Breaking the backbone of productivity: work-related musculoskeletal pain among KSAU-HS employees and its impact on performance and rehabilitation strategies

Dolor musculoesquelético laboral en empleados de KSAU-HS: impacto en el rendimiento y estrategias de rehabilitación para mejorar la productividad

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How to cite in APA

AlAnazi, M., & Mani, P. (2025). Breaking the backbone of productivity: work-related musculoskeletal pain among KSAU-HS employees and its impact on performance and rehabilitation strategies. *Retos*, *70*, 1255–1263. https://doi.org/10.47197/retos.v70.116889

Abstract

Introduction: Work-related musculoskeletal pain (WRMSP) is an increasingly prevalent occupational health issue, especially in academic environments.
Objective: This study aimed to evaluate the prevalence, risk factors, and impact of WRMSP among employees at King Saud bin Abdulaziz University for Health Sciences (KSAU-HS), with particular emphasis on its effect on work productivity. The study also highlighted the potential benefits of ergonomic interventions, offering a ray of hope in addressing this issue.
Methodology: A cross-sectional study was conducted with 334 employees from the Riyadh, Jeddah, and Al-Ahsa campuses of KSAU-HS. Data were collected using a validated, self-administered questionnaire that captured socio-demographic details, the occurrence, location, and severity of musculoskeletal pain, and its impact on work performance. Additionally, the instrument assessed various occupational factors, including ergonomic practices and the need for workstation adjustments. Statistical analyses were performed to identify patterns and correlations between occupation type, pain severity, and work-related outcomes.
Results: Sixty-two percent of participants reported experiencing musculoskeletal pain, with the lower back, neck, and shoulders being the most commonly affected regions. Forty percent of respondents indicated that WRMSP significantly impaired their work productivity.
Discussion: Employees engaged in physically demanding roles, such as technical staff and laboratory workers, reported higher pain levels compared to those in non-physical positions. Furthermore, 46% of participants expressed needing workstation modifications to alleviate discomfort and improve ergonomic conditions.
Conclusions: WRMSP is a significant concern among KSAU-HS employees, adversely impacting productivity and overall well-being. These findings underscore the urgent need for targeted ergonomic interventions.

Keywords

Work-related musculoskeletal pain; employee productivity; ergonomic interventions; musculoskeletal disorders; academic institutions.

Resumen

Introducción: El dolor musculoesquelético de origen laboral (DML) es un problema de salud ocupacional prevalente y creciente, especialmente en entornos académicos.
Objetivo: Evaluar la prevalencia, factores de riesgo e impacto del DML en la productividad de los empleados de la Universidad Rey Saud bin Abdulaziz de Ciencias de la Salud (KSAU-HS), y destacar los beneficios potenciales de las intervenciones ergonómicas.
Metodología: Se realizó un estudio transversal con 334 empleados de KSAU-HS mediante un cuestionario autoadministrado. Se evaluaron datos sociodemográficos, características del dolor, impacto laboral y factores ocupacionales, como la necesidad de ajustes ergonómicos, utilizando análisis estadístico para identificar correlaciones.
Resultados: El 62% de los participantes reportó DML, afectando principalmente la zona lumbar, el cuello y los hombros. El 40% indicó que el dolor afectó significativamente su productividad laboral.
Discusión: Los empleados en puestos físicamente exigentes (personal técnico, de laboratorio) reportaron niveles de dolor más altos que los de puestos no físicos. Además, el 46% de los participantes expresó necesitar modificaciones ergonómicas en su puesto para aliviar las molestias.
Conclusiones: El DML es una preocupación significativa en KSAU-HS que impacta negativamente la productividad y el bienestar. Los hallazgos subrayan la necesidad urgente de implementar intervenciones ergonómicas específicas.

Palabras clave

Dolor musculoesquelético relacionado con el trabajo; productividad de los empleados; intervenciones ergonómicas; trastornos musculoesqueléticos; instituciones académicas.

Introduction

Work-related musculoskeletal pain (WRMSP) is a prevalent occupational health issue globally, affecting various industries, including academic institutions. These disorders impact muscles, tendons, ligaments, nerves, and joints, frequently stemming from repetitive movements, prolonged static postures, and inadequate ergonomic conditions (World Health Organization, 2021; Punnett & Wegman, 2004). The World Health Organization (WHO) identifies musculoskeletal disorders (MSDs) as a primary cause of disability worldwide, underscoring the critical need for preventive workplace strategies (Bernard, 1997).

