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The Impact of Prolonged Sitting Ergonomic Exposure at Work on Office Workers' Sleep Quality: A Recent Scientific Review

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Abstract

Unergonomic sitting positions and prolonged sitting duration can negatively impact workers' sleep quality and productivity. Various studies indicate that extended sitting is associated with sleep disorders, including obstructive *sleep apnea* (OSA), decreased heart rate variability, and an increased risk of other chronic diseases. To address these issues, ergonomics-based interventions—such as active workstations, dynamic work patterns, and increased physical activity during working hours—are recommended. Recent scientific literature highlights the importance of implementing strategies to prevent sleep disorders through interventions related to sitting posture, ultimately promoting workplace health. This aligns with the university's vision of supporting worker well-being, particularly in health, through an evidence-based approach. The findings from this review are expected to serve as a foundation for developing sustainable occupational health policies, particularly in workplace settings. This review examines the ergonomic impact of prolonged sitting on office workers' sleep quality and explores preventive measures to mitigate associated risks.

Keywords: *Ergonomics; Prolonged Sitting; Office Workers, Sleep Quality, Work Productivity, Occupational Health.*

Introduction

Sleep disorders have become a common health issue among office workers, with a high prevalence of 30–50% in some regions (Ohayon, 2011). Prolonged sitting, particularly for more than eight hours a day, is one of the primary factors affecting sleep quality. Static and non-ergonomic sitting positions can cause muscle tension, back pain, and musculoskeletal disorders, leading to disruptions in sleep duration and efficiency (Noll et al., 2017). Additionally, excessive sitting contributes to metabolic disorders such as obesity, hypertension, and cardiovascular disease, which directly or indirectly impact sleep quality (Daneshmandi et al., 2017; Vincent et al., 2017).

In the modern workplace, the shift from manual labor to digitalization has led to increased sedentary behavior (Daneshmandi et al., 2017). Employees often face a monotonous work environment, spending long hours in front of computer screens, which can cause both physical and psychological strain. A lack of physical activity and poor sitting posture further increase the risk of sleep disorders, such as obstructive sleep apnea (OSA) and insomnia (Pitta et al., 2022).

Research also indicates that prolonged sitting can impair autonomic nervous function, as reflected by decreased heart rate variability (HRV) during sleep. This suggests an imbalance between the sympathetic and parasympathetic nervous systems, which negatively affects sleep quality (Hallman et al., 2015). Moreover, suboptimal workplace ventilation—such as high carbon dioxide (CO_2) levels - can further deteriorate vascular function and sleep quality (Headid et al., 2020).

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The high prevalence of sleep disorders associated with prolonged sitting underscores the need for preventive measures and workplace interventions. This literature review aims to explore the relationship between prolonged sitting and sleep disorders, identify key challenges, and discuss potential solutions. Additionally, this article seeks to raise awareness of the importance of ergonomics in promoting healthy sleep, which should be supported by company policies that prioritize worker well-being. By gaining a deeper understanding of the connection between prolonged sitting, sleep disturbances, and productivity, more sustainable solutions can be developed. This is essential not only for enhancing office workers' quality of life but also for fostering a healthier and more productive work environment.

Prevalence of Sleep Disorders in Office Workers

Sleep disorders are a major health concern for office workers, particularly those with sedentary lifestyles. The prevalence of sleep disorders in this group ranges from 20% to 40%, with 35% of workers experiencing mild to moderate insomnia and another 15% suffering from more severe conditions (Headid et al., 2020). Common risk factors include prolonged sitting, lack of physical activity, poor ergonomic posture, and high work pressure.

Daneshmandi et al. (2017) found that office workers in Shiraz, Iran, spend an average of 6.29 hours per day sitting, significantly contributing to fatigue and reduced sleep quality. Another study reported that workers sitting for more than eight hours a day face a higher risk of sleep disorders, with a 95% confidence interval (CI) of 1.15–1.25 (Oftedal et al., 2019). Additionally, prolonged sitting is associated with increased REM sleep latency and decreased mean oxygen saturation during sleep (Hallman et al., 2015).

Metabolic disorders, including obesity and hypertension, also have a strong correlation with sleep disturbances. Pitta et al. (2022) found that each one-unit increase in BMI raises the risk of obstructive sleep apnea (OSA) by 1.22 times (95% CI: 1.15–1.29). Furthermore, OSA prevalence among individuals with hypertension reaches 26.44% (95% CI: 0.99–3.43) for moderate cases and rises to 30.77% (95% CI: 1.28–4.06) in severe cases. Prolonged sitting also decreases heart rate variability (HRV) and oxygen saturation levels during sleep (Hallman et al., 2015), further impairing sleep quality.

The work environment significantly influences sleep health. In developed countries, where workers sit for an average of 4.9 hours per day, circadian rhythm imbalances, increased insomnia risk, and reduced sleep quality are common consequences (McLaughlin et al., 2020).

Impact of Prolonged Sitting and Ergonomics on Sleep Disorders

Sitting for extended periods without breaks severely affects sleep quality, particularly for office workers in static positions. Poor ergonomics cause biomechanical stress, leading to discomfort in the lower back, neck, and shoulders, which disrupts sleep patterns and increases the likelihood of insomnia (Daneshmandi et al., 2017). Additionally, minimal physical activity disrupts the circadian rhythm, which is crucial for maintaining a stable sleep-wake cycle (Chueh et al., 2022).

