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Yoga for Persistent Pain: New Findings and Directions for an Ancient Practice

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Currently, many clinicians treating persistent pain hear about the benefits of yoga from patients who frequent yoga centers. However, pain clinicians and researchers may not be aware of randomized controlled studies examining the efficacy of yoga for managing persistent pain. The purpose of this review is to highlight recent studies that shed light on the potential role that yoga can play in pain management for a range of conditions that can be chronically painful. The review is divided into three sections: 1) a description of the basic components of yoga-based protocols for pain, b) a review of nine of the thirteen randomized studies located that test yoga's efficacy for persistent pain, and c) a discussion of key clinical issues and future directions for yoga-based pain research and practice.

Yoga-Based Protocols for Pain Management

Texts indicate that yoga originated in India and has been practiced for approximately 4,000 years [15]. The term yoga is derived from the Sanskrit verb *yug*, which means to bind or join [6]. This refers to the overarching goal of yoga, which is to unite the mind and body in a way that promotes health. Although there are different schools of yoga, there are key elements that cut across most of these schools, including breathing exercises (*pranayama*), postures (*asanas*), and meditation (*dhyana*).

In popular practice, yoga is often construed as a physical exercise program. However, as applied to the management of persistent pain, yoga protocols are more comprehensive. Recent controlled studies of yoga for managing pain have been based on Hatha or Iyengar yoga. Studies that have used Hatha yoga have concentrated on relaxation techniques and gentle postures tailored to specific patient populations [8,9]. Typical Iyengar yoga protocols have included several basic elements such as physical postures designed for particular patient populations, props to cultivate awareness of body regions, breath control techniques, and home practice [10,19,24,25]. Additionally, many studies have modified these standard yoga protocols to create integrated programs containing practices such as hymns [21], neti pot [12], didactic presentations [2], and therapeutically oriented poses [20,27]. The format for delivering yoga protocols varies but typically involves hourly group sessions led by a trained yoga practitioner once or twice weekly, for approximately 12 weeks.

Controlled Studies of Yoga for Managing Persistent Pain

In one of the earliest controlled studies of a yoga-based protocol, Garfinkel and colleagues [10] assigned 42 patients having pain from carpal tunnel syndrome to either an Iyengar-based Hatha yoga protocol or a control condition (wrist splint). Yoga classes focused on training in postures and relaxation techniques adjusted for the patient population. When

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compared to the control, patients receiving yoga showed significant reductions in pain and an increase in grip strength. Trends towards improvement were reported in motor nerve conduction time, Tinel sign, and sleep disturbance among the yoga group, though these were not significant. Garfinkel and colleagues [9] also conducted a controlled study with hand osteoarthritis (OA) patients showing that Iyengar-based Hatha yoga tailored to the patient population produced significant improvements in pain during activity, joint tenderness, and finger range of motion compared to the control. There were no significant differences in hand pain at rest, hand function, hand grip strength, or circumference of finger joints. Taken together, these studies [9,10] were important in stimulating research on yoga for pain control. Although studies appearing in the late 1990s and early years of 2000 supported the potential efficacy of yoga for managing pain conditions, these studies did not use randomized controlled designs [5,11,13].

