




Acupuncture for the Management of Low Back Pain

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Abstract

Purpose of Review This evidence-based systematic review will focus on the use of acupuncture and its role in the treatment of low back pain to help better guide physicians in their practice. It will cover the background and the burden of low back pain and present the current options for treatment and weigh the evidence that is available to support acupuncture as a treatment modality for low back pain.

Recent Findings Low back pain (LBP), defined as a disorder of the lumbosacral spine and categorized as acute, subacute, or chronic, can be a debilitating condition for many patients. Chronic LBP is more typically defined by its chronicity with pain persisting > 12 weeks in duration. Conventional treatment for chronic LBP includes both pharmacologic and non-pharmacologic options. First-line pharmacologic therapy involves the use of NSAIDs, then SNRI/TCA/skeletal muscle relaxants, and antiepileptics. Surgery is usually not recommended for chronic non-specific LBP patients. According to the 2016 CDC Guidelines for Prescribing Opioids for Chronic Pain and the 2017 American College of Physicians (ACP) clinical practice guidelines for chronic pain, non-pharmacologic interventions, acupuncture can be a first-line treatment for patients suffering from chronic low back pain.

Summary Many studies have been done, and most show promising results for acupuncture as an alternative treatment for low back pain. Due to non-standardized methods for acupuncture with many variations, standardization remains a challenge.

Keywords Chronic pain · Acupuncture · Alternative therapy · Low back pain

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Introduction

Low back pain (LBP), defined as a disorder of the lumbosacral spine and categorized as acute, subacute, or chronic, can be a debilitating condition for many patients. While the majority of patients with LBP are acute and self-limited, up to 40% of patients can develop pain lasting more than 6 weeks [1]. Attributable to various etiologies, LBP can often be persistent and difficult to treat, potentially leading to increased healthcare utilization, disability, and lost wages [1, 2, 3]. While there is a multitude of pharmacologic, psychological, and physical/rehabilitative treatment options, the use of complementary alternative medicine (CAM) is becoming popular around the world. Global studies have shown that up to 40–55% of patients are seeking out CAM to treat their LBP, with treatments including chiropractic manipulation, massage therapy, acupuncture, sleep support, and other non-traditional therapies [4, 5]. Acupuncture is traditionally utilized as a therapy in eastern medicine, where acupuncturists insert needles to mechanically or electrically stimulate specific anatomical points along classically defined meridians to relieve illnesses and maladies [6]. In the USA, based on a 2012 survey, an estimated 3.8 million adults utilized acupuncture within the last year to treat pain and other ailments [7]. With acupuncture growing in popularity within western medicine, physicians may find it difficult to make adequate recommendations regarding this alternative therapy. This evidence-based systematic review will focus on the use of acupuncture and its role in the treatment of LBP to help better guide physicians in their practice.

Acupuncture

Thought to have been practiced in China for over 3000 years, acupuncture was first documented in Chinese history around 100 BC, before spreading through East Asia and Europe over the next 1700 years. While this practice was first seen in US literature as early as the eighteenth century, acupuncture did not enter the mainstream until the early 1970s. With its long history and dissemination throughout multiple continents, there is a wide array of techniques, styles, and procedures, including country-specific variations [8]. Heavily rooted in the Chinese philosophies of Confucianism and Taoism, acupuncture focuses on balancing three major principles: Qi, Yin-Yang, and the five elements. Qi is often described as a person's "vital energy," permeating all things and flowing through meridians on the human body; impedances in the flow of Qi in the body is thought to contribute to various maladies. Yin and yang are thought to be complementary opposites in nature, and acupuncturists believe that good health requires a state of dynamic balance between those two forces. The five elements (wood, water, fire, earth, and metal) represent basic qualities and processes of the human

body, and most organs, meridians, emotions, and other health variables are assigned to a specific element. The five elements, along with Yin-Yang, provide a harmonic balance within the body to promote good health; any imbalances to that harmony or impedances to Qi can result in symptoms or diseases. Utilizing these principles, practitioners attempt to diagnose imbalances within the body and employ different tactics, including acupuncture, to revert those imbalances to improve health and well-being [6]. Within acupuncture, health is not considered the absence of disease, but rather a dynamic balance of varying forces within the body [6, 9].

