

Sedentary Desks, Aching Backs: A Narrative Review of Low Back Pain and Prolonged Sitting

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Abstract: *Low back pain (LBP) remains prevalent and a disabling issue, particularly for office employees who spend extensive time sitting. As sedentary work habits become more common, the incidence of musculoskeletal disorders such as LBP has grown, drawing increased attention. This narrative review explores the association between extended sitting and the onset of LBP among office workers. It evaluates contributing factors such as poor sitting posture, inadequate ergonomic setups, and insufficient physical movement. The paper also examines preventive strategies, including ergonomic modifications, regular physical activity, and postural variation. The findings emphasise the need for targeted workplace interventions and behavioural changes to reduce the impact of LBP, thereby enhancing worker well-being and productivity. Future research directions are suggested, focusing on long-term interventions and the influence of individual factors in LBP management.*¹

Keywords: low back pain, sedentary work habits, office ergonomics, sitting posture, workplace prevention

1. Introduction

Modern lifestyles have increasingly adopted sedentary behaviours, with many individuals spending a significant amount of time seated during both work and leisure.^[1] Simultaneously, there has been a notable rise in low back pain (LBP), particularly among office personnel. Call centre workers, for instance, may remain seated for nearly 95% of their workday, while often managing high-stress interactions with difficult clients.² Occupational stress is believed to contribute significantly to musculoskeletal problems, including LBP, which may explain why call-centre staff report higher rates of such conditions compared to other office professionals³

Given that LBP is the third most commonly reported cause of disability and imposes a substantial economic strain, it is essential to understand workplace-related risk factors to develop effective prevention strategies.⁶

While it seems logical to link sedentary office work with LBP, the literature presents mixed evidence. Some studies have found that sitting more than seven hours a day significantly increases LBP risk⁴ However, other reviews failed to confirm a direct relationship between sitting duration and LBP⁸. These inconsistencies may result from methodological limitations such as small sample sizes, subjective measures, and short observation periods.

Despite debate over the role of sitting time alone, specific sitting behaviours appear to be more clearly related to LBP. Research shows that individuals with LBP tend to sit longer without breaks and adopt slouched postures¹⁰. Although numerous studies have attempted to define the "ideal" posture, no universal agreement has emerged. Research also shows that even a "correct" posture, if maintained without variation, may still lead to discomfort and LBP¹¹.

Incorporating regular postural changes and minor movements may be key to preventing LBP. Dynamic sitting can relieve spinal stress, reduce muscle fatigue, and protect against lumbar disc damage⁴. Even short periods of inactivity can negatively affect spinal biomechanics, making

movement crucial for spinal health⁹.

2. Method

A comprehensive database search was conducted to identify relevant peer-reviewed literature. Keywords included combinations of terms such as "low back pain," "prolonged sitting," and "office workers." The literatures are search was conducted across multiple databases, including CINAHL Plus, Cochrane Library, DOAJ, Google Scholar, Medline/PubMed, ProQuest, ScienceDirect, Scopus, SPORTD, Swe Pub, Wiley (Cross Ref), Informa Healthcare, and Health Reference Centre Academic. Additional articles were sourced from references in selected studies and expert recommendations.

The research explored several themes: workplace posture, ergonomic factors, and pain management in relation to sitting duration. Eligible studies examined the impact of LBP on office workers' daily functions, workplace conditions, and intervention outcomes. Only English- language articles published between January 2011 and September 2024 were included. Military- specific studies were excluded due to their limited applicability to general office settings.

Duplicate entries were removed. Two reviewers screened the titles and abstracts for relevance. Full-text review followed for studies that met the inclusion criteria or required further evaluation. Consensus determined final inclusion. Data from the selected literature were extracted and categorised by one reviewer with support from the other.

3. Result

The body of reviewed literature⁶⁷ indicates a clear link between extended periods of sitting and the occurrence of LBP, especially in office-based roles. Numerous cross-sectional and longitudinal studies identified prolonged static posture as a significant risk factor for developing musculoskeletal issues. Notably, both the amount of timer's are spinets in sitting and the quality of life or body posture were associated with increased LBP incidence. Common

contributors included insufficient lumbar support, slouching, and infrequent movement.

In contrast, more active sitting habits and postural variation correlated with decreased spinal discomfort. Psychosocial conditions like low job satisfaction, high job demands, and low physical activity outside work further exacerbated LBP symptoms.

