

Pain, Progress, and Price: A Review of Conservative and Complementary Treatments for Low Back Pain

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Abstract: Low back pain (LBP) is a leading cause of global disability, with a 7.2% prevalence and up to 80% lifetime risk, substantially impairing functionality and imposing a major economic burden. This review evaluates the cost-effectiveness trade-offs between pharmacological and non-pharmacological therapies for non-specific LBP, drawing on recent, high-quality evidence from a comprehensive PubMed search. Evaluated approaches included physical therapy, pharmacological management, cognitive behavioral therapy (CBT), chiropractic manipulation, acupuncture, yoga, and massage therapy. Non-steroidal anti-inflammatory drugs (NSAIDs) remain widely prescribed, yet their safety concerns contrast with the more sustainable benefits of physical therapy and spinal manipulation, with specialized physical therapy yielding 74% greater improvement than conventional therapy combined with NSAIDs. Nevertheless, physical therapy faces limitations related to practitioner variability, accessibility in rural or low-resource settings, upfront costs, and patient adherence. CBT demonstrates significant psychosocial benefits but is constrained by limited availability of qualified practitioners, high costs, and the active participation required from patients. Complementary approaches such as acupuncture and yoga show moderate efficacy and potential economic benefits; however, evidence consistency, delivery infrastructure, and adherence remain challenges, with yoga in particular showing high dropout rates in low-resource contexts. Importantly, acupuncture and yoga may still provide valuable benefits as part of a multimodal strategy. However, the available evidence is heavily concentrated in high-income countries, while studies from low- and middle-income countries remain scarce and unevenly distributed. Only a few LMICs have reported findings, with particularly limited data from Southeast Asia, underscoring critical research gaps in these regions. No single therapy emerges as universally superior for non-specific LBP, as effectiveness depends on patient profile, healthcare context, and cost. These findings highlight the importance of integrated, scalable, and accessible multidisciplinary models aligned with the biopsychosocial framework to optimize long-term outcomes.

Keywords: low back pain, conservative treatment, complementary medicine, cost effectiveness, pharmacological therapy

Introduction

Low back pain (LBP) is a major global public health concern and one of the most costly musculoskeletal disorders worldwide.¹ Beyond its impact on mobility and quality of life, LBP ranks among the leading causes of disability, with a global prevalence estimated at 7.2%.^{2,3} The economic toll is equally significant: in the United States, direct annual treatment expenditures exceed USD 77 billion, while indirect costs from lost productivity and long-term disability add billions more.⁴ This dual burden of disability and cost underscores the urgent need for effective and economically sustainable management strategies.

From an epidemiological perspective, the prevalence of LBP varies considerably across regions.¹ In Indonesia, national surveys report prevalence rates between 15% and 30% among adults, making it one of the most common musculoskeletal disorders in the country.^{5,6} This high prevalence is compounded by risk factors such as sedentary lifestyles, physically

demanding occupations, and poor workplace ergonomics, all of which are expected to increase with demographic aging and shifting occupational patterns.⁷ Furthermore, Indonesian health authorities have reported that LBP frequently presents as neuropathic pain, particularly among individuals over 40 years of age, with incidence rates rising steadily.^{7,8}

Clinically, LBP is defined as pain localized between the lower rib margin and the gluteal folds, with or without radiation to the lower limbs.² It is broadly categorized as specific, when attributable to identifiable pathologies such as fractures, infections, or neoplasms, or non-specific, which accounts for the majority of cases.^{2,9} Non-specific LBP is commonly associated with soft tissue abnormalities, muscle strain, ligament or tendon injuries, spasms, or postural fatigue, and is often exacerbated by suboptimal occupational or lifestyle factors.⁹

