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WRMSDs and Vision Disorders in Office Workers Using Digital Devices

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ABSTRACT

This scientific literature review examines the prevalence of work-related musculoskeletal disorders (WRMSDs) and health problems related to visual strain. The aim of this study was to analyse the scientific literature on the causes of WRMSDs, visual disorders, and their interaction with psychosocial risks for office workers who work with digital devices. The findings reveal that neck, shoulders, and upper back discomfort are highly prevalent, primarily due to poor posture and prolonged computer use. Visual symptoms such as eyestrain, headaches, and blurred vision are consistently reported, underscoring the need for ergonomic interventions and regular breaks. Psychosocial issues, including general distress, anxiety, and job dissatisfaction, are significant concerns, exacerbated by high workload and prolonged screen time. Organizational factors like low supervisor support and lack of control over tasks further contribute to psychosocial strain. In conclusion office workers are subjected to impact of physical and mental load interaction that causes WRMSDs and vision disorders.

Keywords: Office, Employees, Computer, Vision, Musculoskeletal, Disorders, Psychosocial, Risks

INTRODUCTION

Work-related musculoskeletal disorders (WRMSDs) and health problems related to visual strain are becoming significant in today's world of rapid technological change, where employees increasingly are using digital devices to perform various job tasks (Gómez-Galán et al., 2017; Kaur et al., 2022). Research indicates that the frequency of WRMSDs among computer users ranges from 33.8% to 95.3%, and these health impairments mainly manifest in the following body parts: neck, shoulders, upper back, and low back (Abdullah & Abdullah, 2021; Azmi & Aziz, 2022). Continuous engagement with screens has been associated with Computer Vision Syndrome (CVS), also known as Digital Eye Strain (DES) (Randolph, 2017; Munshi et al., 2017). Office employees complain of dry and itchy eyes and increased sensitivity to light (Blehm et al., 2005). WRMSDs and visual strain health problems are compounded by psychosocial risks at work (Bezzina et al., 2023). Office workers are exposed to such psychosocial risks: high job

demands, workload, low support from colleagues and supervisor, lack of time, limited freedom of choice, violence, sexual harassment (Ariëns et al., 2001; Davis & Heaney, 2000; Bongers et al., 2002; Blaug et al., 2007). With the rapid digitalization of workplaces, these physical and psychosocial issues are becoming increasingly important to investigate and address, in order to increase employee well-being and productivity.

The aim of this study was to analyse the scientific literature on the causes of WRMSDs, visual disorders, and their interaction with psychosocial risks for office workers who work with digital devices.

METHODS AND MATERIALS

A systematic literature analysis was conducted using databases, including Google Scholar, Scopus, and Web of Science, using such keywords: office workers computer, musculoskeletal disorders, vision disorders, psychosocial risks. Studies published in the last 30 years were included, focusing on peer-reviewed articles that examined office workers using digital devices. The inclusion criteria were scientific articles in peer-reviewed journals in English only. Exclusion criteria: conference abstracts, presentations, and summaries. Altogether, 96 articles were selected, of which only 56 met the inclusion criteria. The vast majority of the studies were focused on musculoskeletal disorders, with a smaller number of studies focusing on vision disorders and psychosocial factors.

RESULTS AND DISCUSSION

Studies have shown that office workers using digital devices are influenced by a variety of risk factors, including WRMSDs, but the most important are individual, organizational, and psychosocial aspects (Wærsted et al., 2010). It has been proven that spinal spondylosis with radiculopathy, tendinitis, tendovaginitis, bursitis, periarthritis, etc., are associated with overload at work, strain on certain body parts, and forced working postures (Andersen et al., 2008; Argus & Paasuke, 2022). These health issues are further exacerbated by the sedentary nature of computer-based work (Azmi & Aziz, 2022).