Objective tools, such as accelerometers, revealed stronger associations between sedentary behaviour and LBP than self-reported data alone. International studies confirmed similar trends across various settings, despite differences in ergonomic awareness and workplace practice Overall, LBP appears to arise from multiple modifiable factors including posture, sitting time, and work-related stress Overall, LBP appears to arise from multiple modifiable factors including posture, sitting time, and work-related stress

4. Discussion

The literature consistently supports a relationship in between sedentary life of work behavior the development of LBP. Foundational study highlighted static sitting as a high-risk factor for LBP in around office environments. More recent investigations emphasized how long sitting intervals, particularly without breaks, can increase mechanical strain on

the lower back. These findings were validated through objective measurement methods.

Postural integrity plays a critical role in managing LBP. Studies demonstrated that poor lumbar alignment contributes substantially to pain among workers. Conversely, dynamic stimuli during sitting sessions can reduce discomfort, highlighting the importance of movement and postural variation.

Psychosocial elements such as stress and dissatisfaction at work further compound physical risks. Research showed that these factors are frequently associated with higher LBP prevalence.

Global studies offer a broader view, revealing consistent LBP patterns regardless of geographic location. Variations in ergonomic standards and cultural perceptions may influence outcomes, but core risk factors remain largely the same.

Recent reviews support the notion that sedentary behavior is a preventable occupational hazard, addressable through environmental design and behavior-focused interventions. Although the heterogeneity in study designs limits causal conclusions, the collective evidence strongly suggests that prolonged sitting, poor posture, and insufficient movement are central contributors to LBP.

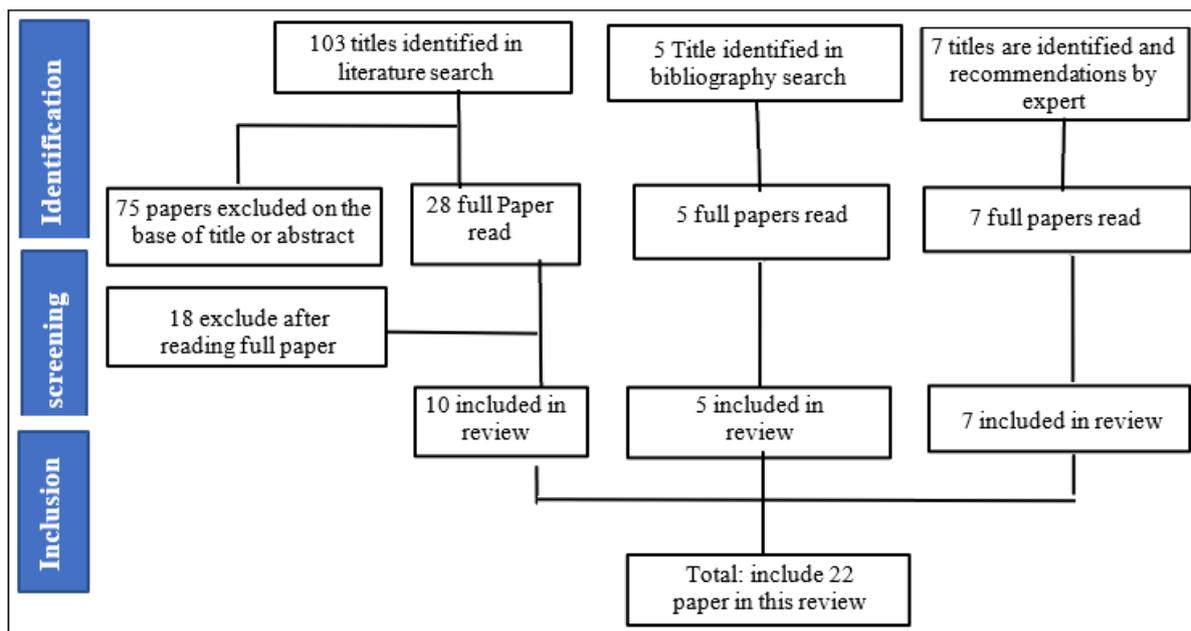


Figure: The review process led to the inclusion of studies that met the eligibility criteria after identification, screening, and full-text assessment

