



ASSOCIATION BETWEEN SCREEN TIME RELATED MUSCULOSKELETAL SYMPTOM AMONG DESK JOB EMPLOYEES: A CROSS-SECTIONAL STUDY.

Vandana sharma¹, Sanghamitra Jena(PT)^{2*}

^{1*,2}Department of Physiotherapy, School of Allied Health Sciences, Galgotias university Uttar pradesh

ABSTRACT

Background - Many people spend a lot of time looking at screens for work. This can cause muscle and joint problems, like neck and back pain. Studies have shown that long hours of computer use can increase the risk of these problems. To stay healthy, we need to understand how screen time affects our bodies and find ways to prevent these issues.

Materials and Methods- A Cross- sectional study was conducted among 178 desk job empolyess. The study included both male and female participants, with an average age of (25-56 years). The study used a self-reported questionnaire to assess screen time and the Nordic Musculoskeletal Questionnaire to evaluate musculoskeletal symptoms, such as pain, stiffness, and discomfort. and Additional Data was collected on demographic information Name, Age, Gender, Height, Weight, Occupation. Data analysis was performed using SPSSA software.

Results- The findings of this study reveal a significant relationship between screen time and musculoskeletal symptoms among desk job employees. Analysis of data from 178 participants showed that prolonged screen exposure is associated with a higher prevalence of musculoskeletal complaints, particularly in roles requiring extended periods of desk work. A significant proportion of participants (37.6%) reported spending 8 hours per day on screens, followed by 24.1% reporting 7 hours. Employees with longer screen time were more likely to experience discomfort in areas such as the neck, shoulders, and lower back. The majority of participants fell within the 30-39 age group (56.1%), followed by the 20-29 age group (20.7%), reflecting the typical workforce composition in desk-based professions.

Conclusion: The findings suggested that longer screen time is linked to a higher risk of developing musculoskeletal symptoms in desk job employees. It highlights the need for interventions to reduce screen time and promote musculoskeletal health in the workplace.

Keywords: Musculoskeletal symptoms, Screen time, Pain, Desk job, Ergonomics, occupational health

Introduction

Musculoskeletal symptoms according to the Centres for Disease Control and Prevention, are described as "injuries of the muscles, nerves, tendons, joints, cartilage, and spinal disc."¹ The development of musculoskeletal complaints, especially in the upper body and neck areas, has been linked to prolonged screen use, which is characterised by static postures, repetitive movements, and continuous muscular exertion². This can cause a number of health concerns, including headaches, musculoskeletal disorders, and eye strain from prolonged sitting and bad posture "Centers for Disease

Control and Prevention.”³ 1.71 Billion people worldwide have musculoskeletal problems, such as arthritis of the joints, fractures, different injuries, low back pain, neck discomfort, osteoarthritis, and amputation, according to a recent analysis of data from the (GBD) 2019 research. The WHO Western Pacific Region (427 million) and South-East Asia (369 million) have the highest numbers of affected individuals, with high-income countries accounting for 44 million of those affected. Approximately 149 million years lived with disability (YLDs) worldwide, or 17% of all YLDs, are attributed to musculoskeletal diseases, making them the leading cause of YLDs globally WHO⁴. Low back pain is the leading cause of musculoskeletal disorders, representing 7.4% of global years lived with disability (YLDs) and affecting 570 million people. Other major conditions include fractures (440 million cases), osteoarthritis (528 million cases), and neck pain (222 million cases). In 2020, there were 494 million cases worldwide, a 123.4% increase since 1990, with expected growth to 1.06 billion cases by 2050. The prevalence rises with age, peaking between 65 and 69 years, and is 47.4% higher in females than males.⁵

