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Nonpharmacologic treatment of chronic pain: What works?

Which therapies should you recommend for chronic low back pain, osteoarthritis, or fibromyalgia? This review—with 3 handy tables—summarizes the evidence.

PRACTICE RECOMMENDATIONS

- › *Recommend tai chi as an exercise modality for patients with osteoarthritis.* **A**
- › *Recommend mindfulness training for patients with chronic low back pain (LBP).* **A**
- › *Recommend a trial of either acupuncture or spinal manipulation for patients with chronic LBP.* **A**

Strength of recommendation (SOR)

- A** Good-quality patient-oriented evidence
- B** Inconsistent or limited-quality patient-oriented evidence
- C** Consensus, usual practice, opinion, disease-oriented evidence, case series

In 2017, the American College of Physicians (ACP) published a clinical practice guideline on the management of low back pain (LBP) that states: “For patients with chronic low back pain, clinicians and patients should initially select nonpharmacologic treatment...”¹

This represents a significant shift in clinical practice, as treatment of pain syndromes often starts with analgesics and other medication therapy. This recommendation highlights the need for physicians to place nonpharmacologic therapies front and center in the management of chronic pain syndromes. But recommending nonpharmacologic therapies often represents a daunting task for physicians, as this category encompasses a broad range of treatments, some of which are considered “alternative” and others that are less familiar to physicians.

This article discusses 3 categories of nonpharmacologic therapies in detail: exercise-based therapies, mind-body therapies, and complementary modalities, and answers the question: Which nonpharmacologic treatments should you recommend for specific pain conditions?

In answering the question, we will provide a brief synopsis of several treatments within these 3 broad categories to allow a framework to discuss them with your patients, and we will summarize the evidence for these therapies when used for 3 common pain conditions: chronic LBP, osteoarthritis (OA), and fibromyalgia. Finally, we will offer suggestions on how to utilize these therapies within the context of a patient’s treatment plan.

■ This review is not without limitations. The quality of evidence is sometimes difficult to evaluate when considering nonpharmacologic therapies and can vary significantly among modalities. We sought to include the highest quality systematic reviews available to best reflect the current state of the evidence. We included Cochrane-based reviews when possible and provided evidence ratings using the Strength of



Just as it's uncommon to prescribe multiple medications from the same drug class, avoid recommending more than one nonpharmacologic treatment from each category.

Recommendation Taxonomy (SORT) system² in the hope of helping you best counsel your patients on the appropriate use of available options.

Exercise-based therapies: Options to get patients moving

Therapeutic exercise is broadly defined as physical activity that contributes to enhanced aerobic capacity, strength, and/or flexibility, although health benefits are derived from lower-intensity physical activity even when these parameters do not change. Therapeutic exercise has well-documented salubrious effects including decreased all-cause mortality, improved physical fitness, and improvement in a variety of chronic pain conditions. In a 2017 Cochrane review of aerobic exercise for fibromyalgia, pain scores improved by 18%, compared with controls, although the quality of evidence was low (6 trials; n=351).³

■ **Yoga** is a system of physical postures and breathing and meditation practices based in Hindu philosophy. Most yoga classes

and research protocols involve some combination of these elements.

There is a growing body of research demonstrating the benefits and safety of yoga for the treatment of chronic pain. Multiple reviews have evaluated the effectiveness of yoga in the treatment of chronic LBP with fairly consistent results. A 2017 Cochrane review (12 trials; n=1080) found moderate evidence of improvement in functional outcomes, although the magnitude of benefit was small.⁴ Chou et al found low-quality evidence of improvement in pain and function with yoga compared with usual care, education, and other exercise therapy (14 trials; n=1431).⁵

■ **Tai chi** is a centuries-old system of slow, deliberate, flowing movements based in the Chinese martial arts. The gentle movements make this a particularly appealing treatment for those who may have difficulty with other forms of exercise, such as the elderly and patients with OA. Tai chi is effective for treating a variety of conditions such as back pain, knee pain, and fibromyalgia. Multiple reviews have shown effectiveness in the treatment of OA.^{6,7}

CONTINUED

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TABLE 1

Exercise-based therapies for chronic pain: The evidence

	Knee OA (SOR)	Chronic LBP (SOR)	Fibromyalgia (SOR)
Therapeutic exercise	Moderate- to high-quality evidence that programs consisting of aerobic and strengthening exercises improve pain and physical function ⁹ (A)	Moderate- to high-quality evidence of improved pain, function, and quality of life ⁵ (A)	Low- to moderate-quality evidence that resistance training, aerobic exercise, and aquatic exercise improve pain and function ^{3,10,11} (A)
Yoga	Low-quality evidence of improved pain and mobility ¹² (B)	Low- to moderate-quality evidence of improved pain and function ^{4,5} (A)	Low-quality evidence of improved pain, fatigue, depression, and health-related quality of life ¹³ (A)
Tai chi	Moderate-quality evidence of improved pain and stiffness ⁷ (A)	Low-quality evidence of improved pain and function ⁵ (A)	Low-quality evidence that tai chi improves sleep, but does not affect pain ¹³ (B)

LBP, low back pain; OA, osteoarthritis; SOR, strength of recommendation.



