CHRONIC LOWER BACK PAIN AMONG HOSPITAL WORKERS: EFFECT OF ERGONOMIC CHAIR INTERVENTION ON QUALITY OF WORKING LIFE: A LITERATURE REVIEW

Zulfa Khairunnisa*

dr. Chasbullah Abdulmadjid Regional Public Hospital, Bekasi City, Indonesia

eISSN: 2828-4070
https://doi.org/10.69951/proceedingsbookoficeonimeri.v9i-.322
Proceedings ICE on IMERI. 2025.
Received: October 26th. 2025
Accepted: January 22nd, 2026
Published online: February 6th, 2026

Corresponding Author
Name : Zulfa Khairunnisa
Email : dr.zulfa.khairunnisa@gmail.com

Abstract

Chronic lower back pain (CLBP) is a common occupational problem for adult workers, particularly among hospital workers, mainly caused by prolonged sitting and poor ergonomic posture. This condition leads to decreased productivity, discomfort, and quality of life (QoL). Ergonomic chair interventions designed to relieve pain and improve workers' well-being have been presented as promising interventions. Literature searches were performed using general keywords such as low back pain, ergonomic chair intervention, hospital workers conducted using reliable databases, such as PubMed, Scopus and Google Scholar. Included studies were published articles from the past 10 years and were confirming these patients being addressed by ergonomic chair intervention, workplace seating or postural correction. Randomized controlled trials and observational studies were also included. In addition, systematic reviews and meta-analyses on relevant topics were also integrated in order to offer extensive evidence synthesis. Studies exclusively focus on non-healthcare workers and incidents in relation to acute injury where there is no relevance to a chronic occupational condition have been excluded. Most studies indicated ergonomic chair interventions led to decreased pain severity and disability scores also improved postural stability and job satisfaction. Improved comfort and decreased fatigue were significantly correlated with an increase in concentration and productivity. Ergonomic chair interventions are concluded as a promising method to improve CLBP reduction and to help in the QoL of hospital workers.

Keywords: ergonomic chair, hospital worker, low back pain, quality of working life

Introduction

Low back pain (LBP) remains one of the most common musculoskeletal disorders in adult workers worldwide. Productive workers in various fields contribute significantly to chronic low back pain (CLBP) incidences every year. Healthcare workers are no exception, even considered as one of the most vulnerable subpopulations to develop CLBP. Epidemiology

showed that a substantial burden of CLBP is borne by a large number of hospital workers with subsequent individual suffering and a major economic cost to healthcare organizations. Its pathophysiology is highly interrelated with biomechanical, psychosocial and personal factors.[1] Several hospital jobs require sustained sitting postures that contribute to high compressive load on lumbar spinal structures leading to progressive degenerative changes and pain sensitization mechanisms. New observations have shown that CLBP symptoms are influenced predominantly by sedentary occupational behaviors, poor postural habits, and lack of dynamic workstation designs.[2] Hospital staff experience different occupational challenges that predispose them to suffering CLBP. Except for administrative staff who tend to perform computer-enabled activities that demand prolonged static sitting posture, many clinical departments require diverse movement between sitting and standing to completely physically challenging shifts. These job demands overload the spinal structure with mechanical repetition, possibly causing an increased degeneration of the tissue and the onset of LBP.[3] Consequently, the adverse effects go beyond local musculoskeletal symptoms.

Recent studies showed a correlation between increased sitting duration (which leads to CLBP) to a greater likelihood of cardiovascular disease, metabolic derangements and psychological disorders.[4] This study underscores the importance of ergonomic interventions combined with long-term health approach to treat CLBP. The ergonomic interventions are designed to prevent and manage occupational musculoskeletal disorders. Recently, chair-based strategies have received intense research attention and demonstrate promising practical implications that underpin its potential for broad-spread application across different work settings.[5] Standardized ergonomic chairs are composed of adjustable components, which aim to help maintain a good sitting posture, redistribute the load evenly in the spine, and reduce cumulative musculoskeletal strain after long hours of sitting. This intervention is believed to be effective in enhancing the workers' quality of life (QoL), which includes physical comfort, psychological wellbeing, and job satisfaction in work experience. Latest evidence also strengthened this proof by stating that chronic pain conditions caused by CLBP were considered as detrimental to all of those mentioned QoL dimensions. Furthermore, these concerns not only impact hospital-based healthcare workers but also workers in the general workforce, such as workers in healthcare organizations and healthcare delivery system.

