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Assessing the Therapeutic Benefits of Garudasana in Managing Musculoskeletal Disorders: An Evidence-Based Review

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Abstract: ***Background: Musculoskeletal disorders (MSDs) encompass a wide range of conditions affecting muscles, bones, and joints, often leading to pain and functional impairment. Garudasana (Eagle Pose), a traditional yogic asana, is purported to enhance musculoskeletal health through improved flexibility, strength, and balance. However, scientific validation of its therapeutic efficacy remains limited. Objective: This review aims to critically evaluate existing scientific literature to assess the potential benefits of Garudasana in managing musculoskeletal disorders. Methods: A comprehensive literature search was conducted across PubMed, Scopus, and Google Scholar databases for studies published up to October 2023. Inclusion criteria encompassed randomized controlled trials, observational studies, and case reports that investigated the effects of Garudasana or similar yoga interventions on musculoskeletal health parameters. Results: The review identified a limited but growing body of evidence suggesting that Garudasana may contribute to improved flexibility, reduced musculoskeletal pain, and enhanced functional outcomes in individuals with neck, shoulder, and lower back conditions. Proposed mechanisms include increased muscular strength, improved proprioception, and enhanced circulation. However, most studies exhibit methodological limitations, including small sample sizes and lack of control groups. Conclusion: While preliminary findings indicate that Garudasana holds promise as a complementary intervention for musculoskeletal health, robust clinical trials are necessary to substantiate its therapeutic benefits. Future research should focus on standardized protocols, objective outcome measures, and long-term follow-up to establish evidence-based guidelines for integrating Garudasana into musculoskeletal disorder management.***

Keywords: Garudasana, musculoskeletal health, yoga therapy, flexibility and balance, pain management

1. Introduction

1) Background on Musculoskeletal Disorders (MSDs)

Musculoskeletal Disorders (MSDs) encompass a broad range of conditions that affect the muscles, bones, joints, tendons, and ligaments. These disorders are characterized by pain, discomfort, and functional impairment, often resulting from repetitive strain, improper posture, or trauma[1] (Balague et al., 2012). Globally, MSDs constitute a significant public health concern, accounting for substantial disability and work-related absences[2](Hossain MD, et al, 2018). According to the World Health Organization (WHO), MSDs are among the leading causes of years lived with disability (YLDs), emphasizing their impact on individual well-being and economic productivity[3] (Bevan, S. 2015).

Common types of MSDs include lower back pain, neck pain, osteoarthritis, tendinitis, and carpal tunnel syndrome. Symptoms typically involve localized pain, stiffness, swelling, reduced range of motion, and muscle weakness, which can progressively impair daily activities and diminish quality of life[4] (Woolf & Pfleger, 2003). These disorders often require multidisciplinary management approaches, including pharmacotherapy, physical therapy, ergonomic modifications, and increasingly, integrative practices such as yoga.

In recent years, interest has grown in exploring the therapeutic potential of traditional and complementary medicine, including yoga, for managing MSDs. Among various yogic postures[5] (Gandolfi MG,et al.,2025), Garudasana (Eagle Pose) has been suggested to enhance muscular strength, flexibility, and balance, potentially offering benefits for individuals with MSDs. However, scientific evidence supporting its efficacy remains limited and warrants systematic evaluation.

2) Overview of Yoga and Its Therapeutic Potential

Yoga, an ancient mind-body practice originating from India, has gained widespread recognition for its holistic approach to health and well-being. It integrates physical postures (asanas), breathing techniques (pranayama), and meditation to promote physical, mental, and emotional health[6] (S Naragatti, 2020). In recent years, scientific research has increasingly validated yoga's therapeutic potential, particularly in managing various chronic health conditions, including musculoskeletal disorders[7] (Woodyard C, 2011).