During an acupuncture session, the practitioner will first assess the patient through conventional and non-conventional means, including a history and physical. A holistic approach to treating patients, the acupuncturist will observe for the patient's inner and outer states, which includes emotions, mental status, and other physical manifestations. There are over 300 specific acupuncture points on the body along 14 meridians that can be associated with a patient's illness or concern. After identifying specific acupuncture points, the acupuncturist will insert sterile, one-time use, stainless steel needles into the identified site while the patient is typically supine. The number of needles used can vary between patients based on the acupuncturist's assessment. The needles are left in the sites for 10–20 min; during this time, the patient may experience some discomfort, numbness, or mild radiculopathies. Needles can also be mechanically manipulated or electrically stimulated for further effects. Complications can include bleeding, infection, disease transmission, and nerve injury but are rarer and more associated with inexperienced practitioners [8, 9].

Chronic Low Back Pain

While LBP is a general, often non-specific umbrella term for a lumbosacral disorder, chronic LBP is more typically defined by its chronicity with pain persisting > 12 weeks in duration. Many studies have been conducted in an attempt to ascertain the prevalence of LBP and chronic LBP in different populations with varying results. A 2012 systematic review of 165 global studies found a 20.1% prevalence of chronic LBP while a 2015 systematic review of 28 global studies showed a 19.6% prevalence for patients between 20 and 59 years old [10, 11]. However, other individual studies specific to the USA only found a prevalence between 3.9 and 10.2% [10]. In 2002, the National Health Interview Survey found that 26% of participants reported LBP lasting at least 1 day within the last 3 months [12]. Another survey from the National Health and Nutrition Examination Survey conducted from 2009 to 2010 showed that chronic low back pain was associated (all adjusted odds ratio > 2) with lower socioeconomic status, higher unemployment, and disability; higher healthcare utilization (> 10 visits per year); and higher rates of depression

[13]. Multiple studies have shown that age, abdominal obesity, general obesity, smoking, strenuous physical exercise, sedentary lifestyle, psychologically stressful work, and family history of LBP with disability are all risk factors for chronic LBP [14–16].

The pathophysiology of chronic LBP involves understanding the various etiologies that can contribute to LBP. Etiologies can be categorized as non-specific and mechanical vs. LBP with radiculopathy vs. systemic and visceral diseases. The majority of LBP (> 70%) is due to idiopathic, mechanical causes and is non-specific; according to some researchers, a definitive diagnosis cannot even be made in up to 85% of patients [1, 2, 12]. Specifically for chronic LBP, arthritic and degenerative changes of the facet joints are thought to be the most common source of pain, also contributing to spinal cord stenosis and thickening of the ligamentum flavum [2, 17, 18]. Radicular low back pain or sciatica can be caused by compression or inflammation of the spinal nerve root, most commonly due to spondylosis or disc herniation. Systemic causes can include a wide range of diseases, including neoplasia, infection, inflammatory diseases, and referred visceral organ pain. These conditions, however, will often present with additional signs and symptoms, prompting clinicians to evaluate further. While there are numerous systemic causes, these diseases and conditions are overall much less common, representing < 5% of the causes of LBP [1, 2, 18, 19].

Differentiating LBP can be daunting, and it is important to evaluate signs and symptoms quickly in order to determine the need for further imaging or intervention. Initially, a thorough history is paramount in determining red flag symptoms. The location, characteristic, and severity of the pain, along with associated symptoms, can help clinicians quickly narrow their differential. For example, dull lower paraspinal muscle pain will trigger a different algorithmic pathway compared with burning, radicular pain with spinal point tenderness. Context, including the circumstances regarding the onset of pain, will further help to elucidate the clinical picture. The patient's demographics and occupation can additionally provide insight, including specific risk factors. Associated symptoms, like fever, weight loss, or neurologic deficits, can point to systemic disease. A thorough physical exam, including full neurological testing, will also provide valuable information. Careful paraspinal muscle and spinal palpation can help to localize spinal fractures. The straight leg raise test can identify radiculopathies associated with LBP. Focal neurologic deficits noted on exam should be approached carefully as the differential can include severe systemic etiologies, including spinal cord compression, cauda equina syndrome, compression due to neoplasia, or spinal epidural abscess. Diagnostic testing and imaging are often unnecessary in the diagnosis and treatment of LBP. Laboratory studies rarely provide diagnostic value, but imaging can be considered in specific circumstances. Most patients do not require imaging if the duration is < 4 weeks;