Understanding the links between ergonomic chair interventions, pain-related outcomes and quality of working life is crucial in order to establish greater impact on the management of healthcare workers. Therefore, the focus of this review is to summarize all information from the existing research articles regarding effectiveness of ergonomic chair interventions on addressing CLBP by measuring QoL dimensions on hospital workers.

Methods

A narrative literature review was performed to assess evidence of ergonomic chair interventions for CLBP among hospital staff. Electronic database searches were conducted using publication databases PubMed, Scopus and Google Scholar, including published articles in the last 10 years. Search strategies used combinations of important keywords such as "low back pain," "chronic lower back pain," "ergonomic chair," "chair intervention," "hospital workers," "quality of working life," and "musculoskeletal disorders." Boolean operators were utilized to increase search sensitivity and specificity. The inclusion criteria were studies matched with the targeted populations (healthcare workers) and directly use ergonomic chair interventions, workplace seating changes, or techniques affecting postural correction in relation to LBP outcomes among working adult populations. We considered randomized controlled trials (RCTs) and observational studies as eligible for inclusion, along with systematic reviews and meta-analyses directed toward relevant topics integrated to increase reliability of these evidences from a thorough statistical analysis. Exclusion criteria were study populations with non-medical work activities or prior management of acute injury not pertinent to chronic occupational disease.

Literature Review

Pathophysiology of Chronic Lower Back Pain in Sedentary Workers

Understanding the core pathophysiology of CLBP is considered critical. This helps scientists to connect its pathophysiology to movement behaviors, also how it develops into physical stiffness and long-term pain. Urits et al. also confirmed that LBP pathophysiology was among the best approach to critically emphasize the evidence and was proven to explain the complex interplay between structural, neurological, and psychosocial components in developing LBP. Prolonged sitting positions exert an ongoing mechanical load on the lumbar spine, mainly on the intervertebral discs and surrounding musculature. Recent studies have shown that prolonged sitting positions gave rise to relatively high intradiscal pressures leading to accelerated degenerative responses in susceptible individuals, especially >40 years old who already underwent aging process.[8] Under functional loading, the nucleus pulposus showed positional changes with prolonged sitting being often associated with posterior disc migration as the main role in the manifestation of LBP symptoms. Along with disc-driven processes, muscular fatigue was also an important factor associated with the onset of low back pain in sedentary workers.[9] Cross-sectional studies by del Pozo-Cruz B, et al., in which the authors assessed musculoskeletal fitness in sedentary office workers with subacute LBP showed significant associations between lower exercise fitness and decreased health-related quality of life.[10] These findings suggested that physical deconditioning linked to extended sedentary behaviour may lead to chronic pain and persistent function decline in the current population.[11]

Hospital Workers Develop Chronic Low Back Pain

CLBP is proven to be prevalent among health care workers and considered as one of the common occupational health burdens. A study by Simsek et al. indicated that the lifetime prevalence of LBP in hospital-based healthcare professionals reached around 53% and showed major associations with age, body mass index (BMI), repetitive spinal loading, patient handling activities and prolonged non-neutral postures. [12] Similarly, a large cross-sectional study performed by Elfergani et al. reported LBP among close to three-quarters of healthcare workers within a 12-month period and found job back trauma and BMI elevation to be risk factors with regular physical activity being protective.[13] Additional evidence from systematic and regional studies indicates that CLBP in healthcare providers is multifactorial, occurring through the interactions of mechanical, individual, and organizational elements. A review by Ilmidin et al. demonstrated that sitting and standing for prolonged periods of time, frequent lifting or repositioning of patients, and inadequate ergonomic support consistently contribute to lumbar pain among this population.[14] These occupational exposures can result in cumulative spinal loading, muscular fatigue, and physical deconditioning, ultimately perpetuating pain chronicity and functional impairment. All these evidences showed consistent proof with the biopsychosocial framework theory of disease development and support comprehensive, evidence-based interventions that integrate ergonomic optimization and physical conditioning in healthcare settings, which shows the most effective implementation on CLBP progression.