In research it was analyzed the prevalence and risk factors of work-related musculoskeletal disorders among computer-using office workers. The main findings indicate that the neck has the highest average prevalence (55%), primarily due to poor posture and prolonged computer use across various roles (Ardahan & Simsek, 2016; Bernard et al., 1994; Pandey et al., 2020; Shahwan et al., 2022; Swetha et al., 2016; Calik et al., 2022; Cho et al., 2012; Giahi et al., 2014; Riccò et al., 2016; Sillanpää et al., 2003; Sánchez-Brau et al., 2020; Talwar et al., 2009; Putsa et al., 2022; Azmi & Abdul Aziz, 2022; So et al., 2017; Jensen, 2003; Prasetya et al., 2024; Andersen et al., 2008; Al Dhuwyan & Al Saigul, 2021; Argus & Paasuke, 2022; Woods, 2005). Shoulders (43%) and upper back (47%) also show moderate to high prevalence, influenced by excessive computer use, mouse usage, and ergonomic deficiencies (Ardahan & Simsek, 2016; Bernard et al., 1994;

Pandey et al., 2020; Shahwan et al., 2022; Swetha et al., 2016; Calik et al., 2022; Cho et al., 2012; Giahi et al., 2014; Riccò et al., 2016; Sillanpää et al., 2003; Talwar et al., 2009; Putsa et al., 2022; Azmi & Abdul Aziz, 2022; So et al., 2017; Jensen, 2003; Prasetya et al., 2024; Andersen et al., 2008; Al Dhuwyan & Al Saigul, 2021; Argus & Paasuke, 2022; Woods, 2005). Issues with hands and wrists are less prevalent (27%), associated with repetitive tasks like typing and mouse use, indicating their significance in roles requiring intensive manual input, though less universal than upper body symptoms (Bernard et al., 1994; Pandey et al., 2020; Swetha et al., 2016; Cho et al., 2012; Giahi et al., 2014; Riccò et al., 2016; Sillanpää et al., 2003; Talwar et al., 2009; Azmi & Abdul Aziz, 2022; So et al., 2017; Jensen, 2003; Prasetya et al., 2024; Al Dhuwyan & Al Saigul, 2021; Argus & Paasuke, 2022; Woods, 2005). The least reported body parts are elbows (15%) and lower limbs (20%), often linked to workstation design and sedentary behavior rather than direct computer use (Bernard et al., 1994; Pandey et al., 2020; Cho et al., 2012; Giahi et al., 2014; Riccò et al., 2016; Sillanpää et al., 2003; So et al., 2017; Putsa et al., 2022; Jensen, 2003; Prasetya et al., 2024; Woods, 2005; Jomoah, 2014; Al Dhuwyan & Al Saigul, 2021). Prolonged computer use emerges as the most recurring risk factor, emphasizing its role as a primary driver of work-related musculoskeletal disorders (WRMSDs), amplifying strain across multiple body regions. Poor posture, non-adjustable workstations, and inadequate keyboard/mouse positioning are frequently cited ergonomic deficiencies, suggesting that workstation design significantly impacts both the onset and severity of musculoskeletal issues. Additionally, female gender is identified as a risk factor for shoulder pain, while high psychological distress or low influence at work are noted for neck and shoulder pain, indicating that demographic and psychosocial elements can exacerbate physical symptoms, adding complexity to the risk profile. These findings align with results from studies on WRMSDs, such as those by James et al. (2018) and Oha et al. (2014), which reported that WRMSDs among computer users were most commonly associated with discomfort in the neck, upper back, lower back, and upper limbs, with prevalence rates ranging from 20% to 68%.

In addition to WRMSDs, office workers experience visual discomfort, particularly visual fatigue (Rosenfield, 2011). One of the most common health problems in computer users is computer vision syndrome (Klamm & Tarnow, 2015; Ranasinghe et al., 2016). Research suggests that prolonged screen use may contribute to ocular issues such as dry eye symptoms (Blehm et al., 2005), myopia progression (Enthoven et al., 2020; Loughman & Flitcroft, 2021), and visual fatigue (Rosenfield, 2011). However, the degree to which these conditions are directly linked to screen exposure varies among individuals and can be influenced by multiple factors, including screen time duration, viewing habits, and pre-existing ocular health conditions (Pavel et al., 2023). The widespread adoption of digital screens has contributed to a significant rise in these issues across all age groups (Randolph, 2017). It has been shown that the computer vision syndrome symptoms can be associated with gender (more frequent in women), vary by ethnicity (highest in Hispanics, lowest in Asians), increase with longer screen time, and are

strongly linked to dry eye disease (Portello et al., 2012; Lema & Anbesu, 2022).

