Themed Review: Nonpharmacologic Approaches to Osteoarthritis

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Nonpharmacologic Approaches to Osteoarthritis

Abstract: Osteoarthritis is the most common form of arthritis, occurring primarily in the older population. Pain, stiffness, and disability are the major complaints of the disease, which are best treated with pharmacologic and nonpharmacologic measures. The goals of therapy are pain relief, maintenance of function, and correction of deformities whenever possible to restore lost function. Nonpharmacologic treatments enhance the role of medicinal therapy in the management of chronic osteoarthritic pain. They help to improve overall lifestyle, build self-reliance, and instill a sense of control over the pain, which in turn may improve pharmacologic compliance. Nonpharmacologic therapy improves outcomes of total joint replacement and some other types of joint surgery. Options include patient as well as caregiver education, physical medical and rehabilitation, weight reduction, sleep hygiene, surgery, and psychosocial intervention. Alternative or complementary medicine, also referred to as integrative medicine, has become quite popular among many patients. Their effectiveness is not to be ignored, but for the most part, scientific evidence is sparse or missing. Clearly, in most patients, symptomatic osteoarthritis can be improved through a comprehensive, multidisciplinary approach.

Keywords: osteoarthritis; disability; nonpharmacologic treatment; therapy providers minimize these symptoms or are concerned about side effects of treatment. As a result, the disease is generally undertreated, and functional consequences are ignored. This is unfortunate because most patients with osteoarthritis can be helped. Management is generally simple but at times can be complex. Therapy differs from time to time and patient to patient, depending on variables that include joint distribution, duration of the disease, exacerbating or remitting factors, prior effectiveness of medications, concomitant illnesses, and predisposition to side effects.

Not all osteoarthritis needs to be treated; many patients are asymptomatic or minimally so, but once the decision is made that pain control is necessary, the treatment should be intensive.

Pain, stiffness, and disability are the major complaints of osteoarthritis, yet, as with so many other types of arthritis, some patients and health care providers minimize these symptoms or are concerned about side effects of treatment. As a result, the disease is generally undertreated, and functional consequences are ignored. This is unfortunate because most patients with osteoarthritis can be helped. Management is generally simple but at times can be complex. Therapy differs from time to time and patient to patient, depending on variables that include joint distribution, duration of the disease, exacerbating or remitting factors, prior effectiveness of medications, concomitant illnesses, and predisposition to side effects.

Before deciding on specific nonpharmacologic options, it is important to understand the intensity of the patient’s symptoms, concerns, disability, and personal impact. Some patients seem undaunted by admitted moderately
severe pain, limp, and deformity. Others, for example, obsess about the meaning of minimally painful Heberden’s nodes. The first steps in osteoarthritis pain management are to respect pain, treat it intensively, and address the psyche. Not all osteoarthritis needs to be treated; many patients are asymptomatic or minimally so, but once the decision is made that pain control is necessary, the treatment should be intensive.1 Poorly treated pain can lead to other serious comorbidities, including depression, sleep disturbances, anxiety, fatigue, impaired ambulation, dementia, aphasia, and decreased socialization. Inadequately treated pain contributes to poor quality of life, whereas untreated acute pain can lead to chronicity.

The overall management program includes a focus on prevention whenever possible because little can be done, other than perhaps surgery, to alter the course of osteoarthritis. Most physicians can manage pharmacologic care but will need to refer the patient to other professionals for the other types of treatments.

**Goals of Treating Osteoarthritis**

In general, the goals of a comprehensive management program for those with 1 or several joints involved with osteoarthritis include pain relief, maintenance of function, prevention of deformity, and correction of deformity. There is currently no predictable way to suppress the destructive changes of osteoarthritis, but the future of osteoarthritis management will certainly include this goal. A balance of pharmacologic and nonpharmacologic therapies, with the latter being emphasized in this article, achieves these goals.4

**Pain Relief**

Appropriate pain reduction is essential before the other goals can be achieved. Although certain nonpharmacologic modalities (ie, ice and splinting) provide analgesia, medications are usually required. Drugs that decrease pain will help to increase participation in nonpharmacologic treatments, such as physical therapy. Pain intensity differs considerably from one patient to another and one day to another in the same patient. It is dependent on many variables, including which joints are involved and the importance of these joints to the particular patient in functional activities of daily living (ADLs).