Pathophysiologically, LBP arises from complex interactions among mechanical, neurological, and psychosocial processes.¹⁰ Reflecting this multifactorial nature, clinical practice guidelines recommend a stepwise treatment approach.⁹ For acute presentations, initial management includes reassurance, patient education, encouragement of physical activity, and pharmacological therapies such as acetaminophen or nonsteroidal anti-inflammatory drugs (NSAIDs).¹¹ When symptoms persist or become chronic, non-pharmacological interventions—including structured exercise, physical therapy, chiropractic care, and cognitive-behavioral therapy—are generally recommended. In recent years, complementary and alternative therapies such as acupuncture, yoga, and massage have gained recognition for their potential role in managing chronic LBP.^{11,12}

Although many cases of LBP are nonspecific and self-limiting, persistent pain can lead to significant physical impairment, psychological distress, and escalating healthcare costs.¹³ Importantly, most high-quality evidence on treatment effectiveness and cost-effectiveness originates from high-income countries.¹⁴ By contrast, studies from low- and middle-income countries (LMICs) remain scarce and geographically uneven, with only a few LMICs—particularly in Southeast Asia—reporting substantial findings.^{15,16} This disparity limits understanding of how effective or feasible these treatment options are in resource-constrained settings.

Given the growing global and regional burden of LBP, its substantial economic implications, and the expanding range of both conservative and complementary treatment options, there is a pressing need to synthesize available evidence. This narrative review therefore aims to critically evaluate the clinical effectiveness and cost-efficiency of pharmacological, non-pharmacological, and complementary treatments for LBP, with particular emphasis on treatment accessibility, variability in implementation, and implications for evidence-based practice and healthcare policy development.

Methods

This narrative review synthesizes findings from peer-reviewed articles and clinical guidelines retrieved from PubMed. A comprehensive database search was conducted in May 2025 using the following keywords in the advanced search function: (“low back pain” OR “lumbar pain” OR “chronic back pain”) AND (“treatment” OR “management” OR “intervention”) AND (“cost effectiveness” OR “economic evaluation” OR “cost utility”). The inclusion criteria were: (1) articles published in English, (2) publication types limited to systematic reviews, original research articles, clinical studies, or randomized controlled trials (RCTs), and (3) studies published within the past 10 years (2015–2025). Exclusion criteria included editorials, opinion pieces, and conference abstracts.

A total of 397 articles were initially retrieved from the PubMed search. Following title and abstract screening, 83 full-text articles were assessed for eligibility. Of these, 28 studies met all inclusion criteria and were included in the final synthesis. The selected articles were manually reviewed for relevance, and data were extracted on the following parameters: type of LBP treatment, classification as pharmacological or non-pharmacological, and reported cost-effectiveness outcomes.

Conservative Treatment

Physical Therapy

Clinical Effectiveness

Treatment for low back pain (LBP) often includes clinic-based physical therapy (PT), which may involve high-heat muscle relaxation, muscle stimulation, and ultrasound therapy. These modalities have demonstrated consistent effectiveness in pain management.¹⁷ PT generally produces better outcomes than medical treatment alone or no treatment at all.^{17,18}

Cost-benefit studies show that early initiation of PT for acute LBP results in superior outcomes compared to either delayed treatment or standard medical intervention, with benefits persisting at one-year follow-up.¹⁹ Numerous randomized controlled trials (RCTs) confirm that PT significantly reduces pain intensity, enhances physical function, and improves quality of life for patients with acute, subacute, and chronic LBP.^{19,20}

For example, combining spinal stabilization exercises with conventional PT has been shown to improve functional outcomes, reduce pain, and enhance health-related quality of life.²¹ Exercise therapy is widely recognized as a low-risk intervention compared to pharmacological options such as NSAIDs, which carry higher risks due to comorbidities like cardiovascular and gastrointestinal disease.^{21–23}

Importantly, specialized PT has been shown to reduce disability scores by 51.7%, whereas conventional PT combined with NSAIDs achieved only a 29.6% reduction—representing a 74% greater improvement with specialized PT.^{23–25} This highlights that exercise-based therapy not only avoids medication-related risks but also provides greater functional benefits.

