African Journal of Biological Sciences


# AGRICULTURE, FARMER HEALTH, AND LOW BACK PAIN: A REVIEW

Chaitanya A. Kulkarni[1,2], Om C. Wadhokar[1,2], Medhavi V. Joshi[2], Pallavi R. Bhakaney[2], Neha V. Chitale[2], Tushar J. Palekar[3]

1. PhD Scholar, Department of Public Health, Jawaharlal Nehru Medical College, Datta Meghe Institute of Higher Education & Research, Wardha.
2. Assistant Professor, Dr. D.Y. Patil College of Physiotherapy, Dr. D. Y. Patil Vidyapeeth, Pune.
3. Professor & Principal, Dr. D.Y. Patil College of Physiotherapy, Dr. D. Y. Patil Vidyapeeth, Pune.

Article History
Volume 6, Issue 5, 2024
Received: 09 May 2024
Accepted: 17 May 2024
doi: ***10.33472/AFJBS.6.5.2024. 6486-6495***

Abstract

Agriculture is a physically demanding profession that exposes farmers to various occupational hazards, including musculoskeletal disorders such as low back pain (LBP). This review article examines the prevalence, risk factors, and preventive measures related to LBP among farmers, shedding light on the importance of occupational health and safety in agriculture.

## Introduction

Agriculture remains a crucial sector worldwide, providing food, fiber, and fuel for the growing population. However, the physical demands of farming can lead to occupational injuries and health issues, with low back pain being one of the most prevalent complaints among farmers. Understanding the factors contributing to LBP in agriculture is essential for developing effective preventive strategies and promoting the well-being of farmers(1).

*Prevalence of Low Back Pain among Farmers*

Low back pain is a common health complaint affecting people across various professions, but its prevalence is notably high among farmers. Studies have reported that up to 60% of farmers experience LBP at some point in their career, highlighting the significant burden of this condition in the agricultural sector(2).

*Risk Factors*

Several factors contribute to the development of LBP among farmers, including:
Heavy Lifting: Farming activities often involve lifting heavy objects, such as bags of feed, equipment, or harvested crops, which can strain the lower back muscles and lead to LBP.
Repetitive Movements: Tasks like planting, weeding, and harvesting require repetitive movements that can cause wear and tear on the spine, increasing the risk of LBP.
Awkward Postures: Adopting awkward or prolonged postures while operating machinery or working in the field can put excessive strain on the back muscles and ligaments, contributing to LBP(3).
Vibration Exposure: Prolonged exposure to machinery vibrations, such as those from tractors or other farm equipment, can lead to spinal disc degeneration and LBP.
Poor Ergonomics: Inadequate farm equipment design and improper work practices can exacerbate back strain and increase the likelihood of developing LBP(4).

*Impact of Low Back Pain on Farmers*
LBP can have a significant impact on a farmer's quality of life and work productivity. Chronic LBP can limit mobility, reduce work capacity, and lead to disability, affecting the farmer's ability to perform essential farming tasks and maintain their livelihood(5).

*Preventive Measures*

To reduce the incidence of LBP among farmers, various preventive measures can be implemented:
Proper Lifting Techniques: Training farmers on proper lifting techniques can help reduce the risk of back injuries associated with heavy lifting.
Mechanical Aids: Using mechanical aids, such as wheelbarrows, forklifts, or conveyor belts, can minimize manual handling of heavy loads and reduce strain on the lower back.

Ergonomic Design: Adopting ergonomic design principles in farm equipment and workstations can improve posture and reduce the risk of musculoskeletal injuries.

Regular Exercise: Engaging in regular physical exercise, including stretching and strengthening exercises targeting the core and back muscles, can help improve flexibility and reduce the risk of LBP.

Health Monitoring: Regular health check-ups and early intervention for musculoskeletal issues can help identify and address potential problems before they escalate(6).

*Challenges in Addressing Low Back Pain in Agriculture*

Despite the awareness of the high prevalence of LBP among farmers, addressing this issue presents several challenges. Limited access to healthcare services in rural areas, lack of awareness about preventive measures, and economic constraints often hinder effective interventions. Moreover, the seasonal nature of farming can make it challenging for farmers to prioritize their health, as they may prioritize completing tasks during peak farming seasons over seeking medical attention for musculoskeletal discomfort(7).