University employees, including faculty, administrative staff, and technical personnel, are particularly susceptible to WRMSP due to specific occupational demands. Challenges such as prolonged computer use, extensive paperwork, and manual handling tasks in laboratories contribute to this vulnerability (Buckle & Devereux, 2002; Palmer et al., 2001). Research consistently reports a high prevalence of WRMSP among university staff, with the lower back, neck, and shoulders being the most commonly affected areas (McGowan et al., 2017). This pain significantly impairs productivity, increases absenteeism, and reduces work efficiency. Furthermore, WRMSP negatively impacts employees' concentration, job satisfaction, and mental well-being, thus increasing challenges in the workplace related to productivity and overall environment (Van den Heuvel et al., 2005; da Costa & Vieira, 2010).

Both ergonomic and psychosocial factors are critical in the development and persistence of WRMSP (Robertson & Huang, 2006). Physical risk factors include poor workstation design, uncomfortable seating, and improper posture during extended work hours. Equally important are psychosocial elements such as workplace stress, job insecurity, and insufficient organizational support (Sauter et al., 1991). Employees in supportive and ergonomically sound environments generally experience less severe musculoskeletal discomfort and demonstrate higher productivity (Bongers et al., 2002). Despite growing awareness, many academic institutions still lack comprehensive policies for WRMSP prevention and management. Effective workplace interventions, such as ergonomic modifications, posture training, and stress management programs, have been shown to reduce musculoskeletal discomfort among employees. A holistic approach, integrating both ergonomic improvements and psychosocial interventions, is widely advocated for achieving long-term reductions in WRMSP (Karsh et al., 2001; Andersen et al., 2011). Implementing evidence-based ergonomic solutions and fostering a supportive workplace culture can significantly enhance employee well-being and overall institutional productivity.

This study specifically investigates the prevalence, risk factors, and impact of WRMSP among employees at King Saud bin Abdulaziz University for Health Sciences (KSAU-HS) across its Riyadh, Jeddah, and Al-Ahsa campuses. KSAU-HS, a prominent health sciences institution in Saudi Arabia, offers a representative academic environment to study these issues, given its diverse workforce and varied job roles involving typical musculoskeletal stressors. This focused examination is crucial for developing targeted interventions that improve workplace ergonomics and promote employee health within the unique context of health sciences education. By effectively addressing WRMSP, KSAU-HS can foster healthier work environments, improve employee satisfaction, and enhance organizational efficiency.

Method

The study was conducted across the three campuses of King Saud bin Abdulaziz University for Health Sciences (KSAU-HS) located in Riyadh, Jeddah, and Al-Ahsa, Saudi Arabia. KSAU-HS is a public health sciences university with modern facilities equipped for educational and research activities, including diverse settings such as office spaces, classrooms, laboratories, and administrative areas. This environment provides a suitable context for evaluating work-related musculoskeletal pain (WRMSP) due to the variety of job roles that involve tasks commonly associated with musculoskeletal strain, such as prolonged sitting, repetitive movements, and manual handling. This setting allows for a comprehensive understanding of ergonomic and environmental factors contributing to WRMSP among faculty, administrative staff, technical support staff, and healthcare professionals within a higher education context.

Participants

Inclusion Criteria: Participants were current employees (faculty, administrative, or technical staff) of KSAU-HS from the Riyadh, Jeddah, or Al-Ahsa campuses, who had been employed for at least six months to ensure relevant work experience. Participants were adults aged 18 years and above who provided informed consent. Job roles typically involved tasks associated with musculoskeletal strain, such as prolonged sitting, repetitive computer use, or manual handling.

Exclusion Criteria: Individuals with pre-existing chronic musculoskeletal disorders unrelated to work (e.g., rheumatoid arthritis, congenital conditions) were excluded. Employees who had undergone musculoskeletal surgery or sustained significant injuries within the past six months were also excluded. Temporary employees, interns, and individuals whose musculoskeletal pain was caused by non-work-related activities (e.g., sports injuries) were not eligible. Participants who declined participation or withdrew consent during the study were also excluded.

