ORIGINAL ARTICLE

Associations Between Work-Related Musculoskeletal Disorders with Perceived Psychosocial and Physical Risk Factors Among Hotel Workers

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ABSTRACT

Introduction: Hotel workers are at heightened risk of developing Work-Related Musculoskeletal Disorders (WRMSDs) due to the physically demanding and psychosocially challenging nature of their job tasks. This study aimed to determine the prevalence of WRMSDs and examine their association with work-related risk factors among hotel workers in the Klang Valley. **Materials and Methods:** A cross-sectional study was conducted using a Malay-translated self-administered questionnaire distributed to 310 hotel workers, achieving a response rate of 91.29%. WRMSD symptoms were assessed using the validated Malay version of the Nordic Musculoskeletal Questionnaire (M-NMQ), while psychosocial risk factors were measured with the Malay-validated Job Content Questionnaire (M-JCQ). Additional socio-demographic, occupational, and health-related information was also collected. Data were analyzed using IBM SPSS to generate descriptive and inferential statistics. **Results:** The 12-month prevalence of WRMSDs was 79.0% (n = 215). The most commonly affected body regions were the neck (54.0%) and lower back (50.2%), whereas the knee was the least affected (41.9%). Respondents reported that WRMSDs negatively impacted their quality of life, necessitated medical attention, limited mobility, and contributed to work absenteeism. High job demands (72.1%), low job control (53.7%), poor job support (55.1%), and high physical demands (61.4%) were commonly reported. Inferential analysis revealed significant associations between WRMSDs and psychosocial factors (job control and job support), as well as physical demands ($p < 0.05$). **Conclusion:** WRMSDs represent a substantial occupational health issue among hotel workers in the Klang Valley, influenced by both physical and psychosocial work-related factors. Targeted interventions, strengthened workplace policies, and enhanced awareness initiatives are essential to safeguard workers' health and improve overall productivity within the hotel sector.

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INTRODUCTION

Over the past decades, Malaysia has strategically positioned itself as a competitive tourism and hospitality hub in Southeast Asia, supported by both government policies and substantial private sector investments. The hospitality industry comprises a wide array of sectors, including accommodation, food and beverage services, tourism, and event management. According to the Department of Statistics Malaysia (DOSM)(1), this sector contributed approximately 15% to the national GDP in the pre-pandemic years, generating total revenue exceeding RM89.4 billion in 2019 Among the various components of this industry, the hotel sector remains a major contributor.

The post-COVID-19 era has introduced both challenges and opportunities for Malaysia's hotel industry. As global travel restrictions eased and international borders reopened, the sector began its gradual recovery. However, the COVID-19 pandemic had greatly exacerbated pre-existing issues, particularly labour shortages. Housekeeping personnel, restaurant chefs, and front desk staff were among the most affected groups, with many retrenched workers choosing not to return to the industry (2). This shortage created a critical workforce gap, limiting the sector's capacity to meet the demands associated with rising hotel occupancy rates.

WRMSDs have long been recognized as a significant occupational health concern in Malaysia. According to the Department of Occupational Safety and Health (DOSH)(3), reported cases have shown an upward trend over recent years. In 2023, confirmed WRMSD cases accounted for 9.1% (696 cases) of all occupational diseases reported nationwide. WRMSDs are categorized as non-communicable diseases and are broadly described as disorders or discomfort involving the musculoskeletal system, peripheral nerves, and neurovascular structures, arising from prolonged exposure to workplace hazards. Consequently, service efficiency declined, and job demands for existing workers increased, heightening the risk of adverse health outcomes, including Work-Related Musculoskeletal Disorders (WRMSDs)(4).

