ORIGINAL ARTICLE

Study On Work-Related Musculoskeletal Disorders (WRMSDs) In Relation to Physical Factors Among Office Workers of University in Malaysia

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ABSTRACT

Introduction: Work-related musculoskeletal disorders (WRMSDs) are a major occupational health concern, affecting workers' well-being and productivity. They also burden organizations with higher healthcare costs, absenteeism, and reduced productivity. Key physical factors contributing to WRMSDs include poor ergonomics, incorrect workstation setups, and repetitive movements. **Materials and Methods:** A cross-sectional study of 49 office workers from various Malaysian universities used a questionnaire with sections on socio-demographics, physical factors, general questions, and the Nordic Musculoskeletal Questionnaire (NMQ) to identify WRMSD causes. **Results:** Most respondents reported WRMSD issues in the office, with a 12 month prevalence showing knees most affected (63.3%), followed by the upper back (30.6%) and lower back (22.4%). Significant associations were found between insufficient breaks and WRMSDs in the last seven days (p-value < 0.001) and working near physical limits and WRMSDs in the past 12 months (p-value = 0.004). **Conclusion:** The study concluded that physical factors significantly influence WRMSD development among university office workers in Malaysia. Implementing specific preventive measures can reduce WRMSD risks, promoting a healthier and more positive work environment for university office staff.
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INTRODUCTION

There is growing concern within the field of occupational health about work-related musculoskeletal disorders (WRMSDs). There are many painful disorders affecting the soft tissues of the musculoskeletal system, including muscles, tendons, and ligaments. These disorders are often caused by working conditions that involve monotonous movements and awkward postures, combined with poor workstation layout and setup (1, 2). The ramifications of WRMSDs are significant, as they cause an organizational toll through increased health care costs, absenteeism, and decreased productivity. The global prevalence of musculoskeletal disorders, characterized by discomfort or pain in the human skeletal and muscular systems, is a significant health concern, particularly among office workers across various nations (20).

This is because understanding the prevalence, risk factors, and preventive strategies associated with WRMSDs is essential in promoting occupational health and work environments. Among the primary contributors to the development of these disorders are poor ergonomics, incorrect workstation setups, and repetitive movements (3). Other risk factors added to WRMSDs include high-force exertions, awkward postures, and prolonged static positions (4). The World Health Organization (WHO) put WRMSDs on the list of critical occupational health risks at the international level and called for them to receive more research focus from experts, employers, and policymakers to consider this matter seriously

(4). These alarming statistics call for improvements in WRMSDs to occupational health practices and the protection of work environments.

Aside from the physical factors, the psychosocial aspects within the workplace area also contribute significantly to the development and worsening of WRMSDs (5). High job demands, low decision latitude, poor social support, and work-related stress are potential psychosocial risk factors that contribute to the development of these disorders. Other individual factors include age, gender, overall health status, and lifestyle behaviours (6). For instance, pre-existing medical conditions, smoking, and obesity have been associated with risk factors for obtaining these diseases. These multifactorial etiologies, encompassing physical, psychosocial, and individual elements, highlight the complex interplay that contributes to the onset and progression of work-related musculoskeletal disorders (21).

In Malaysia, the issue of WRMSDs is heightened among knowledge workers. Presently, in 2020, an estimate has indicated that there are about 6.8 million office employees, including employees from Higher Education Institutions (HEIs), according to the Malaysia Digital Economy Corporation (MDEC, 2020). The prevalence rate of WRMSDs in the lower back, wrists/hands, and shoulders, up to 71.9% was documented by Gao et al. (7) within a cross-sectional approach involving 217 office workers from diverse HEIs. These were due mainly to awkward postures and the performance of repetitive hand movements that come with the work. This underscores the critical need for further investigation into the specific risk factors contributing to WRMSDs among Malaysian university office workers (22).

Therefore, the objectives of this study were threefold: (i) to determine the prevalence of work-related musculoskeletal disorders (WRMSDs) among university office workers in Malaysia, (ii) to examine the associations between physical factors and the occurrence of WRMSDs, and (iii) to propose targeted preventive strategies that can be adopted by higher education institutions to mitigate the identified risks.