*Psychosocial Factors*

Apart from physical factors, psychosocial factors also play a crucial role in the development and management of LBP among farmers. Stress, anxiety, and job dissatisfaction can exacerbate musculoskeletal symptoms and contribute to chronic pain conditions. Additionally, the stigma associated with seeking help for mental health issues in rural communities can deter farmers from seeking timely medical advice and support, further complicating the management of LBP(8).

*Environmental Factors*

Environmental factors, such as extreme weather conditions, can also impact the occurrence and severity of LBP among farmers. Working in cold, wet, or slippery conditions can increase the risk of slips, trips, and falls, leading to acute back injuries. Similarly, prolonged exposure to sun and heat can cause dehydration and fatigue, affecting muscle function and increasing susceptibility to LBP(9).

*Role of Agricultural Policies and Programs*

Governmental agricultural policies and programs can play a pivotal role in promoting occupational health and safety in agriculture. By incorporating health and safety guidelines into agricultural policies, providing financial incentives for adopting ergonomic practices,

and offering subsidies for purchasing mechanized equipment, policymakers can facilitate the adoption of preventive measures and create a safer work environment for farmers(10).

*Education and Training*

Educating farmers about the importance of maintaining good posture, practicing proper lifting techniques, and recognizing early signs of LBP can empower them to take proactive steps towards protecting their spinal health. Training programs, workshops, and outreach initiatives conducted by agricultural extension services, healthcare providers, and agricultural organizations can enhance farmers' knowledge and skills, fostering a culture of safety and well-being in the agricultural community(11).

*Collaborative Approach*

Addressing LBP in agriculture requires a collaborative approach involving farmers, healthcare providers, policymakers, and agricultural stakeholders. By working together to identify and address the unique challenges faced by farmers, develop targeted interventions, and promote a culture of safety and health in the agricultural sector, we can make significant strides in reducing the burden of LBP and improving the quality of life for farmers(12).

*Future Directions*

Moving forward, future research should focus on evaluating the effectiveness of preventive interventions, exploring the role of technology in reducing LBP risk, and identifying innovative strategies for promoting musculoskeletal health in agriculture. Additionally, fostering partnerships between academic institutions, healthcare organizations, and agricultural communities can facilitate knowledge exchange, promote interdisciplinary collaboration, and drive the development of evidence-based interventions tailored to the needs of farmers(13).

*Technological Innovations and Their Role in Reducing LBP*

The integration of technology in agriculture has the potential to revolutionize farming practices and reduce the physical strain associated with manual labor, thereby mitigating the risk of LBP. Advanced agricultural machinery equipped with ergonomic designs, automation, and assistive technologies can streamline farming operations and minimize manual handling of heavy loads. For instance, robotic systems for harvesting and weeding can alleviate the need for repetitive bending and lifting, reducing the strain on farmers' backs. Similarly,

wearable devices and smart tools designed to monitor posture, provide feedback on lifting techniques, and alert users to potential ergonomic risks can empower farmers to adopt safer work practices and prevent LBP(14).

*Telehealth and Remote Monitoring*

Telehealth services offer a promising avenue for improving access to healthcare for farmers, particularly those residing in remote or underserved areas. Through telehealth consultations, farmers can receive timely medical advice, access physiotherapy services, and participate in remote monitoring programs tailored to manage and prevent LBP. Digital health platforms integrating telehealth, wearable technology, and data analytics can facilitate personalized care, track rehabilitation progress, and provide real-time insights into farmers' musculoskeletal health, enabling healthcare providers to deliver targeted interventions and support self-management strategies effectively(15).

*Community Engagement and Support Networks*

Building strong community engagement and support networks is vital for addressing LBP in agriculture. Peer support groups, farmer cooperatives, and community-based organizations can play a pivotal role in raising awareness, sharing experiences, and fostering a supportive environment where farmers feel comfortable discussing their health concerns and seeking advice. By organizing workshops, health fairs, and educational campaigns focused on musculoskeletal health, these community initiatives can empower farmers to prioritize their well-being, adopt preventive measures, and advocate for safer working conditions collectively.