There is a growing body of research demonstrating the benefits and safety of yoga for the treatment of chronic pain.

A 2016 randomized controlled trial (RCT) compared a 12-week course of tai chi to standard physical therapy (PT) for knee OA (n=204).⁸ The authors found that both strategies yielded similar improvement in pain and function, but that the tai chi group had better outcomes in secondary measures of depression and quality of life.⁸ Chou et al also found tai chi effective for chronic LBP (2 trials; n=480)⁵ (TABLE 1^{3-5,7,9-13}).

Counsel patients seeking to learn tai chi that it takes time to learn all the postures. Beginner classes typically offer the most detailed instruction and are best suited to patients new to the activity.

Mind-body/behavioral therapies: Taking on a greater role

Mind-body therapies are becoming increasingly important in the management of chronic pain syndromes because of an improved understanding of chronic pain pathophysiology. Studies have shown chronic pain can induce changes in the cortex, which can affect pain processing and perpetuate the experience of pain. Mind-body therapies have the potential to directly address brain centers affected by chronic pain.¹⁴ In addition, mind-body therapies can improve coexisting psychological symptoms and coping skills.

■ **Psychological therapies** for the treatment of chronic pain are generally based on

a cognitive-behavioral theoretical platform. Cognitive processes surrounding the experience (or avoidance) of pain are thought to exacerbate pain symptoms. Patients are encouraged to shift their mental framework away from a pain-oriented focus and toward a personal goal-oriented focus.¹⁵

Overall, research has found cognitive behavioral therapies (CBT) to be effective in the management of chronic pain. A 2012 Cochrane review of psychological therapies used in the treatment of nonspecific chronic pain found CBT particularly effective at pain reduction and improvement in disability and pain-related coping skills (35 trials; n=4788).¹⁵

Psychological therapy is generally delivered in a face-to-face encounter, either individually or in a group setting; however, a 2014 Cochrane review suggests that Web-based interventions are efficacious as well.¹⁶ Low-quality evidence in a 2013 Cochrane review of CBT for fibromyalgia demonstrated a medium-sized effect of CBT on pain at long-term follow-up (23 trials; n=2031)¹⁷ (TABLE 2^{5,17-25}).

■ **Biofeedback therapy** gives patients real-time information about body processes to help bring those processes under voluntary control. Biofeedback devices measure parameters such as heart rate, blood pressure, and muscle tension and give patients visual or auditory cues to help bring those parameters into desired ranges. There is evi-

TABLE 2

Mind-body therapies for chronic pain: The evidence

	Knee OA (SOR)	Chronic LBP (SOR)	Fibromyalgia (SOR)
Biofeedback	Low-quality evidence of improved pain and function ¹⁸ (B)	Low-quality evidence of improved pain ¹⁹ (A)	For EMG biofeedback, low-quality evidence of improved pain ²⁰ (A)
Mindfulness	Low-quality evidence that mindfulness attenuates the effect of pain on perceived level of stress ²¹ (B)	Moderate-quality evidence of improved pain ⁵ (A)	Low-quality evidence of improved pain and QOL ²² (A)
Progressive muscle relaxation (PMR)	Low-quality evidence of improved pain and distress ²³ (B)	Low-quality evidence of improved pain and functional status ¹⁹ (A)	No clear evidence of benefit due to lack of studies investigating PMR alone ²⁴
Psychological therapy	Low-quality evidence that CBT improves self-efficacy, depression, and distress ²⁵ (A)	Low-moderate evidence that CBT improves pain intensity ⁵ (A)	Low-quality evidence that CBT reduces pain, negative mood, and disability ¹⁷ (A)

CBT, cognitive behavioral therapy; EMG, electromyography; LBP, low back pain; OA, osteoarthritis; QOL, quality of life; SOR, strength of recommendation.

dence of benefit in a variety of pain conditions including fibromyalgia, arthritis, LBP, and headache.^{18,19,26}

Many psychologists are trained in biofeedback. A trained therapist usually guides biofeedback interventions initially, but patients can then utilize the skills independently. Devices can be purchased for home use. Phone-based applications are available and can be used, as well.