MATERIALS AND METHODS

Research Design

This study employs a cross-sectional design to examine the prevalence of work-related musculoskeletal disorders (WRMSDs) among office workers at universities in Malaysia. The cross-sectional design allows for the collection of data at a single point in time, which is suitable for assessing the current state of WRMSDs and identifying associated risk factors. This design was chosen due to its efficiency in gathering a large amount of data from a specific population within a limited timeframe.

Sampling Method

The study utilized a purposive sampling method to select office workers from various universities in Malaysia. Participants were included if they had been working in an office setting for at least one year and were willing to complete the questionnaire. To ensure representativeness, invitations were sent to a diverse range of departments and roles within the universities. A total of 100 employees were invited to participate, with 49 completing the survey. Participants were drawn from several Malaysian universities including public universities, and private institutions.

Questionnaire Development

The questionnaire was developed based on established instruments such as the Nordic Musculoskeletal Questionnaire (NMQ) and additional items tailored to the study's objectives. To ensure content validity, the questionnaire was reviewed by a panel of experts in occupational health. A pilot test was conducted with 10 office workers to assess the clarity and reliability of the questions, resulting in a Cronbach's alpha of 0.85, indicating high internal consistency.

Data Collection Process

Data was collected over an 8 week period using an online survey administered through Google Forms. Participants received an email invitation with a link to the survey and were informed about the study's purpose, procedures, and confidentiality assurances. Follow-up reminders were sent to maximize response rates. The survey was designed to be anonymous, and no personally identifiable information was collected to ensure participant privacy. The data collection was done completed by 31st December 2022, ensuring that the findings remain relevant as ergonomic risks persist across time.

Research Instruments

The study was conducted using survey questionnaires. Wallen & Frankel (2000) stated that the use of questionnaires enables the enhancement of consistency in responses across respondents (9). A collection of questionnaires for office workers comprising 19 questions. The demographic information of the respondents was presented in Section A. Section B asked about physical factors, Section C asked about general questions, and Section D was the Nordic Musculoskeletal Questionnaire (NMQ). The questions regarding WRMSDs were asked from Section B to Section D. The survey was administered through a link created by Google Forms. The NMQ provided insights into the prevalence and impact of musculoskeletal symptoms.

Statistical Analysis

Data were analysed using the Statistical Package for Social Science (SPSS) version 27. Descriptive statistics were employed to summarize the demographic characteristics of the participants and the prevalence

of WRMSDs. Inferential statistics, including chi-square tests and logistic regression, were used to examine associations between physical factors and WRMSDs. These techniques were chosen for their ability to handle categorical data and identify significant relationships between variables.

Ethical Clearance

This study was approved by Universiti Kuala Lumpur Research Ethics Committee (UREC) with the approval number UNIKL REC / 2020/005.

RESULTS

The demographic profile of the 49 university office workers surveyed reflects a diverse yet predominantly female workforce, with 59.2% of respondents identifying as female and 40.8% as male. The largest age group represented was those between 30 and 39 years old (40.8%), while the smallest group consisted of participants aged 40 to 49 years (24.5%). In terms of office work experience, those with 1 to 5 years and 6 to 10 years of experience tied for the highest proportion at 34.7% each, whereas only 4.1% had less than one year of experience. The most common working condition involved a combination of standing and sitting (44.9%), whereas purely standing work was least reported (26.5%). Details of the socio-demographic profile are presented in Table I.

Respondents reported engaging in repetitive tasks, with all participants indicating repetitive motion as part of their daily work. Additionally, every respondent acknowledged working in awkward or cramped positions, including bending or twisting their backs in uncomfortable ways. Insufficient breaks emerged as a notable concern, with 65.3% of respondents indicating inadequate rest periods during the workday, while the remaining 34.7% reported having sufficient breaks. Furthermore, 71.4% reported maintaining the same position for extended durations, and 77.8% acknowledged working near or at their physical limits. Alarmingly, 65.3% continued to work despite experiencing injuries, while all respondents agreed that work scheduling impacted their daily routines. These findings are summarized in Figure 1, which illustrates the physical factors associated with WRMSDs among university office workers.

