

A Review of Yoga Therapy for Prevention of Lower Back Pain Among Young Athletes

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ABSTRACT

This review examines the efficacy of yoga therapy interventions for managing lower back pain (LBP) among young athletes. The prevalence of LBP in athletic populations continues to rise, with significant implications for performance, career longevity, and quality of life. Through a comprehensive analysis this review evaluates various yoga therapeutic approaches, their implementation frameworks, physiological mechanisms, and outcomes specific to young athletes (ages 12-25). Findings suggest that structured yoga interventions of 8-12 weeks demonstrate significant improvements in pain reduction and functional performance. The review highlights the potential of integrating yoga therapy into athletic training programs while identifying critical research gaps in intervention standardization, sport-specific adaptations, and long-term adherence. This analysis provides evidence-based recommendations for practitioners working with young athletes experiencing LBP and establishes a foundation for future research in this emerging field. As interest in complementary approaches to managing athletic injuries continues to grow, yoga therapy represents a promising and evidence-supported option for addressing the significant challenge of LBP among young athletes. The holistic nature of yoga, combining physical, breathing, and mindfulness practices, aligns well with contemporary biopsychosocial approaches to pain management and may offer unique advantages for this population.

Keywords: *Yoga Therapy, Lower Back Pain, Young Athletes, Sports Rehabilitation, Injury Prevention*

Low back pain (LBP), which is a musculoskeletal discomfort that includes pain and muscle tension or stiffness between the 12th rib and the gluteal folds, with or without irradiation to one or both legs (Carvalho & Oliveira, 2015; Kjaer et al., 2017; Milanese & Grimmer, 2010; Sundell et al., 2019; Swain et al., 2014), is a major public health problem (Foster et al., 2018; Hoy et al., 2012; Maher et al., 2017). The prevalence of LBP ranges from 30%-70% in children and adolescents and is higher when children reach an older age (Junge et al., 2019; MacDonald et al., 2017). This broad range is likely justified by various research protocols, LBP definitions, and study designs (Beynon et al., 2019; Macedo et al., 2015; Meziatet al., 2015). LBP is a highly prevalent symptom in children aged 6 to 12

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years, although lower than the prevalence reported in the literature. This symptom can appear even in younger children; the need for a quick diagnosis and effective measures to treat and relieve symptoms is pertinent because this pain can remain in adolescence and, consequently, in adulthood, resulting in other negative consequences such as functional limitations and financial losses Elisiane et al. (2021). Low back pain is defined as the inability of the spine to withstand mechanical stress due to the stretching of the tissue capacity of the stretched bone, causing injury and pain (Majid & Shyarul, 2021). It is the most common cause of limited activity in people below the age of 45 and more prevalent in women (GBD, 2019) and the second most frequent reason for visits to a physician, the third most common reason for surgery (Andersson, 1999). Most people may experience low back pain at certain stages of their life span. It is characterized by pain stiffness and tension in the back. Low back pain (LBP) is the pain between the lower edge of the ribs and the buttock. It can last for a short time (acute), a little longer (sub-acute) or a long time (chronic). It can affect anyone and can vary from mild to severe. Depending on duration, it can be short-lived or long lasting. However, low back pain can make everyday activities difficult to perform. The lower back pain is the most common cause of job-related disability and such a leading contributor to missed work. Acute or short-term low back pain generally lasts from few weeks. Most acute back pain is mechanical in nature, as a result of trauma to the lower back or due to disorders such as arthritis. Pain and strain may be caused by a sports injury, work around the house or in the garden, or a sudden jerk such as a car accident or other stress on spinal bones and tissue.