however, the presence of any red flag symptoms, including focal neurologic deficits, should prompt immediate imaging. Initial imaging with lumbar radiographs is sufficient and can be followed with CT or MRI without contrast if initial radiographs do not explain the clinical presentation. Initial radiographs may show osteophytes suggesting spondylosis or obvious fractures; advanced imaging can potentially diagnose herniations, abscesses, or other compressions [20–23].

Conventional treatment for chronic LBP includes both pharmacologic and non-pharmacologic options. Patients without disability or major functional deficits should participate in a regular exercise program; regular exercise has been shown to help prevent future exacerbations of low back pain. Patients with persistent, disabling symptoms should still pursue non-pharmacologic, adjunctive therapies first. Cognitive-behavioral therapy (CBT), which addresses negative thinking patterns and coping behaviors, has been shown to improve LBP, both short-term and long-term, along with reductions in disability. Another psychological adjunctive therapy, mindfulness-based stress reduction (MBSR) focuses on helping patients relax and cope with stress and manage pain; MBSR has been shown to improve moderate pain and improve physical functioning with similar efficacy to CBT [20, 24–26].

First-line pharmacologic therapy involves the use of non-steroidal anti-inflammatory drugs (NSAIDs) at the lowest effective dose and the shortest duration possible. Acetaminophen is a reasonable alternative for patients with contraindications to NSAIDs. Second-line pharmacologic options include serotonin-norepinephrine reuptake inhibitors (SNRI), tricyclic antidepressants (TCA), skeletal muscle relaxants, and antiepileptics. SNRIs, like duloxetine, have analgesic effects that can advantageously co-treat both pain and depression in patients, are typically well-tolerated, and are often preferred over other classes of medications [20, 21, 27–29].

Epidural glucocorticoid injections involve the administration of steroids in the epidural space to relieve pain, though its efficacy is still debatable. A 2015 systematic review of randomized, placebo-controlled trials found a small improvement short-term in pain, disability, and a decreased risk of surgery at up to 3 months but found no improvement at long-term follow-up. Despite other trials showing similar efficacy only in the short-term, it is still reasonable to offer injections for patients who have failed conservative therapy but do not wish to pursue surgical intervention. Surgery is not recommended for most patients with chronic, non-specific LBP, though indicated in some patients with persistent, debilitating pain who have failed all other medical/psychological management. Surgical options include vertebral fusion, lumbar disc replacement, laminectomy, and discectomy, though long-term outcomes are not favorable [20, 30–32].

Efficacy of Acupuncture for Low Back Pain

In keeping with the 2016 CDC Guidelines for Prescribing Opioids for Chronic Pain and the 2017 American College of Physicians (ACP) clinical practice guidelines for chronic pain, non-pharmacologic interventions, such as acupuncture, can be a first-line treatment for patients suffering from chronic low back pain. A 2020, 7-month cross-sectional study of 568 patients with chronic low back pain found that patients who utilized complementary health approaches (CHAs), including acupuncture, had less back-pain-related disability and pain severity. However, these positive clinical outcomes were dependent on a high degree of CHA utilization. Older, less-educated, and African-American patients were low or non-utilizers and therefore demonstrated little to no improvement in their chronic low back pain [33•].