Ergonomic Chair Design Principles and Mechanisms

Ergonomic chair design consists of several functionalities designed to maintain proper positioning and minimize mechanical load on the lumbar spine and intervertebral discs. Recent research on seated spinal biomechanics highlighted the importance of sustaining physiological lumbar curvature over extended periods of sitting, as non-neutral positions can lead to the distribution of loads across the intervertebral discs as well as the surrounding soft tissues.[11] Backrest use and seated hip flexion angles have been reported to have major implications on trunk muscle activation and postural discomfort during sustained sitting.[15] Also, mechanical research has suggested that chairs with a spinal adjustment to lumbar and ischial support might add to the management of work-related low back pain. Seating systems with different adjustment arrangements compared to traditional chairs have also shown to alleviate spinal loading and lower paraspinal musculoskeletal activity.[16] Indicators of measurable impact on lumbar posture, neuromuscular demand, and perceived pain and targeted ergonomic modifications in office chairs design are also suggested to aid better ergonomic support and function in sedentary employees. [17]

Dynamic Seating and Alternative Chair Designs

Dynamic seating is an idea suggested to mitigate the effect of static conventional chairs. Studies investigating dynamic ergonomic positioning systems indicated that designs might be able to affect lumbar spine posture and trunk muscle activation in typical office-based activities, such as typing and computer work roles. [18] Comparative studies also showed that dynamic and conventional chairs have some distinct muscle involvement and postural variability differences as well as higher level of activity, suggesting that dynamic seating can encourage a more action-oriented seated behavior.[19] Exploration of other seating options, such as exercise ball seating has shown useful potential ergonomic benefits alongside practical and usability limitations.[20] Proven physiological features (trunk kinematics, extensor muscle electromyographic activity, and spinal shrinkage) validate the dynamic seating's ability to modify spinal load and neuromuscular responses with prolonged sitting. Yet, variation in study designs and outcome measures underlined the importance of cautious interpretation of these findings. [21]

Evidence from Chair Intervention Studies

Systematic reviews assessing effectiveness of chair interventions have synthesized evidence of ergonomic interventions for occupational-related musculoskeletal disorders prevention. It showed investigation for ergonomic chair applications for treatment of LBP, discomfort, and trunk muscle activation have shown similar patterns of benefit across outcome domains.[1] Previous systematic reviews involving occupational practice also identified ergonomic seating as a useful approach to reduce musculoskeletal symptoms.[22] Furthermore, latest RCTs evaluating interventions in ergonomic chair design showed significant reductions in musculoskeletal symptoms in comparison with the control group. Despite these studies focusing on medical field, the settings of these studies mainly happened in general offices which demonstrated the general applicability of ergonomic chair principles to the variety of workplace situations.[23]

Comprehensive Workplace Ergonomic Interventions

Studies showed that chair-based ergonomic interventions were clinically more effective when considering both physical and organizational interventions, not only implementing ergonomic chairs alone. Systematic reviews assessing physical and organizational interventions for the prevention of low back and neck pain underscored the role of multi-component strategies that can simultaneously address multiple risk factors.[3] In addition, these reviews also showed that ergonomic chairs combined with equipment modification, provided users with detailed information before using the equipment, and organizational movement support resulted in more beneficial outcomes than single-component interventions.[5] Moreover, studies on large-scale workstation modifications of the office worker reinforced the importance of comprehensive intervention from equipment to users preparations as the most effective approach to prevent musculoskeletal pain.[6] A supplementary set of findings on the joint influence of chair design and computer screen

height changes to neck and upper back pain enhanced the importance of integrated system-level interventions to improve musculoskeletal posture and health in the office. [24]

Quality of Working Life Outcomes

Quality of working life is a representative of multi-dimensional construct of CLBP progression which is believed to be well-extended beyond musculoskeletal pain reduction. This outcome encompasses holistic aspects that contribute to pain reliefs, such as work satisfaction and overall occupational well-being. Evidence from the included studies indicated that greater pain intensity and continued CLBP suffering were associated with the domains of quality working life, such as less work engagement or functional capacity. Promising advantages was shown in improvements of physical comfort, resulted from appropriate ergonomic support have also been associated with better task focus and lower levels of perceived mental fatigue during both cognitively and physically demanding work activities. Moreover, comprehensive ergonomic intervention also recommended inclusion of movement alongside with chair modification in this sedentary work schedules. Systematic reviews supported that standing or walking movement in the daily work also added a significant result to reduce musculoskeletal symptoms in CLBP patients. Together, these results suggested that holistic approach which combined ergonomic chair solutions with the opportunities for regular activity is considerably important for improved musculoskeletal health and working performance of sedentary-related jobs in workplaces.