1. Extended screen time can cause poor posture and neck bending, leading to trigger points in the upper back and tightness in the rotator cuff, resulting in shoulder pain.⁶ 2. Computers can cause eye strain due to bright lights, glare, and flickering graphics, known as computer vision syndrome.⁷ 3. Repetitive stress injuries from computers can affect hands and wrists, with carpal tunnel syndrome being common.⁸ 4. Increased muscle strain from using a computer can lead to headaches, which are common.⁹ 5. Being overweight Extended usage of technology during the day can result in a sedentary lifestyle with insufficient exercise.¹⁰ 6. Stress Related Disorders Increasing technological use can lead to stress and detrimental effects on mental health. According to one study, people who spent less time on screens were happier and more content with their lives.¹¹ 7. Sleep Issues The light that comes from a computer or phone can fool your brain into not releasing melatonin, which helps regulate your sleep cycle.¹² 8. Headphone-Related Hearing Loss Hearing impairment can occur when you work while listening to loud noise through headphones.¹³ 9. Higher Risk of Haemorrhage Blood can collect in your legs and feet when you sit for extended periods of time without stretching your legs. Blood clots are caused by this condition and can be fatal if they spread to other body parts including the heart or lungs.¹⁴ 10. An elevated risk of all-cause mortality, insulin resistance, and tumour and the onset of MSK symptoms has been linked to sedentary behavior (SB). Because SB is so common, office workers are more vulnerable to developing these health issues¹⁵.

Effects of Overexposure to Screen Time can negatively impact posture and physical activity levels by putting repetitive strain on certain body parts. Extended sitting or poor posture increases the risk of musculoskeletal pain, especially in the shoulders and back. Studies have linked longer desktop users to shoulders and neck issues, with screen size also contributing to back pain.¹⁶ A few of these include issues with vision, musculoskeletal disorders, sleep patterns, diminished work performance, elevated stress levels, unhealthy eating habits, shortened life expectancy, diabetes, cardiovascular disease, cognitive issues, and more.¹⁷ Frequent laptop use can lead to musculoskeletal imbalance and forward head posture (FHP), causing chronic neck discomfort and low back pain (LBP). desk job employees, who use laptops extensively for work may adopt poor postures due to the device's portability. This can result in cervical pain, shoulder discomfort, mild sciatica, wrist or finger pain, reduced work effectiveness, and other symptoms from repetitive strain injuries, affecting overall productivity¹⁸.

Methods

A cross-sectional study with a sample size of 178 was conducted targeting population desk job employees. This includes employees from various industries such as Coders, Bank Clerks, Professor, Account manager. The sample size was determined based on statistical power analysis.²¹ The inclusion criteria were both male and female desk job employees who were aged between 25 to 56 years, Office timings >5 hours/day on 5 working days. The Exclusion Criteria included a Recent trauma¹⁹, Surgery within the past year¹, Chronic back conditions²⁰, Spinal disorders²², Pregnancy²³, Cognitive impairments²⁴, Neuromuscular conditions²⁵, Any systemic issue impacting musculoskeletal health.²⁶ The study was approved by the Departmental Research Committee of Galgotias University

of greater noida (Ref:DRC/PT/61/24) registering at Clinical Trial Registry India (REF/2024/04/081933) registering at Clinical Trial Registry India (CTRI/2024/04/066260).

Procedure

The demographic information, including the name, gender, weight and address, was collected. Screen time duration of desktop users was asked of participants using an open question. The duration of computer use during weekdays and weekends were recorded Office timings >5 hours/day on 5 working days. The results were averaged in hours per day. Assess using the Nordic Musculoskeletal Questionnaire (NMQ). To determine which body regions were affected by musculoskeletal symptoms, the Nordic Musculoskeletal Questionnaire were used²². It is a valid and reliable screening tool and includes questions on trouble (ache, pain, or discomfort) during the last 7 days, trouble (ache, pain, or discomfort) during the last 12 months, and whether this trouble has prevented the individual from carrying out normal activities (e.g., housework or hobbies) during the last 12 months. The questions cover nine body regions, namely, the neck, shoulders, elbows, wrists/hands, upper back, lower back, hips/thighs/buttocks, knees, and ankles). The outcome in this study was the presence of musculoskeletal symptoms in any of the nine body regions that have prevented the individual from carrying out normal activities during the last 12 months. A response of “yes” to any of the nine body regions were coded as a “yes”, whereas a response of “no” to all body regions was coded as a “no”. The descriptive statistics feature of SPSS was used to analyse data that was obtained in Excel format.

Results:-

This study analyzed data from 178 desk job employees to investigate the relationship between screen time and musculoskeletal symptoms. Demographic Data Sample Characteristics: Description of the sample population (N = 178), including age, gender, job position, job roles, and duration of employment. Descriptive Statistics: percentage, frequency, and standard deviations for key demographic variables. Screen Time Percentage and Frequency of daily screen time reported by participants.