5. Review of Literature Table

Author and Year	Objectives of the Study	Population	Study Variables	Study Design	Outcome Measure	Conclusion
(Deursen, 1998)	This study aims to explore how controlled, rotational dynamic movements affect low back pain during extended periods of sitting.	We included 120 individuals diagnosed with low back pain (LBP) in this study, of whom 72 are female or 48 were male. Each participant underwent a neurological examination along with	Participants with nonspecific lower back pain lasting over six weeks and worsened by prolonged sitting were included. Those with lumbar radicular	Experimental study	The Pain intensity is assessed by using an open-format of Visual Analogue Scale (VAS).	The authors is concluded that these stimuli, particularly those at lower frequencies, helped to reduce pain during prolonged sitting.

		lumbar spine X- rays to ensure a comprehensive evaluation. Before taking part, all patients were informed about the nature and purpose of theses study, and written consent was obtained from each one.	symptoms, systemic illnesses, vertebral instability, fractures, or malignancies were excluded.			
(Laxmaiah Manchianti, 2000)	Understanding the history of lower back pains are both relevant and essentials for the rational planning of healthcare programs. It is serves as a baseline against which is effectiveness of numerous treatment approaches can also evaluate.	Chronic low back pain was assessed at 3, 6, and 12 months, focusing on cases linked to prolonged sitting in individuals with specific lower back pain.	The assessment for lower back pain included both all the subject's recollection of symptoms and an analysis of their body posture.	Cohort studies	Information on the prevalence or incidence of low back pain can be obtained through multiple channels, such as patient interviews, self-reported questionnaires, clinical research, insurance data, and hospital records.	Encouraging patients to don't smoking stay Being active and maintaining a healthy weight can help prevent low back pain and address psychosocial factors is part of good medical practice. While these measures may not directly relieve low back pain, they can certainly having positive indirect effect on its management.
(AM Lis, 2007)	This paper reviews recent studies on The link between prolonged sitting and lower back pain in working populations	worldwide working population	Common contributors to lower back pain in occupational settings include static posture, awkward working positions, sedentary tasks, trunk twisting, and conditions such as sciatica	Cross- survey study	Sciatica	Sitting alone does not appear to have a strong association with the presence of reported lower back pain (LBP)
Tissot, 2009)	This study examined the prevalence of low back pain (LBP) and its bivariate associations with various working patterns or sitting posture.	A household survey was carried out using a weighted random sample of non- institutionalize residents.	Participants were asking whether a had experienced significant lower back pain in a past 12 months, with response options ranging from "never" to "occasionally," "fairly often," and "all the time."	Survey Study	(LBP)	This study found a mandatory standing work or without the option to sit on chair is linked to lower back pain in both genders. To our knowledge, it is the first to explore various standing postures and their association with low back pain among workers who mainly sitting.
(Rahman Shiri, 2010)	This study aimed to assess the association between smoking and low back pain through meta-analysis	Included studies had cohort, case- control, or cross- sectional designs in general populations . Excluded were studies on clinical populations, those with patient- derived controls, sample sizes under 30, or response rates below 60% or not reported.	Chronic low back pain was defined as discomfort lasting longer than 7 to 12 weeks, or recurring for more than 30 days within the past year.	section al study	Low back pain outcomes were based on the recommend ations from the Meta- Analysis of Pain in the Lower Back and Work Exposures Collaborative Group.	This study found the mandatory standing at work without the option to sit is linked to lower back pain in both genders. To our knowledge, it is the first to explore various standing postures and their association with low back pain among workers who mainly stand
(Jan Hartvigse n1, 2010)	This review aims to critically evaluate recent studies that examine sitting at	The studies were categorised into two groups: those focusing on sitting while working and	The search focused on studies related to low back pain, occupational factors, and epidemiology,	cross-sectional study	questionnaire, personal interview, medical records, etc.	Although sitting while working is often considered a risk factor for low back pain (LBP),