Most occupations involve certain levels of physical or mental demands; however, when demands become unrealistic or excessively strenuous, they can lead to significant work-related stress. In hotel settings, different departments—such as guest services, housekeeping, and food service are responsible for distinct tasks with varying levels of physical and psychosocial demands. For instance, hotel housekeeping staff are required to perform physically intensive activities such as room cleaning, toilet sanitization, changing multiple sets of bed linens, and pushing or pulling heavy trolleys containing amenities. These tasks often involve repetitive motions, awkward postures, heavy exertion, and contact stress, all of which are established physical risk factors contributing to the development of WRMSDs. Musculoskeletal pain involving the lower back, neck, shoulders, hands, wrists, and knees has been widely documented as a prominent occupational health risk among housekeeping workers (5).

In addition to physical workload, WRMSDs are also associated with psychosocial factors, including low social support, high job demands, and excessive workloads, all of which negatively affect workers' physical and mental wellbeing (6). Identifying and managing these risk factors is crucial to preventing worker disability, reducing lost or restricted work time, minimizing medical and compensation costs, and improving overall workplace productivity. Therefore, this research aims to evaluate the relationship between Work-Related Musculoskeletal Disorders (WRMSDs) and work-related risk factors among hotel workers.

MATERIALS AND METHODS

Study design and recruitment process

The cross-sectional study was conducted among hotel workers in the Klang Valley region and obtained ethical approval from the UniKL Research Ethics Committee (UREC) (UNIKL REC/2023/STRG/TCA/02). Participants were selected using convenience sampling, and permission was obtained from hotel management prior to data collection. Meetings were held between the research team and hotel management to present the study objectives and explain the potential benefits to the organization. The sample size was estimated based on the prevalence of Work-Related Musculoskeletal Disorders (WRMSDs)(7), using a 95% confidence level and a statistical power of approximately 80% to ensure adequate sample representation. A total of 310 survey questionnaires were distributed, resulting in a response rate of 91.29%. After applying the inclusion and exclusion criteria, 272 respondents were eligible for analysis. The inclusion criteria required participants to be Malaysian citizens and literate in the Malay language. Individuals who were pregnant, breastfeeding, or had a prior history of musculoskeletal disorders unrelated to occupational exposure were excluded from the study.

Study material

A self-administered Malay-language questionnaire consisting of four (4) sections was used to collect data for this study. Participants were required to provide sociodemographic information (e.g., age, gender, marital status, and education level) and occupational details (e.g., working hours per day, working days per week). The validated Malay version of the Nordic Musculoskeletal Questionnaire (NMQ), adapted from the original instrument (8), was used to assess the 12-month prevalence of Work-Related Musculoskeletal Disorders (WRMSDs) across nine (9) anatomical regions. Using the NMQ, participants responded "Yes" or "No" to questions regarding musculoskeletal symptoms in each body region, specifically relating to: (1) discomfort, (2) limitations in daily activities, and (3) consultations with medical practitioners.

The validated Malay version of the Job Content Questionnaire (JCQ)(9), was based on the original instrument by Karasek (10), assessed perceived workplace psychosocial and physical risk factors. The JCQ comprises four (4) domains: job demands (JD)(5 items), job control (JC)(9 items), job support (JS)(8 items), and physical demand (PJD)(12 items), bringing total of 34 items. Items were rated on a four-point Likert scale, with response options ranging from "strongly disagree" (1) to "strongly agree" (4), or from "often" (1) to "never" (4), depending on item formulation. For analytical purposes, the domain scores were dichotomized as categorical risk levels using the median cut-off value rather than continuous measures, hence provide clearer interpretation (10). Low scores for job control and job support indicated poor perceived psychosocial risk, likewise for higher scores for job demands and physical demands reflected increased levels of psychosocial and physical risk (10).

Statistical analysis

Data analysis was performed using IBM SPSS Statistics version 27. Descriptive statistics were generated to summarize participants' socio-demographic and occupational characteristics, including frequencies,

percentages, means, medians, and standard deviations. Inferential analysis was conducted using the Chi-square test to examine the association between work-related risk factors and the prevalence of Work-Related Musculoskeletal Disorders (WRMSDs).