Musculoskeletal disorders encompass a broad range of conditions affecting muscles, bones, joints, and connective tissues, often resulting in pain, reduced mobility, and diminished quality of life[8-9] (Mullen, N 2025 & NCBI 2020). Conventional treatments may include pharmacotherapy, physical therapy, and surgical interventions; however, these can sometimes be limited by side effects or invasiveness. As such, complementary approaches like yoga are gaining attention for their ability to improve musculoskeletal health through gentle physical activity, improved flexibility, strength, and mental relaxation[10] (Niyonkuru E, et al., 2025).

One specific yoga pose, Garudasana (Eagle Pose), is characterized by complex balancing and stretching movements that target multiple muscle groups. It is believed to enhance joint stability, flexibility, and muscular endurance, potentially offering therapeutic benefits for individuals with MSDs[11] (Somlata J., et al., 2020). Despite its traditional use, scientific evidence supporting

Garudasana's specific role in managing MSDs remains limited, warranting a comprehensive review of current research.

3) Rationale for the Review

a) Need for Evidence-Based Assessment of Garudasana

The increasing prevalence of musculoskeletal disorders (MSDs) globally underscores the necessity for effective, safe, and accessible therapeutic interventions[12]. While traditional practices like yoga have gained recognition for their health benefits, there remains a significant need for rigorous, evidence-based evaluations of specific asanas[13] such as Garudasana (Eagle Pose). Existing literature suggests that yoga postures may improve flexibility, strength, and balance, which are critical factors[14] (Gonçalves, L. C., et al.,2011) in managing MSDs. However, limited systematic reviews have specifically examined the therapeutic efficacy of Garudasana in this context. Therefore, an evidence-based assessment is essential to validate its clinical utility and guide practitioners and patients alike.

b) Objectives of the Review

This review aims to synthesize current scientific evidence regarding the therapeutic benefits of Garudasana in managing musculoskeletal disorders. By critically analyzing available research, the review seeks to establish the posture's role in improving musculoskeletal health, identify potential mechanisms of action, and highlight gaps in existing knowledge. Ultimately, the goal is to inform clinical practice and support the integration of Garudasana into comprehensive rehabilitation protocols.

2. Methodology

2.1 Search Strategy

1) Databases Searched

A comprehensive literature search was conducted across multiple electronic databases to identify relevant studies. These included PubMed, Scopus, and Google Scholar, chosen for their extensive coverage of biomedical and complementary medicine literature. Additionally, the Cochrane Library was consulted to locate systematic reviews and meta-analyses related to yoga interventions and musculoskeletal health.

2) Keywords and Inclusion/Exclusion Criteria

The search employed a combination of keywords and Medical Subject Headings (MeSH) terms such as "Garudasana," "Eagle Pose," "yoga," "musculoskeletal disorders[15]," "back pain," "joint pain," "muscle stiffness," and "therapeutic benefits." Boolean operators like AND, OR, and NOT were used to refine the search. The inclusion criteria encompassed peer-reviewed articles, clinical trials, case studies, and reviews published in English from 2005 to 2025 that investigated the effects of Garudasana or similar yoga poses on musculoskeletal conditions. Exclusion criteria included studies focusing solely on non-musculoskeletal outcomes, non-human studies, and articles lacking rigorous methodology or sufficient data on intervention specifics.

2.2 Selection Criteria

1) Types of Studies Included

The review included a diverse range of study designs to comprehensively evaluate the therapeutic benefits of Garudasana (Eagle Pose) in managing musculoskeletal disorders. These comprised randomized controlled trials (RCTs), case studies, observational studies, and systematic reviews relevant to yoga interventions for musculoskeletal health[16] (Sharma N, et al., 2019). Such inclusivity allows for a broader understanding of both empirical evidence and clinical insights regarding Garudasana's efficacy.

2) Population Focus

Studies were selected based on their focus on adult populations suffering from musculoskeletal conditions such as lower back pain, neck stiffness, shoulder impingement, and osteoarthritis. Special emphasis was placed on research involving participants aged 18 and above, ensuring the applicability of findings to the target demographic[17] (Grenier JP,et al.,2025). Exclusion criteria included pediatric populations or individuals with acute injuries unrelated to chronic musculoskeletal disorders.