Discussion

These results suggested that ergonomic chair interventions were proven to give beneficial effect in reducing CLBP symptoms and enhancing quality-of-working life outcomes for health care workers. These results are broadly consistent with biomechanical evidences demonstrating that prolonged seating directly affects the intervertebral disc and lumbal pressure resulting in a higher neuromuscular demand. However, ergonomic chair interventions have different interpretations when implemented in hospital settings. It is important to highlight the heterogeneous work activities of hospital working environments, which consisted of not only sedentary-related activities, such as administrative work documentation or diagnostic workstation, but also activities that require a high level of movement, such as patient handling or prolonged standing in surgical operation. Furthermore, specific healthcare professionals (neurosurgeons and certain interventional clinicians) are commonly exposed to prolonged static and non-neutral positions during clinical operations, including extended torso flexion and limited working positions, which are established as higher risk to develop CLBP.

In general, health care providers are found to have varied distribution of risk magnitude on developing CLBP. This depends on daily interventions being performed and common cases appeared in daily clinical services. Therefore, ergonomic chair interventions can be of general importance for hospital staff carrying out prolonged seated tasks and might

have lower effects in the less-related sitting jobs. This variability highlights the importance of recognizing ergonomic seating as a component of a multifactorial occupational health intervention strategy, not a uniform solution applicable to all musculoskeletal symptoms arise from hospital-based jobs.

Across the reviewed studies, chair adjustability appeared to be an important design characteristic influencing outcomes. Seating systems that allow individualized adjustment of seat height, seat depth, backrest inclination, and lumbar support tend to be associated with more favorable pain and comfort-related outcomes. This finding reflected the wide anthropometric variability among healthcare workers and highlighted the limitations of fixed chair designs in accommodating diverse body dimensions and postural requirements. All of the evidence also suggested that chair-based interventions were most effective when implemented as part of a broader ergonomic strategy. Studies combining ergonomic seating with workstation optimization and user education generally report better outcomes than those providing equipment alone. In the absence of adequate instruction, even well-designed chairs may be underutilized or improperly adjusted, limiting their potential benefit.

However, interpretation of these findings is nonetheless constrained by methodological heterogeneity and the predominance of office-based study populations. Further research specifically targeting hospital workers with statistical analysis and adjustment for postural structure and generalize anthropometric result is highly needed.

Conclusion

Ergonomic chair interventions may be a potential component of holistic strategies for managing chronic low back pain and quality of working-life problems in the healthcare sector. The available evidence also points towards the influence of important design, in particular adjusting features ensuring individualized layout and adequate lumbar support, integrated into full workplace ergonomic interventions. As for practice, multifaceted ergonomic approaches should be used by healthcare organizations, which include adjustable seating and organized education on equipment and postural awareness. However, due to the variety of tasks in the hospital environment and the limitations of literature, future studies should prioritize high-quality studies conducted on hospital-based populations to produce contextually relevant ergonomic recommendations.

Competing Interests

I declared no competing interests to be concluded.

Acknowledgments

I would like to thank dr. Chasbullah Abdulmadjid Regional Public Hospital, Bekasi City for invaluable support in completing this study.

