HTechJ Health and Technology Journal (HTechJ)

Volume 03 Number 04
August 2025
p-ISSN: 2986-5662
e-ISSN: 2985-959X

Spinal Manipulation Therapy for Reducing the Incidence of Low Back Pain among Workers in the Agro-industrial Sector

Femas Agusta Regi Darmawan[1], Akhmad Ramdhani[1], Handhias Pramudya Sukma[1], Enggal Hadi Kurniyawan[1], Kholid Rosyidi Muhammad Nur[1], Alfid Tri Afandi[1], Dicky Endrian Kurniawan[1]

[1] Faculty of Nursing, Universitas Jember, Indonesia

Correspondence should be addressed to:
Enggal Hadi Kurniyawan
enggalhadi.psik@unej.ac.id

Abstract:
Workers in the agro-industrial sector, such as farmers, are very vulnerable to Low Back Pain, because several risk factors cause low back pain in farmers, such as their working position not being in an ergonomic position and being in an extended position at a particular time without any movement or shift in position. Low Back Pain can be very dangerous if not treated immediately, as it can cause adverse effects for the sufferer. One of the methods that can be used in overcoming Low Back Pain in farmers is Spinal Manipulation therapy. This therapy focuses on improving the spine's position and restoring its function to what it was before. This study aimed to determine whether Spinal Manipulation Therapy can reduce the incidence of LBP in farmers in the Agroindustry area. The method used was a literature review using journals as reference sources accessed from Google Scholar, PubMed, and ScienceDirect with keywords "Spinal Manipulation Therapy" AND "Low Back Pain" AND "Agroindustrial Sector". The results indicate that providing Spinal Manipulation therapy to farmers suffering from LBP is effective because the therapy can improve posture, reduce back pain, and improve physical mobility. Therefore, Spinal Manipulative Therapy is one of the most effective therapies for treating low back pain in farmers because it can improve their quality of life.

Article info:
Submitted:
02-02-2025
Revised:
20-03-2025
Accepted:
09-04-2025

Keywords:
spinal manipulation, farmer, low back pain

DOI: https://doi.org/10.53713/htechj.v3i4.328

INTRODUCTION

As an agrarian nation with extensive agricultural land, Indonesia relies heavily on its farming communities to sustain food security and economic stability. Over 40% of the national workforce engages in agriculture, with the agro-industrial sector serving as a cornerstone for rural livelihoods (Duffy et al., 2021). However, the physically demanding nature of farming activities, such as repetitive bending, lifting heavy loads, prolonged sitting or standing, and improper posture, exposes workers to significant occupational hazards. These risks are compounded by limited awareness of ergonomic practices, inadequate access to healthcare, and the absence of preventive measures in rural settings. Consequently, musculoskeletal disorders (MSDs), particularly low back pain (LBP), have emerged as a critical public health concern among agricultural workers, undermining both individual well-being and sectoral productivity (Barneo-Alcántara et al., 2021).

LBP is a pervasive musculoskeletal condition characterized by pain localized between the lower rib margins and the gluteal folds, often resulting from mechanical stress or postural strain (Ferdinandov et al., 2024). Farmers experience chronic LBP, primarily due to repetitive manual labor and sustained awkward postures. The condition diminishes work capacity and exacerbates

Volume 03 Number 04
August 2025
p-ISSN: 2986-5662
e-ISSN: 2985-959X

socioeconomic burdens through medical costs and lost wages (Lee et al., 2021). Despite its prevalence, interventions tailored to agricultural populations remain underexplored, leaving a gap in practical, accessible solutions for this vulnerable group.

The pathophysiology of LBP in farming communities is multifactorial, involving cumulative trauma from mechanical loading, muscular fatigue, and spinal misalignment. Activities such as rice planting, harvesting, and transporting crops require prolonged spinal flexion and torsion, which accelerate intervertebral disc degeneration and soft tissue inflammation (Raphaë et al., 2025). Additionally, ergonomic deficiencies amplify biomechanical stress, such as the lack of supportive equipment and improper lifting techniques. Without targeted interventions, these factors perpetuate a cycle of pain, reduced mobility, and diminished quality of life, ultimately threatening the sustainability of Indonesia's agricultural workforce (Hilmi et al., 2024).

Current management strategies for LBP predominantly rely on pharmacological interventions, including analgesics and anti-inflammatory drugs. While these approaches offer temporary relief, long-term use is associated with adverse effects such as gastrointestinal complications and drug dependency (Migliorini et al., 2020). Furthermore, access to conventional therapies like physical rehabilitation remains limited in rural areas due to financial constraints and healthcare infrastructure gaps. This underscores the urgent need for cost-effective, non-invasive alternatives that align with agro-industrial workers' cultural and economic realities (Skonnord et al., 2022).