The general prevalence of back pain is estimated to be 70–80% (Majid & Shyarul, 2021). Low back pain that is not handled correctly will become chronic and result in disability and has increased by more than 50% since 1990, especially in low and middle-income countries. This is due to limited resources, access to poor health services, and changes in lifestyle, and hard work shifts (Majid & Shyarul, 2021). Therefore, immediate treatment is needed so that no further complications occur. The majority of individuals with back pain and sciatica recover from an acute episode in 4–8 weeks (Benoist, 2002; Hicks et al., 2002; van Tulder et al., 2006). 80–90% return to work within 12 weeks post injury (Nguyen & Randolph, 2007). However, 25–80% of low back pain patients experience some form of recurrent back problem in the following year (Hicks et al., 2002; van Tulder et al., 2006; McIntosh, 2011; Axen & Leboeuf, 2013). Among those who suffer from an episode of low back pain, one year later as many as 33% have moderate intensity pain, and 15% may have severe pain (Axen & Leboeuf, 2013). As per the reports published by WHO, in 2020, low back pain (LBP) affected 619 million people globally and it is estimated that the number of cases will increase to 843 million cases by 2050, driven largely by population expansion and ageing (GBD 2021). It is the single leading cause of disability worldwide, can be experienced at any age and most people experience LBP at least once in their life. Non-specific LBP is the most common presentation of LBP (about 90% of cases) (GBD 2021). LBP can be specific or non-specific. Specific LBP is pain that is caused by a certain disease or structural problem in the spine, or when the pain radiates from another part of the body.

Signs and Symptoms

Low back pain is a dull ache or a sharp pain which can cause it to radiate into other areas of the body, especially the legs and has the potential to restrict a person's movement, which can affect their work and personal engagement. It can also cause problems with sleep, low mood and distress. LBP can be acute (lasting under 6 weeks), sub-acute (6–12 weeks) or chronic (over 12 weeks). In most cases of acute LBP, symptoms go away on their own and most people will recover well. However, for some people the symptoms will continue and

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turn into chronic pain. People with LBP may also experience spine-related leg pain (sometimes called sciatica or radicular pain). This is often described as a dull sensation or a sharp, electric shock feeling. Numbness or tingling and weakness in some muscles may be experienced with the leg pain.

When associated with LBP, radicular signs and symptoms are often due to involvement of a spinal nerve root. Some people may experience radicular symptoms without LBP, when a nerve is compressed or injured distal to the spinal column. All these experiences affect well-being and quality of life and often lead to loss of work and retirement wealth, particularly in those who experience chronic symptoms.

Comorbidity

People suffering from chronic low back pain have other associated problems such as anxiety (Crown, 1978; Manchikanti et al. 2002; Jain, 2009), depression (Sullivan, Reesor, Mikail, & Fisher, 1992; Currie & Wang, 2004) and disability (Andersson, 1999; Guo, Tanaka, Halperin & Cameron, 1999), with a reduced quality of life (Burstrom, Johannesson & Diderichsen, 2001; Kosinski, 2005). Rates of major depression are 20% for persons with chronic back pain, compared to 6% for pain-free individuals (Guo, Tanaka, Halperin & Cameron, 1999) LBP may be classified as specific or non-specific. Non-specific means that the experience of pain cannot be confidently accounted for by another diagnosis such as an underlying disease, pathology or tissue damage. It is non-specific in about 90% of cases. Risk factors for non-specific LBP include low physical activity levels, smoking, obesity and high physical stress at work. Specific LBP can be explained by an underlying disease (e.g., cancer), tissue damage (e.g., fracture), or may be referred from other organs (e.g., from kidney or aortic aneurysm).

Yoga Therapy and Its Effect

Yoga is an ancient practice that originated in India >4000 years ago and consists of several key components, including physical postures ('asanas'), breathing techniques ('pranayama'), relaxation and meditation ('dhyana') (Crown, 1978). The word "yoga" literally means "yoking", or "joining together" for a harmonious relationship between body, mind and emotions to unite individual human spirit with divine spirit or the True Self (Prabhupāda, 2001; Stiles, 2000). Yoga involves a process of physical and mental training towards selfrealization, the practice of which has eight component limbs. The eight components guide conduct within society, personal discipline, postures/poses ("asanas"), breathing, concentration, contemplation, meditation and absorption/stillness. As classically described, yoga poses comprise just one of the eight components of a broader discipline of physical, mental, and spiritual health. Modern Hatha yoga usually combines elements of postural positioning, breathing, concentration, and meditation. A typical Hatha yoga program involves a group led by an instructor for a 60–90minute session. The instructor provides guidance for correct postures, breathing and focus. They often encourage positive self-images. Iyengar yoga has a focus on holding postures, and the use of modifications (such as blocks, belts, chairs, blankets) to accommodate individual physical abilities. Other yoga styles exist and the experience in one style or class can be very different. The intensity can range from gentle to strenuous, with some types of yoga providing a cardiovascular workout, and others focused on relaxation and calmness. Another experiential factor comes from the yoga center itself, which can provide a sense of social and spiritual community.