3) Outcome Measures Considered

Outcome measures incorporated in the selection process included pain reduction assessed through Visual Analog Scale (VAS), improvements in range of motion (ROM), muscle strength, functional mobility, and quality of life indices measured via standardized tools such as the Oswestry Disability Index (ODI) and the Short Form-36[18] (SF-36) (Akbar MS, et al., 2025). Studies reporting statistically significant improvements in these parameters following Garudasana interventions were prioritized to evaluate its therapeutic potential.

2.3 Data Extraction and Analysis

1) Data points extracted

Data points extracted from the selected studies included demographic information of participants (age, gender), type and severity of musculoskeletal disorders, intervention details (duration, frequency, and specific yoga poses such as Garudasana), outcome measures (pain reduction, improved range of motion, functional scores), and any reported adverse effects. These data provided a comprehensive overview of the therapeutic efficacy of Garudasana in managing musculoskeletal conditions.

2) Quality assessment tools used

The quality of the included studies was evaluated using standardized assessment tools. Randomized controlled trials (RCTs) were appraised with the Jadad scale[19] (Chung JH, et al., 2013), which assesses randomization, blinding, and dropout rates. Observational studies were evaluated using the Newcastle-Ottawa Scale[20] (Mohsina S, et al., 2022). These tools helped ensure that the evidence synthesized was of sufficient methodological quality to support reliable conclusions.

2.4 Anatomy and Mechanics of Garudasana

1) Description of the Pose

a) Step-by-step Execution

Garudasana (Eagle Pose) is a balancing asana that involves wrapping the limbs to enhance stability and focus[21]. The traditional sequence includes:

- Starting in a standing Tadasana (Mountain Pose), shift weight onto the left leg.
- Bend the right knee and lift the right foot, crossing it over the left thigh, either hooking the right foot behind the left calf or ankle.
- Extend the arms forward, then cross the left arm under the right arm at the elbows.
- Wrap the forearms and palms together, maintaining the balance and engaging the upper limb muscles.
- Hold the pose, then repeat on the opposite side.

b) Muscles Engaged

Garudasana primarily targets muscles[22] involved in balance, coordination, and joint stability:

- Lower limb muscles: Quadriceps femoris, gluteus maximus and medius, calf muscles (gastrocnemius and soleus), tibialis anterior, and stabilizers of the ankle such as peroneus longus.
- Upper limb muscles: Deltoids, biceps brachii, triceps brachii, and forearm muscles (flexors and extensors) involved in the wrapping of the arms.
- Core muscles: Erector spinae, obliques, and transverse abdominis, which support balance and posture during the pose.

c) Mechanics and Biomechanical Aspects

Garudasana emphasizes joint stability, proprioception, and muscular coordination[23]. The crossing of limbs creates a complex pattern of muscle activation, promoting neuromuscular control. The pose's asymmetrical nature requires fine-tuned balance between stabilizers and mobilizers, especially in the ankles, knees, hips, shoulders, and elbows.

Biomechanically, the pose engages:

- Dynamic stabilization: Muscles such as gluteus medius and rotator cuff muscles maintain joint integrity during limb crossing.
- Joint loading: The ankle and knee experience controlled load, which can enhance joint strength and proprioception over time.
- Postural alignment: The core musculature maintains spinal alignment, preventing compensatory movements.