Spinal manipulation therapy (SMT), a manual technique involving controlled force application to spinal joints, has gained recognition as a promising intervention for LBP. Rooted in chiropractic and osteopathic traditions, SMT aims to restore spinal alignment, alleviate nerve compression, and enhance neuromuscular function. Clinical trials in broader populations demonstrate SMT's efficacy in reducing pain intensity, improving functional mobility, and decreasing reliance on medication. However, its application within occupational settings, particularly among agricultural workers, remains under-researched. Given the biomechanical similarities between farming tasks and SMT's therapeutic mechanisms, this intervention can potentially address LBP at its source (Nim et al., 2021).

This study explores the efficacy of SMT in mitigating LBP among Indonesian agro-industrial workers, focusing on its role in enhancing occupational health outcomes. By integrating ergonomic education with SMT protocols, the intervention seeks to disrupt the progression of musculoskeletal deterioration while empowering farmers with self-management strategies. The findings may inform policy frameworks for workplace health programs, offering a scalable model to reduce MSD-related burdens in resource-limited agricultural sectors (Dunleavy et al., 2025).

Addressing LBP in farming communities requires multidisciplinary approaches prioritizing prevention, accessibility, and sustainability. SMT represents a paradigm shift from reactive pharmacological care to proactive biomechanical rehabilitation, aligning with global health priorities for non-communicable disease management (Gyer et al., 2021). Through this investigation, we aim to contribute evidence-based insights into the role of complementary therapies in safeguarding the health of agricultural workers, ensuring the resilience of Indonesia's vital agro-industrial sector.

METHOD

The literature search process in this systematic literature review used three databases, namely Google Scholar, PubMed, and ScienceDirect, with a range of publication years 2019-2024. Keywords are used in this English literature review. The literature search used the keywords "Spinal Manipulation Therapy" AND "Low Back Pain" AND "Agroindustrial Sector".

Volume 03 Number 04
August 2025
p-ISSN: 2986-5662
e-ISSN: 2985-959X

The literature search was conducted in several stages. The first stage was identification. At this stage, 1.734 were obtained that matched the keywords entered. The second stage is screening, at this stage, the selection of articles is carried out by the assessment criteria, namely the range of years published 2019-2024. At the screening stage, 503 articles were obtained. The third stage is the screening stage, at which the selection of articles is adjusted to the inclusion and exclusion criteria. Two hundred eighty-five articles met the inclusion criteria, and 218 met the exclusion criteria. The inclusion criteria consisted of full text, year of publication (2019-2024), title identified, and abstract identified. Exclusion criteria consisted of articles that did not discuss low back pain in the agricultural environment, review articles that were not open access, did not have relevant sources, could not be downloaded, or were not indexed. The next step was to focus on titles and abstracts that fit the selected literature review criteria. At this stage, 10 articles were obtained that met the assessment criteria.