	work as a risk factor for low back pain (LBP).	those examining sedentary occupations more broadly	using keywords such as "sitting," "sedentary lifestyle," and "work occupation."			studies across various settings and definitions of LBP have consistently failed to show a statistically significant positive association between the two.
(Janwanta Nakul, 2012)	This study set out to review existing prospective cohort studies to better understand what factors might contribute to the development of low back pain among office workers.	The study focused on linking low back pain with risk or prognostic factors in office settings, specifically involving computer use, visual - display units (VDUs), or visual- display terminals (VDTs).	The severity of low back pain (LBP) has been associated with several sociodemographic factors, including sex, age, level of education, smoking habits, and occupation.	cohort study	Each study's quality was reviewed using a 21- item checklist, covering internal validity and descriptive detail. The strength of evidence for LBP risk factors was then rated across five levels, based on how many studies supported each factor and how strong those studies were.	Recent studies highlight psychosocial work factors as key risks for back pain. Managing computer work- related to the low back pain should address both physical and psychological elements.
(Yilmaz 2012)	This review aimed to evaluate psychosocial and physical factors associated with occupational low back pain based on current literature.	Common spinal conditions include osteoarthritis, disc degeneration, osteoporosis, and nonspecific low back pain.	Machine operators (such as earth mover drivers and long shermen) were regularly subjected to whole-body vibration and extended sitting, occasionally performing manual material handling tasks. Especially during maintenance tasks. Personal Data collected included age, weight, height, job tenure, daily working hours, sex, marital status, education level, smoking status, habits, physical activity, and other relevant factors.	cross-sectional study	Self made questionnaires	Low back discomfort is linked to indicators of disc deterioration and sciatic discomfort relating to posterior disc protrusions. These is a significant correlation between low back pain and one's occupation
(Schinkel-Ivy, 2013)	This study investigated trunk muscle co-contraction differences. The study compared trunk muscle activity between PD and NPD individuals during a two-hour sitting period.	Ten male participants (mean ± S D: height 1.83 ± 0.09m, weight 85.8 ± 15.6 kg, age 24 ± 2 years) were recruited from a university- age group of population	All participants were free of pain in the neck, back, and shoulders at the time of the study.	Survey Study	AS scores	Pain developers showed greater trunk muscle contractions, which increase over time during sitting. This rise in co-contraction was accompanied by higher perceived pain levels.
(B. del Pozo-Cruz a, 2013)	This study assessed musculoskeletal HRQOL and fitness in sedentary office workers with sub-acute LBP, comparing results to healthy peers.	The study included 190 sedentary office workers: 118 with sub-acute, non-specific lower back pain (47 men's, 71 women's) and 72 age- matched healthy controls (30 men's, 42 woman's).	Occupational secondary prevention setting suffering from non- specified sub acute low back pain	cross-sectional study	Disability was assessed using the Oswestry and Roland- Morris Disability Questionnaire, with results compared across genders and conditions.	Physical in office workers with sub-acute, non- specific low back pain showed reduced musculoskeletal fitness- particularly in trunk muscle endurance- compared to healthy,

						age- matched controls. Their HRQOL was also significantly lower.
(Amir Loghmani, 2013)	This study examined the prevalence of musculoskeletal symptoms in Iranian office workers and explored the associations between pain severity, job satisfaction, and musculoskeletal disorders (MSDs).	A random sample of 91 Iranian university office workers was selected for inclusion in the study.	high-risk for musculoskeletal disorders (MSDs),	cross-sectional study	Nordic musculoskeletal questionnaire plus visual analogue scale of pain,	This study shows that musculoskeletal symptoms are common among Iranian office workers and are linked to low job satisfaction. The findings highlight the need for greater attention to MSDs in this group and the development of effective prevention strategies.
(Katariina Luoma, 2014)	This study aimed to examine the relationship between low back pain (LBP) and lumbar disc degeneration associated with prolonged sitting.	The study included 164 men's aged 40–45 years: 53 car drivers, 51 construction carpenter's, and 60 office workers.	chronic or acute back pain	Survey study	Data were collected through a questionnaire and structured interview. Lumbar disc degeneration at L2 or L3 to L5/S1-identified by nucleus dark pulposus or disc bulging— was assessed via MRI.	Prolonged sitting negatively affected office workers, suggesting that active workstations may help improve workplace conditions.
(Gupta1, 2015)	To investigate an association link between objectively recorded sitting duration- both total and segmented by work and leisure, and the prevalence of low back pain among blue-collar workers.	A total of 201 blue-collar workers participated by wearing two accelerometers to track activity.	Blue-collar workers are selected from 7 workplaces, including construction's, cleaning, waste collection, manufacturing, assembly, mobile plant operations, and healthcare.	cross-sectional study	Sitting time was estimated using Acti4 software.	Sitting time is positively linked to LBP intensity among field workers. Future research should use prospective's designs with objective measures of sitting's time.
(Daneshmandi, 2017)	Spending long hours seated has been connected to several health problems. This research explored how common this behaviour is among Iranian office workers and its possible consequences	This study involved 447 Iranian office workers and examined their sitting behavior is a risk factor for many adverse health outcomes	Who had complaints of lumbar pain.	Cross-sectional study	The General Nordic Musculoskeletal Questionnaire (NMQ) was used to assess musculoskeletal symptoms reported in various body regions over the past 12 months. Each participant completed a questionnaire in person at their workplace.	A stronger correlation was identified between sitting habits and chronic lower back pain and acute pain of disability. This could be due to the observation that those experiencing chronic pain tend to be more conscious of pain-free sitting postures and movements that exacerbate their discomfort, in contrast to individuals suffering from acute pain.
(Sunyue Ye, 2017)	This study looked at what might cause neck and lower back pain in people who spend much of their	This study surveyed 417 office workers from 15 companies, including 163 men and 254 women.	The study focused on non-specific neck pain's (NP) and low back pain (LBP's), two common's musculoskeletal	Observational study with a cross-sectional sample.	Demographic data were collected through self-reported. The Northwick's Park Neck Pain's Questionnaire or the	Improper monitor placement specifically not positioned directly in front of the user-are identified as a key risks factor for neck