RESULTS

Sociodemographic overview

A total of 310 questionnaires were distributed, yielding a response rate of 91.20% (N = 283). Of these, 11 responses were excluded based on the study's exclusion criteria. The remaining 272 hotel workers were eligible for inclusion in the final analysis, and their sociodemographic characteristics are summarized in Table I. Most participants were men, Malay, with a mean age of 29.7 years (SD = 7.8) and unmarried. The respondents were from various departments (Eg: housekeeping, security, kitchen, maintenance, front desk, and back-end operation). Two out of three workers attained tertiary-level education The average monthly income was RM 1,890.88 (SD = 515.74). Respondents reported an average job tenure of 3.41 years (SD = 3.41) with their current employer, with working duration of approximately 8 hours per day and working 6 days per week.

Table I: Sociodemographic data of participants (N=272)

Variables	Mean (SD)	n (%)
Age (Years)	29.64 (7.75)	
≤ 28		153 (56.30%)
> 28		119 (43.80%)
Gender		
Male		155 (57%)
Female		117 (43%)
Education		
Non tertiary		88 (32.40%)
Tertiary		184 (67.60%)
Average monthly income	1890.88 (515.74)	
≤ RM1800		155 (57.0%)
> RM1800		117 (43.0%)
Years in current job	3.41 (3.42)	
≤ 3		192 (70.60%)
> 3		80 (29.40%)
Working hour per day	7.90 (0.99)	
≤ 8		241 (88.60%)
> 8		31 (11.40%)
Working days per week	5.74 (3.94)	
≤ 5		151 (88.60%)
> 5		31 (11.40%)

Work-Related Musculoskeletal Disorders (WRMSDs)

Table II presents the prevalence and adverse effects of Work-Related Musculoskeletal Disorders (WRMSDs) across nine anatomical regions among hotel workers. Neck symptoms were the most reported (54.0%), followed by lower back (50.20%), hips/thighs (49.30%), and upper back (47.40%). The knees showed the lowest prevalence (41.90%). Functional limitations due to WRMSDs were frequently reported. Workers experiencing elbow symptoms reported the highest proportion of being prevented from performing normal work tasks (90.10%), followed by those with hips/thigh (82.10%) and feet symptoms (58.80%). Similar patterns were observed for healthcare-seeking behaviour. The highest proportion of workers who sought medical attention was among those with elbow symptoms (89.00%), followed by hips/thigh (78.30%) and knees (66.70%)

Medication use and medical leave were also common among symptomatic workers. Elbow-related WRMSDs showed the highest proportion for both medication and medical leave (89.00%). Of these, workers suffered of hips/thigh symptoms similarly reported high medication use (78.30%, and medical leave. Regarding pain severity, hips/thigh symptoms had the highest proportion of workers experiencing at least moderate pain (score ≥ 2) (54.6%, followed by upper back (47.1%) and neck symptoms (44.8%). In contrast, elbow symptoms showed the lowest proportion of moderate-to-severe pain (5.5%).

Self-perceived workplace ergonomic factors

Table III summarizes the descriptive statistics and internal consistency measures for the Job Content Questionnaire (JCQ) domains. The Job Demand (JD) recorded a mean score of 31.87 (SD = 4.83) and a median of 30, while Job Control (JC) showed a mean score of 64.23 (SD = 9.75) with a median of 64. For Job Support, the mean and median scores were 25.47 (SD = 4.39) and 25, respectively meanwhile Physical Job Demand (PJD) demonstrated a mean score of 4.97 (SD = 3.67) and a median of 5. The median scores were used as the primary cut-off points for dichotomizing each domain (high vs. low workplace perceived exposure), in accordance with established JCQ analytical guidelines. Reliability analysis indicated acceptable to excellent internal consistency across all JCQ domains, with Cronbach's alpha values of 0.67 for Job Demand, Job Control (0.81), Job Support (0.92), and Physical Demand (0.90), supporting the instrument's reliability in the current population.