Cost Effectiveness

PT is considered a cost-effective strategy for managing LBP, particularly when initiated early.²⁶ At one-year follow-up, PT has been found to be more cost-effective than usual primary care for acute and nonspecific LBP.¹⁹ Specific PT modalities, such as stretching and strengthening exercises, have proven especially effective in reducing pain intensity.^{19,26}

One economic study reported that early PT was associated with an additional \$580 in costs over one year, alongside a quality-adjusted life year (QALY) gain of 0.02.¹⁹ The incremental cost-effectiveness ratio (ICER) was calculated at \$32,058 per QALY—well within conventional willingness-to-pay thresholds. Furthermore, early PT initiation has been associated with up to a 60% reduction in total care costs compared to delayed or passive treatment.^{19,27}

Limitations

Despite its benefits, physical therapy has several limitations. The variation in methods among practitioners leads to inconsistent clinical outcomes. Access to physical therapy remains a challenge in rural areas or developing countries. Although generally efficient, the initial costs can still pose a barrier, particularly for patients without health insurance. Furthermore, not all patients respond optimally to therapy, as psychosocial factors, commitments, comorbidities, or fear-avoidance behaviors can influence therapeutic success. The lack of individualized approaches and the excessive use of passive modalities also contribute to the low effectiveness.^{28,29}

Pharmacological Therapy

Drug Types and the WHO Pain Ladder

Pharmacological management—most commonly with nonsteroidal anti-inflammatory drugs (NSAIDs)—remains a standard option for LBP.³⁰ The World Health Organization (WHO) advocates a stepwise approach to pain management, progressing from acetaminophen and NSAIDs to muscle relaxants, tramadol, corticosteroids, and, in select cases, short-term opioids for moderate-to-severe pain.^{2,30}

In primary care, NSAIDs combined with muscle relaxants are frequently prescribed, typically administered on a scheduled basis rather than “as needed” to optimize pain relief.³¹ Patients often experience symptom improvement within one week, although the effect is less pronounced compared with either medication used alone.^{31,32} Opioids are reserved for short-term relief in severe cases but carry substantial risks. NSAID therapy, however, is sometimes discontinued due to adverse effects.^{24,32}

Benefits and Risks NSAID Use

Despite being inexpensive and widely available, NSAIDs are associated with significant safety concerns, including gastrointestinal (GI) bleeding, impaired renal function, and cardiovascular (CV) adverse events (AEs), particularly with prolonged use.^{23,33} While NSAID administration has been shown to reduce pain and functional impairment in patients with persistent low back pain, NSAIDs alone have not demonstrated superior efficacy in managing acute LBP compared to physical therapy or spinal manipulation.^{3,34} In rehabilitation settings, targeted physical therapy interventions have

consistently produced more favorable outcomes—reducing pain intensity and improving functional activity—than standard NSAID treatment.²⁴

Cognitive-Behavioral Therapy (CBT)

Mechanism and Outcomes

Cognitive behavioral therapy (CBT) is a widely used non-pharmacological intervention that encompasses psychoeducation about pain, cognitive restructuring, problem-solving, relaxation techniques, and behavioral activation. It has been shown to be effective in managing chronic pain.^{11,35} Guidelines from the American College of Physician, the American Pain Society, the European Spine Society, the European Spinal Deformity Society, and the European Section of the Cervical Spine Research Society recommend considering CBT for patients with LBP.^{36–39}

CBT stands out among psychotherapeutic options because it targets modifiable risk factors.⁴⁰ It influences pain and disability outcomes by addressing fear-avoidance behaviors and catastrophizing.^{40,41} Fear-avoidance predicts impairment and directly impacts functional ability, while catastrophizing—closely linked to anxiety and depression—contributes to greater pain intensity and disability, and mediates the effects of factors such as education level and mood disorders.⁴¹ Overall, CBT has demonstrated superior outcomes compared to other interventions for nonspecific LBP, particularly when contrasted with back pain education or manual therapy.⁴²

