

Critical Review on Yoga as a Non-Pharmacological Intervention in Occupational Back pain

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Abstract

Occupational back pain is a significant musculoskeletal disorder that affects employees in different occupations, causing decreased productivity, functional disability, and rising healthcare expenses. Repeated sitting, repetitive motion, poor ergonomics, vibration exposure, and psychological stress are some of the occupational factors that contribute to its development. Conventional pharmacological management is only temporarily effective in relieving symptoms, but it is often linked to adverse effects, addiction, and inadequate functional recovery. Thus, non-pharmacological and holistic strategies are increasingly being advocated for long-term management.

Yoga has been identified as a safe, economical, and holistic strategy for occupational back pain. It integrates physical postures (āsanas), breathing exercises (prā āyāma), and relaxation techniques, which cumulatively increase muscle strength, flexibility of the spine, posture, and mental health. Physiologically, yoga increases core stability, neuromuscular coordination, and blood flow, and psychologically, it decreases stress, anxiety, and perception of pain.

Randomized controlled trials and systematic reviews have provided evidence that yoga is effective in reducing pain intensity and disability and improving functional status in patients with chronic low back pain. From an Ayurvedic standpoint, occupational back pain is similar to Katishoola, which is a Vata-dominated disorder, and yoga is

beneficial in this condition by reducing aggravated Vata, improving blood circulation, and balancing the body and mind. Despite the promising results, the differences in yoga techniques, small sample size, and lack of occupation-specific studies underscore the need for standardized yoga packages and long-term studies. Yoga is an effective and holistic strategy for the prevention and management of occupational back pain, which has the potential to benefit both the individual and the workplace.

Key words : Occupational back pain, Yoga, Non-pharmacological therapy, Low back pain.

One of the most common musculoskeletal conditions in the world, occupational back pain is a leading contributor to disability, decreased productivity, and higher medical costs. Nearly 60–80% of people are thought to have low back discomfort at some point in their lives, and occupational factors including prolonged sitting, vibration, repetitive strain, and poor posture greatly increase the likelihood of developing it^{1,2}.

Due to ongoing mechanical stress and unfavorable ergonomic settings, workers including cyclists, drivers, office workers, nurses, and manual laborers are particularly vulnerable to occupational back pain. Analgesics, anti-inflammatory medications, muscle relaxants, and physical therapy are frequently used in conventional care. On the other hand, prolonged use of pharmaceuticals may result in side effects, dependence, and only little functional improvement³

In recent years, non-medical methods have become increasingly significant. Among these, yoga has been recognized as an efficient, safe, and comprehensive approach for alleviating work-related back pain. Yoga integrates physical movements (āsanas), breathing exercises (prā āyāma), and relaxation techniques, which

collectively aid in pain relief, enhance flexibility, improve posture, and support mental health^{4,6}. This review provides a critical examination of yoga's role as a non-medical intervention for occupational back pain, focusing on its underlying mechanisms, existing evidence, benefits, and drawbacks.

Concept of Occupational Back Pain :

Definition :

Occupational back pain denotes pain or discomfort in the lumbar or thoracic area that is caused or intensified by job-related tasks like extended sitting, lifting, repetitive motions, or exposure to vibration.⁸

Common occupational Risk Factors :

Occupational back pain is typically mechanical in nature and associated with muscle imbalance, ligament strain, intervertebral disc stress, and postural dysfunction¹⁰.

The main methods of pharmacological therapy consist of :

- Non-steroidal anti-inflammatory medications (NSAIDs)

- Relaxants for muscles
- Pain relievers
- Opioids for critical situations

Table-1. Major occupational risk factors for back pain

Risk factor	Mechanism
Prolonged sitting	Reduced lumbar lordosis, muscle fatigue
Whole-body vibration (bikers, drivers)	Disc degeneration, micro-trauma
Repetitive bending and lifting	Ligament and muscle strain
Poor ergonomics	Postural imbalance
Sedentary lifestyle	Weak core musculature
Psychological stress	Increased muscle tension

Limitations :

1. Symptomatic relief without addressing root cause.
2. Risk of gastrointestinal, renal, and cardiovascular complications¹¹.
3. Potential dependency with prolonged analgesic use.
4. Lack of improvement in functional mobility and posture.

Because occupational back pain is largely biomechanical and lifestyle-related, non-pharmacological interventions are more appropriate for long-term management.

Yoga as a Non-Medical Treatment Option:

Idea of Yoga :

Yoga is an ancient practice outlined

in classical writings like the Yoga Sutras and Hatha Yoga Pradipika. Its goal is to attain a harmony among the body, mind, and awareness. In terms of therapy, yoga encompasses:

- Āsana (positions)
- Prā āyāma (control of breath)
- Meditation and relaxation

These habits affect the musculo-skeletal, nervous, endocrine, and psychological systems⁹.

Mechanism of Action of Yoga in Back Pain:

Effects on Musculoskeletal System :

- Enhances core and paravertebral muscles.
- Enhances the flexibility of ligaments and tendons.
- Reestablishes spinal alignment.
- Improves flexibility of joints¹².

Effects on the Nervous System :

- Diminishes pain awareness via the release of endorphins.
- Enhances neuromuscular coordination.
- Reduces sympathetic overactivity.