**Maintenance of Function**

Pain is only 1 of several factors that diminish function in osteoarthritis. However, loss of function and deformity may lead to disability; disability leads to helplessness, helplessness leads to hopelessness, and hopelessness leads to depression. It is well recognized that depressed patients complain of more pain that contributes to further loss of function. In turn, a sedentary lifestyle, especially in older age groups, may increase the risk of heart disease, pulmonary emboli, and death.

**Prevention and Correction of Deformity**

Numerous deformities can affect the hands, spine, hips, knees, ankles, and feet. This goal is almost entirely a function of certain nonpharmacologic interventions— notably surgery, the timing of which is often critical to success.

**Nonpharmacologic Management**

Nonpharmacologic treatments play an active and important role in the management of chronic osteoarthritis pain and, in many ways, may be as important as pharmacologic treatments. Nonpharmacologic options help to improve overall lifestyle. Patient involvement in the treatment process can help build self-reliance and a sense of control over the pain, which in turn may improve pharmacologic compliance, resulting in a decreased need for medication and fewer office visits for medical care, whereas analgesics help patients participate in physical therapy and other modalities. Nonpharmacologic therapy improves outcomes of total joint replacement and some other types of joint surgery.5

The American College of Rheumatology (ACR) Recommendations for the Medical Management of Osteoarthritis of the Hip and Knee stress the early employment of nonpharmacologic management in conjunction with appropriate drug management.6

The knee has been the most common joint studied to test the effect of nonpharmacologic modalities and osteoarthritis pain and function. Clinical research protocols for treating osteoarthritis of other joints flow from those for the knee but are not necessarily evidence based. The components of ACR-recommended guidelines for nonpharmacologic therapy are outlined in Table 1.7 The Arthritis Foundation and other organizations supply additional educational materials, including videos, pamphlets, and newsletters. Similar materials are available from physicians’ offices, bookstores, libraries, and the Internet.

**Patient and Caregiver Education**

The ACR guideline encourages patient education and, when appropriate, education of the patient’s family, friends, or other caregivers within the patient’s treatment plan.7-11 Experienced physicians spend most of the first or second visit educating patients about expectations for pain relief, the efficacy and safety of drugs, and the likelihood of improvement in functional abilities. “Knowledge is power,” so patient education can significantly improve the management of pain and is perhaps the most important nonpharmacologic intervention. It includes providing patients and caregivers accurate and understandable information about the nature of pain, use of pain self-assessment tools, pharmacotherapy options, nonpharmacologic treatment strategies, and expectations of therapy. Open and honest information enhances doctor-patient communication, which in turn improves compliance. Education allows patients to participate better in the management of their pain and functional improvement, and it ensures that they understand.

Personalized support, provided either directly or by telephone contact, is a cost-effective nonpharmacologic approach. Moderate to large degrees...
Table 1.
Nonpharmacologic Therapy for Patients With Osteoarthritis

<table>
<thead>
<tr>
<th>Patient Education</th>
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<tbody>
<tr>
<td>Self-management programs (eg, Arthritis Foundation Self-Management Program)</td>
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<tr>
<td>Weight loss (if overweight)</td>
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<tr>
<td>Aerobic exercise programs</td>
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<tr>
<td>Physical therapy</td>
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<td>Range-of-motion exercises</td>
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<td>Muscle-strengthening exercises</td>
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<td>Assistive devices for ambulation</td>
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<td>Patellar taping</td>
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<tr>
<td>Assistive devices for ambulation</td>
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<tr>
<td>Lateral-wedged insoles (for genu varum)</td>
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<tr>
<td>Bracing</td>
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<tr>
<td>Occupational therapy</td>
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<tr>
<td>Joint protection and energy conservation</td>
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<tr>
<td>Assistive devices for activities of daily living</td>
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From the American College of Rheumatology Subcommittee on Osteoarthritis Guidelines. Published with permission.

