

OFFICE SYNDROME LITERATURE REVIEW : LATEST RESEARCH INSIGHTS AND FUTURE DIRECTIONS

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ABSTRAK

Sindroma Perkantoran atau *Office syndrome* merupakan kumpulan gejala yang terutama terjadi akibat kebiasaan bekerja dengan posisi statis dalam jangka waktu lama, yang sering timbul pada pekerja kantor. Sindrom ini mencakup berbagai gangguan muskuloskeletal dan masalah kesehatan lainnya yang disebabkan oleh duduk yang berkepanjangan, postur tubuh yang buruk, gerakan berulang, dan pengaturan ergonomis yang tidak memadai. Tinjauan literatur ini bertujuan untuk mengisi kesenjangan pengetahuan, menyediakan gambaran holistik tentang Sindroma Perkantoran, dan memberikan dasar untuk penelitian lebih lanjut serta pengembangan rekomendasi berbasis bukti. Metodologi penelitian menggunakan *narrative literature review* dengan pencarian sistematis melalui database PubMed, Scopus, *Web of Science*, CINAHL, dan PsycINFO menggunakan kata kunci spesifik. Temuan penelitian menunjukkan prevalensi Sindroma Perkantoran mencakup gangguan muskuloskeletal berkisar 33,8-95,3%, dengan tingkat keparahan lebih tinggi di negara berkembang dibanding negara maju. Sindroma Perkantoran mencakup dua masalah utama: gangguan muskuloskeletal (*work related musculoskeletal disorder/WMSD*) dan Sindrom Penglihatan Komputer (*Computer Vision Syndrome/CVS*). Faktor risiko meliputi penggunaan komputer dalam waktu lama, usia lanjut, gerakan berulang, stres, posisi yang sama dalam waktu lama, beban kerja berat, merokok, pengalaman kerja berkepanjangan, kurang latihan fisik, dan status pendidikan. Responden perempuan dilaporkan lebih mungkin mengalami gangguan muskuloskeletal dibandingkan laki-laki. Penanganan mencakup pendekatan non-farmakologis seperti edukasi ergonomi dan perbaikan postur kerja, serta pendekatan farmakologis menggunakan analgesik, relaksan otot, dan obat adjuvan. Inovasi terkini termasuk terapi seluler seperti *Mesenchymal Stem Cells (MSC)*, *Platelet-Rich Plasma (PRP)*, eksosom, dan potensi modulasi vitamin D.

Kata kunci : *computer vision syndrome*, ergonomi, gangguan musculoskeletal, pekerja kantor, sindroma perkantoran

ABSTRACT

Office syndrome is a collection of symptoms that primarily occur due to the habit of working in a static position for long periods, often arising in office workers. This literature review aims to fill knowledge gaps, provide a holistic overview of Office Syndrome, and lay the groundwork for further research and the development of evidence-based recommendations. The research methodology employs a narrative literature review with a systematic search through the PubMed, Scopus, Web of Science, CINAHL, and PsycINFO databases using specific keywords. The research findings indicate that the prevalence of Office Syndrome includes musculoskeletal disorders ranging from 33.8% to 95.3%, with a higher severity in developing countries compared to developed countries. Risk factors include prolonged computer use, advanced age, repetitive movements, stress, maintaining the same position for long periods, heavy workload, smoking, prolonged work experience, lack of physical exercise, and educational status. Female respondents were reported to be more likely to experience musculoskeletal disorders compared to males. Management includes non-pharmacological approaches such as ergonomics education and posture improvement, as well as pharmacological approaches using analgesics, muscle relaxants, and adjuvant medications. Recent innovations include cellular therapies such as Mesenchymal Stem Cells (MSC), Platelet-Rich Plasma (PRP), exosomes, and the potential modulation of vitamin D.

