



Postural and Ergonomic Training on Musculoskeletal Disorders: A Critical Review

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Abstract:

Musculoskeletal disorders (MSDs) have emerged as a significant occupational health concern globally, particularly among desk-based workers who engage in prolonged periods of sedentary activities. These disorders encompass a range of conditions affecting muscles, tendons, ligaments, nerves, and other soft tissues, leading to pain and functional impairment. The etiology of MSDs among office workers is multifactorial, with poor posture and inadequate ergonomic practices identified as primary contributors. Prolonged sitting, often in suboptimal postures, exerts excessive strain on the musculoskeletal system, particularly the lower back, neck, and shoulders. This review was aimed to find gap/missing of existing literature in order to make foundation of effects of postural and ergonomic intervention on MSDs. After repeated critical review of number of original articles, specific conceptual framework and interlink of confounding and intermediate variables regarding posture, ergonomic and MSDs were missed and vivid pictures were come out.

Keywords: Musculoskeletal Disorders, Posture, Ergonomic, Training

Introduction

Musculoskeletal disorders (MSDs) are the most prevalent occupational health issues worldwide, affecting significantly desk-based professionals. These disorders encompass a range of conditions affecting muscles, bones, tendons, and joints, primarily caused by poor posture, repetitive movements, and prolonged sedentary work. Desk-based officials, particularly in urban settings like Dhaka City, are at a heightened risk due to long hours spent working on computers in ergonomically unsound environments. As Bangladesh continues to develop economically and technologically, the number of office-based jobs is increasing, making MSDs a growing public health concern. Postural and ergonomic training is an evidence-based approach to reducing the risk of MSDs by promoting proper body mechanics, workstation adjustments, and movement strategies. Such interventions focus on educating employees about maintaining neutral spine alignment, reducing strain on musculoskeletal structures, and integrating active work habits. Research from developed countries has demonstrated that ergonomic interventions, including workstation modifications, posture correction exercises, and regular movement breaks, can significantly reduce discomfort and enhance work efficiency.

However, the effectiveness of these interventions in the unique work environments of remains underexplored. The need for intervention is particularly urgent given the rapid urbanization, increasing workload, and lack of standardized ergonomic policies in Bangladeshi workplaces. The high prevalence of MSDs among office workers highlights the necessity of preventive strategies that go beyond medical treatments and pain management. Instead, proactive approaches like ergonomic training can help reduce the incidence of work-related musculoskeletal problems before they become severe. This review aims to assess the role of postural and ergonomic training on reducing MSDs among desk-based officials. By implementing targeted training programs, evaluating their effectiveness, and analyzing long-term benefits, this research will provide valuable insights into workplace ergonomics and occupational health policies.

Critical Reviewed literatures

Postural training, as a component of ergonomic interventions, focuses on educating individuals about maintaining neutral spine alignment and adopting dynamic sitting positions to reduce static load on musculoskeletal structures. Evidence suggests that such training can lead to a reduction in musculoskeletal discomfort and prevent the development of chronic conditions. For example, incorporating exercises that strengthen core muscles and promote flexibility can support better posture and reduce the risk of injury. Despite the recognized benefits of ergonomic and postural interventions, their implementation in Dhaka's workplaces remains limited. Barriers such as lack of awareness, financial constraints, and insufficient training resources hinder the adoption of these preventive measures. The economic implications of MSDs are substantial, encompassing direct costs related to medical treatment and indirect costs such as lost productivity and absenteeism. In Bangladesh, the financial burden of these disorders is exacerbated by the limited availability of occupational health services and the high prevalence of informal employment, where workers may lack access to healthcare and ergonomic resources. Addressing MSDs through preventive strategies can thus have a positive impact on both individual well-being and the broader economy. Musculoskeletal disorders (MSDs) have become a critical occupational health issue among desk-based workers, particularly in urban environments. The increasing reliance on digital technology and prolonged sedentary work patterns have significantly contributed to the rising prevalence of MSDs, which affect employees' productivity, well-being, and overall quality of life. Studies indicate that prolonged sitting, poor posture, and inadequate ergonomic practices are key contributors to the development of MSDs, with common complaints including neck pain, lower back pain, and repetitive strain injuries. Despite the evident risks, awareness and implementation of ergonomic interventions remain limited in many workplaces. Existing literature highlights the effectiveness of postural training and ergonomic interventions in reducing the incidence of MSDs among office workers. However, there is a lack of structured ergonomic policies and training programs tailored to the specific needs of desk-based professionals. Many organizations operate with minimal attention to workplace ergonomics, and employees often lack knowledge about maintaining proper posture and using ergonomic furniture effectively. Furthermore, economic constraints and a lack of employer-driven initiatives hinder the adoption of preventive measures, leaving a significant proportion