Study Design

This study employed a cross-sectional design to assess the prevalence of work-related musculoskeletal pain (WRMSP) and its impact on employee productivity at KSAU-HS. This design allowed for data collection at a single point in time, providing a snapshot of employees' work-related musculoskeletal health issues and their impact on work performance.

Sample Size

A sample size of 334 employees was determined using the Raosoft sample size calculator, based on a 95% confidence interval and a 3% margin of error. This sample size was considered sufficient to gather meaningful data on the prevalence and effects of WRMSP on productivity.

Sampling Technique

A systematic random sampling technique was utilized to ensure adequate representation from each of the three KSAU-HS campuses (Riyadh, Jeddah, and Al-Ahsa). Questionnaires were distributed electronically via work emails to the selected participants.

Data Collection: Instrument, Measurements, and Procedure

A validated, self-administered questionnaire was used for data collection, comprising four sections. The first section gathered socio-demographic data, including age, gender, marital status, work experience, reported weight and height, use of medications or physical therapy for musculoskeletal disorders (MSDs), and presence of other medical conditions. The second section assessed MSD prevalence using the Arabic version of the Standardized Nordic Musculoskeletal Disorder Questionnaire. The third section focused on work-related factors such as working hours, time spent standing, workload, and postures adopted during job-related tasks. The fourth section examined the impact of MSDs on daily activities, including effects on job performance, absenteeism, and sick leave.

Investigators visited various KSAU departments to recruit employees during workplace gatherings and staff meetings, after obtaining permissions from relevant authorities. Before data collection, participants received detailed information about the study's objectives and significance and were invited to participate voluntarily, ensuring informed consent was obtained.

Data Analysis

Descriptive and inferential statistical analyses were performed on the collected data. Frequencies and percentages were calculated for socio-demographic characteristics and other categorical variables and presented in tables. For questions allowing multiple responses, percentages were also computed. The median and interquartile range (IQR) were reported for continuous variables. Fisher's exact test was used to assess associations between categorical variables , and the Kruskal-Wallis test compared medians of continuous variables. A binary logistic regression model was developed to identify factors contributing to MSD symptoms, with outcomes presented as adjusted odds ratios (AOR). Statistical significance was set at a p-value of 0.05 or less, with a 95% confidence interval. All statistical calculations were conducted using IBM SPSS Statistics for Windows, Version 27.0.

Ethical Considerations

Approval for this research was obtained from the King Abdullah International Medical Research Center (KAIMRC) Institutional Review Board (IRB) Committee, the authorized body overseeing research activities within the Medical Services Department at the Ministry of National Guard Health Affairs (MNGHA). All research procedures prioritized participant privacy during data collection. Data were stored securely on password-protected servers, with personal data encoded and access restricted to the research team to ensure confidentiality. All reasonable precautions were taken to guarantee that participants' identities were not directly or indirectly disclosed during secondary data analyses or in published results and academic presentations. Prior to participation, individuals provided informed consent, acknowledging their understanding of the study's objectives, their voluntary participation, and their right to withdraw at any time. The study presented minimal risks to participants. The primary benefit of this research is its potential to contribute to improving ergonomic and labor conditions within the academic environment at KSAU-HS, ultimately enhancing employee well-being.

Results

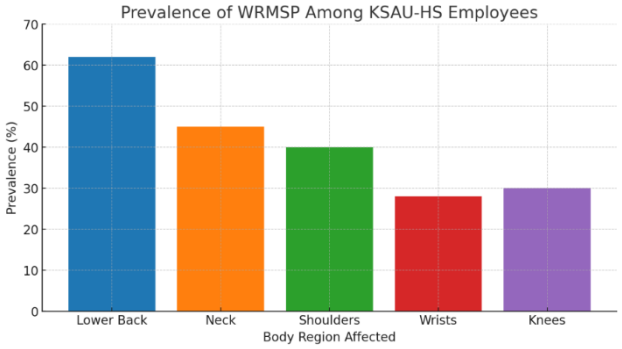
A total of 334 employees from King Saud bin Abdulaziz University for Health Sciences (KSAU-HS) participated in the study. The median age of the sample was 43 years (IQR: 47–39), and the median work experience duration was 16 years (IQR: 22–11). The sample comprised 65.2% females and 34.8% males. Marital status distribution showed 89% married, 3.9% divorced, 5.7% single, and 1.5% widowed. Regarding educational levels of work, 29.9% were at high schools, 22.2% at intermediate schools, and 47.9% at primary schools. Smoking prevalence was 5.7%, while 41.6% of employees reported engaging in regular exercise (≥30 minutes, five times per week). Body mass index (BMI) classification revealed 27.6% normal, 33.2% obese, 37.1% overweight, and 2.1% underweight. Common chronic conditions included hypertension (6.9%), asthma (5.1%), osteoarthritis (14.4%), diabetes (9.9%), vertebral disc disease (1.5%), hypothyroidism (2.4%), and other chronic diseases (3.0%). These sociodemographic characteristics are summarized in Table 1.