Cost Effectiveness Evidence

Given the clinical evidence supporting its effectiveness, there is considerable interest in evaluating the cost-effectiveness of CBT.³⁹ The available evidence suggests that CBT may be cost-effective, although findings are not yet conclusive.^{39,43} Several studies—conducted from employer, societal, and national healthcare perspectives—have reported cost-effectiveness under varying conditions.^{43,44} While initial expenses can be substantial, long-term benefits and reductions in healthcare utilization contribute to its overall economic value.⁴² One study reported that the mean incremental cost per participant to society was \$125, while the incremental cost per participant to the health plan was \$495. These costs (and associated savings) corresponded with statistically significant QALY gains of 0.041 for CBT compared with usual care.⁴⁴

Limitations and Future Directions

Despite growing evidence supporting CBT as an effective intervention for managing LBP, several limitations constrain its widespread application and clinical impact. Access to qualified CBT practitioners is often limited in rural, remote, or resource-constrained settings. In addition, patient adherence can be challenging, as CBT requires active participation, self-reflection, and sustained behavioral change.

To address these challenges, emerging research has proposed strategies to enhance the reach, effectiveness, and sustainability of CBT in LBP management. Future models should integrate CBT within interdisciplinary rehabilitation programs that combine physical therapy, patient education, and pharmacological management when appropriate. Such integration is consistent with biopsychosocial models and has demonstrated superior outcomes in chronic pain populations.

The adoption of internet-based CBT (iCBT) and mobile applications also offers a promising solution to overcome access barriers.⁴⁵ Several randomized controlled trials have shown that iCBT is non-inferior to face-to-face CBT in reducing pain and improving function among LBP patients. These digital platforms additionally allow for self-paced learning and contribute to reduced healthcare costs.^{45,46}

Complementary and Alternative Therapies

Spinal Manipulation/Chiropractic

Techniques and Use Prevalence

Spinal manipulation therapy (SMT) is the most commonly used provider-based complementary approach for low back pain (LBP).⁴⁷ It involves manual techniques, including high-velocity, low-amplitude thrusts and low-velocity, variable-amplitude mobilization maneuvers. In the management of LBP, SMT is typically applied to the lumbar vertebrae or sacroiliac joints with the aim of restoring mobility and alleviating pain.^{47,48}

Recent clinical guidelines strongly endorse SMT, particularly when combined with exercise, as a first-line treatment before initiating pharmacological interventions.⁴⁹ Rehabilitative exercise—designed to instruct and motivate patients to manage their LBP and prevent recurrence—is often integrated with SMT to promote patient self-efficacy.^{49,50}

Chiropractic care is frequently sought by patients with LBP for spinal manipulation.⁴⁹ For example, in Denmark, nearly one-third of individuals with back pain consult a chiropractor as their initial point of care.⁵¹ More recent systematic reviews evaluating SMT have incorporated both randomized and non-randomized studies, concluding that SMT is as effective as other widely used treatment options.⁴⁹ Although SMT is a cornerstone of chiropractic care, practitioners often employ multimodal treatment strategies to optimize outcomes. Moreover, SMT is also provided by osteopaths, physiotherapists, and other trained healthcare professionals. As such, while studies of SMT effectiveness help guide clinicians in treatment selection, they provide limited direction to patients regarding which type of provider they should consult.^{49,51}

Clinical Effectiveness and Economic Evidence

SMT is commonly delivered by chiropractors, osteopaths, or trained physiotherapists and is widely used as a non-pharmacological intervention for low back pain (LBP). Its effectiveness has been evaluated in numerous randomized controlled trials (RCTs) and systematic reviews.⁴⁹ Evidence from a systematic review and meta-analysis indicated that SMT provides modest improvements in pain and functional outcomes for patients with acute LBP compared with placebo or usual care.^{49,52} These benefits are most apparent in the short term (up to six weeks), while long-term advantages remain inconclusive. The magnitude of effect is similar to that of other recommended interventions, such as exercise therapy and nonsteroidal anti-inflammatory drugs (NSAIDs).⁴⁹