■ **Mindfulness.** Based on Eastern meditative traditions, mindfulness interventions focus on breathing and other body sensations as a means of bringing attention to the felt experience of the present moment. Mindfulness encourages a practice of detached observation with openness and curiosity, which allows for a reframing of experience. The growing body of mindfulness literature points to its effectiveness in a variety of pain conditions. A 2017 meta-analysis of mindfulness for pain conditions found a medium-sized effect on pain based on low-quality evidence (30 trials; n=2292).²⁷

Participants can be taught in a series of group sessions (instruct interested patients to look for classes in their geographic area) or individually through a number of resources such as online audios, books, and smartphone applications.

■ **Progressive muscle relaxation** is a relaxation technique consisting of serially tightening and releasing different muscle groups to induce relaxation. Careful attention is paid to the somatic experience of tensing and releasing. Researchers have studied this technique for a variety of pain conditions, with the strongest effects observed in those with arthritis and those with LBP.^{19,28} A variety of health care professionals can administer this therapy in office-based settings, and Internet-based audio recordings are available for home practice.

Complementary modalities for chronic pain

Complementary modalities are frequent additions to pain treatment plans. Spinal manipulative therapy (SMT) and massage therapy are regarded as biomechanical interventions, while acupuncture is categorized as a bio-energetic intervention. As a group, these treatments can address structural issues that may be contributing to pain conditions.

■ **SMT** is practiced by chiropractors, osteopathic physicians, and physical therapists. SMT improves function through the use of thrust techniques—quick, high-



A 12-week course of tai chi yielded benefits comparable to PT for patients with knee OA in terms of pain and function, and had better outcomes in secondary measures of depression and quality of life.



A 2016 meta-analysis found that acupuncture improved both pain and functional outcome measures when compared with either no treatment or sham control.

velocity, low-amplitude force applied to a joint, as well as other manual non-thrust techniques sometimes referred to as “mobilization” techniques. Experts have proposed multiple mechanisms of action for spinal manipulation and mobilization techniques, but ultimately SMT attempts to improve joint range of motion.

SMT is most often studied for the management of spinal pain. The authors of a 2017 systematic review and meta-analysis of 15 RCTs (n=1711) found moderate-quality evidence that SMT improves pain and function in chronic LBP at up to 6 weeks of follow-up.²⁹ A 2017 systematic review performed for an ACP clinical practice guideline on the management of LBP found low-quality evidence of improvement in pain with SMT compared with an inactive treatment, although the magnitude of benefit was small.⁵ The authors also noted moderate-quality evidence that the benefits of SMT are comparable to other active treatments.⁵

■ **Massage therapy** is commonly used for a variety of pain conditions, but is most studied for LBP. A 2017 systematic review found low-quality evidence of short-term pain relief with massage therapy compared with other active interventions, although the effects were small.⁵ A 2015 Cochrane review of 25 RCTs (n=3096) found low-quality evidence of benefit for massage in chronic LBP when compared with both active and inactive controls.³⁰

There was a small functional difference when compared with inactive controls. This review highlights the likely short-lived benefit of massage therapy. Although some studies have hinted at longer-term relief with massage therapy, the majority of the literature suggests the benefit is limited to immediate and short-term relief. Massage therapy is safe, although patients with central sensitization should be cautioned that more aggressive massage treatments may cause a flare of myofascial pain.

■ **Acupuncture** is one element of traditional Chinese medicine (TCM). And while the holistic system of TCM also includes herbal medicine, nutrition, meditative practices, and movement, acupuncture is often practiced as an independent therapy. In the

United States, licensed acupuncturists and physicians provide the therapy. Training and licensing laws vary by state, as does insurance coverage.

Pain is the most common reason that people in the United States seek acupuncture therapy. It is not surprising then that the majority of research surrounding acupuncture involves its use for pain conditions. Chou et al reviewed acupuncture for chronic LBP in 2017 (32 trials; n=5931).⁵ Acupuncture improved both pain and function compared to inactive controls. In addition, 3 trials compared acupuncture to standard medications and found acupuncture to be superior at providing pain relief.

In the management of headache pain, the literature has consistently found acupuncture to be beneficial in the prevention of migraine headaches. A 2016 Cochrane review found acupuncture beneficial compared to no treatment (4 trials; n=2199) or sham acupuncture (10 trials; n=1534), with benefit similar to prophylactic medications but with fewer adverse effects (3 trials; n=744).³¹

Evidence for benefit in OA pain has been mixed, but a 2016 meta-analysis evaluating 10 trials (n=2007) found acupuncture improved both short-term pain and functional outcome measures when compared with either no treatment or a sham control.³² There have also been reviews showing short-term benefit in fibromyalgia pain (TABLE 3^{5,33-38}).³³

Building an effective treatment plan

When creating a treatment plan for chronic pain, it's helpful to keep the following points in mind:

