverse events were similar between the two groups.

What Does This Mean for People Taking Steroids?

“Because some patients having arthritis, lupus or other rheumatic disease may require steroid medications, protecting your bones is very important,” said Dr. Saag. The study authors also concluded that although the standard of care for people at risk for steroid-induced bone loss includes antiresorptive agents, such as alendronate, certain patients with or at high risk for steroid-related osteoporosis may need more aggressive therapy. They further suggest, “Teriparatide might be considered as a therapeutic strategy for patients at high risk for fracture.” [RU](#)

Saag KG, Shane E, Boonen S, et al. Teriparatide or alendronate in glucocorticoid-induced osteoporosis. N Engl J Med 2007;357:2028-39.

Spirituality and Arthritis Outcomes

Studies show that 90 percent of Americans believe in God, and many consider faith and spirituality an important aspect of well-being. Indeed, many people trust in their spiritual beliefs to cope with health challenges. A few studies have even shown that faith is associated with better health outcomes.

What Problem Was Studied?

A team of scientists from Johns Hopkins School of Medicine in Baltimore, MD – including Arthritis Foundation-funded researcher Steffany Haaz, MFA – and Vanderbilt University Medical Center in Nashville, TN, set out to discover the frequency of spiritual experiences in older adults with chronic health conditions. Furthermore, they sought to determine the relationships between spirituality and social factors, demographic factors, pain, health and mood. The research team hypothesized that women, African Americans and people with arthritis would report more frequent spiritual experiences and improved health perceptions, less pain and less depression.

What Was Done in the Study?

Questionnaires were sent to patients of a large primary care physician office in Baltimore, MD. To be eligible, patients had to be at least 50 years old, have at least one chronic medical condition and answered “yes” to the question, “Have you felt more nervous or stressed in the last month?” The questionnaire included basic questions about social, demographic and health histories. More specific to this research, the Daily Spiritual Experience Scale (DSES) was used to assess how often participants experienced common spiritual feelings and a sense of inner peace. To test for health-related outcomes, participants were also asked questions about energy, fatigue, pain, mood and perceptions of their overall health.

What Were the Study Results?

A total of 99 people completed the survey; 62 percent were women, half were African American and 54 percent had arthritis. The most common types of spiritual experiences reported were thankfulness, being touched by beauty, a desire to be closer to God and accepting others. African

American women reported the most frequent DSEs and white men reported the fewest. Higher numbers of coexisting medical conditions were associated with more frequent spiritual experiences.

When relating spiritual experiences to health, the research team found that higher pain scores were modestly associated with more frequent DSEs and that frequent DSEs related to lower depression scores. Due to the design of the study, no cause-and-effect relationship could be inferred from the data. The research team couldn't tell, for example, whether less depressed people prayed more or if people who prayed more were less depressed.

Participants with arthritis reported significantly more frequent DSEs than participants without arthritis. Compared to those without arthritis, participants with arthritis were more likely to find strength and comfort in their religion, trust or rely on God or another spiritual source, accept help from a higher power and feel close to God.

What Does This Mean for People With Arthritis?

The study authors conclude, “This study and others have found that spirituality is an important and effective approach that many patients may use to cope with their pain.” They urge patients and clinicians to embark on discussions of spirituality and to explore, when appropriate for the individuals, the potential therapeutic benefit of using spirituality based strategies to help with day-to-day coping of health challenges. [RU](#)

McCauley J, Tarpley MJ, Haaz S, Bartlett SJ. Daily spiritual experiences of older adults with and without arthritis and the relationship to health outcomes. Arthritis Care Res 2008;59:122-8.

This research was supported by a grant to lead study author Jeanne McCauley, MD, MPH, from the Foundation for Spirituality and Medicine. The Arthritis Foundation grant to Steffany Haaz is for a project involving yoga for people with rheumatoid arthritis.

Rate of Bone Loss During Menopause

It has been well established that the most important risk factor for bone loss for women in mid-life is menopause. Women lose approximately 50 percent of their trabecular bone and 30 percent of their cortical bone over the course of a lifetime – about half is lost during the first 10 years after menses have ceased.

Anatomy Basics

Trabecular bone: Spongy tissue that fills the inner cavity of long bones.

Cortical bone: Dense, extremely hard tissue that forms the surface of bones.