of improvement in pain and functional status without a significant increase in costs occurred in studies in which trained nonmedical personnel telephoned monthly to discuss issues such as joint pain, medications and treatment compliance, drug toxicities, date of next scheduled visit, and barriers to keeping clinic appointments.12,13

Physical Medicine and Rehabilitation

The main purpose of physical medicine and rehabilitation (PM&R) is to prevent and restore function, but PM&R also helps to relieve pain, both directly and indirectly, in patients with osteoarthritis of either the knee or hip. Assistive devices, heat/cold compresses, massage, and a variety of alternative medicine strategies have been shown to be effective. Exercise has been found in numerous studies to reduce pain and disability; it gives most patients a “can-do” sense of well-being. Exercise may be aerobic or muscle strengthening. Flexibility exercises focus on improving joint range of motion. Tailoring the program to the patient’s preferences is likely to enhance patient willingness to persist in the long-term treatment plan.14-20

Muscle strengthening. This is a key component of exercise for osteoarthritis because of the relation between muscle weakness, pain, coordination, and function. It builds endurance. Regular exercise can improve quality of life for patients suffering from chronic pain, thus increasing muscle strength, enhancing postural and gait stability, and restoring cardiovascular fitness.

Quadriceps weakness, common among patients with knee involvement, develops due to unloading of the painful extremity. Conversely, quadriceps muscle strengthening helps over the long term to alleviate pain. Aerobic walking may seem to the patient to worsen the symptoms in the knee but is beneficial in the long run because strengthening exercise reduces pain and disability from osteoarthritis.

Assistive devices. Use of a cane in the contralateral hand helps unload an affected knee joint so that pain is reduced and function improves. Wedged insoles, knee braces, and medial taping are techniques that will help to correct abnormal biomechanics due to varus deformity of the patellofemoral compartment. Foot orthoses have been shown in selected patients to have a role in the management of painful, unicompartmental knee osteoarthritis. A disturbed gait may unbalance the patient with arthritis of the lower extremities; therefore, gait training may therefore protect the joints against unnecessary pain-inducing stress and strain.21-26

Temperature contrast. Applications of heat or cold may relieve pain. Hydrotherapy is useful in patients with osteoarthritis in any part of the body. There are many ways to administer beneficial hydrotherapy, including a whirlpool for extremities and a Hubbard tank for total body immersion. Swimming pool therapy is frequently recommended as an adjunctive nonpharmacologic modality for osteoarthritis because it is an excellent way to promote walking and general aerobic activity while simultaneously avoiding significant weight bearing. A randomized controlled trial of the cost-effectiveness of water-based exercise for lower-limb osteoarthritis concluded that it produced a favorable cost-benefit outcome, using pain reduction as the measure of benefit.27

Massage. Massage has been shown to benefit the symptoms of osteoarthritis and is free of any known side effects. One 16-week study demonstrated that Swedish massage improved osteoarthritic symptoms in patients with pain, stiffness, and limited range of motion. Massage therapy has the advantage of being used safely in conjunction with conventional treatments.28

Energy stimulation. Ultrasound and diathermy studies are conflicting. Neither diathermy nor ultrasound compared with sham respective treatment showed any benefit in any measure of improvement in 1 trial, but another indicated that ultrasound could increase the effectiveness of...
isokinetic exercise for functional improvement of knee osteoarthritis, and pulsed ultrasound has a greater effect than continuous ultrasound.3,30

There is some evidence for the pain-relieving efficacy of thermotherapy and transcutaneous electrical nerve stimulation (TENS). One trial of 50 patients showed benefits of infrared and red laser therapy compared with placebo on measures of pain relief, with twice-daily treatment for 10 days.31