Several recent randomized controlled studies have tested the efficacy of Iyengar and Hatha yoga for persistent low back pain. Persistent low back pain is a particularly appropriate model for yoga research because it is common and related to musculoskeletal problems (e.g., pain avoidant posturing) and psychosocial stress. Williams and colleagues [25] tailored their Iyengar yoga intervention to address back pain, providing specific protocol adjustments: a) patients practiced poses that used props to relieve tension and bring awareness to body regions, b) training progressed to lengthen, strengthen, and relax core muscle groups in the spine and pelvis, and c) training was provided over a graded series of movements involving twisting, bending, and stretching. Compared to an educational control, patients receiving yoga showed significant reductions in pain, functional disability, and pain medication at post-treatment and 3 month follow-up. No significant between group differences were reported in spinal range of motion, fear of movement, pain attitudes, self-efficacy, and coping strategies. In another study, Williams and colleagues [24] reported that Iyengar yoga, tailored to chronic low back pain patients, produced significant reductions in pain, physical disability, and depression. The yoga group demonstrated a higher success rate than controls in decreasing pain medication, though this was non-significant. At 6-month follow-up, these benefits were maintained with 68% of patients in the yoga condition reporting regular home practice with yoga techniques. In another low back pain study, Sherman and colleagues [20] found that Viniyoga, a therapeutically oriented yoga school, was significantly more effective than either aerobic exercise or an educational control in decreasing the bothersomeness of low back pain and pain-related disability. This study did not find any significant improvements on the SF-36. Additionally, Saper and colleagues [17] reported that a Hatha yoga program designed for low back pain significantly reduced pain scores, back-related function, and pain medications among a diverse population of patients with low back pain (83% racial/ethnic minority). No significant differences were reported on SF-36 scores.

Recently, Carson and colleagues [4] conducted a controlled study evaluating the efficacy of a tailored yoga program (Yoga of Awareness), derived from Kripalu yoga, for female fibromyalgia patients. Compared to the control, the yoga group showed significant improvements in fibromyalgia outcomes including pain, fatigue, vigor, mood, acceptance, pain catastrophizing, and other coping strategies. No significant between-group differences were reported on symptoms of tenderness, balance duration, poor sleep, and distancing and confrontation coping strategies.

The efficacy of yoga for pain control has also been tested among disease populations who have conditions that can be chronically painful. Pain symptoms are a primary complaint among end stage renal disease patients, which has led to a randomized yoga intervention for end stage renal disease-related pain, as well as other symptoms. Yurtkuran and colleagues modified a Hatha yoga protocol to address the fatigue and physical deconditioning

experienced by this chronically ill population (e.g., progressively increasing practice from 15 to 30 minutes, moving from chair-based yoga to standing postures) [27]. To enhance access to treatment, yoga training was provided in the hemodialysis clinic. Compared to standard care, yoga significantly decreased pain, fatigue, and sleep disturbance, and improved grip strength, cholesterol, urea, creatinine, and alkaline phosphatase levels, as well as erythrocyte and hematocrit counts. No significant between group changes in calcium, phosphorus, HDL-cholesterol or triglyceride levels were found. The authors suggest that yoga not only enhances pain management, but also has physical benefits similar to those seen with aerobic exercise.

Although interest in yoga for cancer-related pain management is growing, many studies are uncontrolled [3,6,16]. Recently, Carson and colleagues [2] conducted a randomized study of yoga for breast cancer survivors, based on Kripalu yoga (Yoga of Awareness). Compared to a wait-list control, a yoga intervention, which was tailored for breast cancer survivors, produced significant improvements in joint pain, symptom-related bother, fatigue, sleep disturbance, vigor, and hot flashes post-treatment. No significant between-group differences were reported for negative mood, relaxation, acceptance, or night sweats post-treatment. Interestingly, at 3 months follow-up, significant improvements were reported for patients in the yoga condition for negative mood, relaxation, and acceptance, in addition to the maintenance of previous treatment gains. Daily analyses showed that those who spent more time practicing yoga had the largest improvements in pain-related symptoms.

Of the four RCTs identified and not described in the text of this review, three had positive findings on pain-relevant outcomes [12,19,21] and one reported non-significant outcomes [8]. These studies were not included in the text because in three pain was not a primary outcome measure (e.g., measured via pain-related disability) [8,19,21], and in two the yoga intervention was less generalizable to clinical settings (e.g., met eight hours daily for one week) [12,21].

Key Issues

To date, most of the yoga-based studies have been conducted in populations of middle-aged, Caucasian women who are moderately disabled by chronic back pain. Yet, as we have seen, yoga protocols can be beneficial for patients from varying ethnic/racial backgrounds having disease-related pain and/or who are highly disabled. An advantage of yoga is that it can be modified to meet the specific needs of patients who are quite ill or limited in physical ability (e.g., by using props).