Association between Work-Related Musculoskeletal Disorders (WRMSDs) and work- related risk factors

In Table IV, the findings of this study demonstrate that hotel workers in Klang Valley experience a high prevalence of WRMSDs, with significant associations observed between psychosocial workplace factors and musculoskeletal symptoms across multiple anatomical regions. Notably, low job control, low job support, and high physical job demands were consistently associated with higher prevalence of WRMSDs, particularly in the neck, shoulder, lower limbs, and back regions.

Low job control emerged as a significant predictor of WRMSDs across anatomical regions Workers reporting limited autonomy or decision-making capacity exhibited markedly higher symptom prevalence compared to those

Table II: Summary of prevalence WRMSDs and its adverse effect according to body sites among hotel workers in Klang Valley (N=272)

Body sites	Prevalence % (n)	Adverse Effect of WRMSDs, % (n)				
		Been prevented from doing normal work	Seek health professional attention	Medication	Medical leave	Suffered at least moderate pain (score ≥ 2) (%)
Neck	54.00 (116)	44.00 (51)	38.80 (45)	45.70 (53)	38.80 (45)	44.8 (52)
Shoulders	44.70 (96)	37.50 (36)	34.40 (33)	46.90 (45)	34.40 (33)	45.8 (44)
Upper Back	47.40 (102)	51.00 (52)	39.20 (40)	47.10 (48)	44.10 (45)	47.1 (48)
Elbows	42.30 (91)	90.10 (82)	89.00 (81)	89.00 (81)	89.00 (81)	5.5 (5)
Wrists/ hands	43.70 (94)	50.00 (47)	50.00 (47)	50.00 (47)	47.90 (45)	31.9 (30)
Low back	50.20 (108)	43.50 (47)	35.20 (38)	49.10 (53)	40.70 (44)	54.6 (59)
Hips/thigh	49.30 (106)	82.10 (87)	78.30 (83)	78.30 (83)	80.20 (85)	12.3 (13)
Knees	41.90 (90)	74.40 (67)	66.70 (60)	70.00 (63)	66.70 (60)	28.9 (26)
Feet	45.10 (97)	58.80 (57)	52.60 (51)	53.60 (52)	51.50 (50)	38.1 (37)

Table III: Descriptive analysis of workplace psychosocial and physical factors among hotel workers in Klang Valley (N=272)

Variable	Range	Mean (SD)	Median	Cronbach's Alpha (α)
Job Demand High (n=196) Low (n=76)	12-48	31.87 (4.83)	30	0.67
Job Control High (n=126) Low (n=146)	24-96	64.23 (9.75)	64	0.81
Job Support High (n=122) Low (n=150)	8-32	25.47 (4.39)	25	0.92
Physical Demand High (n=105) Low (n=167)	0-12	4.97 (3.67)	5	0.90

Table IV: Association between self-perceived workplace ergonomic risk factors and WRMSDs (N=272)

Domains	Shoulder (n=96)	Neck (n=116)	Upper limbs (n=94)	Lower limbs (n=106)	Back (n=108)
	% (n)	%(n)	% (n)	% (n)	% (n)
Job Demand					
High (n=196)	47.00 (45)	57.00 (66)	73.40 (69)	73.60 (78)	70.10 (76)
Low (n=76)	53.00 (51)	43.00 (50)	26.60 (25)	26.40 (28)	29.90 (33)
Job Control					
High (n=126)	35.20 (34)	27.20 (32)	41.50 (39)	37.70 (40)	33.10 (36)
Low (n=146)	64.80 (62)*	72.80 (84)*	50.50 (55)	56.90 (66)*	66.90 (72)*
Job Support					
High (n=122)	36.30 (35)	22.00 (26)	36.20 (34)	36.80 (39)	45.10 (49)
Low (n=150)	63.70 (61)*	78.00 (90)*	63.80 (60)*	44.90 (67)*	54.90 (59)*
Physical Demand					
High (n=105)	73.80 (71)*	65.00 (75)*	40.40 (38)	50.90 (54)*	60.90 (66)*
Low (n=167)	26.20 (25)	35.00 (41)	59.60 (56)	49.10 (52)	39.10 (42)