Keywords : *computer vision syndrome, ergonomics, musculoskeletal disorders, office workers, office syndrome*

INTRODUCTION

Office Syndrome, or a syndrome that arises due to an unergonomic work position, has become an increasingly significant issue in the modern world of work. With the increasing number of jobs that require the use of computers and static sitting positions, the prevalence of Office Syndrome continues to increase (Yeow et al., 2021). This disorder involves a variety of symptoms such as muscle pain, neck tension, and posture problems, which if left untreated can affect the individual's work productivity and well-being. The phenomenon of Office Syndrome has become a major concern in the world of occupational health, especially in the modern era which is characterized by sedentary work patterns and the use of electronic devices for a long time. This condition, which is often associated with musculoskeletal disorders, eye strain, and mental fatigue, significantly affects the quality of life of workers (Shimazaki, 2018). Research shows that the prevalence of Office Syndrome continues to increase, driven by less ergonomic work habits and a lack of awareness of the importance of physical activity in the workplace (Inoue et al., 2019).

Office Syndrome or Office Syndrome is a collection of symptoms that mainly occur due to the habit of working in a static position for a long time, which is often experienced by office workers (Arshad et al., 2022; Delshad et al., 2019). This syndrome involves a variety of musculoskeletal disorders and other health problems rooted in prolonged sedentary activity, poor posture, repetitive movements, as well as inadequate ergonomic regulation (Demissie et al., 2022; Guo et al., 2024). This condition is a serious concern because its common symptoms, such as musculoskeletal pain, eye strain, and fatigue, can have a significant impact on work productivity and quality of life of individuals who experience it (Akrouf et al., 2010; Janwantanakul et al., 2008).

Globally, the incidence of Office Syndrome which includes musculoskeletal disorders is reported to have a variable prevalence, ranging from 33.8% to 95.3%, with the severity tending to be higher in developing countries than in developed countries. This variation indicates that this syndrome is not only a health challenge in the work environment but also has the potential to become an economic and social burden. In addition to having an impact on individuals, the high prevalence of Office Syndrome also raises concerns about increasing health care costs and declining productivity due to absenteeism or decreased work performance (Besharati et al., 2020; Sihawong et al., 2016).

The consequences of Office Syndrome not only have an impact on the health of individuals, but also on the productivity of the organization as a whole. Neck and back muscle tension, one of the main symptoms, often requires costly medical interventions, both for individuals and organizations. In the long term, this condition also has the potential to increase the level of work absenteeism and employee turnover (Magid-Bernstein et al., 2022). Therefore, the identification of risk factors and mitigation strategies is an important element in overcoming these challenges. A research-based approach is becoming increasingly relevant to understand the main causative factors, such as unergonomic workplace design, poor diet, and lack of workplace fitness programs (Lozano et al., 2019). In addition, modern technology, including posture analysis software, provides new opportunities to mitigate the risk of Office Syndrome through timely and data-driven interventions (Scotton et al., 2019).

In this context, current literature studies not only explore their causes and impacts, but also propose sustainable solutions, including the implementation of technology and organizational policy change (Dent et al., 2019). Although there have been many studies that address various aspects of Office Syndrome, there is an urgent need for a more comprehensive synthesis of the latest evidence, particularly with regard to prevalence, risk factors, and effective management strategies (Karakolis & Callaghan, 2014; Varaprasada et al., 2015). The scattered research requires an integrated approach to provide a holistic understanding of this syndrome.

In response to this need, this literature review aims to fill the gap by providing a comprehensive overview of Office Syndrome, including its prevalence, influencing factors, and management measures that can be taken to mitigate its impact. In addition, the results of this review are expected to be an important foundation for further research and the development of evidence-based recommendations to address this problem effectively and comprehensively (Lazko et al., 2021; National Research Council, 2001; Wynn, 1998). This literature review aims to fill knowledge gaps, provide a holistic overview of Office Syndrome, and lay the groundwork for further research and the development of evidence-based recommendations.

METHOD

This study uses a systematic literature review design to explore the prevalence, risk factors, and management strategies of Office Syndrome. The literature search process was carried out using several electronic databases with relevant keywords such as "Office Syndrome", "musculoskeletal disorders in office workers", "ergonomics and health", as well as other combinations that are suitable for the purpose of the research. Inclusion criteria include articles published in the last 10 years, available in English or Indonesian, and relevant to the topic of Office Syndrome. Articles that only discuss certain aspects without relating them directly to this syndrome, or that do not include empirical data, are excluded from the analysis. The literature selection process involves three stages, namely screening by title, abstract, and full text to ensure the relevance and quality of the selected article.