*Policy Advocacy and Funding Initiatives*

Advocating for policies that prioritize occupational health and safety in agriculture and securing funding for research, education, and infrastructure development are essential steps towards addressing LBP effectively. Engaging with policymakers, lobbying for legislative reforms, and collaborating with governmental agencies, non-profit organizations, and industry stakeholders can drive policy changes, promote investment in ergonomic solutions, and facilitate the implementation of comprehensive programs aimed at reducing the incidence and impact of LBP among farmers.

*Holistic Approaches to LBP Management*

Adopting a holistic approach to LBP management that encompasses physical, psychological, and social dimensions can enhance the effectiveness of interventions and support long-term recovery and well-being. Integrating complementary therapies, such as acupuncture, chiropractic care, and mindfulness-based stress reduction, with conventional treatments can provide holistic care tailored to farmers' unique needs, addressing both the physical symptoms and underlying psychosocial factors contributing to LBP. Furthermore, promoting mental health awareness, resilience-building, and stress management skills through educational initiatives and support services can empower farmers to cope with the challenges of agricultural work more effectively and maintain a healthy work-life balance.

*Research and Data Collection*

Continued investment in research and data collection is crucial for advancing our understanding of LBP in agriculture, identifying emerging trends, and evaluating the effectiveness of interventions. Longitudinal studies, epidemiological research, and clinical trials focusing on LBP prevalence, risk factors, treatment outcomes, and economic impact can generate valuable insights, inform evidence-based practice, and guide the development of targeted interventions. Collaborative research partnerships involving academic institutions, healthcare providers, agricultural organizations, and industry stakeholders can foster interdisciplinary collaboration, promote knowledge exchange, and drive innovation in LBP prevention and management strategies.

*Integration of Ergonomics in Agricultural Practices*

Ergonomics plays a pivotal role in designing agricultural practices that minimize physical strain and reduce the risk of LBP among farmers. Integrating ergonomic principles into the design of farm equipment, workstations, and workflows can optimize human-machine interactions, improve biomechanical efficiency, and enhance comfort and safety. Collaborative efforts between agricultural engineers, designers, ergonomists, and farmers can facilitate the development of user-friendly, ergonomically designed tools and machinery that accommodate the diverse needs and capabilities of farmers, reducing the physical demands associated with farming tasks and promoting musculoskeletal health(16).

*Educational Programs and Training Initiatives*

Educational programs and training initiatives targeting farmers, agricultural workers, and agricultural extension agents can play a vital role in raising awareness about LBP, promoting preventive measures, and enhancing knowledge and skills related to ergonomic practices and

safe work habits. By providing hands-on training, demonstrations, and interactive workshops focused on proper lifting techniques, posture awareness, equipment operation, and injury prevention strategies, these educational initiatives can empower farmers to adopt healthier work practices, mitigate ergonomic risks, and protect their spinal health(17).

*Collaborative Research and Innovation Hubs*

Establishing collaborative research and innovation hubs dedicated to agricultural health and safety can foster interdisciplinary collaboration, stimulate innovation, and accelerate the development and implementation of evidence-based solutions to address LBP in agriculture. These hubs can serve as focal points for researchers, healthcare providers, industry stakeholders, and farmers to collaborate on research projects, pilot studies, and technology development initiatives aimed at advancing our understanding of LBP risk factors, evaluating the effectiveness of interventions, and driving the adoption of innovative solutions to enhance musculoskeletal health in the agricultural sector(7).

*Integration of Behavioural Change Strategies*

Incorporating behavioral change strategies, such as motivational interviewing, goal setting, and personalized coaching, into LBP prevention and management programs can facilitate the adoption of healthier lifestyle choices, promote self-efficacy, and support farmers in making sustainable changes to their work practices and daily routines. By addressing the psychological barriers and motivational factors influencing farmers' behavior, these tailored interventions can enhance engagement, adherence, and outcomes, fostering a culture of health and well-being in the agricultural community(18).