Referral sources for yoga are increasingly available. It is important that a yoga practitioner be certified (e.g., in the USA, certification is offered through the Yoga Alliance, www.yogaalliance.org), and have experience with patients' painful medical conditions. To ensure safety and minimize risk, the referring health care provider should inform the patient and yoga specialist about physical limitations. Insurance coverage for complementary medical services is increasing; however, many patients pay for inexpensive yoga classes in community settings.

Several mechanisms could potentially explain the benefits of yoga for persistent pain conditions. First, it has been speculated that yoga can produce physiological changes that alter the pain experience: decreases in sympathetic nervous system activity (e.g., decreases in heart rate) [22], reductions in inflammatory markers (e.g., tumor necrosis factor, interleukin-II, CRP) [1,14] and stress markers (e.g., cortisol) [26], and increases in flexibility, strength, circulation, and cardiorespiratory capacity [10,27].

Second, yoga may produce behavioral changes that influence pain. Yoga, often delivered in a group format, has the potential to reduce social isolation and foster social networks that reinforce improvements in activity. Yoga home practice sessions build regular physical activity into the day, something many patients avoid, and could effectively communicate to others that the patient can be active. Interestingly, at least one yoga study has shown that the duration of daily practice is related to same day improvements in pain, as well as next day improvements in pain, fatigue, invigoration, acceptance and relaxation [3].

Finally, research has demonstrated that yoga can produce psychological changes, such as increased awareness of mental and physical states [3,8], which may help patients better understand their pain. Yoga has also been shown to increase the frequency of positive emotions [23], which could potentially undo the physiological effects of negative emotions, broaden cognitive processes (e.g., taking a broader perspective on problems), and build physical (e.g., improved sense of health), social (e.g., improved social support) and psychological (e.g., optimism) resources [7]. Yoga may also increase pain acceptance—the willingness to experience pain and acknowledge negative thoughts and emotions [3], while remaining committed to pursuing valued goals. Finally, it is possible that yoga can lead to improvements in self-efficacy for pain control.

Future Research Directions

The patient samples in the majority of studies reviewed are predominantly Caucasian (86%), middle-aged (mean age=46.7), women (72%) of higher socioeconomic status. Future studies (e.g., work by Saper [18]) need to determine whether yoga protocols are efficacious for patients who come from more diverse backgrounds with respect to ethnicity, age, gender, and socioeconomic status. Research also needs to compare the efficacy of protocols based on specific schools of yoga and test whether protocols tailored to specific patient populations are more efficacious than those relying on standard approaches.

Future studies also need to compare yoga protocols to active treatment control conditions (e.g., aerobic exercise, cognitive-behavioral therapy). Additionally, research needs to examine the optimal dose of yoga treatment required to achieve improvements in pain and pain-related outcomes. Finally, long-term follow-up assessments are needed to assess the maintenance of treatment improvements.

Conclusions

Yoga for managing persistent pain is an ancient practice. A small, but growing body of randomized clinical trials suggests that yoga may have promise for persistent pain conditions. Methodologically rigorous research in this area is in its early stages and further research is needed. Yet, clinicians should be aware that yoga could be used as a tool to help patients better address the biological, social, and psychological aspects of persistent pain.