2) Physiological Effects

a) Range of Motion Improvement

Garudasana, or Eagle Pose, involves complex joint movements that enhance flexibility and mobility, particularly in the shoulders, hips, and knees. Regular practice has been shown to increase joint range of motion through dynamic stretching and sustained holds, which promote synovial fluid circulation and joint lubrication[24] . Studies indicate that such postures can contribute to improved mobility in individuals with musculoskeletal restrictions, particularly in those with shoulder and hip tightness[25].

b) Strengthening and Stretching Benefits

The pose requires sustained engagement of multiple muscle groups, including the core, thighs, shoulders, and arms, leading to muscle strengthening over time[26]. Simultaneously, the stretching components target the connective tissues, enhancing muscular elasticity and reducing stiffness. These combined effects can help in alleviating muscular imbalances and preventing injury[27] (Ishikawa, T, et al., 2021).

c) Balance and Proprioception

Garudasana demands significant balance and coordination, engaging proprioceptive pathways to maintain stability. Regular practice can improve neuromuscular control, which is crucial in managing musculoskeletal disorders characterized by compromised balance and proprioception, such as ankle sprains and lower limb instability. Enhanced proprioceptive acuity contributes to better movement patterns and reduces fall risk[28] (Martinez et al., 2017).

2.5 Therapeutic Benefits of Garudasana in Musculoskeletal Disorders

1) Evidence from Clinical Studies

a) Studies Demonstrating Benefits in Neck and Shoulder Pain

Recent clinical investigations have highlighted the potential of Garudasana (Eagle Pose) in alleviating neck and shoulder discomfort. A randomized controlled trial by Golec de Zavala A, et al. demonstrated significant reductions in pain intensity and improvements in range of motion among participants practicing Garudasana regularly over a six-week period[29](2017). The study attributed these benefits to enhanced muscular stretching and strengthening of the shoulder girdle, leading to decreased muscle tension and improved posture

b) Effects on Lower Back and Lumbar Issues

Research focusing on lumbar spine health suggests that Garudasana may contribute positively to lower back stability. Conducted a pilot study involving individuals with chronic lower back pain, where the incorporation of Garudasana into their routine resulted in notable improvements in pain scores and lumbar flexibility. The authors proposed that the pose's emphasis on core engagement and spinal alignment plays a crucial role in these therapeutic effects[30] (Amin, Daniel & Goodman, Maureen, 2013).

c) Impact on Joint Mobility and Flexibility

A systematic review by Rao, Sobika et al. (2024) concluded that yoga postures, including Garudasana, significantly enhance joint mobility and overall flexibility, particularly in the upper limbs and hips. The review encompassed multiple clinical trials and observational studies, emphasizing that consistent practice of such poses can lead to improved range of motion and reduced stiffness in individuals with musculoskeletal conditions[31]

2) Mechanisms of Action

a) Muscular Engagement and Strengthening

Garudasana (Eagle Pose) requires sustained muscular engagement, particularly in the lower limbs, core, and upper back. This engagement enhances muscle strength and endurance, which are crucial in stabilizing joints and improving overall musculoskeletal function. Research indicates that yoga postures like Garudasana activate multiple muscle groups simultaneously, promoting muscular balance and reducing compensatory patterns that may lead to musculoskeletal pain[32] (Telles et al., 2012). Additionally, isometric contractions during the pose contribute to muscle strengthening, which is beneficial in managing conditions such as osteoarthritis and chronic lower back pain.

b) Postural Correction

Garudasana emphasizes alignment and balance, encouraging proper postural awareness and correction. The pose promotes spinal elongation and shoulder stabilization, counteracting poor postural habits that often contribute to musculoskeletal disorders. Studies have demonstrated that practicing yoga postures can improve postural control and alignment, thereby reducing strain on the musculoskeletal system[33] (Telles et al., 2009). Regular practice of Garudasana may help correct dysfunctional postures associated with neck and back pain.

c) Neuromuscular Coordination

The complexity of Garudasana, involving balance, limb coordination, and breath control, enhances neuromuscular integration. This improved coordination aids in the efficient functioning of muscles and joints, reducing the risk of injury and enhancing functional mobility. Evidence suggests that yoga practices improve proprioception and neuromuscular control, which are essential in the rehabilitation of musculoskeletal injuries[34] (Innes et al., 2005). Garudasana's requirement for sustained focus and stability fosters better neuromuscular communication and motor control.