- **Emphasize active treatments.** Most traditional medical treatments and many complementary therapies are passive, meaning a patient receives a treatment with little agency in its implementation. Active therapies, such as exercise or relaxation practices, engage patients and improve pain-related coping skills. Active treatments promote self-efficacy, which is associated with improved outcomes in chronic pain.³⁹

TABLE 3

Complementary modalities for chronic pain: The evidence

	Knee OA (SOR)	Chronic LBP (SOR)	Fibromyalgia (SOR)
Spinal manipulation	Low-quality evidence of improved pain, but not function, with manual therapy ³⁴ (B)	Low-quality evidence of short-term improvement in pain and function compared with usual care ⁵ (A)	Moderate-quality evidence that spinal manipulation is not effective in reducing pain ³⁵ (A)
Massage	1 RCT showing short-term improvement in pain and function with massage compared with usual care ³⁶ (B)	Low-quality evidence of short-term benefit in pain reduction compared with inactive or active treatment ⁵ (B)	Low-quality evidence of short-term pain relief ³⁷ (A)
Acupuncture	Mixed evidence of clinically significant improvement in pain and function with acupuncture vs sham control acupuncture ³⁸ (B)	Moderate-quality evidence of short-term benefit in pain reduction ⁵ (A)	Low- to moderate-quality evidence that acupuncture improves pain compared with standard therapy at 1 month ³³ (B)

LBP, low back pain; OA, osteoarthritis; RCT, randomized controlled trial; SOR, strength of recommendation.

- **Use treatments from different categories.** Just as it is uncommon to choose multiple medications from the same pharmaceutical class, avoid recommending more than one non-pharmacologic treatment from each category. For example, adding chiropractic therapy to a treatment plan of PT, osteopathic manipulation, and massage isn't likely to add significant benefit because all of these are structural therapies. Addition of a mind-body therapy would likely be a better choice. Consider the template provided on page 482 when putting together a pain management plan (FIGURE).

Good plan, but how did the office visit go?

A 2006 study by Laerum et al provided unique insights into the best ways to manage chronic pain.⁴⁰ The authors asked patients a simple question: "What makes a good back consult?" The answers were deceptively simple, but serve as an excellent resource when working with patients to address their pain.

Patients indicated that taking their pain seriously was key to a good back consult. Other factors that were important to patients included: receiving an explanation of what

is causing the pain, addressing psychosocial factors, and discussing what could be done.⁴⁰ The following tips can help you address these patient priorities:

- **Explain the underlying cause of the pain.** Explaining the complex interplay of factors affecting pain helps patients understand why nonpharmacologic therapies are important. As an example, patients may accept mindfulness meditation as a treatment option if they understand that their chronic LBP is modulated in the brain.
- **Address lifestyle and psychosocial issues.** Pain syndromes cause far-reaching problems ranging from sleep dysfunction and weight gain to disrupted relationships and loss of employment. Explicitly addressing these issues helps patients cope better with these realities and gives clinicians more therapeutic targets.

The Veterans Affairs Health System offers a self-administered personal health inventory that can facilitate a patient-driven discussion about self-care. (See the Personal Health Inventory form available at: https://www.va.gov/PATIENTCENTEREDCARE/docs/PHI_Short_508.pdf.) In addition to identifying areas for growth, the inventory



What makes a good back consult? Patients say it's important to take their complaints seriously, explain what's causing their pain, and discuss what can be done.

FIGURE

Pain management plan

Cause of pain: _____

Contributing factors: _____

Initial recommendations for managing your pain

Self-care goals: _____

Exercise or movement-based treatments (eg, therapeutic exercise, yoga, tai chi): _____

Mind-body treatments (eg, mindfulness, cognitive behavioral therapy, biofeedback): _____

Complementary modalities (eg, physical therapy, osteopathic manipulative treatment, chiropractic, massage): _____

Medications/supplements: _____

Consults/interventional treatments (eg, injections): _____

Additional tests: _____

can highlight what is going well for a patient, adding an element of optimism that is often lacking in office visits for pain problems.

- **Discuss what can be done in a way that empowers patients.** Moving past medications when discussing pain treatment plans can be challenging. The goal of such discussions is to be as comprehensive as possible by including self-management aspects and nonpharmacologic approaches, in addition to appropriate medications. But this doesn't all have to be done at once. Help patients set realistic goals for lifestyle-related change, and start with 1 or 2 nonpharmacologic therapies first. This approach both empowers patients and provides them with new treatment options that offer the hope of improved function. **JFP**

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Residents' Rapid Review

Fluids and electrolytes
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QUESTION 1 OF 5

A 60-year-old woman presents to the emergency department with a headache, slight blurring of vision, and mild chest discomfort. She states that her symptoms began the day before and had slowly worsened. She says that over the past 4 to 5 days, she's had multiple episodes of diarrhea.

The patient has type 2 diabetes mellitus, which

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