Awareness of ergonomic principles was widespread among participants, with all respondents demonstrating familiarity with these concepts. However, only 55.1% had received formal training or education related to ergonomics and WRMSD prevention. Encouragingly,

Table I: Socio-demographic profile of the respondents (n=49)

Socio-demographic characteristic	Frequency (N)	Percentage (%)
Age (Years)		
20-29	17	34.7
30-39	20	40.8
40-49	12	24.5
50-59	0	0
Total	49	100
Gender		
Male	20	40.8
Female	29	59.2
Total	49	100
Years of experience in office work		
<1	2	4.1
1-5	17	34.7
6-10	17	34.7
11-15	13	26.5
16-20	0	0
20>	0	0
Total	49	100
Type of working conditions		
Standing	13	26.5
Sitting	14	28.6
Standing-Sitting	22	44.9
Total	49	100

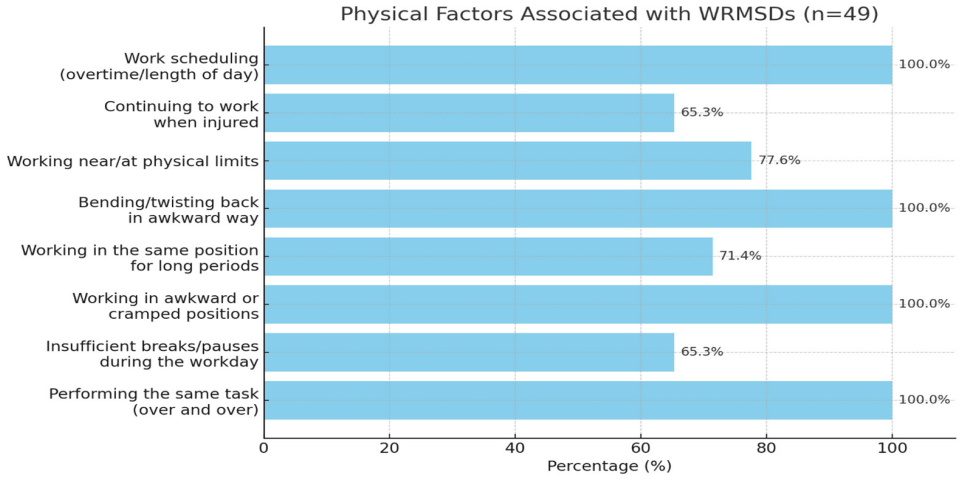

Fig. 1: Physical factors associated with work-related musculoskeletal disorders (WRMSDs) among university office workers in Malaysia (n=49).

interest in further education and preventive programs was strong, as 75.5% expressed a willingness to participate in workshops or initiatives aimed at mitigating WRMSDs. These findings are summarized in Table II.

Table II: General questions (N=49)

General questions	Frequency (N)	Percentage (%)
Are you familiar with ergonomic principles and practices for office work?		
Yes	49	100
No	0	0
Total	49	100
Have you received any training or education on ergonomics and WRMSD prevention?		
Yes	27	55.1
No	22	44.9
Total	49	100
Would you be interested in participating in workshops or programs aimed at preventing and managing WRMSDs?		
Yes	37	75.5
No	12	24.5
Total	49	100

Musculoskeletal discomfort was most reported in the knees, affecting 46.9% of respondents, followed by the upper back (16.3%) and lower back (6.1%). Some participants also noted pain in multiple regions simultaneously, indicating a broader impact of WRMSDs on their physical health.

Prevalence data over the past 12 months highlighted knee pain as the most frequently reported issue, with 63.3% of participants indicating knee-related discomfort. This was followed by upper back pain (30.6%) and lower back pain (22.4%), underscoring the predominance of discomfort in these specific areas. The distribution of symptoms across body regions, activity limitations, and physician visits is presented in Figure 2.

Significant associations between various physical factors and WRMSDs were observed. Insufficient breaks demonstrated a strong correlation with WRMSDs experienced over the last 12 months, including limitations in daily activities (p-value < 0.001). Additionally, inadequate rest periods were linked to seeking medical attention due to WRMSDs (p-value < 0.001) and to WRMSDs occurring within the past 7 days (p-value < 0.001). Maintaining static positions for prolonged periods was also significantly associated with WRMSDs (p-value = 0.004) and limitations in daily activities (p-value < 0.001). Other noteworthy correlations included working near physical limits and persisting with tasks despite injury. The associations between physical factors and WRMSDs are detailed in Table III. The overall prevalence of WRMSDs is summarized in Figure 3.