What Problem Was Studied?

The Study of Women's Health Across the Nation (SWAN) is a seven-center study of the menopause transition in a sample of women from multiple ethnic groups. MaryFran R. Sowers, PhD, of University of Michigan at Ann Arbor, is a past recipient of an Arthritis Foundation research grant, one of the principal investigators in SWAN and chair of the SWAN Bone Committee. One goal of this study is to determine when bone loss begins and at what rate women lose bone during the various stages of the menopause transition. Because this is a multi-ethnic cohort – including women of Caucasian, African American, Chinese and Japanese background – ethnic differences in bone loss are also able to be identified.

What Was Done in the Study?

Of the women enrolled in SWAN, 1,902 had baseline bone mineral density (BMD) measurements and results of at least one follow-up exam available for analysis. At each annual visit, menopause stage was determined, BMD was measured, factors possibly related to BMD were assessed (such as calcium intake, cigarette smoking, etc.) and height and weight were measured. A woman was classified as premenopausal if she had experienced at least one menstrual period in the last three months with no change in menstrual regularity during the past year. Early perimenopausal

was defined as having at least one period in the last three months with some change in menstrual regularity during the past year. Late perimenopause was defined as no menstrual bleeding in the last three months but some bleeding during the last 11 months. Postmenopause was established once a woman had gone 12 consecutive months without a menstrual period.

What Were the Study Results?

Body weight and ethnicity were powerful predictors of baseline BMD in this study, so the research team performed additional analyses to separate out these elements. The research team found that BMD began to decline substantially during late perimenopause and continued to decline rapidly during early postmenopause. The women with the lowest body weight lost bone considerably faster than women with the highest body weight.

Of importance, initial data analysis appeared to reveal an ethnic difference in rates of BMD loss. However, once the team accounted for those differences in body weight across the race/ethnic group, the ethnic disparity disappeared. Ethnicity did not predict bone loss rate once body weight was taken into account.

What Does This Mean for Women in Mid-Life?

Because there is little if any change in BMD in premenopause or in early perimenopause, there is no need to have bone density screened at that point in your life, unless you have independent risk factors for low bone mass or bone loss, including family history of osteoporosis, treatment with chemotherapy or surgery to remove the ovaries. The authors conclude that screening for osteoporosis should be considered at the late stage of the menopause transition (once you've missed three consecutive menstrual periods), particularly if you have a body mass index less than 22 kg/m². [RU](#)

Finkelstein JS, Brockwell SE, Mehta V, et al. Bone mineral density changes during the menopause transition in a multi-ethnic cohort of women. J Clin Endocrinol Metab. December 26, 2007. Epub ahead of print.

Oats and Inflammation

Exercise can cause significant changes within immune system cells. Studies have shown, in particular, that moderate exercise can increase neutrophil activity and vigorous exercise can suppress neutrophil activity.

Neutrophils play an important role in inflammatory conditions such as rheumatoid arthritis. An exaggerated neutrophil response results in them being the predominant cell in the synovial fluid of joints with active rheumatoid arthritis. Even when the disease is quiet, neutrophils remain in an activated state.

Various nutrition and supplement strategies have been employed to regulate these immune system changes. β -glucans – a carbohydrate derived from the cell walls of yeast, fungi, algae and oats – have been shown in studies to enhance immune system activity.

What Problem Was Studied?

A team of researchers from University of South Carolina in Columbia – including Arthritis Foundation-funded scientist Adrienne S. Brown, PhD – sought to determine the effect of oat β -glucan on neutrophil activity after repeated days of moderate or vigorous exercise. This particular study was focused on exercise effects on neutrophils with the ultimate goal of learning to preserve the body's ability to fight off infection during intense exercise training and competition. However, what was learned in this experiment can add to our knowledge of arthritis and inflammation and how exercise and nutrients may effect the disease.

What Was Done in the Study?

Mice were randomly assigned to one of six groups: exercise to fatigue with water; exercise to fatigue with oat β -glucan; moderate exercise with water; moderate exercise with oat β -glucan; control with water; control with oat β -glucan. The amount of oat β -glucan the mice received per day was roughly equal to a person eating three bowls of instant oatmeal per day.

Exercise to fatigue was accomplished by running the mice on a treadmill until they were unable to maintain pace.