Economic analyses further support SMT when used in combination with other treatments. RCT evidence has shown that, compared with chiropractic care alone, combination treatment strategies (eg, SMT plus exercise or education) resulted in quality-adjusted life year (QALY) gains and lower healthcare costs.⁵³ From a Swedish healthcare perspective, combination treatment was considered cost-effective at a willingness-to-pay threshold of SEK 900,000 per QALY, with an incremental cost-effectiveness ratio (ICER) of SEK 850,000 compared to chiropractic care alone.⁵⁴

Acupuncture

Mechanism

Acupuncture originated in China more than 4000 years ago and is rooted in traditional Chinese medicine, which posits that the body's vital energy (*Qi*) circulates through 12 primary and eight secondary meridians.⁵⁵ The insertion of needles into specific points along these meridians—whether manipulated or not—is believed to restore the proper flow of *Qi*. Patients often experience a sensation known as *De Qi*, described as soreness, fullness, numbness, or tingling, during needle manipulation.^{55,56}

Dry needling, often referred to as myofascial trigger point needling, resembles acupuncture when applied at Ah Shi points, which correspond to trigger or tender points within the myofascial tissue.⁵⁷ This approach is now frequently termed myofascial acupuncture. Both acupuncture and dry needling may be augmented by additional stimulation methods, such as small electrical currents (electroacupuncture), moxibustion (the burning of the herb moxa on the needle handle), or heat lamps.^{57,58} However, an optimal treatment protocol for chronic LBP has yet to be established.

Clinical and Economic Findings

Acupuncture has been extensively studied as a non-pharmacological intervention for both acute and chronic LBP. High-quality RCTs and systematic reviews provide evidence of moderate clinical benefits, particularly for chronic LBP.⁵⁹ In 2017, American College of Physicians (ACP) recommended acupuncture as a primary treatment option for chronic LBP, citing its ability to relieve pain and improve function.⁶⁰

Supporting this, RCT findings from Skonnord et al⁶¹ demonstrated that acupuncture was cost-effective, yielding a QALY gain by day 365. At day 28, incremental QALY values were zero for both healthcare and societal perspectives. At a willingness-to-pay threshold of NOK 275,000, the probability of acupuncture being cost-effective based on

healthcare costs was 46.1% at day 28 and 95.9% at day 365. From a societal perspective, the probabilities were 81.5% and 74.1%, respectively. Differences in healthcare and societal costs, however, were not statistically significant.

Limitations: Placebo Effects and Practitioner Expertise

The effectiveness of acupuncture can vary widely due to factors such as placebo responses and practitioner expertise, highlighting the importance of treatment by qualified professionals.⁵⁹ Contextual elements—including patient expectations, therapist–patient interactions, and the ritualistic aspects of treatment—may significantly influence perceived benefits beyond needle placement or meridian theory.⁶²

Acupuncture is not a uniform intervention; it encompasses diverse styles (eg, traditional Chinese, Japanese, Western medical acupuncture, and electroacupuncture) that differ in insertion depth, point selection, stimulation intensity, and treatment duration.⁶³ Clinical outcomes therefore vary according to practitioner training and technical skill. Inexperienced practitioners may fail to achieve therapeutic benefits, whereas highly experienced practitioners might unintentionally amplify nonspecific effects (eg, through confidence and communication), complicating the interpretation of trial outcomes.⁶⁴ Furthermore, the absence of standardized protocols across studies reduces reproducibility and limits the generalizability of findings.⁵⁹