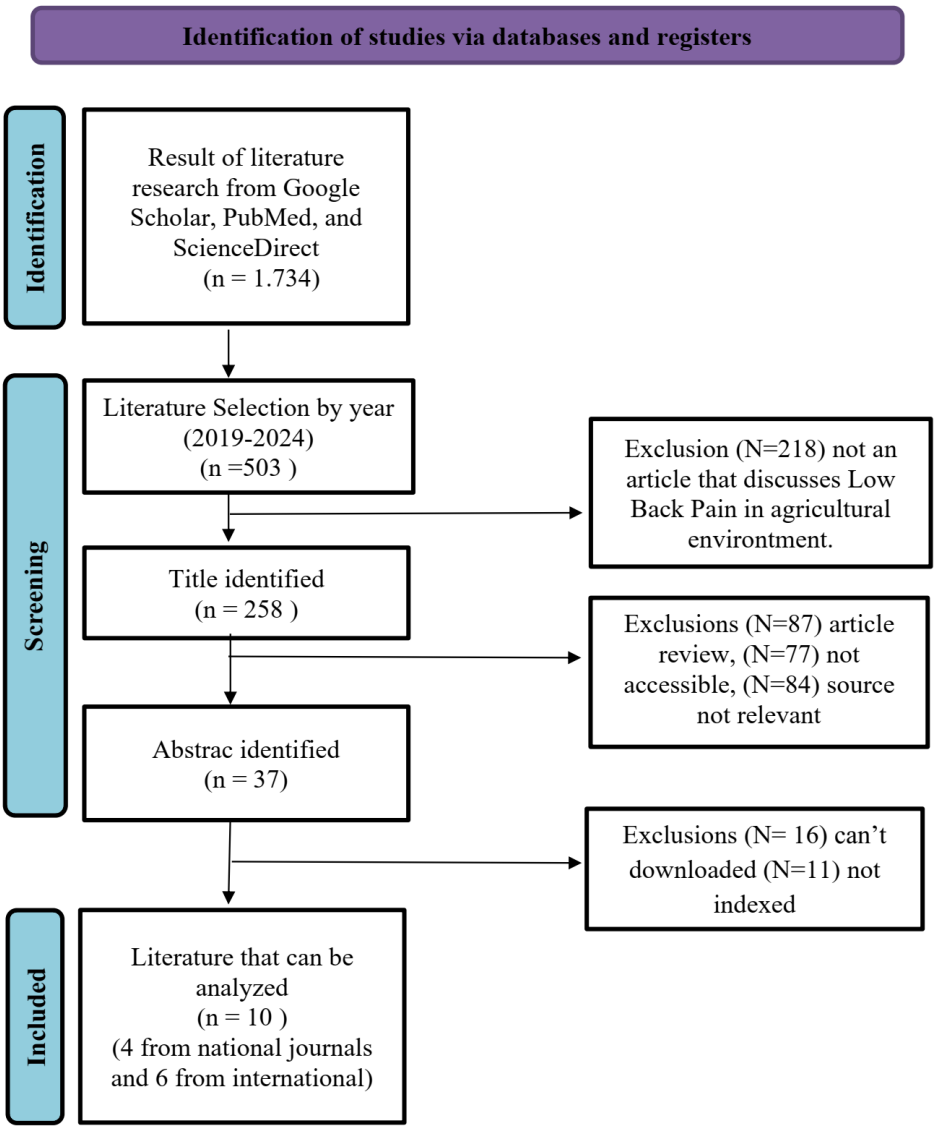

Figure 1. Flowchart of Literature Search

HTechJ Health and Technology Journal (HTechJ)
Volume 03 Number 04
August 2025
p-ISSN: 2986-5662
e-ISSN: 2985-959X

RESULT

Table 1. Article Identification

ID	Author and Journal Identity	Journal Title	Objective	Population and Sample	Method	Summary of Results
A1	Author: Schulz, C., Evans, R., Maiers, M. et al Journal Identity: Schulz et al. Chiropractic & Manual Therapies (2019) 27:21 https://doi.org/10.1186/s12998-019-0243-1	Spinal manipulative therapy and exercise for older adults with chronic low back pain: a randomized clinical trial	The article aimed to assess the effectiveness of adding spinal manipulative therapy (SMT) or supervised exercise programs to a home exercise program for managing low back pain in older adults. The study aimed to compare outcomes related to pain severity, disability, satisfaction with care, and long-term improvements in older adults with chronic low back pain.	The study population consisted of older adults with chronic low back pain, with a total of 241 individuals randomized for the study.	The study used a parallel-group randomized controlled trial design to assess the effectiveness of adding spinal manipulative therapy (SMT) or supervised exercise programs to a home exercise program for managing low back pain in older adults.	The study compared the effectiveness of adding spinal manipulative therapy (SMT) or supervised exercise programs to a home exercise program for managing low back pain in older adults. The results showed no significant differences in pain severity, disability, improvement, or medication use between the groups over the long term. However, satisfaction with treatment was higher in the SMT + HEP group compared to the SEP + HEP group. The study suggests that adding SMT or supervised exercise did not significantly improve pain or disability outcomes but enhanced satisfaction with care. The findings indicate that self-management strategies, such as a home exercise program, may be important for older adults with chronic low back pain.
A2	Author: Musharyadi, F., Efendi, Z. Journal Identity: JURNAL KESEHATAN PIJAR https://jurnal.pijarkesehatan.org/	Chiropractic dalam menurunkan nyeri punggung bawah pada kelompok penjahit konveksi	The article aims to highlight the effectiveness of chiropractic therapy in reducing low back pain in individuals at risk of musculoskeletal disorders, such as tailors, through trained professionals' manual manipulation of the spine. The study conducted on convection	The population in the article consists of convection tailors in the working area of the Lubuk Buaya Health Center, Padang City. The sample size for the study was 13 individuals who were convection tailors experiencing low back pain.	The study utilized a pre-experimental design with a one-group Pre-Post test design approach. Chiropractic therapy was administered four times a week for one week to the sample of 13 convection tailors experiencing low back pain.	The study conducted on convection tailors in Padang City demonstrated a significant decrease in pain levels after receiving chiropractic therapy four times a week for one week. The pain scale decreased from 4.15 to 2.15 after the chiropractic therapy sessions, indicating a positive impact of chiropractic therapy on reducing pain in clients at risk of musculoskeletal disorders.