Moderate exercise was accomplished by running the mice on a treadmill for one-hour each day. After six days, the mice were injected with a chemical that acted as an inflammatory stimulus and initiated a neutrophil response. The number and activity of the neutrophils found in the area of the injection were then measured.

What Were the Study Results?

The researchers found fatiguing exercise increased the number of neutrophils mobilized, but it did not increase the activity of those neutrophils. Moderate exercise increased the function of neutrophils, but not the number. Oat β -glucan increased both the number and activity of neutrophils, but the increase was not enhanced by the addition of exercise (neither moderate nor fatiguing). These results indicate that taking oat β -glucan may help preserve the body's ability to fight off infection during intense physical training.

What Does this Mean for People with Arthritis?

The actions of neutrophils make these cells key players in the inflammatory response in rheumatic diseases. It is known that stress can affect the severity of rheumatoid arthritis. By examining components of the inflammatory response, such as neutrophil function, and using a quantifiable stressor, such as exercise stress, scientists can begin to better understand the roles of neutrophils in inflammation.

Studies suggest that, in general, exercise in people with arthritis increases joint range of motion and muscle function without harmful effects on disease severity. This study suggests that – in an animal model – short-term exercise stress does effect neutrophil number/function. However, Adrienne Brown warns that future studies are needed to examine the mechanisms associated with these changes, including how moderate, intense, and long-term exercise effect neutrophils. She concludes, “Successful elucidation of these mechanisms may suggest novel strategies to control the inflammatory process during rheumatoid arthritis and reduce symptom severity experienced by patients with chronic rheumatic disease.” [RU](#)

Murphy EA, Davis JM, Brown AS, et al. Oat β -glucan effects on neutrophil respiratory burst activity following exercise. Med Sci Sports Exerc 2007;39:639-44.



Profile in Research: Adrienne Brown, PhD

University of California, San Francisco



Since working on the oat β -glucan project in the lab of J. Mark Davis, PhD (see pg 7), Dr. Brown moved on to the University of California, San Francisco. She has just completed her first year of study on her Arthritis Foundation-funded postdoctoral fellowship project titled “Sexual dimorphism in the inflammatory response following stress.” In this work, she is seeking to determine if and how men and women react differently to stress. In particular, she will be studying the functions of neutrophils (an immune system cell), corticosterone (an adrenal hormone) and epinephrine (another adrenal hormone) in the inflammatory response during times of stress and how those reactions differ between men and women.

How do you think your research will impact your local community?

I hope that my research will aid in bringing local awareness to the need for research in this crucial area concerning inflammatory diseases.

How would you ultimately like to see your research applied?

I believe that this research will provide critical information concerning the effects of stress on inflammatory responses. Hopefully this will lead to future studies

aimed at treatments and/or therapies for various inflammatory diseases.

What are your impressions of the Arthritis Foundation?

The Arthritis Foundation is a key leader and the most visible advocate in the fight against arthritis.

What role do you feel the Arthritis Foundation plays in the progress of arthritis research?

The Arthritis Foundation has been critical in the support of research to understand, prevent, treat and cure arthritis and other inflammatory diseases. With funding by the Arthritis Foundation, many young investigators have made important findings that have led to significant breakthroughs.

Do you have a personal connection with arthritis that makes the disease more than a statistic to you?

Yes, I have several family members afflicted with arthritis and I understand how this disease can impact a person's quality of life.

What are the mysteries surrounding arthritis that interest you most?

The biggest mystery for me is the greater incidence and disease severity

of arthritis and other inflammatory diseases in women. I hope that my research aids in a better understanding of why and how this disease afflicts more women than men.

When you're not in the lab, where can you most often be found?

I enjoy spending time with my husband, practicing yoga and going on long bike rides.

What is the last good, non-medical book you read?

I honestly can't remember the last book I read. Right now the only things I have time to read are scientific journal articles!

What is your favorite musical style and artist?

I enjoy a variety of music – anything from Mozart to Morrissey.

If you weren't a medical researcher, what would you be doing now?

Riding my bike and spending time with my family. [RU](#)

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Research Update is a bimonthly publication of the Arthritis Foundation, Consumer Health Publications, 1330 W. Peachtree St., Suite 100, Atlanta, GA 30309.

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