Yoga and Massage Therapy

Functional Outcomes

Clinical guidelines for chronic low back pain (CLBP) from the American College of Physicians recommend a stepped-care strategy that begins with nonpharmacological approaches, such as yoga and physical therapy, progresses to nonopioid medications, and reserves opioids for cases in which the potential benefits clearly outweigh the risks.⁶⁰ Within this framework, therapeutic yoga is recognized as an evidence-based intervention, supported by multiple randomized controlled trials (RCTs), systematic reviews, and meta-analyses demonstrating its effectiveness in reducing pain intensity and improving back-related function.⁶⁵ Similarly, a Cochrane Review update on massage therapy reported that massage can improve pain outcomes in patients with acute, subacute, and chronic LBP, although these benefits were limited to the short term. Functional improvements were also noted in subacute and chronic LBP when compared with inactive controls, but again only in the short term. Reported adverse effects of massage were generally minor.^{66,67}

Comparative Effectiveness

Yoga has been shown to be at least as effective as physical therapy for CLBP.⁶⁸ However, recommending yoga depends on several factors: the availability of qualified instructors, the presence of CLBP-specific yoga programs, clinician familiarity with the evidence, and patient and provider preferences. Access through healthcare systems or insurance coverage remains relatively rare.^{65,68}

From a health system perspective, the incremental cost-effectiveness ratio (ICER) of yoga was estimated at \$4488 per quality-adjusted life year (QALY). From a societal perspective, yoga was considered “dominant”, offering both improved health outcomes and cost savings. Probabilistic sensitivity analysis revealed an 89% probability of yoga being cost-effective at a willingness-to-pay threshold of \$50,000. Furthermore, comparative studies suggest that yoga can achieve outcomes comparable to physical therapy at a substantially lower cost.⁶⁹

Access and Insurance Considerations

Despite demonstrated clinical benefits, yoga faces significant barriers to widespread implementation, including limited accessibility, affordability, and insurance coverage. RCTs report an average dropout rate of 11.4%, which increases to 15.2% for interventions lasting more than 12 weeks, and can exceed 40% among socioeconomically disadvantaged or medically vulnerable populations.⁷⁰ In low-resource settings, adherence is further challenged by high out-of-pocket costs, restricted insurance coverage, limited access to trained instructors, and logistical issues such as scheduling conflicts or travel requirements.⁷¹ Additional barriers include misconceptions (eg, yoga is ineffective for weight loss), fear of injury, and low motivation for home practice. These challenges contribute to higher dropout rates in real-world settings, reflected in lower participation rates among lower-income adults (10.4% among those earning less than 200% of the

federal poverty level versus 23.0% among those earning 400% or more).^{70,71} Insurance reimbursement gaps further restrict access for lower-income populations, exacerbating disparities in utilization.

Summary of Cost-Effectiveness Findings Across Modalities

A wide range of conservative treatments—including exercise, physical therapy, and medication—are used to manage LBP, with the goals of improving mobility, reducing pain, and enhancing both functional and psychological well-being. Physical therapy (PT) is frequently recommended as a first-line treatment for both acute and chronic LBP. Cost-utility analyses have shown that early PT intervention is associated with an incremental cost-effectiveness ratio (ICER) of \$32,058 per quality-adjusted life year (QALY) gained, well below conventional willingness-to-pay thresholds.¹⁹ Moreover, early PT initiation has been linked to a 60% reduction in subsequent healthcare costs compared to delayed or passive care, underscoring its value in long-term management.⁷²

Pharmacological treatment of LBP generally follows the World Health Organization (WHO) pain management ladder, progressing from acetaminophen and nonsteroidal anti-inflammatory drugs (NSAIDs) to muscle relaxants, tramadol, corticosteroids, and, when necessary, opioids for severe pain. NSAIDs—often combined with muscle relaxants—are widely used in primary care and can provide symptomatic relief within one week.^{2,30,31} However, their effectiveness is modest when used alone, and they pose risks such as gastrointestinal bleeding, renal impairment, and cardiovascular events, particularly with long-term use.²³ While NSAIDs improve pain and function in chronic LBP, they are less effective than non-pharmacological interventions such as PT or spinal manipulation for acute cases, which offer better functional outcomes and lower risk profiles.⁷³