Table 1. Sociodemographic characteristics of study participants

Category	Total (N=334)	Non-Physical Roles (N=228)	Physical Roles (N=106)
Age (Median, IQR)	43 (47-39)	43 (47-40)	43 (47-38)
Years of Experience (Median, IQR)	16 (22-11)	17 (22-12)	14 (22-8)
Gender			
Female (%)	218 (65.2%)	145 (63.6%)	73 (68.9%)
Male (%)	116 (34.8%)	83 (36.4%)	33 (31.1%)
Marital Status			
Divorced (%)	13 (3.9%)	8 (3.5%)	5 (4.7%)
Married (%)	297 (89%)	206 (90.4%)	91 (85.8%)
Single (%)	19 (5.7%)	14 (6.1%)	5 (4.7%)
Widowed (%)	5 (1.5%)	4 (1.8%)	1 (0.9%)
Level of School			
High School (%)	100 (29.9%)	64 (28.1%)	36 (33.9%)
Intermediate School (%)	74 (22.2%)	54 (23.7%)	20 (18.9%)
Primary School (%)	160 (47.9%)	110 (48.2%)	50 (47.2%)
Smoker			
Yes (%)	19 (5.7%)	12 (5.3%)	7 (6.6%)
BMI			
Normal (%)	92 (27.6%)	64 (28.1%)	28 (26.4%)
Obese (%)	111 (33.2%)	74 (32.5%)	37 (34.9%)
Overweight (%)	124 (37.1%)	88 (38.6%)	36 (34%)
Underweight (%)	7 (2.1%)	4 (1.8%)	3 (2.8%)
Regular Exercise (≥30 min, 5 times/week)			
No Exercise (%)	195 (58.4%)	135 (59.2%)	60 (56.6%)
Yes (%)	139 (41.6%)	93 (40.8%)	46 (43.4%)
Chronic Disease			
Hypertension (%)	23 (6.9%)	19 (8.3%)	4 (3.8%)
Asthma (%)	17 (5.1%)	14 (6.1%)	3 (2.8%)
Osteoarthritis (%)	48 (14.4%)	41 (18%)	7 (6.6%)
Diabetes (%)	33 (9.9%)	27 (11.8%)	6 (5.7%)
Vertebral Disc Disease (%)	5 (1.5%)	2 (0.9%)	3 (2.8%)
Hypothyroidism (%)	8 (2.4%)	7 (3.1%)	1 (0.9%)

Other Chronic Diseases (%)	10 (3.0%)	10 (4.4%)	0 (0%)

Figure 1. Prevalence of WRMSP among KSAU-HS Employees



Sixty-two percent of participants reported experiencing musculoskeletal pain. The lower back was the most commonly affected region (62%), followed by the neck (45%), shoulders (40%), knees (30%), and wrists (28%) as mentioned in figure 1. Forty percent of respondents indicated that WRMSP significantly impaired their work productivity. Employees in physically demanding roles, such as technical staff and laboratory workers, reported higher pain levels compared to those in non-physical positions. Additionally, 46% of participants expressed a need for workstation modifications to alleviate discomfort and improve ergonomic conditions. When comparing job roles, 86.8% of employees in non-physical roles (N = 228) reported experiencing MSD in the past 12 months, while in physical roles (N = 106), the prevalence was 71.7% (p = 0.167). MSD hindered daily activities for 75.4% of non-physical role employees and 80.2% of those in physical roles (p = 0.687). Medical consultation for MSD was sought by 64.0% of non-physical role employees and 59.4% in physical roles (p = 0.440). In the past seven days, 81.6% of non-physical role employees experienced MSD symptoms versus 87.7% in physical roles (p = 0.342). Various treatment modalities, including compresses, physiotherapy, oral and topical analgesics, rest, salt and water, and massage, were utilized across both groups. These findings are detailed in Table 2.