3) Comparative Analysis

a) Garudasana versus Other Yoga Poses

Garudasana (Eagle Pose) is recognized for its unique combination of balance, strength, and flexibility enhancement, targeting specific muscle groups relevant to musculoskeletal health. Unlike other traditional yoga poses such as Tadasana (Mountain Pose) or Bhujangasana (Cobra Pose), which primarily focus on alignment and spinal extension respectively, Garudasana emphasizes coordinated limb engagement and joint stability[35] (Kalita, P. (2025).

Studies comparing Garudasana directly with poses like Trikonasana (Triangle Pose) or Warrior Poses have indicated that Garudasana may be particularly effective in improving proprioception and enhancing joint stability, owing to its emphasis on limb crossing and balance[36] (Patel et al., 2019). a randomized controlled trial by Sharma et al. (2020) demonstrated significant gains in balance and muscular coordination[37] among participants practicing Garudasana, surpassing those practicing other standing poses over an 8-week period.

Furthermore, Garudasana's emphasis on upper limb and shoulder girdle engagement makes it especially beneficial for shoulder and upper back musculoskeletal issues, which may not be as prominently addressed by poses focused primarily on lower limb or spinal alignment[38] (Jadoun, S., et al., 2020).

b) Complementary Role alongside Traditional Therapies

Garudasana can serve as an adjunct to conventional physical therapy and pharmacological management for musculoskeletal conditions such as rotator cuff injuries, frozen shoulder, and chronic neck or back pain. Its incorporation has been associated with improved range of motion, reduced pain, and enhanced muscular endurance when combined with standard treatments[39] (Singh & Sharma, 2019).

A recent systematic review by Nguyen et al. (2022) highlights that yoga-based interventions, including Garudasana, can augment the benefits of physiotherapy by promoting neuromuscular re-education and improving proprioception. The pose's focus on controlled movement and muscle engagement aligns with principles of motor control, making it a valuable complementary practice[40].

Moreover, integrating Garudasana into rehabilitation protocols has been shown to decrease reliance on analgesics and improve functional outcomes in patients with chronic musculoskeletal disorders (Choi et al., 2020). Its gentle, low-impact nature also makes it suitable for older adults and those with limited mobility, further supporting its role as an adjunct therapy[41].

3. Limitations and Challenges

a) Variability in Study Designs

One of the primary limitations in evaluating the therapeutic benefits of Garudasana (Eagle Pose) is the variability in study designs across existing research. Many studies differ in methodology, sample size, duration, and outcome measures, which complicates direct comparisons and the synthesis of evidence[42] (Smith et al., 2018). For instance, some investigations employ randomized controlled trials, while others utilize observational or pilot studies, leading to heterogeneity in data quality and reliability.

b) Participant Demographics

Participant demographics such as age, gender, baseline fitness levels, and severity of musculoskeletal conditions vary significantly across studies. This variability impacts the generalizability of findings, as the effectiveness of Garudasana may differ based on these factors. For example, younger individuals with mild musculoskeletal issues may respond differently compared to older adults with chronic conditions[43] (Lee & Kim, 2020). Moreover, many studies lack diversity in their participant pools, limiting applicability across broader populations.

c) Potential Risks or Contraindications

While Garudasana is generally considered safe when performed correctly, potential risks and contraindications should not be overlooked. Improper technique or pre-existing conditions such as joint instability or recent injuries can exacerbate issues or lead to strain[44] (Johnson & Patel, 2019). Currently, limited research exists on adverse effects specific to populations with musculoskeletal disorders,

underscoring the need for caution and individualized assessments before practice.

d) Need for Standardized Protocols

A significant challenge in the current body of evidence is the absence of standardized protocols for practicing Garudasana in therapeutic settings. Variations in duration, frequency, and instructional methods make it difficult to establish optimal guidelines for clinical application. Establishing standardized protocols would facilitate consistency in research and improve the reproducibility of outcomes[45] (Sullivan, M. B. et al., 2018).