	workday using a computer.		complaints among office workers.		Oswestry's Disability Index's were used, along with additional question's, to assess occupational risk factors and perceived pain levels.	and low back pain's among female computer users.
(Bontrup, 2019)	To investigate d the relationship in between low back pain and occupation al sitting posture or habits in 64 mobile center Employees	The data of different types of LBP, individual characteristics, and lifestyle factors	Individuals with chronic low back pain tended to maintain more static sitting postures.	Experimental study	Static sitting behavior was observed among call center workers with chronic low back pain and related disability.	Pain was positively associated with time spent sitting, and negatively associated with time spent standing and walking.
(Keskin , 2019)	This study aimed to evaluate whether prolonged sitting and sitting posture are risk factor's or lumbar pain in office's worker's.	The studies was conducted over two weeks at two call center worksites, including 64 participants from one site and 131 office workers with lumbar pain from the other.	Office workers aged 18–65 with lumbar pain complaints who primarily worked in a sitting position were included in the study.	Correlational study	Pain duration was correlated with the percentages of sitting, standing, and walking, while pain severity was specifically associated with sitting time.	A positively co-r-relation are also found between a pain intensity's and the percentage of time spent sitting.
(Guzin Kaya Aytutuldu, 2020)	The Office worker's is frequently exposed to a work's related musculoskeletal pain due to prolonged sitting and repetitive tasks.	A total number of 150 office workers were included in this study. Lower back pain, musculoskeletal disorders, neck pain	MSD's or spine curvature's disorder's are, such as scoliosis, kyphosis and kyphoscoliosis	Correlational study	Nordic musculoskeletal questionnaire (NMQ) The Oswestry disability index (ODI)	The Pain- related disability's among office worker's was linked to physical inactivity, BMI, working hours, job tenure, and workplace ergonomics.
(Eduardo Gallas Leivas, 2021)	This study aimed to examine how different work-related lumbar postures such as sitting, standing, walking, and alternating positions, are associated with low back pain (LBP) among workers.	Data from 529 adult workers. Data were obtained from a private company's database. Predominant lumbar posture was determined based on the proportion of time workers spent sitting, standing, walking, or alternating between these positions during their workday.	A Low back pain (LBP) in the past 12 months is associated with the female sex, blue-collar work, frequent fatigue, pain in other body regions during the same period, a history of LBP, and monotonous tasks.		The study outcomes were LBP symptoms reported over the past day's and the past 12 month's.	Compared to walking, a standing posture was linked to a higher likelihood of reporting LBP in a past 12 month's. LBP during a past year and the previous 7 days was also associated with various personal and clinically factor's.
(Marzena Malińska, 2021)	A study aims to identify key determinants of a neck and low back pain (LBP) among going office workers across different age groups.	A total of 2,000 Computer workers completed a questionnaire covering demographics, musculoskeletal disorders (MSDs), and lifestyle factors. Ergonomics of a computer worker's and psychosocial and physical job characteristics	demographics, musculoskeletal disorders (MSDs), lifestyle characteristics, poor ergonomics of computer workers and mental and physical job characteristics	Cross-sectional study	The questionnaire also included BMI and lifestyle- related items such as self-rated health, diet, smoking, and alcohol consumption.	The most effective way to reduce MSD risks at work is through health programs that promote healthy lifestyles and raise awareness of ergonomics and work organization - especially among women and older workers.
(Andy Yuwono1, 2021)	Sitting for half or more of the work shift is an occupation al risk factor linked to a higher likelihood of their is a non-	A research included 61 respondents with no musculoskeletal disorders, a normal BMI (18–25 kg/m ²), who primarily work in a sitting position	Specific low back pain refers to pain caused by identifiable conditions such as degenerative, inflammatory, infectious, or	cross- section al analytic al studied	A Participants either had a body mass index (BMI) within the normal range of 18–25 kg/m ² or were	Only 9% of participants reported sitting for less than half of their work shift. Low back pain was reported by 65.57% of office