Cognitive behavioral therapy (CBT) has demonstrated clinical effectiveness in addressing psychosocial contributors to chronic LBP.⁷⁴ Maladaptive thought processes can exacerbate pain perception and disability by influencing emotional states and behavior.⁷⁵ CBT targets these mechanisms through structured interventions, leading not only to improved pain and functional outcomes but also to reductions in healthcare utilization. When combined with PT, CBT further enhances outcomes by addressing psychosocial risk factors alongside physical impairments.⁴² From a societal perspective, CBT has demonstrated a favorable cost-effectiveness profile, with an estimated incremental cost of \$3049 per QALY gained and an average incremental societal cost of \$125 per participant, resulting in a QALY gain of 0.041 compared to usual care.⁴⁴ These findings highlight the economic feasibility of CBT as part of interdisciplinary care, though barriers remain related to initial implementation costs and limited availability of trained providers.

Spinal manipulation therapy (SMT), commonly provided by chiropractors, has been associated with modest short-term improvements in pain and function. A cost-effectiveness analysis from a Swedish healthcare perspective estimated an ICER of SEK 850,000 per QALY for integrated SMT interventions, remaining below the national threshold of SEK 900,000.⁵⁴ The addition of exercise or educational components further improved cost utility, suggesting that multimodal approaches are more efficient. In a large study of more than 72,000 older adults with multiple chronic conditions and LBP, those receiving chiropractic care had lower overall healthcare expenditures and reduced costs per episode day compared to those receiving conventional medical treatment.⁷⁶ However, some studies that assessed both clinical outcomes and costs reported higher expenditures, suggesting that while SMT is probably cost-effective, its economic impact may vary depending on context.⁷⁷

Acupuncture has also demonstrated moderate clinical benefits in chronic LBP, though cost-effectiveness results vary by setting. A Norwegian study⁶¹ found acupuncture to be cost-effective in 95.9% of simulations at a willingness-to-pay threshold of NOK 275,000 per QALY from a healthcare perspective. Cost-effectiveness probabilities from a societal perspective remained substantial (74.1–81.5%), although differences in overall costs were not statistically significant. These findings support acupuncture as a feasible adjunct therapy, particularly for chronic or refractory LBP. In line with growing evidence, the American College of Physicians recommends acupuncture as a first-line non-pharmacological treatment for chronic LBP. However, further cost-effectiveness research is needed to clarify its long-term economic and clinical impact.

Among complementary and alternative medicine (CAM) therapies, yoga has shown particular promise. Medical yoga has demonstrated the ability to alter pain perception and produce lasting improvements in back function. Compared with evidence-based self-care advice, yoga is associated with greater improvements in health-related quality of life (HRQL).

From a societal perspective, yoga is more likely to be cost-effective than exercise therapy or self-care recommendations. Studies also suggest cost-effectiveness from the employer perspective, as improvements in HRQL may enhance productivity, thereby offsetting the costs of yoga programs delivered through occupational health services.⁷⁸ A randomized trial estimated an ICER of \$4488 per QALY gained, with an 89% probability of cost-effectiveness at a \$50,000 threshold. From a societal perspective, yoga was considered “dominant”, offering both improved outcomes and reduced costs.⁶⁹ Nonetheless, widespread implementation remains limited by variable insurance coverage and restricted access to clinically tailored yoga programs.