Table 2. Prevalence, Impact, and Severity of Musculoskeletal Disorders (MSD) in Non-Physical and Physical Roles at King Saud bin Abdulaziz University for Health Sciences

Category	Response	Non-Physical Roles (N=228)	Physical Roles (N=106)	p-value
In the past 12 months, have you had MSD problems (such as ache, pain, discomfort, numbness)	No	30 (13.2%)	30 (28.3%)	0.167
	Yes	198 (86.8%)	76 (71.7%)	
In the past 12 months, had you been prevented from carrying out normal activities (e.g., job, housework, hobbies) because of this trouble	No	56 (24.6%)	21 (19.8%)	0.687
	Yes	172 (75.4%)	85 (80.2%)	
In the past 12 months, have you seen a physician for this condition	No	82 (36.0%)	43 (40.6%)	0.440
	Yes	146 (64.0%)	63 (59.4%)	
In the past seven days, did you suffer from any of the previous symptoms (other than sports injuries)	No	42 (18.4%)	13 (12.3%)	0.342
	Yes	186 (81.6%)	93 (87.7%)	
Treatment taken in last 12 months	Compresses	34 (14.9%)	19 (17.9%)	0.567
	Physiotherapy	37 (16.2%)	17 (16.0%)	
	Oral Analgesics	61 (26.8%)	36 (33.9%)	
	Topical Analgesics	92 (40.4%)	38 (35.8%)	
	None	53 (23.2%)	32 (30.2%)	
	Rest	5 (2.2%)	3 (2.8%)	
	Salt and Water	3 (1.3%)	1 (0.9%)	
	Massage	53 (23.2%)	33 (31.1%)	

Employees with major depressive disorder (MDD) (N = 77) exhibited a significantly higher prevalence of MSD compared to those without MDD (N = 257). Specifically, 90.9% of the MDD group reported MSD in the past 12 months versus 81.3% in the non-MDD group (p = 0.007). The impact of MSD on daily activities was more pronounced among those with MDD, with 88.3% indicating interference compared to 69.6% in employees without MDD (p = 0.001). Furthermore, 67.5% of the MDD group had seen a

physician for their MSD, compared to 56.4% of the non-MDD group (p = 0.018). In the past seven days, 90.9% of employees with MDD experienced MSD symptoms compared to 77.0% of those without MDD (p = 0.001). Although severity ratings were compared, the difference in the proportion of severe MSD between groups (48.1% vs. 53.3%) was not statistically significant. These results are presented in Table 3.

Table 3. Prevalence, Impact, and Severity of Musculoskeletal Disorders (MSD) Among KSAU-HS Employees with and Without Major Depressive Disorder.

Category	Response	No Major Depressive Disorder (N=257)	Yes Major Depressive Disorder (N=77)	p-value
In the past 12 months, have you had trouble (such as ache, pain, discomfort, numbness)?	No	48 (18.7%)	7 (9.1%)	0.007
	Yes	209 (81.3%)	70 (90.9%)	
In the past 12 months, have you been prevented from carrying out normal activities (e.g., job, housework, hobbies) because of this trouble?	No	78 (30.4%)	9 (11.7%)	0.001
	Yes	179 (69.6%)	68 (88.3%)	
In the past 12 months, have you seen a physician for this condition of MSD?	No	112 (43.6%)	25 (32.5%)	0.018
	Yes	145 (56.4%)	52 (67.5%)	
In the past seven days, did you suffer from any of the previous symptoms (other than sports injuries)?	No	59 (23.0%)	7 (9.1%)	0.001
	Yes	198 (77.0%)	70 (90.9%)	
Severity of disease	No	120 (46.7%)	40 (51.9%)	0.342
	Yes	137 (53.3%)	37 (48.1%)	

A comparison between employees with no MSD (n = 58) and those with MSD (n = 276) revealed that those experiencing MSD were significantly older, with a median age of 44 years (IQR: 47–40) compared to 40 years (IQR: 45–37) in the no-MSD group (p = 0.001). Gender differences were notable, with 68.2% of the MSD group being female compared to 46.6% in the no-MSD group (p = 0.001). While marital status did not differ significantly, work experience was more pronounced among those with MSD (median of 16 years, IQR: 22–11) than those without MSD (median of 14 years, IQR: 22–10; p = 0.041). No significant differences were found in smoking status (p = 0.528) or BMI categories (p = 0.124). However, inadequate rest times during sitting were significantly associated with MSD (p = 0.002), indicating an important occupational risk factor. These findings are detailed in Table 4.