*p=<0.05, analysed by using χ^2 test

with higher job control. High physical job demand was significantly associated with WRMSDs of the shoulders, neck, lower limbs, and back. Hotel work frequently involves forceful exertions, repetitive arm movements, awkward trunk postures, bending, lifting, pushing heavy trolleys, and prolonged standing—all well-recognized ergonomic risk factors. For example, housekeeping staffs repeatedly lift mattresses, room cleaning, bend to clean toilets, and push heavy housekeeping carts. Job demand, in contrast, was not significantly associated with WRMSDs in this sample. This may be attributable to multiple factors, including homogeneous workload distribution.

These findings align with the Job Demand–Control–Support (DCS) model, which suggests that low control amplifies the physiological and biomechanical strain experienced during physically demanding tasks, thereby elevating musculoskeletal risk. In the context of hotel work, low job control is frequently observed among housekeeping staff, room attendants, laundry personnel, and food service workers, whose tasks are highly structured, time-bound, and closely supervised. The inability to adjust work pace, modify task sequences, or temporarily pause work to alleviate discomfort may exacerbate repetitive micro-trauma and fatigue accumulation, increasing susceptibility to WRMSDs.

DISCUSSION

From administration to housekeeping department, all hotel workers share the burden of demanding work. Frequent unmanageable workloads lead the workers through significant challenges in completing their responsibilities and contributing to the prevalence of work- related musculoskeletal problems. Gikunda et al. (12) reported that housekeeping workers experienced pain in the lower back (96.10%) along with neck and shoulder (81.00%). Krause et al. (2010)(13) reported that 75–90% of hotel room attendants experienced pain in the back, neck, or shoulders, driven by repetitive bending, lifting, and awkward postures associated with room-cleaning tasks. The prevalence of shoulder symptoms in this study (44.7%) is comparable to findings by Serratos-Perez et al. (2020), who found that 40–55% of hotel cleaners reported shoulder complaints. Frequent overhead reaching, bed-making, and handling linen bundles are known risk factors contributing to shoulder strain in housekeeping tasks.

Besides that, many of the musculoskeletal symptoms resulted in further injuries that require medical attention and prescriptions. This was similar with S6nchez-Rodrнguez (14) where more than 54.70% of hotel housekeepers reported to have used medications and 17.70% had used complimentary medications during the previous year to cope with musculoskeletal discomfort. Discomfort or pain on the neck and back can also be associated especially when neck muscles are constantly pulled forward, causing an increase in muscle tension and movement of the lumbosacral nerve roots resulting in lower back pains. This phenomenon is known as ligament creep where the forces of the spine increase as the head posture moves forwards, resulting in posterior neck ligaments stretched (15). Besides that, workspace and work tasks also result in poor posture habits. Most of the time, the hotel workers deal with tasks or workstations for a long time which forces their neck muscles to strain and their shoulders to hunch down.

The present study demonstrates significant associations between psychosocial and physical workplace factors and the prevalence of Work-Related Musculoskeletal Disorders (WRMSDs) across multiple anatomical regions among hotel workers. The study is in line with the Job-Demand-Control-Support model that explains hotel workers are experiencing high job demands, poor job autonomy and poor support proposed high risk of poor health among workers (10). Hotel operations comprise a wide spectrum of job tasks including housekeeping, food and beverage service, kitchen operations, front office, and maintenance exposes workers to distinct psychosocial and physical risk factors that shape their overall work experience and WRMSD risk.