The technique of pulsed electromagnetic fields (PEMF) has been found to have therapeutic benefit in painful osteoarthritis of the knee or cervical spine in several studies. However, a Cochrane meta-analysis of only 3 studies with a total of 259 patients revealed that PEMF had a small to moderate effect on outcomes for knee osteoarthritis.32

**Weight Reduction**

Osteoarthritis is more common in obese patients. Overweight increases the bearing load of joints of the lower extremities.33,34 A force of nearly 3 to 6 times one's body weight is exerted across the knee while walking; an increase in body weight increases the force by this amount. Ten pounds of excess weight increases the force on the knee by 30 to 60 pounds with each step. Furthermore, overweight has also been associated with higher rates of hand osteoarthritis in some studies, suggesting the involvement of a circulating systemic factor as well. The ACR guidelines recommend weight loss in obese patients with hip or knee osteoarthritis. A possible relationship between loss of body fat (rather than loss of body weight) and improvement of a circulating systemic factor as well. The ACR guidelines recommend weight loss in obese patients with hip or knee osteoarthritis. A possible relationship between loss of body fat (rather than loss of body weight) and improvement in symptoms can be demonstrated. Combined modest weight loss and moderate exercise was superior to either intervention alone in self-reported measures of function and pain.

**Alternative Modalities**

Because of the nebulous nature of pain in osteoarthritis and the imperfect nature of pharmacologic therapy, nontraditional treatment modalities often appear in the medical and lay literature; unfortunately, most are not subjected to scientific scrutiny. This seems to be particularly true on the Internet, where anecdotal reports tied to commercial products thrive.

**Magnetic Bracelets**

Pain from osteoarthritis of the hip and knee decreases when wearing magnetic bracelets, a popular trend. However, it is uncertain whether this response is due to specific or nonspecific (placebo) effects.31

**Acupuncture**

Acupuncture has been reported several times as adjunctive therapy for pain relief of osteoarthritis of the knee. In a study comparing the effects of acupuncture to a sample nonsteroidal anti-inflammatory drug (NSAID), there were differences. Patients who received acupuncture plus diclofenac fared better than sham acupuncture plus diclofenac for 12 weeks. Pain was significantly reduced as measured by several different pain scales.35

**Yoga**

Yoga, purported to work by fostering better circulation, joint flexibility, and musculoskeletal relaxation, may be beneficial for chronic pain. An analgesic effect in osteoarthritis of the hands and knees has been reported, with the latter group more recently subjected to modified Iyengar yoga. It was thought to provide a feasible treatment option for previously yoga-naïve, obese patients older than 50 years of age.36

**Relaxation and Hypnosis**

Although not traditional, these modalities may benefit some patients with osteoarthritic pain. One study showed that both hypnosis and relaxation allowed more pain relief in 2 experimental groups, and they also reduced the need for oral analgesics.37,38

**Diet, Supplements, and Local Applications**

A full discussion of this topic is beyond the intended scope of this article. The Internet is replete with unproven information, touting hundreds of different potions and lotions. There are no recent published scientific articles on diet, although many patients will report anecdotal relief from certain elimination or supplementation diets. No single diet has been proven to be beneficial for the majority of patients with arthritis. It has long been known that a starvation diet renders most patients with rheumatoid arthritis asymptomatic until a normal diet is resumed. An interesting investigation of dogs showed that restricted feeding delayed or prevented development of radiographic signs of hip joint osteoarthritis in a cohort of Labrador retrievers. Lifetime maintenance of 25% diet restriction delayed onset and reduced severity of hip joint osteoarthritis, thus favorably affecting both duration and quality of life.39 Recently, *Consumer Reports* (January 2007) discussed the “Top 25 Osteoarthritis Relief Products,” including comparisons in safety, joint mobility, joint repair, pain relief, and bioavailability, but it is not clear if the analyses were determined scientifically.

**Flavocoxid.** This “medical food,” marketed as Limbrel for the management of osteoarthritis, is similar to NSAIDs, and it is somewhat selective for cyclooxygenase 1 and 2 (COX-1 and COX-2), with the latter being a mediator of joint inflammation.40 The substance is considered safer and associated with reduced gastrointestinal bleeding than NSAIDs. Medical foods are available only by prescription, and they can only be indicated for the management of a specific disease.