of the workforce vulnerable to MSD-related complications. A study in Kuwait found that the prevalence of WMSDs among bankers was 57% in the week before the study and 80% in the year prior (Akrouf et al., 2010). These disorders are often associated with poor workplace postures, such as flexed, static, twisted postures and repetitive trunk movements. Other risk factors include age, gender, lifestyle habits (e.g., smoking, alcohol consumption), psychological stress, past pain symptoms, socioeconomic status, low muscle flexibility and strength, physical activity, and workload. Work-Related Musculoskeletal Disorders significantly impair quality of life, leading to absenteeism, increased work restrictions, job changes, and financial losses at individual, organizational, and societal levels (Sohail & Yazdani-Charati, 2014). Office workers are particularly susceptible due to repetitive movements and poor ergonomic practices, often leading to musculoskeletal pain. Psychosocial factors such as heavy workloads and time pressures further exacerbate the problem (Janwantanakul et al., 2008). Common WMSDs include tennis elbow, golfer's elbow, tendonitis, thoracic outlet syndrome, carpal tunnel syndrome, tension neck syndrome, and degenerative spinal disorders. Without timely treatment, these conditions can result in permanent disabilities. Factors like poor posture, repetitive tasks, noise, mental stress, biomechanical loading, gender, and obesity also contribute to the development of MSDs (Rashaduzzaman et al., 2019). These disorders negatively impact employee productivity, leading to significant psychological, economic, and service-related consequences. In regions like the US, Europe, and Australia, the financial burden of MSDs has been extensively documented (Hoe et al., 2018). In Asia, studies reflect comparable trends. A study conducted in South Korea found that 52% of office workers reported experiencing musculoskeletal pain, particularly in the neck and lower back regions (Lee et al., 2017). In Japan, a survey among IT professionals revealed that 60% suffered from neck and shoulder pain, often linked to prolonged computer use and poor ergonomic setups. Ergonomic interventions have proven effective in reducing MSDs by addressing the physical demands placed on the body during prolonged desk work. Ergonomics focuses on optimizing the interaction between workers and their work environment, reducing strain and improving comfort. Amin et al. (2016) examined the prevalence of computer-related MSDs among bankers in Dhaka and emphasized the need for education programs on prevention and coping strategies. Their findings revealed that improper workstation setups, such as inadequate chair support and incorrect monitor height, significantly contributed to musculoskeletal discomfort. Adjustments to desk height, chair ergonomics, monitor positioning, and keyboard placement can alleviate physical strain. Moreover, implementing sit-stand desks and promoting micro-breaks have been shown to reduce the risk of MSDs. A meta-analysis by Shrestha et al. (2018) confirmed that interventions promoting regular movement and ergonomic adjustments effectively reduced musculoskeletal pain and improved overall well-being among office workers. In China, a randomized controlled trial demonstrated that implementing adjustable workstations and ergonomic training significantly reduced neck and shoulder pain among office workers over a six-month period (Zhang et al., 2020). In Australia, a study by Straker et al. (2014) highlighted the positive impact of workplace-based physical activity programs combined with ergonomic interventions in reducing MSDs. Implementing comprehensive training

programs that address both ergonomic principles and postural awareness is essential. Employers must invest in creating supportive work environments and fostering a culture that prioritizes employee health. Postural training focuses on educating individuals about maintaining proper body alignment during daily activities. It emphasizes core strengthening, flexibility, and awareness of posture, aiming to reduce strain on the musculoskeletal system. The impact of MSDs extends beyond physical discomfort. Affected individuals often experience reduced work efficiency, increased absenteeism, and higher healthcare utilization. In economic terms, MSDs contribute to significant costs related to lost productivity and medical expenses. Consequently, preventive measures, including ergonomic interventions and postural training, have become essential components of workplace health strategies.

Conclusion

Implementing ergonomic training programs can improve employee well-being, enhance productivity, and reduce absenteeism caused by work-related musculoskeletal discomfort. Additionally, the economic implications of MSDs, including healthcare costs and loss of work hours, highlight the necessity of adopting preventive strategies in the workplace. By providing empirical evidence on the effectiveness of postural training and ergonomic adjustments, this review can serve as a valuable resource for policymakers, employers, and occupational health professionals. Furthermore, this critical thinking aligns with global occupational health standards, which emphasize the importance of ergonomic interventions in reducing work-related injuries. The gap findings will contribute to the growing body of knowledge on workplace ergonomics and serve as a foundation for developing workplace policies tailored to the needs of desk-based workers. Ultimately, this article seeks to promote a healthier and more efficient workforce by advocating for sustainable ergonomic practices that benefit both employees and employers.

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