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ORIGINAL ARTICLE

Prevalence of Musculoskeletal Disorders and their Associated Risk Factors among Computer Users

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ABSTRACT

Introduction: In 21st century, computers are crucial devices in universities' official operations. In academic institutions, musculoskeletal disorders (MSDs) are leading causes of decreased productivity, absenteeism, disability, and illness. Office staff who use computers extensively are vulnerable to occupational MSDs. This study aims to determine risk factors of MSDs among computer users in a public university. **Methods:** This cross-sectional study involved 320 respondents among computer users working in all departments in Universiti Sains Malaysia Health Campus using random sampling. Tools used were a self-administered questionnaire containing questions on socio-demographical data, Cornell Musculoskeletal Discomfort Questionnaire (CMDQ) for assessing musculoskeletal disorder and observation and Rapid Office Strain Assessment (ROSA) to assess office equipment and quantify exposure to risk factors in office work environment. **Results:** Response rate was 92% and 86.2% of respondents reported work-related musculoskeletal disorders (WRMSDs). The most prevalent MSD was lower back, 62.8% of MSD cases, followed by right shoulder (53.4%), hip/buttock (46.4%), and left shoulder (45.3%).Older age was significantly associated with WRMSDs (OR=6.944, CI:1.238-39.017, p=0.0.028) and with neck MSDs (OR=3.908, CI:1.342-11.377, p=0.012), while female gender was significantly associated with neck MSDs (OR=2.042, CI:1.199-3.475, p=0.009) and with upper arm MSDs (OR=1.791, CI:1.091-2.941, p=0.021). Older age was significantly associated with upper arm MSDs (OR=3.303, CI:1.006-10.849, p=0.049), while those with healthy and overweight were significantly associated with upper arm MSDs (OR=0.092, CI:0.010-0.814, p=0.046), (OR=0.127, CI:0.014-1.123, p=0.032), respectively. **Conclusion:** The prevalence of reported WRMSDs and MSDs at neck and upper arm were associated with socio-demographic background and high duration of computer use; 12.2% of workstation presented musculoskeletal discomfort risk.

Keywords: computer users, cornell musculoskeletal discomfort questionnaire (CMDQ), musculoskeletal disorders (MSDs), rapid office strain assessment (ROSA), work-related musculoskeletal disorder (WRMSD)

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INTRODUCTION

In the 21st century, electronic data have permeated every sector of modern society, driven by rapid technological advancements. These innovations have profoundly impacted both workers and the workplace, significantly enhancing productivity and operational efficiency (Yamin, 2019). However, the widespread use of electronic devices, whether due to prolonged usage or improper body posture, has led to musculoskeletal disorders (MSDs). These conditions have become some of the most frequently diagnosed occupational diseases in various European countries, affecting individuals' wellness and overall health, and serving as a major contributing factor to decreased productivity, increased absenteeism, disability, illness and medical expenses (Luxembourg, 2023). In the United States, approximately 30% of people experience MSDs (OHS, 2022), with the financial burden exceeding $380 billion (Dieleman *et al.*,

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2020). Similarly, in Australia, MSDs account for the highest costs among all disease groups, totaling $14.7 billion (AIHW, 2024). However, the exact statistic about Malaysian computer users is not available.

Musculoskeletal disorders affect various populations and occupations, resulting in differing prevalence rates. Several review studies have examined the prevalence of WRMSDs across different occupational groups. Among computer users, studies conducted in 14 countries showed that the prevalence of WRMSDs ranged from 33.8% to 95.3% (Demissie, Bayih and Demmelash, 2024). Research involving professional drivers revealed a prevalence range from 43.1% and 93% (Joseph *et al.*, 2020). Additionally, review studies among dentists have shown an alarmingly high prevalence of WRMSDs, with annual rates ranging from 68% to 100% (Soo *et al.*, 2023). These findings highlight the widespread nature of WRMSDs across different professions.