Perspectives on Integration Into Healthcare Systems

Integrating evidence-based strategies for managing low back pain (LBP) into healthcare systems is essential for improving patient outcomes, reducing chronic disability, and optimizing resource utilization. Current guidelines emphasize a multidisciplinary, stepped-care approach that combines pharmacological, physical, psychological, and complementary therapies.^{2,30} However, implementation varies widely across settings due to disparities in access, provider training, infrastructure, and reimbursement policies. Conventional treatments such as physical therapy and NSAIDs are generally well-established in primary care, though timely referral to physical therapy remains inconsistent. Psychological interventions, including cognitive behavioral therapy (CBT), are strongly recommended for chronic LBP but remain underutilized because of limited access to trained providers and inadequate insurance coverage. Complementary therapies such as acupuncture, spinal manipulation, and yoga demonstrate favorable cost-effectiveness but are seldom reimbursed and are often delivered outside formal medical systems, which restricts scalability. Strategies to improve integration include embedding non-pharmacological treatments into primary care and rehabilitation services, broadening insurance coverage for validated interventions, and enhancing education and collaboration across multidisciplinary teams. Digital innovations—such as internet-based CBT (iCBT) and virtual physical therapy—offer scalable solutions to overcome geographic and logistical barriers. Ultimately, successful integration depends on supportive policies, strong clinical infrastructure, and patient-centered delivery models that align with the biopsychosocial framework for managing LBP.

The integration of evidence-based strategies for managing LBP within healthcare systems is crucial for enhancing patient outcomes, minimizing chronic disability, and maximizing resource utilization. Current guidelines emphasize a multidisciplinary and stepped-care approach, combining pharmacological, physical, psychological, and complementary therapies. However, implementation varies widely across settings due to disparities in access, provider training, infrastructure, and reimbursement policies. Conventional treatments such as physical therapy and NSAIDs are typically well-implemented in primary care setting, though early referral to physical therapy remains inconsistent. Cognitive behavioral therapy and other psychological approaches are recommended for chronic LBP but are underutilized due to limited access to trained professionals and inadequate insurance coverage. Complementary therapies such as acupuncture, spinal manipulation, and yoga show favorable cost-effectiveness but are rarely covered by insurance and often delivered outside formal medical settings, limiting scalability. Initiatives aimed at improving integration involve incorporating non-pharmacologic treatments into primary care, rehabilitation services, and digital platforms, broadening insurance coverage for validated interventions, and educating multidisciplinary teams. Innovations in digital health, such as internet-based CBT (iCBT) and virtual physical therapy, present scalable solutions to address geographic and logistical challenges. The successful integration of these approaches relies on supportive policies, robust clinical infrastructure, and patient-centered delivery models that are consistent with the biopsychosocial framework for managing LBP.

Recommendations for Future Research and Practice

Future research and clinical practice in the management of LBP should prioritize interventions that are personalized, cost-efficient, and widely accessible. Key priorities include conducting long-term comparative studies, particularly on non-pharmacological therapies; strengthening economic evaluations in low-resource settings; and expanding the use of digital solutions such as tele-rehabilitation and internet-based CBT to improve access. Developing stratified care models informed by patient risk profiles, enhancing interdisciplinary collaboration, and advancing workforce training are also critical for improving treatment adherence and outcomes. Finally, addressing equity issues—such as gaps in insurance coverage and shortages of qualified providers—will be essential for achieving effective, patient-centered management of LBP.

Conclusion

Low back pain (LBP) remains a leading global cause of disability and economic burden, requiring treatment strategies that are both evidence-based and cost-conscious. No single therapy has proven consistently superior for non-specific LBP, emphasizing the need for flexible, patient-centered care. Conservative interventions such as early physical therapy and cognitive behavioral therapy (CBT), along with complementary options like acupuncture, spinal manipulation, and yoga, demonstrate meaningful clinical benefits and favorable cost-effectiveness when integrated into comprehensive care. However, limited access, inconsistent reimbursement, and infrastructure gaps hinder widespread adoption. To advance LBP management, health systems should prioritize multidisciplinary approaches and incorporate incremental cost-effectiveness ratio (ICER) thresholds into national reimbursement frameworks, alongside expanding insurance coverage and digital delivery models. Aligning clinical effectiveness with cost-efficiency will be critical for sustainable, patient-centered care.

Disclosure

The authors have no conflicts of interest to disclose in this work.

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