ID	Author and Journal Identity	Journal Title	Objective	Population and Sample	Method	Summary of Results
			tailors in Padang City demonstrated a significant decrease in pain levels after receiving chiropractic therapy four times a week for one week, emphasizing the positive impact of chiropractic therapy on pain reduction in clients.		The research was conducted in the working area of the Lubuk Buaya Health Center, Padang City.	
A3	Author: Zoete A. D., et al Journal Identity: Physiotherapy (United Kingdom), 112, 121–134. https://doi.org/10.1016/j.physio.2021.03.006	The effect of spinal manipulative therapy on pain relief and function in patients with chronic low back pain: an individual participant data meta-analysis	To assess the effects of SMT on chronic LBP pain and function in a meta-analysis of IPD.	This study used 43 RCT respondents, which represents a total of 4223 participants.	This research used the Preferred Reporting Items guidelines for Systematic Review and Meta-Analysis for IPD (PRISMA-IPD), data sources, and searches, including RCTs published in 2000. Researchers limited this inclusion, as it was difficult to trace the older authors of the studies, and there is a high probability that this data is inaccessible. More importantly, the latest research on SMT for back pain below has better methodological quality.	From the 42 RCTs that met the inclusion criteria, we obtained IPDs from 21 comparing SMT with the intervention recommended. There is moderate quality evidence that SMT vs recommended interventions produce similar outcomes on pain. SMT vs sham SMT analysis was not performed, because we only had data from one study. Sufficient evidence shows that SMT produces good results similar to the therapy recommended for pain relief and improved functional status. SMT seems to be an option that is suitable for treating chronic LBP.

ID	Author and Journal Identity	Journal Title	Objective	Population and Sample	Method	Summary of Results
A4	Author: Rubinstein, Sidney M., Zoete, 1 Annemarie de., et.al Journal Identity: BMJ: first published as 10.1136/bmj.l 689 on March 13, 2019 https://doi.org/ 10.1136/bmj.l 689	Benefits and harms of spinal manipulati ve therapy for the treatment of chronic low back pain: systematic review and meta-analysis of randomise d controlled trials	To find out the benefits and dangers of manipulative therapy applied to the spine (SMT). This is done to help relieve pain in patients with LBP and as a means of therapy for chronic lower back pain.	47 randomized controlled trials were included in total Of the 9211 participants identified, the The average age is middle age (35-60 years).	This review follows the guidelines for Preferred Reporting Items for Systematic Reviews and Meta-- analyses (PRISMA). Our protocol is registered with the Cochrane Collaboration. We only included published randomised studies. Studies using an inadequate randomisation procedure (eg, alternate allocation, allocation based on birth date) were excluded, as was grey literature	Pain—Moderate quality evidence suggested that SMT is not statistically better than recommended interventions at one month and 12 months, although the difference was significant at six months. The size of the effect was, However, not clinically relevant (Fig. 2). Exclusion of Extreme outliers accounted for a large percentage of the statistical heterogeneity for this outcome at one month (mean difference −0.39, 95% confidence interval −2.41to 1.62; participants=3005; studies=23; I2 =44%), while The overall effect remained virtually unchanged
A5	Author: Meir, R Golda., Adlina.,et.al Journal Identity: Jurnal Pustaka Mitra Vol.3 No. 6(2023) 243–247 https://doi.org/ 10.55382/jurn alpustakamitr a.v3i6.633	Sosialisasi Terapi Manipulas i Terhadap Pengaruh Penuruna n Nyeri Low Back Pain Komunitas Bulu Tangkis Balai Desa Wironang gan	This study aims to examine members of the badminton community at risk of LBP and how treatment or therapy can be done by modifying the spinal cord in members of the badminton community, with 10 research respondents.	10 community members	The service was carried out through direct interviews on Monday, January 9, 2023, at the Wironanggan field to determine respondents' pain level in the "Wironanggan Village Hall Badminton" community. The intended community is an association of people who like to play badminton. The age interval is	Based on the results of the research that has been carried out, the results can be described as follows: respondents who still experience complaints are 0 (zero) respondents, then those who still feel minimal complaints are 2 (two) respondents, and those who have not felt complaints are 8 (eight) respondents. Solving low back pain cases with manipulation and education interventions in the badminton community produces good results.