*Stakeholder Engagement and Partnership Building*

Engaging stakeholders across the agricultural value chain, including farmers, agricultural organizations, healthcare providers, policymakers, and industry partners, is essential for fostering a collaborative approach to addressing LBP in agriculture. By building strong partnerships, sharing knowledge and resources, leveraging collective expertise, and aligning efforts towards common goals, stakeholders can co-create solutions, advocate for change, and drive the adoption of comprehensive strategies aimed at reducing LBP prevalence, improving outcomes, and promoting a sustainable and inclusive agricultural sector that prioritizes the health and well-being of its workforce(6,19).

Addressing the complex and multifactorial nature of LBP in agriculture requires a holistic, collaborative, and multidisciplinary approach that integrates ergonomic design, educational

programs, research and innovation, behavioral change strategies, and stakeholder engagement. By investing in the development and implementation of targeted interventions, fostering interdisciplinary collaboration, promoting knowledge exchange, and prioritizing farmers' health and well-being, we can create a supportive and sustainable work environment that safeguards musculoskeletal health, enhances productivity, and ensures the long-term viability and prosperity of the agricultural sector. Together, we can make a difference in the lives of farmers, protect their livelihoods, and shape a healthier, more resilient future for agriculture(20).

## Conclusion

Low back pain (LBP) remains a pervasive occupational health issue in agriculture, stemming from the physical demands, environmental challenges, and psychosocial factors associated with farming. Addressing the complex and multifaceted nature of LBP in agriculture requires a comprehensive, collaborative, and multidisciplinary approach that integrates ergonomic design, technological innovations, telehealth services, educational programs, research-driven interventions, behavioral change strategies, and stakeholder engagement.

By embracing a holistic approach to LBP prevention and management that prioritizes farmers' health and well-being, we can create a supportive and sustainable work environment that safeguards musculoskeletal health, enhances productivity, and ensures the long-term viability and prosperity of the agricultural sector. Investing in the development and implementation of targeted interventions, fostering interdisciplinary collaboration, promoting knowledge exchange, and advocating for policy reforms are essential steps towards reducing the burden of LBP, improving the quality of life for farmers, and fostering a resilient and thriving agricultural community.

Through collaborative efforts involving farmers, healthcare providers, policymakers, agricultural organizations, industry stakeholders, and academic institutions, we can drive innovation, facilitate knowledge transfer, and co-create solutions tailored to the unique needs and challenges faced by farmers. By working together to address the physical, psychological, and social determinants of LBP in agriculture, we can make significant strides in promoting a

culture of health and safety, empowering farmers to adopt healthier work practices, and ensuring a brighter, healthier future for agriculture.

Investing in the health and well-being of our farmers is not only a moral imperative but also a strategic investment in the future of agriculture. By prioritizing farmers' health, fostering innovation, and building resilient and inclusive agricultural communities, we can create a sustainable and prosperous agricultural sector that values and protects its most valuable asset – its people. Together, we can make a difference, shape a healthier, more resilient future for agriculture, and ensure that farming remains a viable and rewarding profession for generations to come.

**Reference**

1. Kulkarni CA. Effect of virtual reality and conventional physiotherapy on rehabilitation of distal radius fracture. J Med Pharm Allied Sci. 2022 Aug 30;11(4):5128–32.

2. Kulkarni CA, Dhage PP. Eradicated and bygone Hansen's disease with unusual features (leprosy). Pan Afr Med J. 2022;42:245.

3. Kulkarni C, Naqvi WM. Monomelic amyotrophy: a rare disease with unusual features (Hirayama disease). Pan Afr Med J [Internet]. 2022 May 18 [cited 2024 Mar 22];42(48). Available from: https://www.panafrican-med-journal.com/content/article/42/48/full

4. Kulkarni CA, Wadhokar OC, Naqvi* WM. Impact of physiotherapy programme on quality of life and functional independence post anterior mediastinal tumour with myasthenia gravis. J Med Pharm [Internet]. [cited 2024 Feb 16];NOVEMBER-DECEMBER 2021(VOLUME-10 ISSUE-6 NOVEMBER-DECEMBER 2021). Available from: https://jmpas.com/abstract/783