In 2016, a clinical inquiry published in the *International Journal of Acupuncture* examined three systematic reviews of 54 randomized-controlled trials with 26,292 patients with chronic low back pain. Each of these studies is compared with acupuncture, sham acupuncture, usual care, and no treatment. Overall, acupuncture's effects in alleviating acute low back pain varied and were not clinically significant. In contrast, acupuncture was useful for long-term pain relief in patients with chronic low back pain and had superior clinical effects compared with sham acupuncture, usual care, and no treatment [34].

In 2020, a large-scale systematic review and meta-analysis of randomized-placebo and sham-controlled trials of 2110 patients from 1980 to 2016 were conducted to compare acupuncture, sham acupuncture, and placebo acupuncture. Pain intensity and disability were measured using the Visual Analogue Scale (VAS) and the Roland Morris Disability Questionnaire (RMDQ), respectively. The study concluded that, in the treatment of subacute and chronic low back pain, there was evidence that acupuncture is a moderately effective short-term treatment method of decreasing pain intensity in chronic and subacute low back pain with few adverse effects [35].

In a complementary study in 2019, 56 patients aged 25–51 with chronic low back pain were treated with either real acupuncture (REAL) or phantom acupuncture (PHNT) after eliciting low back pain via a low back extension. Forty-three participants were included in the final analyses, 25 from the REAL group and 18 from the PHNT group. Both REAL and PHNT reported decreased pain using an 11-point Visual Analogue Scale (VAS) following the intervention, suggesting a positive neurocognitive connection in reducing low back pain short-term. Although different parts of the brain reacted to the REAL or PHNT treatments, they were equally valid methods of relieving low back pain in the short-term as measured by the VAS [36].

In a single-blind randomized-controlled clinical trial of 66 patients aged 20–60 with a history of chronic low back pain

for at least 3 months, another 2020 study found that patients who received either manual acupuncture (MA) or electroacupuncture (EA) twice a week for 6 weeks had comparable decreases in pain severity and disability as well as an increase in mobility and quality of life at 6 weeks, and again, at 3 months measured by the Roland Morris Disability Questionnaire (RMDQ) [37••].

In 2017, a systematic review and meta-analysis of 2 randomized-controlled trials and 136 male and female patients aged 30–60 found that acupuncture with or without baclofen (30 PID) translated into decreased chronic low back pain as measured by the VAS. Sample sizes and the number of RCTs reviewed were small; however, there was a statistically significant evidence that acupuncture with or without pharmacologic treatment resulted in decreased pain severity as measured by the Visual Analogue Scale (VAS) [38••].

A study the following year, in 2018, compared 40 men and 40 women who were treated with manipulation therapy, acupuncture, or both for 6 weeks, and then evaluated the severity of their pain using the 0–10 numeric rating scale (NRS) and assessed their associated disability using the Roland-Morris LBP Disability scale. Interestingly, women reported more significant pain reduction via their RMDQ and NRS scores with acupuncture treatment only. In contrast, men reported more significant pain reduction with spinal manipulation therapy only. This study suggests that there are sex differences in how men and women respond to acupuncture therapy for chronic low back pain and may have implications as to which patients are better candidates [39].

In 2019, a randomized-controlled trial of 152 non-medicated participants compared hand-ear acupuncture, standard acupuncture, and usual care after 18 visits over 7 weeks. Chronic low back pain severity and disability were measured using the Roland-Morris Disability Questionnaire (RMDQ) and the Visual Analogue Scale (VAS), and after 2 months, all three groups showed improvement in RMDQ and VAS scores. At 6 months, VAS scores continued to improve for all three groups to varying degrees. Though hand-ear and standard acuapunctures were effective in the treatment groups compared with the control at 6 months, hand-ear acupuncture demonstrated superior benefits after 6 months of treatment compared with standard acupuncture and the usual treatment group. Overall, this study supports the idea that acupuncture is as an effective method of treating chronic low back pain by decreasing pain severity and associated disability [40].