Workers reporting low job control experienced substantially higher rates of shoulder, neck, lower limb, and back symptoms, consistent with the Demand–Control–Support model, which posits that limited autonomy heightens workers' physiological stress responses and susceptibility to musculoskeletal strain. These findings are in line with previous research among hotel room attendants and service employees, who often lack decision latitude over work pace, sequencing, and rest periods (16, 17). Crescenzo (18) explained employees assumed in the Karasek model are experiencing the most stressful risk when the work has high level of job demands and poor job control. Other studies by Cheng (19) demonstrate workers with WRMSDs were significantly associated with low job support, especially related with support among coworkers. High physical job demand was also strongly associated with WRMSDs in the across body regions, reflecting the strenuous and repetitive nature of hotel tasks. Housekeeping activities, such as lifting mattresses, bending to clean floors and bathrooms, pushing laundry or housekeeping carts, and repetitive upper-limb motions, are well-documented ergonomic risk factors in hotel environments (20). Workers in food and beverage, kitchen, and laundry divisions similarly encounter forceful exertions, prolonged standing, and manual material handling, which contribute to musculoskeletal overload (21,22).

CONCLUSION

This study demonstrates that Work-Related Musculoskeletal Disorders (WRMSDs) are highly prevalent among hotel workers in the Klang Valley, particularly affecting the neck, lower back, hips/thighs, and upper back. The findings highlight that WRMSDs are not solely the consequence of physically demanding tasks but are significantly influenced by workers' perceptions of their psychosocial work environment. Low job control and low job support were consistently associated with higher WRMSD prevalence across multiple body regions, underscoring the importance of autonomy, supportive supervision, and effective coworker collaboration in reducing musculoskeletal strain. High physical job demands further contributed to symptoms in the shoulders, neck, lower limbs, and back, reflecting the cumulative biomechanical loads inherent in housekeeping, food and beverage service, laundry operations, and kitchen work. Taken together, the results reinforce that WRMSDs among hotel workers arise from the combined effects of intensive physical workloads and adverse psychosocial conditions. Addressing these issues requires a dual approach: implementing ergonomic improvements to reduce physical strain and strengthening organizational practices that enhance job control, support, and workload management. Such integrated interventions are essential to improving worker health, reducing absenteeism, and supporting the long-term productivity and sustainability of Malaysia's hotel industry.