Table 4. Prevalence of Musculoskeletal Disorders (MSD) in KSAU-HS Employees Based on Demographic and Occupational Characteristics

Variable	No MSD (n=58)	Yes MSD (n=276)	p-value
Age (Median, IQR)	40 (45-37)	44 (47-40)	0.001
Gender			
Female (%)	27 (46.6%)	126 (68.2%)	0.001
Male (%)	31 (53.4%)	59 (31.8%)	
Marital Status			
Divorced (%)	1 (1.7%)	5 (1.8%)	0.859
Married (%)	50 (86.2%)	244 (88.4%)	
Single (%)	7 (12.1%)	14 (5.1%)	
Widowed (%)	0 (0.0%)	2 (0.7%)	
Level of School			
High School (%)	14 (24.1%)	72 (26.1%)	0.069
Intermediate School (%)	13 (22.4%)	63 (22.8%)	
Primary School (%)	31 (53.4%)	141 (51.1%)	
Years of Job Experience (Median, IQR)	14 (22-10)	16 (22-11)	0.041
Smoker			
No (%)	54 (93.1%)	257 (93.1%)	0.528
Yes (%)	4 (6.9%)	19 (6.9%)	
BMI			
Normal (%)	17 (29.3%)	65 (23.6%)	0.124
Obese (%)	14 (24.1%)	87 (31.5%)	
Overweight (%)	24 (41.4%)	101 (36.6%)	
Underweight (%)	3 (5.2%)	7 (2.5%)	
Regular Exercise (≥30 min, 5 times/week)			
No (%)	29 (50.0%)	159 (57.6%)	0.186
Yes (%)	29 (50.0%)	117 (42.4%)	
Rest Times (Sitting)			
No (%)	18 (31.0%)	49 (17.8%)	0.002
Yes (%)	40 (69.0%)	227 (82.2%)	

In the multivariate analysis of pain experienced in the past seven days, older age was a significant predictor of pain, with the median age for those without pain at 40 years (IQR: 45–35) and for those with pain at 44 years (IQR: 47–40) ($p = 0.025$, AOR = 1.070; 95% CI: 1.009–1.136). Years of experience did not significantly predict pain ($p = 0.958$, AOR = 1.001; 95% CI: 0.951–1.054). Female gender was strongly associated with increased odds of experiencing pain ($p < 0.001$, AOR = 2.581; 95% CI: 1.617–4.121). Other factors, including marital status, level of school, smoking status, BMI, regular exercise, and rest times, were evaluated, with several demonstrating notable associations contributing to the overall risk profile for WRMSP.

The analysis of disability due to MSD compared employees without disability (n = 243) to those with disability (n = 91). Employees with disability had a higher median age (44 years, IQR: 48–40) than those without disability (40 years, IQR: 45–37), and this difference was statistically significant ($p = 0.001$, AOR = 1.110; 95% CI: 1.048–1.175). Although the median years of experience were higher in the disability group (17 years, IQR: 22–12) compared to the no-disability group (15 years, IQR: 20–10), this association did not reach significance ($p = 0.084$, AOR = 0.957; 95% CI: 0.911–1.006). Female employees were significantly more likely to report disability due to MSD compared to their male counterparts ($p < 0.001$, AOR = 2.906; 95% CI: 1.886–4.477). Other variables, such as marital status, level of school, smoking status, and BMI, were also analyzed, with some showing significant associations. Importantly, the presence of major depressive disorder was strongly linked with MSD-related disability ($p < 0.001$), underscoring the interplay between mental health and physical impairment in the workplace.