In China, there is a large-scale prospective study of 2000 patients underway comparing the various acupuncture methods: traditional Chinese acupuncture, microacupuncture, local acupoint, non-local acupoint, single acupuncture, and combined therapy for a minimum of three treatments over 2–5 years. Treatment efficacy for chronic low back pain using the various methods will be measured using the standard Numeric Rating Scale (NRS) and the Oswestry Disability

Index (ODI) [41]. Another ongoing China-based randomized, double-blind clinical trial of 160 patients is comparing nine silver-needle warm acupuncture to stainless steel filiform-needle warm acupuncture to treat chronic low back pain over 3 weeks using the Japanese Orthopedic Association Back Pain Questionnaire and the Oswestry Disability Index (ODI). Warm acupuncture is becoming more widely used as an improved acupuncture method in treating chronic low back pain in China. This group anticipates that the silver needle's superior conductivity will translate into improved treatment outcomes compared with the standard stainless-steel needle [42].

An article published in 2020 evaluated the impact of acupuncture, spinal manipulative therapy, cognitive behavioral therapy, and exercise training on patients in treating more chronic low back pain. Chronic low back pain is a multi-dimensional, complex problem that can have detrimental and far-reaching effects on patients' mental and physical well-being. Accounting for biopsychosocial factors can improve patient outcomes in conjunction with acupuncture, spinal manipulative therapy, cognitive behavioral therapy, or exercise training [43].

Although the published data on the efficacy of acupuncture for lower back pain is limited, it is still a commonly used technique [44]. A review highlighting the perspectives of eight different doctors was published in 2019 on their extensive clinical experiences using acupuncture as a treatment for chronic lower back pain. The discussion showed that, although each individual's techniques may have differed, they did see a positive effect in acupuncture on chronic lower back pain in older patients. One participant commented on the mechanism of acupuncture, discussing the effect on the autonomic nervous system in relation to pain control [45]. Many studies have expressed various theories of the mechanism of acupuncture and its relation to different anatomical regions on the human body. The association of high-density nerve endings resulting in higher therapeutic levels has been shown; however, further studies are still needed to understand the complexity of acupuncture [46].

Clinicians often choose non-pharmacological methods for initial treatment of lower back pain. Of those complementary modalities, acupuncture is often recommended as a first-line therapy, along with massage and spinal manipulative therapy [47, 48]. A non-inferiority RCT recently looked at classical massage compared with acupuncture and demonstrated that massage was not significantly inferior compared with acupuncture [49]. In a *JAMA* review in 2018, various therapies used as substitutes were analyzed for efficacy. Cognitive behavior therapy (CBT), acupuncture, mindfulness-based stress reduction (MBSR), and yoga were shown to have a small benefit that was comparable with or better than usual care. Tai chi was described as "promising but inconclusive." Cost analysis of the different modalities showed that yoga and

MBSR were of higher value in comparison with other therapies [50]. With the increase of therapies available to patients with chronic lower back pain, future studies should consider cost-efficacy as treatment can prolong for many years.

A 2017 practice guideline analyzed various lower back pain treatment modalities and showed that acupuncture significantly decreased pain intensity and function compared with sham treatment. Other therapies showing effectiveness on lower back pain include exercise, massage, and spinal manipulation. Many published articles report short-term outcomes after treatment, making it difficult to develop a strong consensus on the long-term efficacy of these therapies. [51]. Interestingly, a review looked at RCT's between "sham" and placebo acupuncture compared with no treatment and found that pain levels were significantly decreased. However, there was no significant difference in the post-intervention function between sham and placebo intervention and usual care [52]. This finding demonstrates that RCTs using placebo acupuncture as a control arm may not be valid in assessing acupuncture efficacy. Eliminating bias and improving accuracy remain a challenge in acupuncture efficacy trials. Currently, there are no standardized methods for acupuncture, with several variations in the technique, duration, anatomical points, and various other variables [45, 52].