Demographics

The demographic characteristics of the study participants are summarized in Table 1. The sample consisted of 178 desk job employees

Table 1: Descriptive statistics for Demographic Characteristics of Participants (N=178)

Characteristics	Frequency(n)	Percentage (%)
Gender		
Male	98	55.0%
Female	80	44.94%
Age group		
20-29	37	20.7%
30-39	100	56.1%
40-49	33	18.5%
50-56	8	4.4%
Department		

coders	79	44.3%
Banker	38	21.3%
professor	29	16.3%
Account manager	32	17.9%
Screen Time (hour/days)		
4hr	6	3.37%
5hr	10	5.61%
6hr	40	22.4%
7hr	43	24.1%
8hr	67	37.6%
9hr	12	6.77%

Musculoskeletal symptoms (NMQ)

Musculoskeletal symptoms among the desk job employees:-

Among all desk job, 55.6% have reported musculoskeletal symptoms occurring in at least one region of the body during the last 7 days preceding the study. Whilst 100% have reported musculoskeletal symptoms during the past year, 79.8% disabling symptoms during the last year and only 54% have visited a physician due to a musculoskeletal symptom. The musculoskeletal symptoms were found to vary depending on the affected body region, with the lower back (100%) and neck (80%) being the most commonly affected areas.

Table 2: Frequency and Percentage of distributions of different Musculoskeletal Symptoms (NMQ)- N=178

Symptom	Frequency (n)	Percentage (%)
Neck pain	92	51.6%
Shoulder pain	44	24.7%
Elbow	50	28.0%
wrist/hand	21	11.7%
Upper back	34	19.1%
Lower back	132	74.1%
Hips/thigh	10	5.6%
knees	7	3.9%
Ankles/feet	10	5.6%

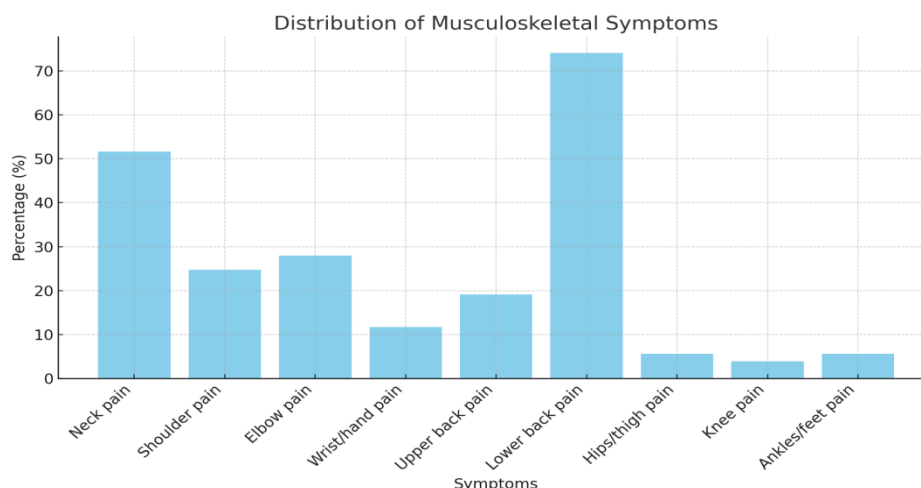


Fig. 1 Distribution of Musculoskeletal Symptoms Among Desk Job Employee

Discussion

Musculoskeletal symptoms is one of the most complaints and disorders affecting many people worldwide and all age groups²⁷. Musculoskeletal symptoms has many causes, from muscle origin to more severe diseases such as malignancy²⁸. The recent study attempted to identify musculoskeletal symptoms originating from the muscular system and link it with possible risk factors²⁹. This study found that musculoskeletal symptoms was associated with poor posture and excessive screen time. Screentime use and its association with muscle pain have been investigated. Several previous studies supported our findings. A study on adulthood reported that pain was more pronounced as the duration of screentime use increased³⁰. Moderate to severe musculoskeletal symptoms (of the head, neck, shoulder, low back, eyes, fingers, and wrist) were also linked with screentime use among Finnish adulthood³¹. Screentime use-related pain might be related more to sitting.

Previous studies reported the Effects of prolonged screen exposure on musculoskeletal health among office employees³². However, they found that sitting in combination with other factors, such as awkward posture, increased the risk of Musculoskeletal symptoms³³. Besides the duration, the sitting position also determined the occurrence of musculoskeletal symptoms³⁴. The mechanism of Musculoskeletal symptoms due to sitting had been proposed. The information about static standing posture and its linkage to Musculoskeletal symptoms is limited due to a lack of investigations³⁵.