ID	Author and Journal Identity	Journal Title	Objective	Population and Sample	Method	Summary of Results
					approximately 30 years and over, and the respondent has pain problems in the lower back area. Pain is measured using the Numeric Rating Scale (NRS) parameter with a scale of 0-10	
A6	Author: Thomas, J. S., Clark, B. C., Russ, D. W., France, C. R., Ploutz-Snyder, R., & Corcos, D. M. Journal Identity: JAMA Network Open, 3(8), 1–12. https://doi.org/10.1001/jamanetworkopen.2020.12589	Effect of Spinal Manipulative and Mobilization Therapies on Young Adults With Mild to Moderate Chronic Low Back Pain	The objective of the article is to evaluate the comparative effectiveness of spinal manipulation and spinal mobilization at reducing pain and disability compared with a placebo control group (sham cold laser) in a cohort of young adults with chronic LBP.	The population in this journal is 4903 adult patients whose eligibility was assessed; 4741 did not meet the inclusion criteria, and 162 patients did. Patients with chronic LBP were eligible for randomization to 1 of 3 treatment groups.	The method used in this journal to carry out this randomized clinical trial was a single-blind (investigator-blinded) placebo-controlled trial with three groups. Parallel group trials with repeated measurements.	The results obtained indicate that spinal manipulation and spinal mobilization therapy are no more effective than a well-chosen placebo in reducing pain and disability in patients with chronic low back pain. The journal concluded that these manipulative therapy techniques do not appear to be effective for chronic back pain, both in relatively young individuals with mild to moderate back pain.
A7	Author: Wulandari, A. Journal Identity: Jurnal Medika Hutama, Vol. 02 No. 01, Oktober 2020 https://www.jurnalmedikahutama.com/index.php/JMH/article/view/90	Terapi Chiropractic (Spinal Manipulation) Terhadap Low Back Pain	This article discusses chiropractic spinal manipulation as a complementary and alternative treatment for low back pain, focusing on its effectiveness in reducing pain and improving function in patients with acute low back pain.	The population and sample used in this article are patients with low back pain who received chiropractic spinal manipulation therapy.	The research in this article utilized a Systematic Literature Review method to collect, evaluate, and develop research on the effectiveness of chiropractic spinal manipulation therapy for low back pain.	The conclusion from the results found in this article is that chiropractic spinal manipulation therapy is an effective treatment for low back pain, both acute and chronic. The therapy involves controlled thrusts to the spine, which can reduce pain and improve function in patients with low back pain. However, it is important to note that spinal manipulation may have side effects such as radiating pain, headaches, and fatigue, and in rare cases, dangerous complications like vertebral artery dissection and stroke. Therefore,

ID	Author and Journal Identity	Journal Title	Objective	Population and Sample	Method	Summary of Results
						careful consideration and monitoring are necessary for this treatment approach for low back pain.
A8	Author: Minder, C. R., Gorbach, C., & Peterson, C. K. Journal Identity: Journal Manipulative and Physiological Therapeutics, October 2022 https://doi.org/10.1016/j.jmpt.2023.03.002	Factors Associated With Pain Medication Use and the Relationship to Chiropractic Treatment Outcomes for Patients With Low Back and Neck Pain: A Cross-Sectional Study	The article aims to identify factors associated with pain medication use in Swiss chiropractic patients with back and neck pain, and to determine if there are differences in chiropractic treatment outcomes based on the use of pain medication.	The study included 1077 patients with low back pain (LBP) and 845 with neck pain (NP) from Swiss chiropractic practices.	The method used in this article is a retrospective analysis of data collected from Swiss chiropractic patients with back and neck pain.	The study found that patients with low back pain and neck pain who used pain medication tended to have higher pain and disability levels at baseline, were more likely to have radiculopathy, poor general health, and be smokers. However, there were no significant differences in subjective improvement between users and non-users of pain medication at any data collection time point.
A9	Author: Vining, R., Long, C. R., Minkalis, A., Gudavalli, M. R., Xia, T., Walter, J., Coulter, I., Goertz, C. M. Journal Identity: The Journal Of Alternative And Complementary Medicine, Volume 00, Number 00, 2020, pp. 1–10 https://doi.org/10.1089/acm.2020.0107	Effects of Chiropractic Care on Strength, Balance, and Endurance in Active-Duty U.S. Military Personnel with Low Back Pain: A Randomized Controlled Trial	To investigate whether chiropractic care influences strength, balance, and/or endurance in active-duty United States military personnel with low back pain (LBP).	One hundred ten active-duty military personnel, 18–40 years of age, with self-reported LBP.	This study used a prospective randomized controlled trial with a pragmatic treatment approach. Participants were randomly allocated to 4 weeks of chiropractic care or a wait-list control group.	Patient-reported LBP seriousness and incapacity within the chiropractic care group were consistent with the direct short-term enhancements detailed in a large clinical trial assessing chiropractic care plus standard medical care in a comparative population with a similar number of chiropractic visits. They found changes in isometric pulling strength, balance with eyes closed, and endurance that were statistically significantly more prominent within the chiropractic care group than the wait-list group.

ID	Author and Journal Identity	Journal Title	Objective	Population and Sample	Method	Summary of Results
A10	Author: Nugraha, M. H. S., Antari, N. K. A. J., Dewi, A. A. N. T. N. Journal Identity: Jurnal Kesehatan Vokasional, Vol. 7 No. 4, ISSN 2541-0644, ISSN 2599-3275, DOI https://doi.org/10.22146/jkesvo.70447	Efektivitas Mobilisasi Sendi dan Pelatihan Stabilisasi Lumbopelvis pada Non-Specific Low Back Pain	To compare the effectiveness of increasing joint mobilization and lumbopelvic stabilization (Mostab) in the standard physiotherapy treatment, ultrasound therapy (UST) intervention, and stretching training in reducing low back disability.	24 participants	This study is experimental, and participants were randomly divided into two groups. The control group (n=12) was given UST + stretching training, while the treatment group (n=12) was given UST + stretching training + Mostab. A measuring instrument for the therapy evaluation was used, and the Indonesian version of the modified oswestry disability index (MODI) was used.	The results of the comparison test between groups showed that there was a significant difference (p=0.000) between the two groups. Adding Mostab to interventional ultrasound therapy and stretching training was more significant than combining ultrasound therapy and stretching training alone in reducing low back disability in non-specific low back pain.