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REFERENCES

1. Department of Statistics Malaysia. (2020).
2. Hassan, H. (2022). Malaysia's hotels and other businesses face manpower shortage as border reopens. The Straits Times.
3. Department of Statistics Malaysia. 2024. Big data analytics: national occupational injury and disease statistics 2023.
4. Institute for Health Metrics and Evaluation. (2019). Malaysia's Global Burden of Diseases.
5. Chela-Alvarez, X., Oana, B., Garcia-Illan, E., Vidal-Thomas, Mc., Llobera, J., & Arenal Group. (2022). Hotel housekeepers and occupational health: experiences and perceived risks. Annals of Occupational and Environmental Medicine (AOEM). https://doi.org/10.35371/aoem.2022.34.e29
6. European Agency for Safety and Health at Work, EU-OSHA (2021). Musculoskeletal Disorders: Association with Psychosocial Risk Factors at Work : Literature Review. Luxembourg: Publications Office of the European Union.
7. Raji, A. R. A., & Abidin, E. Z. (2020). Distribution of musculoskeletal symptoms and ergonomic risk assessment among housekeepers at budget hotels in Sepang, Selangor. Malaysian Journal of Medicine & Health Sciences, 16.
8. Kuorinka, I., Jonsson, B., Kilbom, E., Vinterberg, H., Biering-Sшrensen, F., Andersson, G., & Jшrgensen, K. M. (n.d.). Standardized Nordic questionnaires for the analysis of musculoskeletal symptoms. Applied Ergonomics, 18(3), 233–237. https://doi.org/10.1016/0003-6870(87)90010-x
9. Amin, N. A., Quek, K. F., Oxley, J. A., Noah, R., & Nordin, R. B. (2015). Validity and Reliability of Malay Version of the Job Content Questionnaire among Public Hospital Female Nurses in Malaysia. International Journal of Occupational and Environmental Medicine, 6(4), 232–242. https://doi.org/10.15171/ijoem.2015.632
10. Karasek, R., Brisson, C., Kawakami, N., Houtman, I., Bongers, P., & Amick, B. C. (1998). The Job Content Questionnaire (JCQ): An instrument for internationally comparative assessments of psychosocial job characteristics. Journal of Occupational Health Psychology, 3(4), 322–355. https://doi.org/10.1037/1076-8998.3.4.322
11. Krishnan, K. S., Raju, G., & Shawkataly, O. B. (n.d.). Prevalence of Work-Related Musculoskeletal Disorders: Psychological and Physical Risk Factors. International Journal of Environmental Research and Public Health, 18(17), 9361. https://doi.org/10.3390/ijerph18179361
12. Gikunda, E. K., Mburu, C. M., & Kibiti, C. M. (2023). Association between Work- Related Musculoskeletal Disorders' risk factors and different body parts affected among Housekeepers in selected hotels in Mombasa County. Journal of Agriculture Science & Technology, 6, 90–100.
13. Krause, N., Rugulies, R., Maslach, C., & Jacobson, M. (2010). Work-related musculoskeletal disorders among hotel room cleaners: Biomechanical and psychosocial risk factors. American Journal of Industrial Medicine, 53(5), 559–575. https://doi.org/10.1002/ajim.20818
14. Sánchez-Rodrнguez, C., Bulilete, O., Chela-Alvarez, X., Velasco-Roldбn, O., & Llobera-Canaves, J. (2022). Chronic pain and work conditions of hotel housekeepers: A Descriptive study. International Journal of Environmental Research and Public Health, 19(6), 3383. https://doi.org/10.3390/

ijerph19063383
15. Kapandji, A. I. (2009). The Physiology of the Joints: The Spinal Column, Pelvic girdle & Head (6th ed., Vol. 3, Issue 1). Elsevier.
16. Waters, T. R., Dick, R. B., Davis-Barkley, J., & Krieg, E. (2021). The impact of job control on musculoskeletal health among workers in labor-intensive industries. Human Factors, 63(3), 452–466. https://doi.org/10.1177/0018720820907734
17. Yang, L., Matz, M., & Balderrama, C. (2016). Psychosocial work factors and musculoskeletal disorders among hotel room attendants. Occupational Medicine, 66(6), 482–489. https://doi.org/10.1093/occmed/kqw055
18. Crescenzo, P. (2016). An ancient theory for a current problem. Journal of Health and Social Sciences, 1(3), 287-292.
19. Cheung, K., Szeto, G., Lai, G. K. B., & Ching, S. S. Y. (2018). Prevalence of and Factors Associated with Work-Related Musculoskeletal Symptoms in Nursing Assistants Working in Nursing Homes. International Journal of Environmental Research and Public Health, 15.
20. Lee, J., & Chi, C. G. (2020). Ergonomic risk factors associated with musculoskeletal disorders among hotel housekeepers: A systematic review. Applied Ergonomics, 85, 103058. https://doi.org/10.1016/j.apergo.2019.103058
21. Yoon, S., Kim, H., & Yang, S. (2021). Ergonomic exposures and musculoskeletal disorders in laundry workers: A cross-sectional study. Journal of Occupational and Environmental Hygiene, 18(1), 32–40. https://doi.org/10.1080/15459624.2020.1841892
22. Yarandi, M. S., Ghasemi, M., & Ghanjal, A. (2022). The relationship between individual, physical and psychosocial risk factors with musculoskeletal disorders and related disabilities in flight security personnel. International journal of occupational safety and ergonomics, 28(1), 387-397.