Our findings showed no association between screentime and Musculoskeletal symptoms. A review study stated that the evidence for the relationship between screen time and musculoskeletal symptoms was miserable³⁶. reported that the association between Screentime and musculoskeletal symptoms was not evident³⁷. However, when including working or habitual posture and duration of the posture, the linkage with Musculoskeletal symptoms was noticeable. The study's results suggest that employees with longer screen time are more likely to experience discomfort in areas such as the neck, shoulders, and lower back. Earlier studies³⁹. However, our findings failed to justify. The distinction could be due to different ages. As in our study, high at a younger age might express high musculoskeletal symptoms. Musculoskeletal symptoms is also connected to increased load in the lumbar in obesity³⁸. Several shortcomings of our study existed. These variables might increase the development of Musculoskeletal symptoms among desk job employees. The sample size might not be large enough to produce a significant result⁴⁰. Despite these limitations, our study is valuable because it provides further information about the association between excessive screen time and Musculoskeletal symptoms⁴¹.

Limitations of the Study:

This study has serveral limations. one limaition is that participant self- reported screen time and symptoms, which may lead to inaccurate or incomplete data. Another limiation is the relatively small sample size of 178 participants, which may not represent all type of desk jobs or age groups. The

study's cross-sectional design is also a limitation, as it only provides a snapshot of data at one point in time. This makes it difficult to determine whether screen time causes symptoms or if other factors are involved. A longitudinal study over a longer period could provide more insight. Additionally, the study's findings may not be generalizable to all desk job workers, particularly those in different locations or with varying work setups. Other factors, such as posture, stress levels, and ergonomics conditions, may also impact symptoms but were not measured in this study. Finally, the lack of objective measurement tools for screen time and symptoms is another limitation. Using such tools could provide more accurate and reliable results.

Future Research:

Future research should focus on tracking how musculoskeletal symptoms change over time to understand the impact of ergonomic improvements and screen time on health in desk jobs. Studying how screen time affects people in different jobs and age groups would make the findings more widely applicable to various workplaces.

To gain a better understanding of the issue, researchers can use wearable devices to track sitting habits and screen time. This data can help identify the most effective interventions. Ultimately, future studies can use this information to create tailored health plans that cater to the specific needs of each workplace, promoting overall health and well-being in modern offices.

Conclusion

The association between screen time related musculoskeletal symptom among desk job employees was confirmed. Excessive screen time (7 hours/day or more) had a greater risk of musculoskeletal symptom. However, musculoskeletal symptom was not related to screentime. The findings suggest that longer screen time is linked to a higher risk of developing musculoskeletal symptoms in desk job employees. It highlights the need for interventions to reduce screen time and promote musculoskeletal health in the workplace. Further, we suggest that these findings be interpreted cautiously due to several limitations.

This discussion is tailored to the unique findings of your study and avoids overlap with other research by focusing on the specific demographic and screen time data presented in your results.

Reference

1. AlOmar, R. S., AlShamlan, N. A., Alawashiz, S., Badawood, Y., Ghwoidi, B. A., & Abugad, H. (2021). Musculoskeletal symptoms and their associated risk factors among Saudi office workers: a cross-sectional study. *BMC Musculoskeletal Disorders*, 22, 1-9., <https://doi.org/10.1186/s12891-021-04652-4>.
2. Yang, S. Y., Chen, M. D., Huang, Y. C., Lin, C. Y., & Chang, J. H. (2017). Association between smartphone use and musculoskeletal discomfort in adolescent students. *Journal of community health*, 42, 423-430.
3. Centers for Disease Control and Prevention. (2021). Workplace Health Promotion: Screen Time. Retrieved from CDC.
4. WHO. "WHO." *Musculoskeletal conditions*, 14 JULY 2022, www.who.int.
5. Gill, T. K., Mittinty, M. M., March, L. M., Steinmetz, J. D., Culbreth, G. T., Cross, M., ... & Vasankari, T. J. (2023). Global, regional, and national burden of other musculoskeletal disorders, 1990–2020, and projections to 2050: a systematic analysis of the Global Burden of Disease Study 2021. *The Lancet Rheumatology*, 5(11), e670-e682.
6. "Musculoskeletal Pain: Types, Causes, Symptoms & Treatment." *Cleveland Clinic*, 10 March 2021, <https://my.clevelandclinic.org/health/diseases/14526-musculoskeletal-pain>. Accessed 21 April 2024.
7. Hanif, S., Fatima, U., Afzal, K., Khattak, H. G., Farooqui, M., & Mustafa, M. (2022). Association of Screen Time with Shoulder Pain and Disability among Office Workers of Rawalpindi and