Electroacupuncture is a type of acupuncture involving the addition of a small electrical current between the needles. A double-blind RCT, published in 2018, analyzed the efficacy of electroacupuncture as an isolated treatment for chronic lower back pain. Results showed that electroacupuncture did not significantly alter quantitative sensory testing or decrease central desensitization [53]. In 2018, a systematic review and meta-analysis reviewed sixteen RCTs to evaluate the safety and efficacy of dry needling for treating lower back pain. Dry needling is a modern minimally invasive treatment that is often compared with acupuncture but focuses on the treatment of myofascial trigger points. Sixteen RCTs were analyzed, and results showed that dry needling was more effective at treating pain than acupuncture immediately after intervention; however, it was not significantly significant during follow-up. Dry needling was shown to be more effective than sham needling [54]. In comparison with other treatment modalities, there are still not enough published trials to determine its superiority. As with acupuncture, more robust and standardized RCTs are needed to claim a clear consensus with confidence.

Standardization of acupuncture and other non-pharmacological modalities used for chronic lower back pain may play a beneficial role in interpreting results from future studies. Often acupuncture is personalized to a patient's specific ailments and needs, which may sway results in either direction. Variability in the different causes of lower back pain, both acute and chronic, is often overlooked and may affect overall outcomes.

Table 1 Acupuncture for low back pain

Author (year)	Groups studied and intervention	Results and findings	Conclusions
Licciardone (2020) [37••]	Population: 7-month observational cross-sectional study of 568 patients with chronic low back pain (96 of whom received acupuncture) defined as ≥ 3 months everyday over the preceding 6-month period. Interventions: Complementary Health Approaches (CHA) including massage therapy, spinal manipulation, yoga, and acupuncture.	Greater utilization of CHAs, including acupuncture, along with higher Pain Self-Efficacy Questionnaire (PSEQ) scores, were associated with better clinical outcomes such as less back-pain related disability and intensity. However, this was only true for highly educated, younger, white patients as older and black patients were low or non-utilizers of CHAs.	CDC Guideline for Prescribing Opioids for Chronic Pain in 2016 and American College of Physicians Clinical Practice Guidelines in 2017 recommended non-pharmacologic interventions such as massage therapy, spinal manipulation, yoga, and acupuncture as initial treatments for patients suffering from chronic low back pain, in place of opioids. Evidence suggests that, as long as patients utilize one or more CHAs, including acupuncture, they will benefit from increased mobility and decreased severity of chronic low back pain.
Wei (2019) [34]	Population: prospective study of 2000 patients ages 16–80, suffering from chronic low back pain. Intervention: several methods will be compared, including traditional Chinese acupuncture, microacupuncture, local acupoint, and non-local acupoint, single acupuncture, and combined therapy for a minimum of three treatments and patients followed over a period of 2–5 years.	Treatment efficacy will be measured using a Numeric Rating Scale (NMS) and the Oswestry Disability Index (ODI). No results yet; the study is currently ongoing.	This study hopes to compare several different methods of acupuncture to assess treatment efficacy in chronic low back pain.
Kizhakkeveetil (2019) [39]	Population: 40 men and 40 women were randomized to receive spinal manipulation therapy, acupuncture, or both to treat chronic low back pain for 6 weeks and then followed up after 60 days. Interventions: spinal manipulation therapy, acupuncture, or both.	At baseline and a 60-day follow-up, treatment efficacy was measured using the Roland-Morris LBP Disability scale and a 0–10 numeric rating scale (NMS). Women reported more significant pain reduction via their RMDQ and NMS scores with acupuncture treatment only. Men reported more significant pain reduction with spinal manipulation therapy only.	This study suggests that there are sex differences in how men and women respond to therapy for chronic low back pain. Women respond better to acupuncture treatment alone, while men have better clinical outcomes with spinal manipulation therapy alone.
Li (2019) [36]	Population: randomized, double-blind clinical trial of 160 patients, aged 20–60, recruited from December 2018 to June 2020. Interventions: nine silver-needle warm acupuncture or stainless steel filiform-needle warm acupuncture treatments administered over 3 weeks.	Treatment efficacy will be measured using the Japanese Orthopedic Association Back Pain Questionnaire and the Oswestry Disability Index (ODI). No results yet; the study is currently ongoing.	Warm acupuncture is becoming more widely used as an improved acupuncture method in treating chronic low back pain in China. This group hypothesizes that the silver needle's superior conductivity will translate into improved treatment outcomes compared with the standard stainless-steel needle.
Lee (2019) [42]	Population: 31 men and 25 women (56 participants) aged 25–51 with low back pain greater than four measured on a visual analog scale (VAS). Interventions: 33 received real acupuncture (REAL), and 23 received phantom-acupuncture (PHNT) after elicitation of low back pain via a low back extension. Four fMRI scans were done at rest, before REAL/PHNT, during REAL/PHNT, after REAL/PHNT to look for neurological changes.	Forty-three participants were included in the final analyses, 25 from the REAL group and 18 from the PHNT group. Both REAL and PHNT reported decreased pain using an 11-point Visual Analogue Scale (VAS) following the intervention, suggesting a positive neurocognitive connection in reducing low back pain short-term.	Although different parts of the brain reacted to the REAL or PHNT treatments, they were equally effective methods of relieving low back pain in the short-term as measured by the VAS.
Luo (2019) [33•]	Population: randomized-controlled trial of 152 non-medicated participants aged 18–50 years old with a history of chronic low back pain for ≥ 3 months. Interventions: 54 received hand-ear acupuncture, 50 received standard	Chronic low back pain severity and disability were measured using the Roland-Morris Disability Questionnaire (RMDQ) and the Visual Analogue Scale (VAS) at baseline, 2 months, and 6 months. Before the intervention, the	Acupuncture is an effective method of treating chronic low back pain by both decreasing pain severity and decreasing associated disability. Though both hand-ear and standard acupuncture were effective in the treatment groups