DISCUSSION

Agro-nursing, a specialized field at the intersection of occupational health and agricultural labor, focuses on addressing workers' unique health challenges in agrarian settings. Spinal Manipulation Therapy (SMT) aligns with agro-nursing's preventive and rehabilitative goals by targeting musculoskeletal disorders (MSDs), particularly low back pain (LBP), which disproportionately affects agroindustrial workers. Agricultural tasks often involve repetitive, high-intensity movements—such as bending, lifting, and prolonged squatting—that strain the spine and lead to chronic pain. Agro-nursing integrates SMT as a non-pharmacological, accessible intervention to alleviate mechanical stress, restore spinal alignment, and improve mobility. By training nurses in rural clinics or mobile health units to administer or refer SMT, agro-nursing bridges gaps in healthcare access, offering farmers a cost-effective alternative to medication-based pain management. This synergy reduces reliance on analgesics with adverse side effects while empowering workers to maintain productivity and quality of life (Kurniyawan et al., 2023; Nur et al., 2023).

Integrating SMT into agro-nursing also emphasizes preventive education, aligning with the field's holistic approach to occupational health. Nurses deliver SMT and educate workers on ergonomic practices, such as proper lifting techniques and posture adjustments, to mitigate future LBP risks. For instance, agro-nursing programs might combine SMT sessions with workshops on

Volume 03 Number 04
August 2025
p-ISSN: 2986-5662
e-ISSN: 2985-959X

workplace ergonomics, fostering sustainable behavioral changes in farming communities. This dual focus—treating existing pain and preventing recurrence—strengthens the resilience of agroindustrial workers, who often lack resources for long-term medical care. By embedding SMT within agro-nursing frameworks, policymakers and healthcare providers can address LBP at both individual and systemic levels, ensuring safer, healthier workplaces in Indonesia's vital agricultural sector (Kurniyawan et al., 2023; Nur et al., 2024).

Spinal Manipulative Therapy (SMT) is performed by manipulating/mobilizing the patient's spine. This therapy aims to improve spinal posture and reduce pain in the spinal region, and it can overcome low back pain (LBP). Musharyadi et al (2024) mentioned that when SMT is done regularly, 4 times a week, it reduces the pain scale from 4.15 to 2.15. This shows the positive impact of SMT, reducing the risk of musculoskeletal disorders. This is supported by research on Active-Duty military personnel conducted by Vining et al (2020), where SMT was shown to have benefits in reducing the intensity and disability of LBP and can also increase muscle strength and endurance in patients. Meir et al (2023) agree that SMT is suitable for LBP, where, from the data collected, no one complained of experiencing LBP; then two respondents still complained a little, and eight had no complaints.

SMT has also been proven effective in treating LBP problems in patients because, according to data collected by Zoete et al. (2021), SMT shows the same results as recommended therapy, which can relieve pain and improve functional status. Rubinstein et al. (2019) also have the same opinion, stating that SMT has the same impact as recommended therapies for LBP. The advantage of SMT over other recommended therapies is that SMT has a better effect for a short period than other therapies.

In collaboration with other therapies, SMT is effective in treating LBP cases. Schulz et al (2019) argue that SMT combined with HEP can improve patient satisfaction and is important in adult patients with chronic LBP. Besides being collaborated with other therapies, SMT can also be a companion to other therapies, as described by Nugraha et al (2022) where the addition of lumbar joint mobilization and lumbopelvic stabilization (SMT) therapy to ultrasound therapy (UST) was shown to be effective in reducing pain and disability in patients with LBP.

Although SMT has proven to be effective in treating LBP, Wulandari (2020) cautions us that SMT has side effects such as radiating pain, headache, and fatigue, and in rare cases, dangerous complications such as vertebral artery dissection and stroke. Therefore, patient monitoring during SMT is necessary. Also, according to Minder et al. (2020), SMT combined with administering medications such as NSAIDs showed no significant difference compared to SMT without medication administration. Thomas et al (2020) also argued that SMT was not shown to be more effective than a well-chosen placebo for reducing pain and activity intolerance in LBP patients. SMT was not shown to be effective for LBP in adolescents with mild to moderate back pain.

CONCLUSION

Spinal manipulation therapy, which chiropractic professionals often use, was found to be effective in reducing the risk of farmers experiencing low back pain. Research shows that spinal manipulation can help reduce pain, improve physical function, and speed up recovery compared to usual care. Therefore, it can be an effective option for low back pain management in farmers, helping them return to work faster, improve their posture, and enhance their quality of life.

ACKNOWLEDGMENT

We want to thank Safrie Rahmadi Haq and Raul Requilmy Suprapto, who helped make this article.