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Table 1

Characteristics of Included Studies

Study	Design/Methods	Mean Age	Pain Population	Type of Yoga Intervention	Outcome Measures	Significant Findings
Garfinkel et al. 1998 [10]	RCT	49	Carpel tunnel syndrome	Iyengar-based Hatha Yoga	<ul style="list-style-type: none"> Pain intensity Grip strength Sleep disturbance Phalen sign Tinel sign Median nerve motor/sensory conduction time 	Yoga group improved more than control in pain reduction and grip strength.
Garfinkel et al. 1994 [9]	RCT	52-79*	Osteoarthritis of the hands	Iyengar-based Hatha Yoga	<ul style="list-style-type: none"> Hand pain Hand function Range of motion of finger joints Hand grip strength Tenderness of finger joints Circumference of finger joints 	Yoga group improved more than control in pain during activity, joint tenderness, and finger range of motion.
Williams et al. 2005 [25]	RCT	48	Chronic low back pain	Iyengar Yoga	<ul style="list-style-type: none"> Pain intensity Functional disability Pain medication usage Pain-related attitudes Pain-related behaviors Spinal range of motion 	Yoga group showed greater reductions in pain intensity, functional disability, and pain medication at post-treatment/3 month follow-up than control.
Williams et al. 2009 [24]	RCT	48	Chronic low back pain	Iyengar Yoga	<ul style="list-style-type: none"> Pain intensity Functional disability Depression Pain medication usage 	Yoga group showed greater reductions in pain, physical disability, and depression than control.
Sherman et al. 2005 [20]	RCT	44	Chronic low back pain	Viniyoga	<ul style="list-style-type: none"> Pain-related disability Bothersomeness of pain 	Yoga group showed greater reductions in pain-related disability

Study	Design/Methods	Mean Age	Pain Population	Type of Yoga Intervention	Outcome Measures	Significant Findings
Saper et al. 2009 [18]	RCT	44	Chronic low back pain	Hatha Yoga	<ul style="list-style-type: none"> Health status Pain scores Back-related function Medication use Global improvement Quality of life 	Yoga group had significant reductions in pain scores, back-related function, and pain medications.
Carson et al. 2010 [4]	RCT	54	Fibromyalgia (FM)	Yoga of Awareness	<ul style="list-style-type: none"> FM symptoms FM functional deficits Pain coping strategies 	Yoga group improved more than control in FM outcomes: pain, fatigue, vigor, mood, acceptance, pain catastrophizing, and coping strategies.
Yurikuran et al. 2007 [27]	RCT	38	Hemodialysis	Modified Hatha Yoga	<ul style="list-style-type: none"> Pain intensity Fatigue Sleep disturbance Grip strength Biochemical variables 	Yoga group improved more than control in pain, fatigue, sleep disturbance, grip strength, cholesterol, urea, creatinine, alkaline phosphatase levels, erythrocyte count, and hematocrit count.
Carson et al. 2009 [2]	RCT	54	Breast cancer survivors	Yoga of Awareness	<ul style="list-style-type: none"> Hot flashes Joint pain Fatigue Negative mood Sleep disturbance Night sweats Symptom-related bother Relaxation Vigor Acceptance 	Yoga group improved more than control in joint pain, symptom-related bother, fatigue, sleep disturbance, vigor, and hot flashes post-treatment.
Sareen et al. 2007[19]	RCT	50	Chronic pancreatitis	Iyengar Yoga	<ul style="list-style-type: none"> Quality of life (including bodily pain items) Mood Stress 	Yoga group improved more than control in overall quality of life, mood, and symptoms of stress.

Study	Design/Methods	Mean Age	Pain Population	Type of Yoga Intervention	Outcome Measures	Significant Findings
John et al. 2007 [12]	RCT	34	Migraine	Modified Yoga Program (postures, breathing, neti pot)	<ul style="list-style-type: none"> • Headache frequency • Migraine severity • Pain • Anxiety • Depression • Medication usage 	Yoga group improved more than control in frequency and intensity of migraine, pain, medication use, anxiety, and depression.
Galanitino et al. 2004 [8]	RCT	30-65*	Chronic low back pain	Hatha Yoga	<ul style="list-style-type: none"> • Functional impairment • Pain-related disability • Depression 	No significant between-group differences.
Tekur et al. 2008 [21]	RCT	49	Chronic low back pain	Integrated Approach to Yoga Therapy (IAYT)	<ul style="list-style-type: none"> • Pain-related disability • Spinal flexibility 	Yoga group improved more than control in pain-related disability and spinal flexibility.

* This study did not include a mean age, thus an age range is provided.