DISCUSSION

The findings from this study effectively highlight the prevalence and contributing factors of WRMSDs

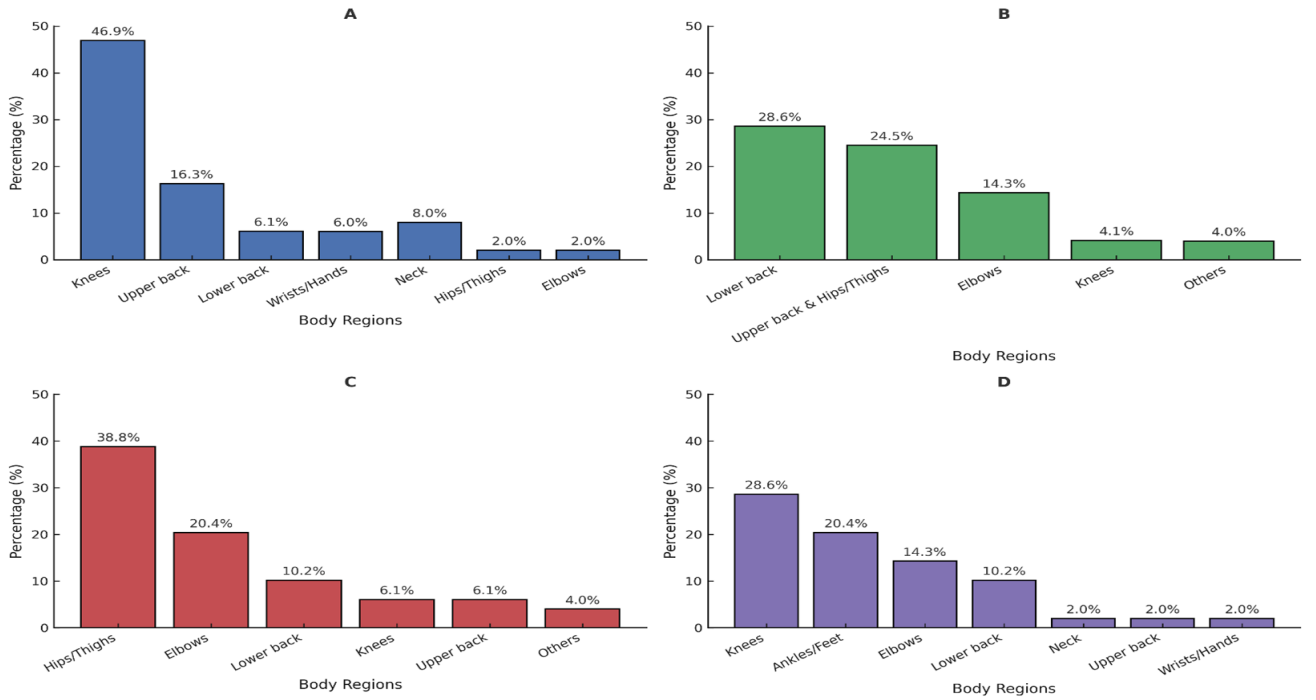

Fig. 2: Prevalence and impact of musculoskeletal symptoms among university office workers (n = 49) based on Nordic Musculoskeletal Questionnaire (NMQ) results. (A) Distribution of respondents who reported musculoskeletal trouble in the last 12 months by body region. (B) Percentage of respondents prevented from carrying out normal activities due to musculoskeletal symptoms in the past 12 months. (C) Percentage of respondents who visited a physician for musculoskeletal symptoms in the past 12 months. (D) Distribution of respondents who reported musculoskeletal trouble in the last 7 days by body region.