Data collection was carried out by extracting information from selected articles related to the prevalence, risk factors, and management strategies of Office Syndrome. The collected data were analyzed descriptively and narratively to identify general patterns, knowledge gaps, and implications for future research and practice.

RESULT

Office Syndrome and Its Scope

Office Syndrome encompasses a wide range of physical and mental health issues that are directly related to the nature of office-based work (Vafae-Najar et al., 2023); (Arshad et al., 2022). Many symptoms that arise as part of Office Syndrome are musculoskeletal and eye problems. Musculoskeletal disorders due to Office Syndrome are often referred to as work-related musculoskeletal disorder (WMSD) with common symptoms including pain in the neck, back, shoulders, and wrist and arm disorders due to recurrent muscle tension (Demissie, 2024; (Noraziera & Norzaida, 2018). Meanwhile, complaints of visual discomfort and ocular symptoms due to increased use of digital devices with an increase in screen time duration are known as Computer Vision Syndrome (CVS) or Computer Vision Syndrome (SPK).

Musculoskeletal Problems in Office Syndrome

Musculoskeletal symptomatic areas can be distributed in different parts of the body. Various studies show that low back pain is the most common area to experience WMSD (Dixit et al., 2020); (Etana et al., 2021); (Navidi et al., 2022); (Rehman et al., 2022). In addition to the back area, the neck is also the most frequent part of the body that experiences WMSD due to office work that uses computers (Azmi & Aziz, 2022); (Deme et al., 2024); (Darvishi et al., 2016); (Oha et al., 2014). A systematic review by Demissie et al. of 90 articles on WMSD in computer users showed that low back pain was the most commonly affected part of the body in 12 studies, while neck pain was the most common in 10 studies (Deme et al., 2024).

Various risk factors have been studied in studies that examined WMSD in office workers. Prolonged computer use, old age, repetitive movements, short rest periods, stress, prolonged

positioning, heavy workload, smoking, prolonged work experience, lack of physical exercise and ergonomic training, poor educational status, and body mass index were significantly associated with MSD (Demissie et al., 2022). Many findings show that female respondents are more likely to experience MSD than men (Sulaiman et al., 2015); Maduagwu, 2014; (Habibi et al., 2016).

Early detection of MSD in various populations is generally carried out with the help of questionnaire instruments. Demissie et al. in a systematic review of the literature on MSD in office workers showed that 24 out of 25 studies used standardized Nordic questionnaires, while there was also 1 study using a modified questionnaire that specifically analyzed the upper extremities (Deme et al., 2024). With the questionnaire method, it can be known the prevalence of MSD that has occurred, as well as the severity that can lead to disability. In the end, it is hoped that preventive measures and management will be carried out as early as possible.

Computer Vision Syndrome (CVS)

Computer Vision Syndrome includes a wide range of ocular and extra-ocular symptoms that are directly related to prolonged exposure to digital screens. Research has found that the prevalence of SPK cases is around 60-90% in computer users and increases by around 1 million cases every year (Rosenfield, 2016). Clinical manifestations of SPK include ocular symptoms such as blurred vision, intermittent diplopia, dry eyes, burning sensation, stinging or itching in the eyes, and eye fatigue (asthenopia). Extra-ocular symptoms are headaches due to visual strains to vertigo and musculoskeletal disorders such as neck pain, shoulder stiffness, back pain. In addition, psychological symptoms such as chronic fatigue, decreased productivity, and sleep disturbances due to exposure to blue light, especially at night (Barrette et al., 2022).