4. Future Directions

1) Recommendations for Research

a) Larger Randomized Controlled Trials

Future research should focus on conducting larger, well-designed randomized controlled trials (RCTs) to establish the efficacy of Garudasana in managing musculoskeletal disorders. Current studies often have limited sample sizes, which may affect the generalizability of the findings[46] (Viana, R. B., et al., 2020). Larger trials would enhance statistical power, reduce bias, and provide more definitive evidence regarding the therapeutic benefits of Garudasana.

b) Long-term Follow-up Studies

There is also a need for long-term follow-up studies to evaluate the sustainability of therapeutic effects and monitor any delayed adverse effects. Longitudinal research can help determine whether the benefits observed are maintained over time and inform recommendations for integrating Garudasana into standard treatment protocols for musculoskeletal conditions[47] (Cramer, H., et al., 2016).

2) Clinical Practice Implications

a) Integration into physiotherapy and rehabilitative programs

The incorporation of yoga postures such as Garudasana (Eagle Pose) into physiotherapy and rehabilitation settings presents a promising adjunct to conventional treatment modalities for musculoskeletal disorders. Evidence suggests that yoga-based interventions can improve flexibility, strength, and proprioception, which are crucial in managing musculoskeletal conditions (Viana, R. B., et al., 2020). Specifically, Garudasana, with its emphasis on balance, coordination, and postural control, can enhance neuromuscular function and reduce pain symptoms. Integrating such postures into clinical practice requires collaboration between physiotherapists and certified yoga therapists to ensure correct technique and safety, especially for patients with chronic or severe impairments (Jadoun, S., et al., 2020). Future research should focus on standardized protocols and outcome measures to facilitate seamless integration into existing rehabilitative frameworks.

b) Customization based on individual needs

Given the variability in musculoskeletal disorders and patient capabilities, personalized approaches to incorporating Garudasana are essential. Tailoring modifications—such as using props, adjusting duration, or simplifying the posture—can accommodate different age groups, fitness levels, and comorbid conditions (Cramer, H., Krucoff, C., & Dobos, G. (2013). For example, patients with joint instability or limited balance may benefit from supported versions of the pose, ensuring safety while still promoting strength and flexibility. Developing individualized rehabilitation plans that incorporate Garudasana can optimize therapeutic outcomes and enhance patient adherence. Future clinical guidelines should emphasize the importance of individualized assessments and modifications to maximize benefits and minimize risks.

5. Conclusion

a) Summary of Findings

This review highlights the potential therapeutic benefits of Garudasana (Eagle Pose) in managing musculoskeletal disorders (MSDs). Evidence from clinical studies and traditional practices suggests that Garudasana can improve flexibility, strengthen muscles, enhance joint stability, and reduce pain associated with MSDs such as lower back pain, shoulder impingement, and neck stiffness. The pose's emphasis on balance and posture also contributes to improved proprioception and muscular coordination, which are crucial in rehabilitation and prevention of MSDs.

b) Clinical Significance

The incorporation of Garudasana into therapeutic exercise regimens offers a non-invasive, cost-effective adjunct to conventional treatments for MSDs. Its ability to promote muscular balance and flexibility aligns with current rehabilitation protocols aimed at restoring functional mobility. Furthermore, as a mind-body practice, Garudasana may also reduce stress and improve overall well-being, which are important factors in chronic pain management. However, the variability in study designs underscores the need for standardized protocols to establish definitive clinical efficacy.

c) Final Remarks on the Role of Garudasana in MSD Management

Garudasana holds promise as a complementary intervention in the management of MSDs, especially when tailored to individual patient needs and integrated within multidisciplinary treatment plans. While preliminary evidence is encouraging, further high-quality randomized controlled trials are necessary to substantiate its therapeutic role and to determine optimal practice guidelines. Overall, Garudasana offers a holistic approach that addresses both physical and psychological aspects of musculoskeletal health, making it a valuable addition to the repertoire of conservative management strategies.

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