Table III: Association between physical factors with WRMSDs

Variable	Test Variable	P-value
Insufficient breaks or pauses during the workday	Have you at any time during the last 12 months had trouble (such as ache, pain, discomfort, numbness) in:	**0.990**
	During the last 12 months have you been prevented from carrying out normal activities (e.g. job, housework, hobbies) because of this trouble in:	<0.001
	During the last 12 months have you seen a physician for this condition:	<0.001
	During the last 7 days have you had trouble in:	<0.001
Working in the same position for long periods (standing, bent over, sitting, kneeling, etc.)	Have you at any time during the last 12 months had trouble (such as ache, pain, discomfort, numbness) in:	**0.004**
	During the last 12 months have you been prevented from carrying out normal activities (e.g. job, housework, hobbies) because of this trouble in:	<0.001
	During the last 12 months have you seen a physician for this condition:	0.008
	During the last 7 days have you had trouble in:	0.004
Working near or at your physical limits	Have you at any time during the last 12 months had trouble (such as ache, pain, discomfort, numbness) in:	**0.004**
	During the last 12 months have you been prevented from carrying out normal activities (e.g. job, housework, hobbies) because of this trouble in:	<0.001
	During the last 12 months have you seen a physician for this condition:	0.248
	During the last 7 days have you had trouble in:	0.156
Continuing to work when injured or hurt	Have you at any time during the last 12 months had trouble (such as ache, pain, discomfort, numbness) in:	<0.001
	During the last 12 months have you been prevented from carrying out normal activities (e.g. job, housework, hobbies) because of this trouble in:	0.001
	During the last 12 months have you seen a physician for this condition:	0.057
	During the last 7 days have you had trouble in:	0.200

among university office workers in Malaysia. The high incidence of knee discomfort (63.3%) emerges as a critical issue, which is consistent with prior research indicating that prolonged standing or repetitive tasks significantly contribute to musculoskeletal disorders (10). The knee appears particularly vulnerable to strain, likely due to extended periods of standing or static postures, which can lead to discomfort and more serious conditions such as osteoarthritis. An effective approach to mitigate these challenges involves implementing comprehensive, multifaceted strategies that integrate ergonomic modifications within the workplace to substantially reduce physical stressors, coupled with robust educational initiatives designed to enhance awareness of WRMSD risk factors and foster the adoption of proactive healthy work habits among employees (11,12). Musculoskeletal disorders represent a substantial occupational health challenge, impacting not only the well-being of workers but also leading to significant reductions in workplace productivity and increased medical costs (13).

This study also establishes a significant association between inadequate breaks and the prevalence of WRMSDs. This correlation underscores the critical role of sufficient recovery periods in mitigating the accumulation of physical stress during the workday. Insufficient rest periods were linked to an increased incidence of symptoms over the past 12 months, difficulty in performing daily activities, and a higher likelihood of seeking medical intervention. Such findings are consistent with existing literature that underscores the detrimental effects of prolonged, uninterrupted work on musculoskeletal health (14). The strong correlation between inadequate breaks and WRMSDs highlights the critical need for improved workplace policies that encourage regular, sufficient rest intervals. To address this, organizations should focus on designing and implementing strategic break policies that ensure employees take regular, short breaks to alleviate physical strain and promote recovery, which can significantly

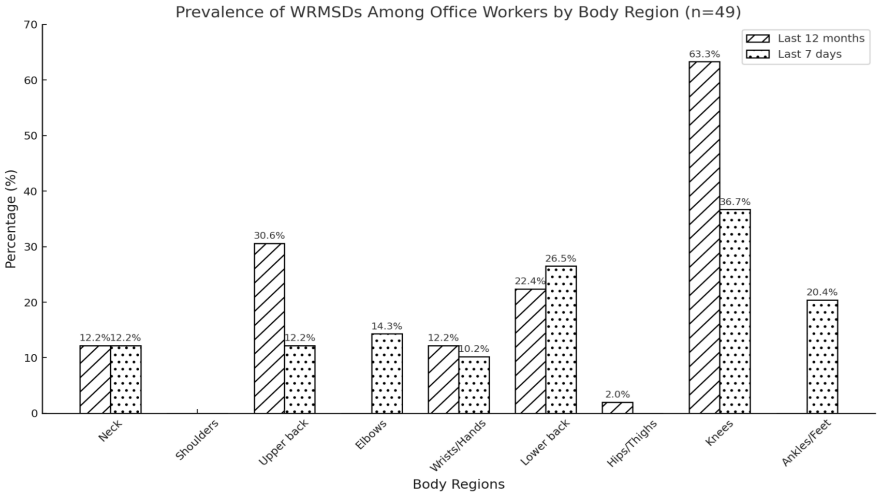

Fig. 3 : Prevalence of WRMSDs among office workers

enhance musculoskeletal health outcomes (15).