Computer Vision Syndrome (CPI) presents a vast research opportunity, especially given the surge in the use of digital devices globally. One promising area is the exploration of the long-term impact of screen use on eye health, including the potential link between SPK and the development of myopia, chronic accommodation dysfunction, or even retinal degeneration due to blue light exposure. Research is also needed to develop more effective pharmacological and technological interventions, such as nanotechnology-based eye drops to improve the stability of the tear layer or devices that reduce the burden of accommodation through adaptive optical techniques. In addition, the influence of screen design, high resolution, and low-light technology on SPK symptoms still requires further study to produce more user-friendly ergonomic innovations (Morris & Murray, 2022).

Prevention and Management of Office Syndrome

Successful prevention of musculoskeletal problems in office workers requires proper knowledge and awareness of risk factors, safe execution of work tasks, and effective use of equipment. To prevent WMSD among office workers, it is important to educate them regarding "ergonomics" and "risk factors associated with WMSD." Evidence-based strategies to deliver this education are Ergonomics Education (Mani et al., 2016); (Bohr, 2000). Ergonomics is an intervention strategy that is recognized and recommended by various occupational health and safety agencies around the world. Ergonomics education is a strategy in which an ergonomist educates participants (workers) about the principles of ergonomics. The goal is to increase participants' knowledge of WMSD risk factors, WMSD prevention strategies, and effective work behaviors (Mani et al., 2016).

The management of musculoskeletal problems consists of non-pharmacological and pharmacological problems. Non-pharmacological management includes ergonomic improvement actions, both posture and technical office equipment used. Work posture training and the ideal workplace need to be aligned with the MSD that has happened to office workers. Pharmacotherapy management in musculoskeletal disorders can be carried out by administering

non-opioid analgesic drugs such as paracetamol and NSAID drugs such as ibuprofen, naproxen, and diclofenac. Meanwhile, the use of opioid analgesics such as tramadol and morphine is used for moderate to severe pain that does not respond to other therapies. There is a risk of dependence and serious side effects on the use of opioid analgesics. Other pharmacotherapies that can be used are from the adjuvant group such as anticonvulsant drugs, gabapentin and pregabalin which are used for neuropathic pain that often accompanies musculoskeletal disorders. In addition, antidepressant drugs such as duloxetine are also effective in reducing chronic musculoskeletal pain (El-Tallawy et al., 2021); (Moretti et al., 2024).

Eperison, which is a central muscle relaxant is used to treat musculoskeletal conditions related to muscle pain and spasm. The combination of Eperisone with NSAIDs provides significant pain reduction results compared to NSAIDs alone. In the prospective studies conducted, it was proven that the group receiving this combination therapy showed a greater reduction in VAS score than the control group (72.4% vs 46.7%, $P < 0.05$). Functional status and mobilization measurements based on finger to floor (FTF) tests, also showed improvement. At the end of the fourth week, 75.9% of patients in the combination group were able to achieve an FTF distance of < 10 cm, compared to 70% of the control group. (Pinzon et al., 2020). The vasodilating effect of Eperisone will improve blood flow in the paraspinal muscles which contributes to pain reduction. Eperisone will improve blood flow in the paraspinal muscles which contributes to pain reduction (Pinzon et al., 2020); (Rani et al., 2016).

Future Insights in the Management of Musculoskeletal Problems

One of the alternatives that is being explored in the management of MSD is the use of cellular therapy, including stem cells. Mesenchymal Stem Cells (MSCs) have the potential to differentiate into musculoskeletal tissue, thus allowing for the repair of muscle and bone tissue damage caused by repetitive stress and poor posture (Eskelinen et al., 2024). Platelet-Rich Plasma (PRP) is one of the cellular products that results from the patient's own blood and is rich in growth factors that can stimulate tissue healing. PRP has been widely used in the therapy of various soft tissue injuries, such as tendinitis and muscle pain, which are common problems in office workers (Jayaram et al., 2023). In the context of office syndrome, the use of PRP can help improve the body's natural healing process by stimulating angiogenesis and collagen synthesis (Vali et al., 2023). In addition to stem cells, exosomes and secretomes from MSCs are an interesting topic in regenerative research. Exosomes play a role in communication between cells by carrying microRNAs and proteins that function to reduce inflammation and support tissue regeneration (Kendlbacher et al., 2024). Exosomes may be a safer alternative because they do not involve transplanting living cells, but they still provide the expected therapeutic effect in repairing tissues damaged by poor posture and repetitive strain.