**Glucosamine and chondroitin.** Glucosamine and chondroitin as sulfa- fates or hydrochlorides are used to treat the pain of osteoarthritis.41-45 In 2005, a Cochrane database analysis of 20 studies with 2570 patients treated with glucosamine was published. Pooled results of studies using a Rotta (manufacturer) glucosamine preparation did improve pain and function on the WOMAC osteoarthritis index. Glucosamine was determined to be equally as safe as placebo.42 A recent multicenter, double-blind, placebo- and celecoxib-controlled Glucosamine/Chondroitin Arthritis Intervention Trial (GAIT) evaluated their efficacy and safety as a treatment for knee pain from osteoarthritis.44 A total of 1583 patients with symptomatic
knee osteoarthritis were randomly assigned to receive 24 weeks of 1500 mg of glucosamine daily, 1200 mg of chondroitin sulfate daily, both glucosamine and chondroitin sulfate, 200 mg of celecoxib daily, or placebo. Rescue analgesia consisted of up to 4000 mg of acetaminophen daily. The primary outcome measure consisted of a 20% decrease in knee pain from baseline. Glucosamine and chondroitin sulfate overall did not show a statistically significant advantage over placebo in reducing knee pain by 20%. Celecoxib led to a statistically significant 10.0 percentage-point higher rate of response compared with that of placebo. However, the rate of response was significantly higher with combined therapy than with placebo (79.2% vs 54.3%) for patients with moderate to severe pain at baseline. Adverse events were evenly distributed among the groups; they were mild and infrequent.

Why was the combination of glucosamine and chondroitin sulfate more effective in the subgroup of patients with moderate to severe knee pain? Perhaps patients with milder osteoarthritis failed to show a statistical response because there was little room for improvement. A 2006 study of postigestion serum glucosamine levels raised questions about current biologic rationales for glucosamine use that were based on in vitro effects of glucosamine at much higher concentrations. Many other questions, such as the ratio of glucosamine to chondroitin, dose, reliability of compounds, prevention of structural change, and duration of any effect, remain to be answered scientifically.

**Herbal medicines and other substances.** There are a few studies in the literature supporting benefits from some herbal medicines, such as devil’s claw (*Harpagophytum procumbens*), but they have not reached mainstream America. Anecdotal but unproven testimonies of a variety of remedies, mostly vitamin based, abound, are heavily advertised, and can be found in food stores and on the Internet.

**Surgery**

Total joint replacement has become the mainstay of the surgical management of osteoarthritis. The severity of the disease radiographically is not in itself an indication for surgery because surprisingly, most patients become symptomatically improved in time. Both knee and hip replacements have yielded a high success rate with relatively low intraoperative and postoperative morbidity, particularly if the proper indications are followed and comorbid conditions such as heart disease are appropriately controlled. Patients with intractable pain and progressive disability, despite optimal medical and physical therapy, are generally the best candidates. In some centers, minimally invasive surgical techniques for total hip replacement result in less perioperative blood loss, shorter lengths of stay, and smaller surgical scars than the traditional open surgical techniques. Postoperative rehabilitation is indicated for all types of total joint replacement, but the need for walking aids is reduced, and range of motion is increased after minimally invasive surgery of the lower extremity. Arthroscopic surgery of the knees, even early in the disease, does not usually result in long-term patient satisfaction. The small joints of the hand may require fusion or, when appropriate, arthroplasty. Vertebral laminectomy or fusion may be required for osteoarthritis in the cervical and lumbar spine.

It is understandable how some patients are reluctant to undergo surgery for osteoarthritis of any joint, but generally, when they have suffered enough pain over a long enough period of time, they are not only willing but usually quite gratified to “have their life back.”

Short-term postoperative complications of total joint replacement include thrombophlebitis, pulmonary embolism, and infection, whereas long-term problems consist of persistent swelling or flexion contracture of the knee and prosthetic loosening.