REFERENCES

Barneo-Alcántara, M., Díaz-Pérez, M., Gómez-Galán, M., Carreño-Ortega, Á., & Callejón-Ferre, Á. J. (2021). Musculoskeletal disorders in agriculture: A review from web of science core collection. *Agronomy*, *11*(10), 2017. https://doi.org/10.3390/agronomy11102017

Duffy, C., Toth, G. G., Hagan, R. P., McKeown, P. C., Rahman, S. A., Widyaningsih, Y., ... & Spillane, C. (2021). Agroforestry contributions to smallholder farmer food security in Indonesia. *Agroforestry Systems*, *95*(6), 1109-1124. https://doi.org/10.1007/s10457-021-00632-8

Dunleavy, K., Radunovich, H. L., Beneciuk, J. M., Hu, B., Yang, Y., Blythe, J. M., & Gurka, K. K. (2025). Self-Management Strategies for Low Back Pain Among Horticulture Workers: Protocol for a Type II Hybrid Effectiveness-Implementation Study. *JMIR Research Protocols*, *14*(1), e64817. https://doi.org/10.2196/64817

Ferdinandov, D., Yankov, D., & Trandzhiev, M. (2024). Common differential diagnosis of low back pain in contemporary medical practice: A narrative review. *Frontiers in Medicine*, *11*, 1366514. https://doi.org/10.3389/fmed.2024.1366514

Gyer, G., Michael, J., Inklebarger, J., & Ibne Alam, I. (2021). Effects of biomechanical parameters of spinal manipulation: A critical literature review. *Journal of Integrative Medicine*, *20*(1), 4-12. https://doi.org/10.1016/j.joim.2021.10.002

Hilmi, A. H., Abdul Hamid, A. R., & Wan Ibrahim, W. A. R. A. (2024). Current Trends and Risk Factors in Low Back Pain: An Ergonomic Perspective on Prevention and Management. *Malaysian Journal of Ergonomics (MJEr)*, *6*(1), 105–118. https://doi.org/10.58915/mjer.v6.2024.1312

Kurniyawan, E. H., Isyroq, H. F., Rifa'i, A., Rusmawati, A. A., Ramadhan, I. H. D., Kurniawan, D. E., & Nur, K. R. M. (2023). Increase Noise Hazard on Incident of Occupational Diseases in Agroindustrial Area. *International Journal of Midwifery and Health Sciences*, *1*(2), 177–188. https://doi.org/10.61777/ijmhs.v1i2.34

Kurniyawan, E. H., Yustiana, T. S., Shofiyyah Firdaus, P., Nasywa Ramadhanti, S., Tri Afandi, A., Endrian Kurniawan, D., & Rosyidi Muhammad Nur, K. (2023). Nursing First Aid to Emergency Events in Agricultural Areas: Literature Review. *Health and Technology Journal (HTechJ)*, *1*(5), 491–500. https://doi.org/10.53713/htechj.v1i5.100

Lee, H. J., Oh, J., Yoo, J. R., Ko, S. Y., Kang, J. H., Lee, S. K., Jeong, W., Seong, G. M., Kang, C. H., & Song, S. W. (2021). Prevalence of Low Back Pain and Associated Risk Factors among Farmers in Jeju. *Safety and Health at Work*, *12*(4), 432-438. https://doi.org/10.1016/j.shaw.2021.06.003

Meir, R. G., Adlina, A., Rahmi, A., Ramadhani, R. S. S., Fitriani, D., Santoso, T. B., Pristianto, A., & Wahyuni, W. (2023). Pengaruh Terapi Manipulasi Terhadap Penurunan Nyeri Low Back Pain Komunitas Bulu Tangkis Balai Desa Wironanggan. *Jurnal Pustaka Mitra (Pusat Akses Kajian Mengabdi Terhadap Masyarakat)*, *3*(6), 243–247. https://doi.org/10.55382/jurnalpustakamitra.v3i6.633

Migliorini, F., Maffulli, N., Eschweiler, J., Betsch, M., Catalano, G., Driessen, A., … Baroncini, A. (2020). The pharmacological management of chronic lower back pain. *Expert Opinion on Pharmacotherapy*, *22*(1), 109–119. https://doi.org/10.1080/14656566.2020.1817384

Minder, C. R., Gorbach, C., & Peterson, C. K. (2022). Factors Associated With Pain Medication Use and the Relationship to Chiropractic Treatment Outcomes for Patients With Low Back and Neck Pain: A Cross-Sectional Study. *Journal of Manipulative and Physiological Therapeutics*, *45*(8), 575–585. https://doi.org/10.1016/j.jmpt.2023.03.002

Volume 03 Number 04
August 2025
p-ISSN: 2986-5662
e-ISSN: 2985-959X

Musharyadi, F., Efendi, Z. (2024). Chiropractic Dalam Menurunkan Nyeri Punggung Bawah Pada Kelompok Penjahit Konveksi. Jurnal kesehatan pijar. *Jurnal Kesehatan Pijar*, 1–5.