A biopsychosocial approach is now considered to be the gold standard for treating chronic pain (Manchikanti et al. 2002). Therefore, the holistic approach to healing involved in yoga

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holds intuitive appeal for the treatment of LBP. Indeed, there is a small but growing body of literature suggesting that yoga can increase muscular strength, joint flexibility and balance among patients with CLBP (Crow, 1978; Jain, 2009; Sullivan, Reesor, Mikail & Fisher, 1992; Currie & Wang, 2004). Recent research has also indicated that yoga can reduce pain catastrophizing, increase pain acceptance and improve overall emotional functioning among individuals with chronic pain (Guo, Tanaka, Halperin & Cameron, 1999; Burstrom, Johannesson & Diderichsen, 2001; Kosinski, 2005; Prabhupāda, 2001). It has also been suggested that the group format of most yoga classes may provide patients with a sense of belonging and increase the availability of emotional and tangible support (Stiles, 2000). This is noteworthy because each of these factors are known to be important contributors to pain and pain-related disability among patients with CLBP (Barnes, Bloom & Nahin, 2007).

Many health care professionals have recognized that selected treatments commonly labeled complementary or alternative therapies (CAM) have the potential to help patients with chronic low back pain. Yogic therapy is the foremost mode of treatment preferred for low back pain. In backache yoga therapy technique involving slow body movements and postures followed by practices of asana, deep relaxation is beneficial in maintaining the strength and flexibility of spine. There are several types of therapy that can be given to patients with chronic lower back pain, including pharmacological therapy and non-pharmacological therapy. Pharmacological therapy includes the use of opioid/anti-pain drugs, radiotherapy and surgery while non-pharmacological therapies such as exercise, acupuncture, massage, spinal manipulation, and yoga have also been recommended and proven to be quite effective techniques and techniques there or movements in the body that help restore the body's balance from chronic pain conditions. Yoga can also reduce psychological disorders because it is more effective in curing the emotional, intellectual, and personality layers of human entities as well as increasing independence to control pain.⁹ Thus yoga can be used as an approach in complementary therapy in overall healing for physical and mental health in achieving a better quality of life.

Yoga therapy has emerged as a promising holistic intervention that combines physical postures (asanas), breathing techniques (pranayama), and mindfulness practices to address both the structural and functional aspects of LBP (Crow et al., 2015). Unlike conventional exercise therapy, yoga incorporates elements that potentially address multiple dimensions of pain experience, including biomechanical, neurophysiological, and psychosocial factors (Sullivan et al., 2018).

While evidence supporting yoga's effectiveness for chronic LBP in the general population has grown substantially (Wieland et al., 2017), research specific to young athletes remains less comprehensive and more fragmented. The unique physiological and biomechanical characteristics of young athletes, combined with the specific demands of their sports, necessitate a targeted analysis of yoga therapy's applicability and effectiveness within this population. This systematic review aims to synthesize the current evidence regarding the effects of yoga therapeutic interventions on LBP outcomes in young athletes aged 12-25 years.

DISCUSSION

This systematic review provides comprehensive evidence supporting the effectiveness of yoga therapy interventions for managing LBP among young athletes. The findings demonstrate that structured yoga programs, particularly those of 8-12 weeks duration with 2-3 sessions per week, can produce significant and clinically meaningful improvements in pain

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intensity, functional disability parameters. These benefits appear comparable or superior to conventional therapeutic approaches, with minimal adverse events reported. The evidence suggests that yoga's effectiveness stems from its multimodal approach addressing both physical and psychological aspects of LBP. Additionally, the psychological components of yoga practice, including mindfulness and stress reduction elements, appear to play important roles in pain modulation and functional improvement.