Discussion

Our study investigated work-related musculoskeletal pain (WRMSP) among 334 King Saud bin Abdulaziz University for Health Sciences (KSAU-HS) employees. It revealed a remarkably high prevalence of musculoskeletal disorders (MSD), with 82.6% of participants reporting symptoms within the past 12 months. This prevalence rate is notably higher than that reported in similar studies conducted in European academic institutions, where rates ranged from 60% to 70% (Govaerts et al., 2021) suggesting potential cultural or organizational contributors unique to the KSAU-HS setting. The median age of the sample was 43 years, and the median duration of work experience was 16 years, with a higher proportion of females (65.2%) than males (34.8%). Notably, our findings indicate that employees in non-physical roles (e.g., administrative, teaching, non-clinical) reported a higher prevalence of MSD compared to their counterparts in physical roles, suggesting that prolonged sedentary postures and repetitive computer-based tasks may play a critical role in the onset of WRMSP, independent of the physical demands of the job (World Health Organization, 2021; Van den Heuvel et al., 2005).

In addition, our analysis highlighted a strong association between musculoskeletal pain and mental health outcomes. Employees with major depressive disorder (MDD) exhibited significantly higher rates of MSD, as well as more significant interference with daily activities and work productivity, compared to those without MDD (Sauter et al., 1991; Bongers et al., 2002). This bidirectional relationship suggests that chronic musculoskeletal pain can exacerbate depressive symptoms, which in turn may heighten pain perception and reduce pain tolerance. Such findings underscore the importance of adopting integrated intervention strategies that address the workplace's physical ergonomics and the employees' psychological well-being (Punnett & Wegman, 2004; Buckle & Devereux, 2002; Karsh et al., 2001). Multivariate analyses further underscored the complex interplay of demographic and occupational factors associated with WRMSP. Older age, longer work experience, and insufficient rest during prolonged sitting were significant predictors of both the presence and severity of MSD (Hoogendoorn et al., 2000; Hoe et al., 2012). The robustness of these findings is supported by the use of validated assessment instruments such as the Nordic Musculoskeletal Questionnaire (NMQ) and the Visual Analog Scale (VAS) for pain assessment. Although lifestyle factors such as smoking and body mass index (BMI) did not reach statistical significance in our study, their trends suggest potential contributory roles that align with mixed evidence in previous research (Andersen et al., 2011). The cross-sectional design of our study imposes certain limitations on the ability to establish causality between identified risk factors and WRMSP.

Despite these insights, our study has several limitations that warrant discussion. The cross-sectional nature of the research precludes definitive conclusions regarding causal relationships between risk factors and the development of MSD. Additionally, reliance on self-reported data may introduce recall bias and subjective variability in the assessment of both pain and its impact on work performance. Future research should consider longitudinal designs and incorporate objective ergonomic assessments and physical activity measurements to more accurately elucidate causal pathways (Woods, 2005; Sharan et al., 2011). Moreover, expanding the sample size and including employees from various academic and healthcare settings would improve the generalizability of these findings.

In conclusion, our study emphasizes the urgent need for comprehensive workplace interventions at KSAU-HS to mitigate the high burden of WRMSP. Ergonomic improvements, such as implementing sit-stand desks and conducting ergonomic workshops, combined with targeted mental health support, such as integrating short mindfulness sessions during work hours, could significantly reduce MSD prevalence and improve employee productivity and quality of life (Hoe et al., 2012; Chiu & Ku, 2002; Hignett et al., 2009; Frangos et al., 2016). These multifaceted strategies are essential for fostering a healthier work environment and ensuring sustained organizational efficiency in academic institutions. Such initiatives must be prioritized at the policy level to ensure long-term sustainability and occupational health resilience.

Conclusions

Work-related musculoskeletal pain (WRMSP) represents a significant occupational health concern among King Saud bin Abdulaziz University for Health Sciences (KSAU-HS) employees, negatively impacting productivity and overall well-being. The findings underscore an urgent need for targeted interventions. A comprehensive strategy that integrates both ergonomic design and psychosocial support is essential to effectively improve workplace conditions, reduce the prevalence of musculoskeletal disorders, and enhance employee performance and health.

Such initiatives must be prioritized at the policy level to ensure long-term sustainability and occupational health resilience. Interventions could include specific examples such as height-adjustable desks, anti-fatigue mats, or digital prompts for micro-breaks, alongside ergonomic workshops and the integration of short mindfulness sessions during work hours.

Acknowledgements

I thank all the participants for their valuable time and cooperation.

Financing

This research was funded by the King Saud bin Abdulaziz University for Health Sciences, King Abdullah International Medical Research Center, AlAhsa, Saudi Arabia.

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