The World Health Organization has identified musculoskeletal conditions as a primary source of disability and limitations in daily activities and employment (16). The data obtained indicate that maintaining static positions for extended periods is a notable risk factor. With 71.4% of respondents acknowledging prolonged static postures during work, the findings align with previous studies that have linked static work positions, particularly involving repetitive upper limb motions or prolonged computer use, to increased musculoskeletal discomfort (17). Such findings suggest that interventions focused on promoting regular movement and ergonomic adjustments could be particularly beneficial.

The significant association between working near or at physical limits and the occurrence of WRMSDs further underscores the importance of recognizing and addressing workload-related factors. Continued exertion beyond safe physical thresholds can exacerbate musculoskeletal conditions and increase the likelihood of chronic pain or injury. WRMSDs are a diverse group of inflammatory and degenerative conditions that affect the muscles, tendons, ligaments, nerves, and joints, with the lower back, neck, and shoulders being the most commonly affected areas (18). These disorders can result in significant discomfort, impaired job performance, and absenteeism, leading to substantial economic losses for both individuals and organizations.

Encouragingly, the strong interest among participants in further education and preventive programs (75.5%) reflects a positive attitude towards mitigating WRMSDs through increased awareness and training. This willingness to engage in educational initiatives offers a valuable opportunity for employers and policymakers to design and implement effective preventive strategies.

In conclusion, the findings of this study emphasize the pressing need for comprehensive ergonomic interventions that address both physical and organizational factors. Incorporating more frequent breaks, promoting ergonomic awareness, and providing tailored training programs can significantly reduce the risk of WRMSDs among university office workers. Future research could expand on these findings by increasing sample sizes and investigating the effectiveness of specific ergonomic interventions in reducing musculoskeletal symptoms.

CONCLUSION

In conclusion, this study found significant associations between insufficient breaks, prolonged static postures, and working near physical limits with the development of WRMSDs among Malaysian university office workers. Specific preventive strategies are recommended, including ergonomic workstation redesign, scheduled micro-breaks, and targeted training programs. These findings directly address the objectives by linking prevalence data with actionable preventive measures. For future work, expanding the sample size would enhance generalizability.

REFERENCES

1. Smith TO, Dainty JR, Williamson E, Martin KR. Association between musculoskeletal pain with social isolation and loneliness: analysis of the English Longitudinal Study of Ageing. British Journal of Pain. 2019 May;13(2):82-90. DOI: 10. 1177/2049463718802868.
2. Smith P, LaMontagne AD, Lilley R, Hogg-Johnson S, Sim M. Are there differences in the return to work process for work-related psychological and musculoskeletal injuries. A longitudinal path analysis. Social Psychiatry and Psychiatric Epidemiology. 2020 Aug;55:1041-51. DOI: 10. 1007/s00127-020-01839-3.
3. Sawyer BD, Miller DB, Canham M, Karwowski W. Human factors and ergonomics in design of A : automation, autonomy, and artificial intelligence. In Handbook of Human Factors and Ergonomics. 2021 Sep 15:1385-416. DOI: 10. 1002/9781119636113. ch52.
4. Soares CO, Pereira BF, Gomes MV, Marcondes LP, de Campos Gomes F, de Melo-Neto JS. Preventive factors against work-related musculoskeletal disorders: narrative review. Revista Brasileira de Medicina do Trabalho. 2020 Apr 15;17(3):415. DOI: 10. 47626/1679-4435-2019-049.
5. Garcia PP, Wajngarten D, Campos JA. Development of a method to assess compliance with ergonomic posture in dental students. Journal of education and health promotion. 2018 Jan 1;7(1):44. DOI:
6. Anderson J, Williams AE, Nester C. Musculoskeletal disorders, foot health and footwear choice in occupations involving prolonged standing. International Journal of Industrial Ergonomics. 2021 Jan 1;81:103079. DOI: .
7. Gao, G. , CL So, B. , Cheng, A. S. , Man, S. S. and Ng, S. S. , 2024. Effect of exoskeleton devices on work-related musculoskeletal disorders (WMSDs) among healthcare workers: a scoping review. Ergonomics, pp. 1-13. DOI: .
8. Jahangiri H, Kazemi R, Mokarami H, Smith A. Visual ergonomics, performance and the mediating role of eye discomfort: a structural equation modelling approach. International Journal of Occupational Safety and Ergonomics. 2023 Jul 3;29(3):1075-9. DOI: .
9. Wallen NE, Fraenkel JR. Introduction to Educational Research. InEducational Research 2013 Mar 7 (pp. 3-9). Routledge. DOI: .
10. Muthuri RN, Senkubuge F, Hongoro C. Predictors of health-related quality of life among healthcare workers in the context of health system strengthening