Prolonged sitting elevates blood pressure, reduces metabolic activity, and triggers the release of stress hormones such as cortisol, all of which negatively impact sleep. The effects are more pronounced in individuals who sit for over eight hours a day without taking breaks. Research suggests that short breaks or light activity every 30 minutes significantly improve

cardiometabolic health and sleep quality (Vincent et al., 2017). Modifying daily routines by incorporating intermittent light activity has also been linked to improved sleep outcomes (Oftedal et al., 2019).

Using non-ergonomic chairs and desks exacerbates the physical strain of prolonged sitting. Poor posture leads to continuous muscle tension, which has been associated with sleep disturbances, including insomnia and metabolic disorders like insulin resistance (Lee & Koo, 2015). Additionally, prolonged sitting impairs blood circulation and increases inflammatory cytokine levels, leading to systemic inflammation that further worsens sleep quality (Hallman et al., 2015; Headid et al., 2020).

Long-term exposure to poor posture not only affects physical health but also exacerbates psychological stress, such as anxiety due to work pressure, further increasing the risk of significant sleep disorders (Pitta et al., 2022). Therefore, workplace ergonomics play a crucial role in improving sleep quality and overall worker well-being. Strategies such as ergonomic chairs, properly adjusted desks, and incorporating stretching breaks throughout the workday can help alleviate physical strain and promote relaxation before sleep (McLaughlin et al., 2020).

Small changes in activity patterns, such as increasing movement during work hours, can minimize the health risks of prolonged sitting. Greater attention to ergonomics and reducing sitting duration can serve as effective strategies for enhancing workers' quality of life and overall health (Noll et al., 2017).

Preventive Measures to Reduce Prolonged Sitting and Improve Sleep Quality for Workplace Productivity

Prolonged sitting is a prevalent health concern in modern workplaces, particularly among office workers. This habit not only increases the risk of musculoskeletal disorders but also negatively impacts sleep quality and work productivity. Implementing comprehensive preventive strategies is essential for balancing worker health and performance (McLaughlin et al., 2020).

1. Workplace Ergonomics

The use of ergonomic equipment, such as chairs with proper lumbar support, height-adjustable desks, and eye-level computer screens, helps prevent muscle strain and back pain. These adjustments encourage healthy posture, reducing excessive physical stress and enhancing daily comfort (McLaughlin et al., 2020; Daneshmandi et al., 2017).

2. Physical Activity and Active Breaks

Incorporating light physical activity into the work routine, such as stretching or walking every 30–60 minutes, improves blood circulation and reduces physical stress. Standing desks or treadmill desks have been shown to reduce sitting time by up to 143 minutes per day while increasing energy expenditure (Daneshmandi et al., 2017; Hallman et al., 2015). Physical activity plays a crucial role in regulating hormones associated with sleep quality, with regular movement linked to better hormonal balance and improved sleep patterns (Clark et al., 2017; Vincent et al., 2017; Pitta et al., 2022).

3. Education and Training

Raising awareness about the risks of prolonged sitting and the importance of sleep hygiene is essential. Educational programs covering proper posture, stress management techniques, and

healthy sleep routines can help employees adopt effective preventive measures (Lee & Koo, 2015; Noll et al., 2017; Daneshmandi et al., 2017).

4. Workplace Policies
Organizations play a vital role in supporting preventive efforts through healthy workplace policies. Implementing standing or walking meetings, providing physical activity facilities, and encouraging employees to alternate between sitting and standing can significantly enhance worker well-being (Headid et al., 2020).

5. Work Environment Management
A well-designed work environment also contributes to sleep quality. Optimizing lighting, ventilation, and noise levels can create a more comfortable workspace. Additionally, stress management training and balanced workloads help mitigate mental stress, positively impacting both sleep quality and productivity (McLaughlin et al., 2020; Vincent et al., 2017).

By integrating occupational health strategies into workplace safety programs, the negative effects of prolonged sitting can be minimized. These measures not only enhance sleep quality but also promote long-term worker productivity and well-being.

Conclusion

Exposure to prolonged sitting in the workplace is a key factor affecting the sleep quality of office workers. Sitting for extended periods without physical movement not only contributes to musculoskeletal disorders but also negatively impacts cardiovascular health and increases the risk of sleep disorders. Poor ergonomic sitting positions can lead to muscle tension, impaired blood circulation, and body fatigue, ultimately reducing sleep quality and work productivity.

To mitigate these effects, preventive measures are essential, including the use of adjustable desks that allow alternating between sitting and standing, implementing regular rest breaks, and providing education on proper workplace ergonomics. Company policies that prioritize employee health, such as offering sports facilities or promoting active work habits, also play a crucial role in fostering a healthier work environment.

By adopting an integrated and systematic approach involving workers, management, and policymakers, these challenges can be effectively addressed to enhance workplace well-being and overall occupational health. Further research is needed to develop more targeted and effective strategies for minimizing the negative impact of prolonged sitting on worker health.

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