Psychological Impacts :

- Lowers stress, anxiety, and depression levels.
- Enhances adaptability skills.
- Improves the quality of sleep.

Functional Impacts :

- Enhances alignment.
- Enhances stamina.
- Decreases tiredness during work-related tasks

Common Yoga Practices for Occupational Back Pain :

Table-2. Common yoga practices for back pain

Category	Practices	Benefits
Spinal extension	Bhujangasana, Shalabhasana	Strengthens back muscles
Relaxation poses	Makarasana, Shavasana	Reduces muscle tension
Stretching poses	Marjariasana, Pawanmuktasana	Improves flexibility
Core strengthening	Setubandhasana	Enhances spinal stability
Breathing techniques	Anulom Vilom, Bhramari	Reduces stress and muscle tension

Proof from Clinical Trials :

- Multiple randomized controlled trials and systematic reviews have assessed yoga for the treatment of low back pain.

Trials Controlled by Randomization :

- Research conducted by Sherman *et al.* indicated that yoga notably alleviated pain and enhanced functional capability in comparison to standard care¹⁵.
- Tilbrook *et al.* found that yoga classes led to more significant enhancement in back function compared to standard care at 12 months¹⁷.

Comprehensive Assessments :

- A Cochrane review discovered moderate

evidence indicating that yoga enhances pain relief and functional results in chronic low back pain¹⁸.

- A meta-analysis conducted by Cramer *et al.* indicated substantial decreases in both pain intensity and disability scores in individuals practicing yoga⁵.

Professional Research :

- Research conducted with office employees indicated decreased pain levels and enhanced posture following yoga sessions⁷.
- Studies involving drivers and industrial employees showed a decrease in absenteeism and enhanced functional capacity¹⁶.

Comparative effectiveness with other Interventions :

Table-3. Comparison of yoga with other interventions

Intervention	Advantages	Limitations
Pharmacological therapy	Quick pain relief	Side effects, dependency
Physiotherapy	Targeted exercises	Requires equipment/clinic visits
Ergonomic correction	Preventive approach	Does not address stress or flexibility
Yoga	Holistic, low cost, improves strength, flexibility, and mental health	Requires regular practice and supervision

- Studies suggest that yoga is comparable or superior to conventional exercise therapy in reducing chronic low back pain¹³.

Ayurvedic perspective :

- From the Ayurvedic perspective, occupational back pain is similar to *Katishoola*, which is mainly a *Vata*-dominant disorder. The following occupational factors contribute to the aggravation of *Vata* :
 - Excessive or continuous movement
 - Improper or faulty posture
 - Constant exposure to vibration
 - Irregular daily routine and lifestyle
- These factors aggravate *Vata*, resulting in symptoms such as pain, stiffness, and restricted movement in the lower back.¹⁴
- Yoga helps in managing this condition by:
 - Pacifying aggravated *Vata*
 - Improving blood circulation
 - Increasing flexibility of muscles and joints
 - Promoting mental relaxation and calmness
- Thus, yoga follows the principles of *Swasthavritta* and supports a preventive and holistic approach to health.

Critical analysis :

Strengths of Yoga as an Intervention :

- Addresses both physical and psychological aspects of back pain.
- Cost-effective and easily accessible.
- Safe practice with minimal side effects.

- Suitable for long-term management.
- Improves quality of life and work efficiency.

Limitations of existing Research :

- Differences in yoga protocols across various studies.
- Many studies have small sample sizes.
- Lack of long-term follow-up in several trials.
- Limited research focused on specific occupations.
- Difficulty in blinding participants in yoga-based studies.

Research gaps :

- Lack of standardized yoga modules for specific occupational groups.
- Limited evidence on biomechanical changes produced by yoga.
- Minimal integration of Ayurvedic concepts with yoga therapy.
- Very few studies focusing on bikers or vibration-related back pain.

Implications for occupational Health :

- *Yoga can be incorporated into:*
 - Workplace wellness programs
 - Preventive health policies
 - Rehabilitation protocols
 - Daily routines of workers
- *Potential outcomes include :*
 - Reduced absenteeism

- Improved productivity
- Lower healthcare costs
- Better mental well-being among workers.

Occupational back pain is a widespread problem that affects work performance, quality of life, and healthcare costs. Modern work environments often involve prolonged sitting, repetitive movements, and exposure to vibration, which place continuous mechanical stress on the spine. Although pharmacological treatments provide temporary relief, they do not address the underlying biomechanical and lifestyle-related causes of the condition. Yoga offers a holistic and practical solution for occupational back pain. Through the combined practice of āsanas, prā āyāma, and relaxation techniques, it improves muscle strength, spinal flexibility, posture, and stress management. Yoga also helps regulate the nervous system and reduce pain perception, making it effective for both treatment and prevention.

Scientific evidence supports the role of yoga in reducing pain, improving function, and enhancing quality of life among individuals with chronic low back pain. From an Ayurvedic perspective, occupational back pain resembles *Katishoola*, a condition mainly caused by aggravated *Vata*. Yoga helps in pacifying *Vata*, improving circulation, and promoting physical and mental balance.

However, further high-quality studies with standardized, occupation-specific yoga protocols are needed to strengthen the evidence base. Integrating yoga into workplace health

programs and daily routines can provide long-term benefits, reduce dependence on medications, and improve overall well-being among workers.

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