Nim, C. G., Downie, A., Kawchuk, G. N., & Perle, S. M. (2021). The importance of selecting the correct site to apply spinal manipulation when treating spinal pain: Myth or reality? A systematic review. *Scientific Reports*, *11*(1), 1-13. https://doi.org/10.1038/s41598-021-02882-z

Nugraha, M. H. S., Antari, N. K. A. J., & Dewi, A. A. N. T. N. (2022). Efektivitas Mobilisasi Sendi dan Pelatihan Stabilisasi Lumbopelvis pada Non-Specific Low Back Pain. *Jurnal Kesehatan Vokasional*, *7*(4), 196. https://doi.org/10.22146/jkesvo.70447

Nur, K. R. M., Hadi Kurniyawan, E., Dwi Puja Lestari, M., Ayuning Tyas, A., Salzabilla Flaurenza, S., Ayu Setyaningrum, R., & Dewi, K. (2023). Management of Snake Bites in the Agricultural Sector. *Health and Technology Journal (HTechJ)*, *1*(6), 671–681. https://doi.org/10.53713/htechj.v1i6.131

Nur, K. R. M., Narulia Sari, N., Salsabila, H., Firda Azza Zahra, A., Zhafirah Nur Nashirah, M., Hadi Kurniyawan, E., & Endrian Kurniawan, D. (2024). Risk Factors for Occupational Diseases Due to Exposure to Ultraviolet Rays among Agricultural and Outdoor Workers. *Health and Technology Journal (HTechJ)*, *2*(2), 172–180. https://doi.org/10.53713/htechj.v2i2.142

Raphaë, L., Ntsambi, E., Eugè, L., Losimba, L. J., Amisi, K. R., Tshimbila, K. J. M. V., & Wami, I. F. (2025). Socio-Anthropometric Profile of Women with Chronic Low Back Pain in a Peri-Urban Environment in the City of Kisangani. *Open Journal of Applied Sciences*, *15*(6), 1529-1553. https://doi.org/10.4236/ojapps.2025.156106

Rubinstein, S. M., De Zoete, A., Van Middelkoop, M., Assendelft, W. J. J., De Boer, M. R., & Van Tulder, M. W. (2019). Benefits and harms of spinal manipulative therapy for the treatment of chronic low back pain: Systematic review and meta-analysis of randomised controlled trials. *BMJ (Online)*, *364*. https://doi.org/10.1136/bmj.l689

Schulz, C., Evans, R., Maiers, M., Schulz, K., Leininger, B., & Bronfort, G. (2019). Spinal manipulative therapy and exercise for older adults with chronic low back pain: A randomized clinical trial. *Chiropractic and Manual Therapies*, *27*(1), 1–14. https://doi.org/10.1186/s12998-019-0243-1

Skonnord, T., Fetveit, A., Skjeie, H., Brekke, M., Grotle, M., Klovning, A., & Aas, E. (2022). Cost-effectiveness analysis of acupuncture compared with usual care for acute non-specific low back pain: Secondary analysis of a randomised controlled trial. *Acupuncture in Medicine*. https://doi.org/10.1177/09645284211055747

Thomas, J. S., Clark, B. C., Russ, D. W., France, C. R., Ploutz-Snyder, R., & Corcos, D. M. (2020). Effect of Spinal Manipulative and Mobilization Therapies in Young Adults with Mild to Moderate Chronic Low Back Pain: A Randomized Clinical Trial. *JAMA Network Open*, *3*(8), 1–12. https://doi.org/10.1001/jamanetworkopen.2020.12589

Vining, R., Long, C. R., Minkalis, A., Gudavalli, M. R., Xia, T., Walter, J., Coulter, I., & Goertz, C. M. (2020). Effects of Chiropractic Care on Strength, Balance, and Endurance in Active-Duty U.S. Military Personnel with Low Back Pain: A Randomized Controlled Trial. *Journal of Alternative and Complementary Medicine*, *26*(7), 592–601. https://doi.org/10.1089/acm.2020.0107

Wulandari, A. (2020). Terapi Chiropractic (Spinal Manipulation) Terhadap Low Back Pain. *Jurnal Medika Hutama*, *02*(01), 369–375.

Zoete, A., Rubinstein, S. M., de Boer, M. R., Ostelo, R., Underwood, M., Hayden, J. A., Buffart, L. M., van Tulder, M. W., Bronfort, G., Foster, N. E., Maher, C. G., Hartvigsen, J., Balthazard, P., Cecchi, F., Ferreira, M. L., Gudavalli, M. R., Haas, M., Hidalgo, B., Hondras, M. A., Zaproudina, N. (2021). The effect of spinal manipulative therapy on pain relief and function in patients with chronic low back pain: an individual participant data meta-analysis. *Physiotherapy (United Kingdom)*, *112*, 121–134. https://doi.org/10.1016/j.physio.2021.03.006