	specific's of low back pain.	and voluntarily agreed to participate.	neoplastic diseases. In contrast, non-specific low back pain has no clearly identifiable underlying cause.		assessed for functional disability using the Oswestry Low Back Pain Disability Questionnaire	workers, while 34.43% reported no symptoms. These findings suggest a significant association between sitting duration and low back pain among office workers in a DKI Jakarta.
(Nuray Alaca, 2025)	This scoping review aimed to identify key themes and gaps in research on how sitting time, posture, and behaviour influence low back pain risk among office workers.	involving 7814 participants acute or chronic low back pain	The Office workers typically spend about two-thirds of their workday's on seated in the workplace.	scoping review	Mixed Methods Appraisal Tool (MMAT).	When addressing workplace ergonomics and low back pain (LBP), it's important to consider's a all contributing factor's siting time, and a posture, and workers' behaviour

6. Summary of Review

The present narrative review synthesises existing evidence on the relationship between prolonged sitting and low back pain (LBP) among office workers. The findings indicate that while sitting duration alone does not uniformly predict LBP, the *manner* in which sitting occurs- characterised by static posture, poor ergonomics, and insufficient movement- plays a critical role in the development and persistence of low back symptoms. This supports the growing consensus that LBP in office workers is multifactorial, involving physical, behavioural, and psychosocial components.

A consistent observation across the reviewed literature is the detrimental effect of prolonged static sitting on spinal health. Several studies included in this review demonstrated that extended uninterrupted sitting increases mechanical loading on the lumbar spine, reduces disc nutrition, and contributes to muscle fatigue. Dynamic studies, such as those by Van Deursen et al., highlighted that controlled movement during sitting significantly reduces pain intensity, suggesting that immobility rather than sitting itself is a primary contributor to LBP. These findings align with biomechanical models showing that sustained flexed postures elevate intradiscal pressure and strain posterior spinal structures.

Postural factors emerged as another key determinant of LBP. Poor lumbar alignment, slouched posture, and inadequate back support were frequently associated with higher pain prevalence. Although traditional ergonomic recommendations often promote a "correct" sitting posture, the reviewed evidence suggests that maintaining any single posture for prolonged periods may still be harmful. Studies increasingly emphasise postural variability as a protective factor, reinforcing the concept that frequent postural changes and micro-movements are essential for spinal health. This challenges static ergonomic prescriptions and supports a more dynamic approach to workstation design.

In addition to physical factors, psychosocial influences were strongly associated with LBP among office workers. High job

demands, low job satisfaction, work-related stress, and reduced physical activity outside work were repeatedly linked to increased pain intensity and disability. These findings are consistent with biopsychosocial models of pain, which recognise that psychological stress can amplify pain perception, muscle tension, and maladaptive postural behaviours. Importantly, studies from diverse geographic regions reported similar psychosocial associations, suggesting that these factors transcend cultural and occupational boundaries.

Objective assessment methods strengthened the evidence linking sedentary behaviour to LBP. Studies using accelerometers and posture-monitoring devices demonstrated clearer associations between sitting time, reduced movement variability, and pain outcomes compared to self-reported measures. This highlights the limitations of subjective data and underscores the importance of objective monitoring in future research. The discrepancy between self-reported and objectively measured sitting time may partially explain inconsistencies observed in earlier studies that failed to identify a strong relationship between sitting and LBP.