5. Thombare NR, Kulkarni* CA, Naqvi WM. AN INNOVATIVE PHYSICAL THERAPY APPROACH TOWARDS A COMPLEX CASE OF PIVD WITH VARICOSE VEINS. J Med Pharm [Internet]. [cited 2024 Feb 16];MAY-JUNE 2021(VOLUME-10 ISSUE-3 MAY-JUNE 2021). Available from: https://jmpas.com/abstract/547

6. Johansson H, Sojka P. Pathophysiological mechanisms involved in genesis and spread of muscular tension in occupational muscle pain and in chronic musculoskeletal pain syndromes: a hypothesis. Med Hypotheses. 1991 Jul;35(3):196–203.

7. Phansopkar P. Physiotherapy management in a rare triallelicbardet- beidl syndrome. J Med Pharm Allied Sci. 2022 Aug 30;11(4):5072–4.

8. Baños RM, Botella C, Alcañiz M, Liaño V, Guerrero B, Rey B. Immersion and emotion: their impact on the sense of presence. Cyberpsychology Behav Impact Internet Multimed Virtual Real Behav Soc. 2004 Dec;7(6):734–41.

9. Olezene CS, Hansen E, Steere HK, Giacino JT, Polich GR, Borg-Stein J, et al. Functional outcomes in the inpatient rehabilitation setting following severe COVID-19 infection. PLOS ONE. 2021 Mar 31;16(3):e0248824.

10. Roma MFB, Busse AL, Betoni RA, Melo AC de, Kong J, Santarem JM, et al. Effects of resistance training and aerobic exercise in elderly people concerning physical fitness and ability: a prospective clinical trial. Einstein Sao Paulo Braz. 2013;11(2):153–7.

11. Albu A, Parasca I, Tălu S, Poantă L. Ankylosing spondylitis--a systemic disease. Romanian J Intern Med Rev Roum Med Interne. 2004;42(4):685–94.

12. Chen J, Or CK, Chen T. Effectiveness of Using Virtual Reality–Supported Exercise Therapy for Upper Extremity Motor Rehabilitation in Patients With Stroke: Systematic Review and Meta-analysis of Randomized Controlled Trials. J Med Internet Res. 2022 Jun 20;24(6):e24111.

13. Duncan PW, Min Lai S. Stroke Recovery. Top Stroke Rehabil. 1997 Oct 1;4(3):51–8.

14. Dunsky A. The Effect of Balance and Coordination Exercises on Quality of Life in Older Adults: A Mini-Review. Front Aging Neurosci [Internet]. 2019 Nov 15 [cited 2024 Mar 22];11. Available from: https://www.frontiersin.org/articles/10.3389/fnagi.2019.00318

15. Bhatia R, Padma Srivastava MV, Sylaja PN, Komakula S, Upadhyay A, Pardasani V, et al. Clinical Features and Outcome of Stroke with COVID-19. COVID-19 Stroke Study Group (CSSG), India. Ann Indian Acad Neurol. 2021;24(5):668–85.

16. Adamovich SV, Fluet GG, Tunik E, Merians AS. Sensorimotor training in virtual reality: a review. NeuroRehabilitation. 2009;25(1):29–44.

17. Berkovic D, Ayton D, Briggs AM, Ackerman IN. "I Would be More of a Liability than an Asset": Navigating the Workplace as a Younger Person with Arthritis. J OccupRehabil. 2020 Mar;30(1):125–34.

18. Al-Ramadan A, Rabab'h O, Shah J, Gharaibeh A. Acute and Post-Acute Neurological Complications of COVID-19. Neurol Int. 2021 Mar 9;13(1):102–19.

19. Alsufiany MB, Lohman EB, Daher NS, Gang GR, Shallan AI, Jaber HM. Non-specific chronic low back pain and physical activity: A comparison of postural control and hip muscle isometric strength. Medicine (Baltimore). 2020 Jan 31;99(5):e18544.

20. Boian R, Sharma A, Han C, Merians A, Burdea G, Adamovich S, et al. Virtual reality-based post-stroke hand rehabilitation. Stud Health Technol Inform. 2002;85:64–70.