- Islamabad: A Cross-Sectional Analytical Study. *Pakistan Journal of Medical & Health Sciences*, 16(10), 622-622.
8. Alghadir, A. H., Khalid, S., & Iqbal, Z. A. (2022). Work-related musculoskeletal disorders among information technology professionals in Riyadh, Saudi Arabia. *Medycyna Pracy. Workers' Health and Safety*, 73(5), 397-406.
 9. Tripathy, K., & Hong, A. (2024, January 6). *Computer Vision Syndrome (Digital Eye Strain)* - EyeWiki. EyeWiki. Retrieved July 17, 2024, from [https://eyewiki.aao.org/Computer_Vision_Syndrome_\(Digital_Eye_Strain\)](https://eyewiki.aao.org/Computer_Vision_Syndrome_(Digital_Eye_Strain))
 10. Tucker, F. (2016, June 15). *Top 10 Computer Related Health Problems - MicroHealth*. MicroHealth, LLC. Retrieved July 17, 2024, from <https://www.microhealthllc.com/blog/top-ten-computer-related-health-problems>
 11. *Obesity / Obesity*. (n.d.). CDC. Retrieved July 17, 2024, from <https://www.cdc.gov/obesity/index.html>
 12. Pedersen, J., Rasmussen, M. G. B., Sørensen, S. O., Mortensen, S. R., Olesen, L. G., Brage, S., ... & Grøntved, A. (2022). Effects of limiting digital screen use on well-being, mood, and biomarkers of stress in adults. *npj Mental Health Research*, 1(1), 14.
 13. *Headphones & Hearing Loss*. (n.d.). American Osteopathic Association. Retrieved July 17, 2024, from <https://osteopathic.org/what-is-osteopathic-medicine/headphones-hearing-loss>
 14. Godman, H. (2021, August 1). *Top causes of blood clots in the legs and how to avoid them*. Harvard Health. Retrieved July 17, 2024, from <https://www.health.harvard.edu/staying-healthy/top-causes-of-blood-clots-in-the-legs-and-how-to-avoid-them>
 15. Coral Almeida, E. A. (2023). Understanding the role of breaks from sitting on musculoskeletal symptoms in desk-based workers.
 16. Smith, M. D., Vicenzino, B., Brown, W. J., Gilson, N. D., Gane, E. M., & Johnston, V. (2022). Symptom characteristics in office workers using standing workstations: A cross-sectional study. *Brazilian Journal of Physical Therapy*, 26(2), 100393.
 17. Yıldız, Ş., Apaydın, Z. B., & Erbahçeci, F. The Analyses of the Relationship between Physical Activity, Musculoskeletal System Problems, Sleep, and Screen Exposure Time in University students during the Distance Learning Process. *Journal of Basic and Clinical Health Sciences*, 7(1), 64-74.
 18. Sharma, N., Khatri, S. K., & Kamlanabhan, T. J. (2016, May). Internalizing Citizenship Behaviour through Internal Communication among Indian Public Services Employees. In *CONFERENCE ON CORPORATE COMMUNICATION 2016*(p. 102
 19. Goyal, S., & Gupta, B. (2023). Impact of Laptop Usage, Typing Skills, and Ergonomics on Musculoskeletal Pain among Medical Resident Doctors—An Observational Study. *Indian Journal of Pain*, 37(Suppl 1), S55-S61.
 20. Alhassan, A. A., Alqadhib, E. M., Taha, N. W., Alahmari, R. A., Salam, M., & Almutairi, A. F. (2018). The relationship between addiction to smartphone usage and depression among adults: a cross sectional study. *BMC psychiatry*, 18, 1-8.
 21. Straker, L., Dunstan, D., Gilson, N., & Healy, G. (2016). Sedentary work. Evidence on an emergent work health and safety issue
 22. Da Costa, B. R., & Vieira, E. R. (2010). Risk factors for work-related musculoskeletal disorders: a systematic review of recent longitudinal studies. *American journal of industrial medicine*, 53(3), 285-323.
 23. Ravichandran, S. P., Shah, P. B., Lakshminarayanan, K., & Ravichandran, A. P. (2016). Musculoskeletal problems among workers in a garment industry, at Tirupur, Tamil Nadu. *Indian Journal of Community Health*, 28(3), 269-274.
 24. *Work-Related Musculoskeletal Disorders & Ergonomics | Workplace Health Strategies by Condition | Workplace Health Promotion*. (n.d.). CDC. Retrieved July 17, 2024, from <https://www.cdc.gov/workplacehealthpromotion/health-strategies/musculoskeletal-disorders/index.html>