The findings on musculoskeletal discomfort among computer users are complemented by key observations related to visual symptoms. Average prevalences for symptoms such as "Tired Eyes/Eyestrain" (44%), "Headache" (43%), and "Blurred Vision & Focusing Issues" (47%) are consistently reported around 43%–47%, aligning with prolonged screen exposure and ergonomic strain common in office settings (Shahwan et al., 2022; Talwar et al., 2009; Cantó-Sancho et al., 2023; Woods, 2005; Ranasinghe et al., 2016; Sánchez-Brau et al., 2020; Portello et al., 2012; Ranasinghe et al., 2016). Symptoms like "Blurred Vision & Focusing Issues" (13%–73%) and "Dry Eyes & Irritation" (26%–73%) exhibit the broadest ranges, indicating variability across populations, work conditions, and reporting methods. "Eye Pain & Sensitivity" has the lowest average prevalence (27%), despite a wide range (8%–57%), suggesting these symptoms are less consistently reported than fatigue-related symptoms like eyestrain or headaches (Pandey et al., 2020; Cantó-Sancho et al., 2023; Sánchez-Brau et al., 2020; Jomoah, 2014; Ranasinghe et al., 2016), possibly due to their association with pre-existing vision conditions or specific triggers such as optical correction use. Risk factors like prolonged screen time, poor lighting, and lack of breaks appear in multiple categories, highlighting their broad impact on visual health and comfort (Swetha et al., 2016; Talwar et al., 2009; Soria-Oliver et al., 2019; Woods, 2005). This consistency underscores the need for systemic interventions, such as ergonomic adjustments and break schedules, rather than symptom-specific solutions. Additionally, females are more likely to experience digital eye strain, indicating a gender-related disparity in visual discomfort. These observations emphasize the importance of addressing both musculoskeletal and visual health through comprehensive ergonomic practices and preventive measures.

Literature analysis reveals that it has been argued that a systematic approach to risk reduction is needed, addressing organizational, psychosocial, and physical work factors (Woods, 2005). Other studies have shown that in order to achieve high performance in an organization, not only should employees be provided with a healthy working environment and safety at work (Pastare et al., 2020; Roja et al., 2017), but also management of occupational health and safety is highly relevant (Lundqvist et al., 2024). Studies have shown that WRMSDs have a multifactorial and complex etiology that includes psychosocial risks at work (Bezzina et al., 2023). WRMSDs contribute to stress and mental overload. Eliminating one of these risks has also been shown to demonstrably reduce the other (Gallagher & Barbe, 2022). High job demands and low job control are associated with the onset and progression of WRMSDs. This is supported by research that allowing workers to take more control over the work they perform (taking breaks as needed or deciding for themselves at what point to change from one task to another during the working day, etc.) can prevent or reduce stress, thus allowing workers to change their work posture, change the pace of their work, preventing work-related musculoskeletal disorders (Buruck et al., 2019; Ng et al., 2019, Dragioti et al., 2019). Authors have

shown that women are more likely to suffer from WRMSDs related to psychosocial risks at work (Herin et al., 2014; Lapointe et al., 2013).

Findings on musculoskeletal discomfort among computer users are complemented by key observations related to psychosocial risks at work. Psychosocial issues are a significant concern, with nearly half of office workers experiencing general psychosocial problems (49%) and over a third facing distress (38%) or 40% in dissatisfaction (Cho et al., 2012; Putsa et al., 2022; So et al., 2017; Andersen et al., 2008; Woods, 2005). High workload and prolonged computer use are common risk factors, highlighting the impact of excessive screen time and task demands on psychosocial strain. Additionally, low supervisor support, lack of influence at work, and low control over tasks are key risk factors for psychological distress/stress (38%), work-related anxiety (26%), and job dissatisfaction (40%). These findings emphasize the need for improved management practices and comprehensive ergonomic interventions to address both physical and mental well-being in office environments.

CONCLUSION

The scientific literature analysis of musculoskeletal and visual symptoms among computer users highlights the significant impact of prolonged screen time and poor ergonomic practices on physical health. Neck, shoulders, and upper back discomfort are prevalent, driven by factors such as poor posture and excessive digital devices use. Visual symptoms like eyestrain, headaches, and blurred vision are consistently reported, emphasizing the need for ergonomic interventions and regular breaks to mitigate these issues. Psychosocial risks at work impact WRMSDs and vision disorders for office workers. Organizational factors such as low supervisor support and lack of control over tasks further contribute to psychosocial strain. Further research will be conducted to investigate in depth the muscle fatigue and vision disorders using objective measurements.

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