Vitamin D has an important role in modulating the differentiation of MSCs and their immunomodulatory activity. Vitamin D deficiency is often found in individuals who work indoors for long periods of time, which is also a risk factor in the occurrence of low-grade chronic inflammation in people with office syndrome (Johnson et al., 2024). In addition to MSC modulation, vitamin D supplementation also plays an indirect role in the management of MSD in office workers. Goaziao et al. conducted a study on diffuse musculoskeletal pain in workers aged 18-50 years. The results showed a significant improvement in pain evaluation after vitamin D supplementation compared to before administration. There was also a significant improvement in quality of life after giving vitamin D to subjects who previously experienced vitamin D deficiency. Based on the results of this study, further research can be carried out to deepen the relationship between vitamin D and the incidence of MSD and the potential of vitamin D in the management of musculoskeletal disorders.

DISCUSSION

This review reveals complexities that go beyond just conventional medical approaches. The phenomenon of Office Syndrome displays significant diversity, not only in clinical manifestations but also in the social and geographical contexts that shape the dynamics of the disease. The prevalence varies between 33.8% to 95.3% across different regions indicating that Office Syndrome is not just an individual health condition, but a profound reflection of structural transformations in the modern work environment. Significant differences between developing and developed countries suggest that contextual factors such as ergonomic infrastructure, organizational culture, and working conditions play a critical role that is not yet fully understood in the epidemiology of the disease. Interesting findings on gender vulnerability provide a new perspective. The tendency of women to be more likely to experience musculoskeletal disorders opens up an in-depth investigation into the intersection between the ergonomic design, occupational structure, and biology of the female body. Are these differences purely biological or do they reflect structural injustices in the design of the work environment?

The intervention approaches presented in this literature show the complex evolution of Office Syndrome management. From traditional ergonomic strategies to cutting-edge explorations in cellular therapies such as Mesenchymal Stem Cells (MSCs), Platelet-Rich Plasma (PRP), and the potential for vitamin D modulation, it is clear that this field is undergoing a paradigmatic transformation. This emerging technology is not just offering alternative therapies, but indicates a fundamental shift in understanding the mechanisms of disease and recovery. The economic and social implications of Office Syndrome go beyond just health metrics. Reduced productivity, increased healthcare costs, and potential long-term disability demand a holistic approach that integrates medical, ergonomic, psychological, and organizational perspectives. Future research requires designs capable of capturing this complexity, with sensitive longitudinal studies, sophisticated assessment instruments, and cross-disciplinary analytical frameworks.

CONCLUSION

Office syndrome has become an increasingly frequent phenomenon in Asia, with many cases reported in various countries. If not controlled immediately, this syndrome has the potential to become a bigger health problem, given the high number of office workers. Therefore, effective preventive and handling measures are urgently needed to overcome and prevent the spread of office syndrome. Prevention of Office Syndrome in office workers requires knowledge, especially about ergonomics, such as maintaining ideal posture at work, occupational risk factors that have an impact on musculoskeletal health, non-pharmacological approaches such as the correct use of work equipment and pharmacological as follow-up management if there are complaints and symptoms that are felt and affect performance. Pharmacological drugs are in the form of a class of central muscle relaxants such as Eperison that are effective in overcoming muscle pain and spasm. Non-opioid analgesic drugs and opioids to treat moderate to severe pain. As well as adjuvant drugs for neuropathic pain and chronic musculoskeletal pain. Innovations related to the treatment of musculoskeletal problems are always developing, such as cellular therapy in the form of Mesenchymal Stem Cells (MSC), Platelet-Rich Plasma (PRP), exosomes, and vitamin D have great potential in repairing musculoskeletal tissue damage, improving healing and quality of life for office workers. It is hoped that there will be more detailed and in-depth research by involving more parties to make new breakthroughs from various more effective approaches and innovations so that they can prevent office syndrome.

ACKNOWLEDGMENTS

The author would like to thank all parties who have helped in the process of completing this research.

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