Table 1 (continued)

Author (year)	Groups studied and intervention	Results and findings	Conclusions
	acupuncture, 48 received usual care along with massage and physical therapy at each visit, 18 treatments over 7 weeks.	three groups were comparable in terms of low back pain severity and disability. At 2 months, all three groups showed improvement in RMDQ and VAS scores. At 6 months, VAS scores continued to improve for all three groups, but only the hand-ear acupuncture group had a significant improvement in their RMDQ score.	compared with the control, hand-ear acupuncture demonstrated superior benefits after 6 months of treatment compared with standard acupuncture and the usual treatment group.
Comachio (2020) [40]	Population: single-blind randomized--controlled clinical trial of 66 patients (33 in each group) aged 20–60 with a history of chronic low back pain with ≥ 3 on an 11-point severity scale for at least 3 months. Interventions: 12 sessions of manual acupuncture (MA) or electroacupuncture (EA) administered twice per week over 6 weeks.	Low back pain intensity was measured using an 11-point Numeric Rating Scale (NRS), and disability was measured using The Roland Morris Disability Questionnaire (RMDQ) at baseline, after 6 weeks, and at a 3-month follow-up. After 6 weeks, both the MA and EA groups showed comparable decreases in pain severity and disability. Thirty-one patients in each group were followed up after 3 months, and again, both groups demonstrated no significant difference between them. However, both continued to report improved analgesia and increased mobility and quality of life.	MA and EA are both equally effective methods in treating chronic low back pain by decreasing pain severity and disability as measured by an NRS and RMDQ.
Xiang (2020) [43•]	Population: systematic review and meta-analysis of randomized-placebo and sham-controlled trials from 1980–2016 of 2110 patients > 18 years old with subacute or chronic low back pain. Interventions: acupuncture, sham acupuncture, or placebo-acupuncture. Pain intensity and disability were measured using the Visual Analogue Scale (VAS) and Roland Morris Disability Questionnaire (RMDQ), respectively.	In the treatment of subacute and chronic low back pain, there was evidence that acupuncture decreased pain intensity but had minimal to no impact on disability post-treatment when compared with sham or placebo acupuncture though these differences were no longer present at follow-up.	Acupuncture is a moderately effective short-term treatment method of decreasing pain intensity in chronic and subacute low back pain with few adverse effects.
Tagliaferri (2020) [41]	Population: review article for consideration of biopsychosocial factors in the management of chronic low back pain. Interventions: acupuncture, spinal manipulative therapy, cognitive behavioral therapy, and exercise training.	Chronic low back pain is a multi-dimensional, complex problem that can have detrimental and far-reaching effects on patients' mental and physical well-being. Accounting for biopsychosocial factors can improve patient outcomes in conjunction with acupuncture, spinal manipulative therapy, cognitive behavioral therapy, or exercise training.	Individualized plans to treat chronic low back pain in patients should consider more than pain intensity and disability. Biopsychosocial factors and patient goals can improve outcomes in patients independent of the specific treatment modality used.
Yeganeh (2017) [35]	Population: systematic review and meta-analysis of 2 randomized-controlled trials of 136 male and female patients aged 30–60 with chronic low back pain. Interventions: acupuncture with and without pharmacologic treatment.	When compared, acupuncture twice per week for 2 weeks was more effective at reducing chronic low back pain intensity at 2 weeks and 4 weeks, measured by VAS, than 30 mg/day of piroxicam for 2 weeks. Another study compared acupuncture to acupuncture + baclofen at 30 mg/day for 5 weeks, baclofen alone, and no treatment. They found that 2 weeks of 4 sessions of acupuncture with and without baclofen provided clinically significant pain relief after 1, 5, and 10 weeks.	Sample sizes and the number of RCTs reviewed were small; however, there was a statistically significant evidence that acupuncture with or without pharmacologic treatment resulted in a decrease in pain severity as measured by the Visual Analogue Scale (VAS).
Gong (2016) [38••]	Population: clinical inquiry; 3 systematic reviews 54 randomized-controlled trials	Acupuncture was statistically and clinically superior in treating chronic low back	Acupuncture is effective for long-term pain relief in patients with chronic low back