References

1. Channak S, Klinsophon T, Janwantanakul P. The effects of chair intervention on lower back pain, discomfort and trunk muscle activation in office workers: a systematic review. Int J Occup Saf Ergon. 2022;28(3):1722-31.
2. Sabola NE, Wifaq K, Alruwaili MM, Sweelam RKM, El-Amrosy SH, Abdelwahed AY. Chronic lower back pain among occupational workers: effect of relaxation technique on quality of working life, pain and disability level with nurse-led intervention. BMC Nurs. 2025;24(1):122.
3. Driessen MT, Proper KI, van Tulder MW, Anema JR, Bongers PM, van der Beek AJ. The effectiveness of physical and organisational ergonomic interventions on low back pain and neck pain: a systematic review. Occup Environ Med. 2010;67(4):277-85.
4. van Vledder N, Louw Q. The effect of a workstation chair and computer screen height adjustment on neck and upper back musculoskeletal pain and sitting comfort in office workers. S Afr J Physiother. 2015;71(1):279.
5. Roman-Liu D, Kamińska J, Tokarski T. Effectiveness of workplace intervention strategies in lower back pain prevention: a review. Ind Health. 2020;58(6):503-19.
6. Lee S, De Barros FC, De Castro CSM, De Oliveira Sato T. Effect of an ergonomic intervention involving workstation adjustments on musculoskeletal pain in office workers-a randomized controlled clinical trial. Ind Health. 2021;59(2):78-85.
7. Urits I, Burshtein A, Sharma M, Testa L, Gold PA, Orhurhu V, et al. Low back pain, a comprehensive review: pathophysiology, diagnosis, and treatment. Curr Pain Headache Rep. 2019;23(3):23.
8. Alexander LA, Hancock E, Agouris I, Smith FW, MacSween A. The response of the nucleus pulposus of the lumbar intervertebral discs to functionally loaded positions. Spine. 2007;32(14):1508-12.
9. Cochrane Work Group (Ed). Workplace interventions for increasing standing or walking for decreasing musculoskeletal symptoms in sedentary workers. Cochrane Database Syst Rev. 2019. doi:10.1002/14651858.CD012487.pub2.
10. del Pozo-Cruz B, Gusi N, Adsuar JC, del Pozo-Cruz J, Parraca JA, Hernandez-Mocholí M. Musculoskeletal fitness and health-related quality of life characteristics among sedentary office workers affected by sub-acute, non-specific low back pain: a cross-sectional study. Physiotherapy. 2013;99(3):194-200.
11. Pynt J, Higgs J, Mackey M. Seeking the optimal posture of the seated lumbar spine. Physiother Theory Pract. 2001;17(1):5-21.
12. Simsek S, Yilmaz E, Karahan AY. Prevalence and risk factors of chronic low back pain among healthcare workers in hospital settings. *Rev Bras Ortop*. 2017;52(4):451–458.
13. Elfergani H, Yousif A, Al-Makhaita A, Al-Zahrani A. Prevalence and risk factors of low back pain among healthcare workers in Saudi Arabia. *BMC Musculoskelet Disord*. 2019;20:56.
14. Ilmidin A, Putra IK, Suryadi T. Work-related risk factors of low back pain among healthcare workers: a systematic review. *Int J Occup Saf Health*. 2022;12(2):97–105.
15. Curran M, O'Sullivan L, O'Sullivan P, Dankaerts W, O'Sullivan K. Does using a chair backrest or reducing seated hip flexion influence trunk muscle activity and discomfort? A systematic review. Hum Factors. 2015;57(7):1115-48.
16. Makhsous M, Lin F, Bankard J, Hendrix RW, Hepler M, Press J. Biomechanical effects of sitting with adjustable ischial and lumbar support on occupational low back pain:

evaluation of sitting load and back muscle activity. BMC Musculoskelet Disord. 2009;10:17.
17. De Carvalho DE, Callaghan JP. Effect of office chair design features on lumbar spine posture, muscle activity and perceived pain during prolonged sitting. Ergonomics. 2023;66(10):1465-76.
18. O'Sullivan K, McCarthy R, White A, O'Sullivan L, Dankaerts W. Lumbar posture and trunk muscle activation during a typing task when sitting on a novel dynamic ergonomic chair. Ergonomics. 2012;55(12):1586-95.
19. Ellegast RP, Kraft K, Groenesteijn L, Krause F, Berger H, Vink P. Comparison of four specific dynamic office chairs with a conventional office chair: impact upon muscle activation, physical activity and posture. Appl Ergon. 2012;43(2):296-307.
20. Kingma I, van Dieën JH. Static and dynamic postural loadings during computer work in females: sitting on an office chair versus sitting on an exercise ball. Appl Ergon. 2009;40(2):199-205.
21. van Dieën JH, De Looze MP, Hermans V. Effects of dynamic office chairs on trunk kinematics, trunk extensor EMG and spinal shrinkage. Ergonomics. 2001;44(7):739-50.
22. van Niekerk SM, Louw QA, Hillier S. The effectiveness of a chair intervention in the workplace to reduce musculoskeletal symptoms. A systematic review. BMC Musculoskelet Disord. 2012;13:145.
23. Rempel DM, Wang PC, Janowitz I, Harrison RJ, Yu F, Ritz BR. A randomized controlled trial evaluating the effects of new task chairs on shoulder and neck pain among sewing machine operators. Spine. 2007;32(9):931-8.
24. Daneshmandi H, Choobineh A, Ghaem H, Karimi M. Adverse effects of prolonged sitting behavior on the general health of office workers. J Lifestyle Med. 2017;7(2):69-75.