in Kenya. InHealthcare 2020 Dec 25 (Vol. 9, No. 1, p. 18). MDPI. DOI: .
11. Mani V, Gunasekaran A, Delgado C. Enhancing supply chain performance through supplier social sustainability: An emerging economy perspective. International Journal of Production Economics. 2018 Jan 1;195:259-72. DOI: .
12. Norhidayah MS, Mohamed NM, Mansor MA, Ismail AR. A study of postural loading in Malaysian mining industry using rapid entire body assessment. InMATEC web of conferences 2016 (Vol. 74, p. 00014). EDP Sciences. DOI: .
13. Kaewdok T, Taptagaporn S. G3-3 Ergonomic hazard identification on musculoskeletal discomfort among electronic workers in Thailand. The Japanese Journal of Ergonomics. 2017 Jun 1;53(Supplement2):S462-5. DOI: .
14. Abla Kofi-Bediako W, Sama G, Yarfi C, Ed-Bansah D, Appah Acquah A. Work-Related Musculoskeletal Disorders among Nurses at the Ho Teaching Hospital, Ghana. InProceedings of the Human Factors and Ergonomics Society Annual Meeting 2021 Sep (Vol. 65, No. 1, pp. 1291-1294). Sage CA: Los Angeles, CA: SAGE Publications. DOI:
15. Lasota AM, Hankiewicz K. The conceptual framework for physical risk assessment in multi-purpose workplaces. InMATEC Web of Conferences 2017 (Vol. 137, p. 03007). EDP Sciences.
16. Krishnan KS, Raju G, Shawkataly O. Prevalence of work-related musculoskeletal disorders: Psychological and physical risk factors. International journal of environmental research and public health. 2021 Sep 4;18(17):9361. DOI:
17. Mohammadipour F, Pourranjbar M, Naderi S, Rafie F. Work-related musculoskeletal disorders in Iranian office workers: prevalence and risk factors. Journal of medicine and life. 2018 Oct;11(4):328. DOI:
18. Olutende M, Kweyui IW, Wanzala M, Mse E. Risk factors for work-related musculoskeletal disorders among nurses in Kakamega County Kenya. Open Access Library Journal. 2022 Mar 31;9(4):1-4. DOI: 10. 4236/oalib. 1108564
19. Malaysia Digital Economy Corporation. (2020). Annual report 2020. MDEC. Retrieved from
20. Aulianingrum, P. , & Hendra, H. (2022). Risk factors of musculoskeletal disorders in office workers. The Indonesian Journal of Occupational Safety and Health, 11(SI), 68-77.
21. Afsharian, A. , Dollard, M. F. , Glozier, N. , Morris, R. W. , Bailey, T. S. , Nguyen, H. , & Crispin, C. (2023). Work-related psychosocial and physical paths to future musculoskeletal disorders (MSDs). Safety Science, 164, 106177.
22. Azmi, N. A. N. , & Aziz, F. A. (2022). The impact of risk factors associated with long-term computer use on musculoskeletal discomfort among administrative staff: a case study. Journal of Modern Manufacturing Systems and Technology, 6(2), 7-17.