International studies included in this review revealed consistent patterns of LBP across office-based populations, despite differences in workplace ergonomics and awareness. This suggests that prolonged sitting-related LBP is a global occupational health concern. However, variations in ergonomic standards, access to preventive interventions, and organisational policies may influence the severity and persistence of symptoms. These differences highlight the need for context-specific workplace interventions that consider organisational culture and resource availability.

Despite strong associative evidence, causal conclusions remain limited due to heterogeneity in study designs, outcome measures, and definitions of LBP. Most included studies were cross-sectional, restricting the ability to establish temporal relationships. Nevertheless, the convergence of findings across longitudinal, experimental, and observational studies strengthens the argument that prolonged static sitting,

combined with poor posture and limited movement, significantly contributes to LBP development.

From a clinical and occupational health perspective, the findings of this review support multidimensional preventive strategies. Ergonomic interventions alone may be insufficient unless combined with behavioural modifications such as scheduled movement breaks, sit-stand workstations, and employee education on postural awareness. Additionally, addressing psychosocial stressors through organisational support and workload management may further reduce LBP risk.

7. Conclusion

Prolonged time worker's sitting has been shown to negatively impact lower back health, particularly in office workers. Factors such as static posture, poor ergonomic setup, and lack of bodily movement significantly contribute to the onset and worsening of the LBP. These physical stressors are often intensified by psychological and occupational pressures like job dissatisfaction and high workload.

Addressing this problem requires a holistic approach—one that integrates ergonomic redesign, employee education, movement-promoting strategies, and psychosocial support. Employers and policymakers should invest in evidence-based workplace wellness programs that target these multifactorial risks. With a proactive and comprehensive strategy, it is possible to reduce LBP prevalence, enhance employee well-being, and foster a more productive workforce.

This narrative review highlights prolonged sitting as a substantial and modifiable occupational risk factor contributing to low back pain (LBP) among office workers. The evidence synthesised in this review demonstrates that LBP is not solely a consequence of the total duration of sitting but is strongly influenced by sitting behaviour, postural habits, ergonomic conditions, and psychosocial workplace factors. Static sitting postures, inadequate lumbar support, limited movement variability, and prolonged uninterrupted sitting emerge as consistent contributors to lumbar discomfort and functional limitations.

The findings underscore that **sedentary work environments**, when combined with poor ergonomic design and insufficient physical activity, create cumulative mechanical stress on the lumbar spine. Over time, this stress may accelerate disc degeneration, muscular fatigue, and altered neuromuscular control, thereby increasing vulnerability to both acute and chronic LBP. Importantly, evidence suggests that even individuals who adopt "correct" sitting postures remain at risk if postural variation and movement are absent, reinforcing the need to shift from static ergonomic models toward **dynamic sitting concepts**.

Psychosocial factors— including job dissatisfaction, high workload, occupational stress, and low levels of physical activity outside working hours— further amplify the risk and severity of LBP. These findings support a **biopsychosocial understanding of LBP**, emphasising that effective prevention and management strategies must address not only

physical exposures but also behavioural and organisational influences within the workplace.

From a preventive and clinical perspective, this review highlights the importance of **multifaceted workplace interventions**. Ergonomic workstation design, promotion of sit-stand workstations, scheduled movement breaks, postural education, and workplace exercise programs are essential components of an effective LBP prevention strategy. Additionally, organisational policies that encourage task variation, reduce prolonged sitting demands, and support employee well-being may play a critical role in reducing the overall burden of work-related LBP.

Despite the valuable insights provided, this review also identifies several gaps in existing literature. The predominance of cross-sectional studies limits causal inference, and there is a need for more high-quality longitudinal and intervention-based research using objective measures of sitting time and posture. Future studies should explore the long-term effectiveness of dynamic sitting interventions, individual susceptibility factors, and the combined impact of ergonomic and psychosocial modifications on LBP outcomes.

In conclusion, prolonged sitting-related low back pain among office workers represents a significant yet preventable occupational health issue. Addressing this challenge requires a comprehensive, evidence-based approach that integrates ergonomic innovation, behavioural change, and organisational support. Implementing such strategies has the potential to not only reduce the prevalence and severity of LBP but also enhance employee well-being, productivity, and overall quality of life in modern sedentary workplaces.

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