**Psychosocial Interventions**

There is an emotional component to all pain, particularly when it is chronic, as with osteoarthritis. Only the patient knows how much pain he or she has and its lifestyle implications. Persistent pain breeds anger, frustration, and depression. Justified or not, chronic pain often causes patients to worry if they will ever be pain free, able to work, or be a loving spouse. Helplessness leads to hopelessness. Some patients feel that their relatives, friends, and even health care providers do not take their pain seriously. Most physicians and other health care providers offer some degree of psychosocial intervention in their routine care, even if it is not recognized as such. It is part of the humanism that was a moving force for us to go into medicine as a field. The following are some specific techniques that may be consciously used in managing patients with painful osteoarthritis to augment other types of pharmacologic and nonpharmacologic therapy.

**Patient-Physician Relationship**

A solid patient-physician relationship can be an effective therapeutic tool. When patients value the patient-physician relationship, they are more likely to be compliant with all therapies. Simple recognition and validation by the health care provider of the patient’s pain have therapeutic value. All of us recognize that just listening can have an analgesic effect. Communication is an important element of education and patient care in general. A cost-effective approach for patients with osteoarthritis is provision of personalized support, either directly or by periodic telephone contact. In more than 1 study, monthly telephone calls by trained nonmedical personnel to discuss such issues as joint pain, medications and treatment compliance, drug toxicities, date of next scheduled visit, and barriers to keeping clinic appointments showed moderate to large degrees of improvement in pain and functional status without a significant increase in costs. These studies underscore the concept that improved communication and education are important factors in decreasing pain and improving function in patients with the disease.

Reassurance is usually justified because, as noted above, most patients do respond to therapy. Believing otherwise may become a self-fulfilling prophecy.
Several controlled studies in patients with chronic pain have shown that appropriate touch, such as reassuringly holding a patient’s hand, ameliorates pain.

**Guided Imagery**

Guided imagery techniques have been useful in decreasing pain in other conditions, including fibromyalgia and cancer. In 1 study, these methods were used in osteoarthritis. Participants were verbally guided to visualize moving without stiffness or pain in specifically affected joints. In time, subjects were able to select images that they themselves thought were relaxing. The result after 12 weeks of intervention was impressive because pain was significantly reduced. More studies are needed to overcome the perceived objection that the technique is too time-consuming for the typical practitioner. Although guided imagery is safe and can be self-administered, it requires motivated, intelligent patients who will comply with instructions.

**Cognitive-Behavioral Therapy**

Behavioral modification is conducted in individual or group settings with a trained therapist and can be used alone or in combination with pharmacologic therapy. In either case, the goal is to decrease the psychosocial impact of pain, specifically the feelings of helplessness, low self-esteem, and catastrophizing. Patients are encouraged to engage in pleasurable activities, thereby distracting them from the pain, as well as participate in concomitant relaxation techniques.

**Sleep Management**

According to a National Sleep Foundation (NSF) Sleep in America poll, 20% of American adults report that pain or physical discomfort disrupts their sleep a few nights a week or more. Many patients in chronic pain, including that due to osteoarthritis, have difficulty falling asleep, staying asleep, and awakening feeling refreshed. Poor sleep translates to more daytime fatigue and increased pain and interferes with function, including manual dexterity. Therefore, in managing patients with painful osteoarthritis, it is important to manage sleep by (1) making general suggestions for sleep hygiene, such as going to bed at the same time every night; (2) providing nonpharmacological modalities, such as heat applications prior to bed or splints while sleeping; (3) prescribing analgesics that are proven to enhance sleep; and (4) offering an appropriate hypnotic.55-57

**Nonpharmacologic Prevention**

In that osteoarthritis is a disease of aging and genetics, preventative techniques are limited. However, weight reduction, avoidance of repetitive joint stress, and regular graded exercise are likely to help. It is not clear if glucosamine prevents worsening of osteoarthritis in humans.58

**References**

19. Tak E, Staats P, van Hespen A, Hopman-Rock M. The effects of an exercise program...