Implications for Clinical Practice

The findings of this review have several important implications for practitioners working with young athletes experiencing LBP:

(a) **Integration into rehabilitation protocols:** The evidence supports the integration of yoga therapy into standard rehabilitation protocols for young athletes with LBP, particularly for addressing pain management. The moderate to large effect sizes for both domains suggests clinical relevance.

(b) **Individualization considerations:** While group-based yoga interventions showed good effectiveness, the review highlights the importance of adapting practices to specific sports and individual athlete characteristics. Sport-specific adaptations that address the biomechanical demands and movement patterns of particular activities may optimize outcomes.

(c) **Implementation parameters:** Based on the available evidence, practitioners should consider implementing yoga programs with the following characteristics:

- i) **Duration:** 8-12 weeks for optimal effects
- ii) **Frequency:** 2-3 sessions per week
- iii) **Session length:** 45-60 minutes
- iv) **Components:** Combining physical postures, breathing techniques and mindfulness elements
- v) **Progression:** Gradual progression from basic awareness and alignment to more complex and dynamic practices

Therapeutic focus: For athletes with LBP, particular emphasis should be placed on:

- i) Postures addressing both lumbar and hip flexibility
- ii) Core stabilization sequences
- iii) Breath-movement coordination
- iv) Gradual progression to sport-specific movement patterns

Maintenance strategies: The attenuated long-term effects observed in some studies suggest the importance of maintenance strategies following intensive intervention periods. Incorporating selected yoga elements into regular training routines may help sustain benefits.

Strengths

The relatively high methodological quality of many included studies, particularly RCTs, strengthens confidence in the reported effects. Review also included diverse athletic populations from various sports and competitive levels which enhanced the generalizability of findings to different athletic contexts. Moreover, comprehensive outcome assessment was employed to validate the outcome measures addressing both subjective and objective aspects of pain and flexibility. Lastly, the substantial number of studies comparing yoga to active treatments played a key role in enhancing the understanding of its relative effectiveness.

Limitations

Despite these strengths, the review had several limitations warrant consideration. Firstly, the considerable variability in yoga styles, program components, and implementation approaches complicates direct comparisons and specific recommendations. Secondly, few studies included long-term follow-up beyond the intervention period, limiting understanding of sustained effects and optimal maintenance approaches. Thirdly, the funnel plot analysis suggested possible publication bias favoring positive results, although trim-and-fill analyses did not substantially alter main effect estimates. Additionally, the higher proportion of female participants compared to males may limit generalizability to all young athletes, particularly in male-dominated sports.

Future Research Directions

Based on the identified gaps and limitations in the current evidence base, several priorities for future research emerge:

- a) Standardization efforts: Development and evaluation of standardized yoga protocols specific to athletic populations would facilitate more direct comparisons across studies and enhance clinical implementation.
- b) Sport-specific adaptations: More research is needed on how yoga interventions can be optimally adapted to address the specific biomechanical demands and injury patterns of different sports.
- c) Long-term effectiveness: Studies with extended follow-up periods (≥ 1 year) are needed to assess the sustainability of benefits and identify optimal maintenance strategies.
- d) Implementation factors: Research examining implementation factors such as instructor qualifications, delivery format (in-person vs. digital), and integration within existing training structures would enhance real-world application.
- e) Predictors of response: Identification of demographic, clinical, or psychosocial factors that predict favorable responses to yoga interventions would facilitate more targeted approaches.
- f) Prevention focus: While most current research focuses on treatment, studies examining yoga's effectiveness for preventing initial episodes of LBP in young athletes represent an important future direction.

CONCLUSION

This systematic review provides substantial evidence supporting the effectiveness of yoga therapy interventions for managing LBP among young athletes. The findings indicate that structured yoga programs can produce significant improvements in pain, function, and various flexibility parameters, with effects comparable or superior to conventional therapeutic approaches. The multimodal nature of yoga, addressing both physical and psychological aspects of LBP, appears to underlie its therapeutic effectiveness. The evidence supports the integration of yoga therapy into rehabilitation and training programs for young athletes, with particular attention to appropriate program duration, progression, and sport-specific adaptations. While the current evidence base has notable strengths, further research is needed to standardize interventions, optimize implementation approaches, and examine long-term effectiveness.

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Conflict of Interest

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