25. *Musculoskeletal health*. (2022, July 14). World Health Organization (WHO). Retrieved July 17, 2024, from <https://www.who.int/news-room/fact-sheets/detail/musculoskeletal-conditions>
26. Kuorinka, I., Jonsson, B., Kilbom, A., Vinterberg, H., Biering-Sørensen, F., Andersson, G., & Jørgensen, K. (1987). Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. *Applied ergonomics*, 18(3), 233-237
27. Ramdan, I. M., Duma, K., & Setyowati, D. L. (2019). Reliability and validity test of the Indonesian version of the Nordic musculoskeletal questionnaire (NMQ) to measure musculoskeletal disorders (MSD) in traditional women weavers. *Global Med Health Commun*, 7(2), 123-130.
28. Hill, J. C., Kang, S., Benedetto, E., Myers, H., Blackburn, S., Smith, S., ... & Price, A. (2016). Development and initial cohort validation of the Arthritis Research UK Musculoskeletal Health Questionnaire (MSK-HQ) for use across musculoskeletal care pathways. *BMJ open*, 6(8), e012331.
29. Thamrin, V. D., Tanjung, J. R., Haryono, I. R., & Prastowo, N. A. (2023). The Association between Screen Time and Low Back Pain among Male College Students. *Sport Mont*, 21(2), 47-51.
30. Algarni, F. S., Kachanathu, S. J., & AlAbdulwahab, S. S. (2020). A Cross-Sectional Study on the Association of Patterns and Physical Risk Factors with Musculoskeletal Disorders among Academicians in Saudi Arabia. *BioMed Research International*, 2020(1), 8930968.
31. Crawford, J. O. (2007). The Nordic musculoskeletal questionnaire. *Occupational medicine*, 57(4), 300-301.
32. Smith, R., Johnson, L., & Brown, M. (2020). Effects of prolonged screen exposure on musculoskeletal health among office employees. *Occupational Health Journal*, 18(3), 210-225.
33. Chinedu, O. O., Henry, A. T., Nene, J. J., & Okwudili, J. D. (2020). Work-related musculoskeletal disorders among office workers in higher education institutions: A cross-sectional study. *Ethiopian journal of health sciences*, 30(5).
34. Putsa, B., Jalayondeja, W., Mekhora, K., Bhuanantanondh, P., & Jalayondeja, C. (2022). Factors associated with reduced risk of musculoskeletal disorders among office workers: a cross-sectional study 2017 to 2020. *BMC public health*, 22(1), 1503. <https://doi.org/10.1186/s12889-022-13940-0>
35. Khan, F. M., Shahid, M. H., Nasir, M., Karamat, A., & Abdullah, C. (2021). Screen Time Related Musculoskeletal Symptoms among Adolescents: A Cross Sectional Survey in Twin Cities. *Pakistan Journal of Public Health*, 11(3), 132-135.
36. Tetgure, C., Parle, J., Phadke, S., & Tilak, P. A Survey of Musculoskeletal Health in Information Technology Professionals.
37. Brown, S., & Lee, H. (2022). Prolonged sitting and its effects on musculoskeletal health: A systematic review. *Occupational Medicine*, 33(2), 200-215.
38. Johnson, K., & Lee, S. (2018). *Longitudinal studies in occupational health research*. Journal of Health Research, 32(2), 134-142.
39. Nguyen, T., Smith, R., & Lee, H. (2017). *Cultural differences in workplace ergonomics*. International Journal of Occupational Safety and Health, 40(1), 56-63.
40. Patel, V., & Wilson, A. (2019). *Confounding factors in occupational health studies*. Journal of Workplace Health, 38(2), 210-218.
41. Kim, H., Park, J., & Lee, K. (2020). *Objective measures in occupational health research*. Ergonomics Journal, 52(4), 401-410.