Table 1 (continued)

Author (year)	Groups studied and intervention	Results and findings	Conclusions
	of 26,292 patients > 17 years old suffering from chronic low back pain. Interventions: acupuncture, sham acupuncture, usual care, and no treatment.	pain when compared with sham acupuncture, no treatment, and usual care among all experimental groups. Acupuncture's effects in treating acute low back pain varied and were not found to be clinically significant.	pain and delivers superior clinical effects when compared with sham acupuncture, usual care, and no treatment.
Klassen 2019 [49]	Non-inferiority RCT comparing classical massage to acupuncture in patients with chronic back pain	Classical massage was not significantly inferior to acupuncture for chronic back pain.	More studies need to be conducted analyzing the efficacy of classical massage in comparison with other commonly used methods for the alleviation of chronic back pain.
Leite 2018 [53]	Double-blind and placebo-controlled RCT using electroacupuncture on patients with chronic lower back pain	Significant reduction in both resting and movement pain intensity between experimental and control groups. No significant difference found in pain intensity or quantitative sensory testing responses in electroacupuncture group compared with control groups	Addition of electric current to the needles did not improve pain; more studies are required, perhaps for a longer duration, in order to prove if this technique is more effective than traditional acupuncture.

Conclusion

Chronic LBP is more typically defined by its chronicity with pain persisting > 12 weeks in duration. Etiologies can be categorized as non-specific and mechanical vs. LBP with radiculopathy vs. systemic and visceral diseases. The majority of LBP (> 70%) is due to idiopathic, mechanical causes and is non-specific; according to some researchers, a definitive diagnosis cannot even be made in up to 85% of patients. Acupuncture was first documented in Chinese history around 100 BC, before spreading through East Asia and Europe over the next 1700 years. While acupuncture was first seen in US literature as early as the eighteenth century, acupuncture did not enter the mainstream until the early 1970s. Acupuncture focuses on balancing three major principles: Qi, Yin-Yang, and the five elements. Acupuncture can be a first-line treatment for patients suffering from low back pain as acupuncture studies have shown promising results. Currently, there are no standardized methods for acupuncture, with several variations in the technique, duration, anatomical points, and various other variables. There needs to be a standardized approach to acupuncture to improve the accuracy in acupuncture efficacy trials in the hope of eliminating bias towards acupuncture (Table 1).

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflicts of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

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