The growing use of computers in the workplace has been significantly linked to an increased prevalence of MSDs affecting various body regions, including the shoulders, arms, elbows, wrists, hands, back, legs, and feet. Several studies have reported prevalence of MSDs in the lower back, shoulder, neck ranging from 17.0-62.0%, 5.0-47.0%, 17.0-45.0% respectively (Malińska, Bugajska and Bartuzi, 2021; Arora and Khatri, 2022; Kibria *et al.*, 2023). In Malaysia, the prevalence of lower back MSDs among various population groups has ranged from 12.4% to 84.6%, influenced by the type of occupation (Abas *et al.*, 2023), while it was reported that 61% of office workers experienced lower back MSDs (Shariat *et al.*, 2018).

Therefore, this study aims to investigate the prevalence of WRMSDs and MSDs in different body regions among office workers at a large university in the Eastern region of Malaysia, and its association with individual and ergonomic risk factors.

METHODS

Sample Size

This cross-sectional study was carried out in the state of Kelantan, Malaysia. The required sample size to obtain a 95% confidence interval (CI) with a margin of error of 5% was 346. Malaysian office employees affiliated to Universiti Sains Malaysia (USM) of Health Campus were studied. The sample was calculated by used the random number generator software (www.randomizer.org).

Study Design, Participants and Eligibility Criteria

This cross-sectional study was conducted between April 2022 and August 2022. The inclusion criteria were both male and female office staff aged between 18 and 60 years, who had been working in the same job for more than one year, and all computer users who understood the Malay language, while the exclusion criteria included a history of surgery or accidents affecting their musculoskeletal system, pregnant women, and computer users with a duration of less than 2 hours per day. The participants were selected based on simple random sampling technique which was applied to select the 346 participants from the 791 computer users. A total of 320 participants completed the questionnaire. All the respondents participated in this study voluntarily and signed a written informed consent before conducting the study.

Data Gathering Tools

Sociodemographic and Health-related Questions

The demographic questionnaire started with collecting information such as gender, age, height, weight, formal education, duration of employment, duration of computer use, lifestyle factors, including smoking status, a history of regular exercise per week, and the distance from participants' residence to USM as their place of work.

Cornell Musculoskeletal Discomfort Questionnaire

The Cornell Musculoskeletal Discomfort Questionnaire (CMDQ) is effectively used to report the prevalence of MSDs in different body region among computer users; It uses a scale to measure discomfort frequency, never (no discomfort), 1-2 times/week, 3-4 times/week, once every day, and several times every day (presence of discomfort). CMDQ is a practical and accurate assessment, applicable, valid, and reliable tool (Hedge, Morimoto and Mccrobie, 1999).

Rapid Office Strain Assessment Checklist

Rapid Office Strain Assessment (ROSA) is a checklist designed by Sonne, Villalta and Andrews (2012) to assess office equipment and

quantify exposure to risk factors in an office work environment by observation for high-risk workstations based on ROSA scores. Final scores and ranked ergonomic risk levels are interpreted as follows: "Low risk" if the final score is between 1-4, and "High risk" if the final score is between 5-10.

Statistical Analysis

Data were entered and analyzed using SPSS version 26. All items in the questionnaire were analyzed using descriptive and inferential statistics. The items related to MSDs which generated dichotomous nominal data, were coded as "1" for "yes" and "0" for "no" as specified by the researcher. Descriptive statistics were employed for both dependent and independent variables to obtain frequency and percentage, while inferential statistics were used to test hypotheses. Multiple logistic regression was used to assess the association between risk factors and MSDs. The model's fit was evaluated using the Hosmer and Lemeshow goodness-of-fit test, which yielded a p-value of 0.921.

Ethical Consideration

Ethical approval for this study was obtained from the Human Research Ethical Committee of Universiti of Sains Malaysia (USM/JEPeM/21120778) as routinely done for such type of study.

Operational Definitions

The term "WRMSDs" is defined as university office staff having perceived pain or discomfort in the last 12 months in any part of their musculoskeletal body regions (Demissie *et al.*, 2022), while the term "MSDs" is defined if university office staff have experienced perceived pain or discomfort in specific, defined body regions within the last 12 months. Computer user is a university office employee who spends 10 hours each week at a computer workstation to perform some or all of their job tasks (Kibria *et al.*, 2023).

Office workstation is defined as an individual or collaborative workspace that consists of essential components such as a chair, computer monitor,

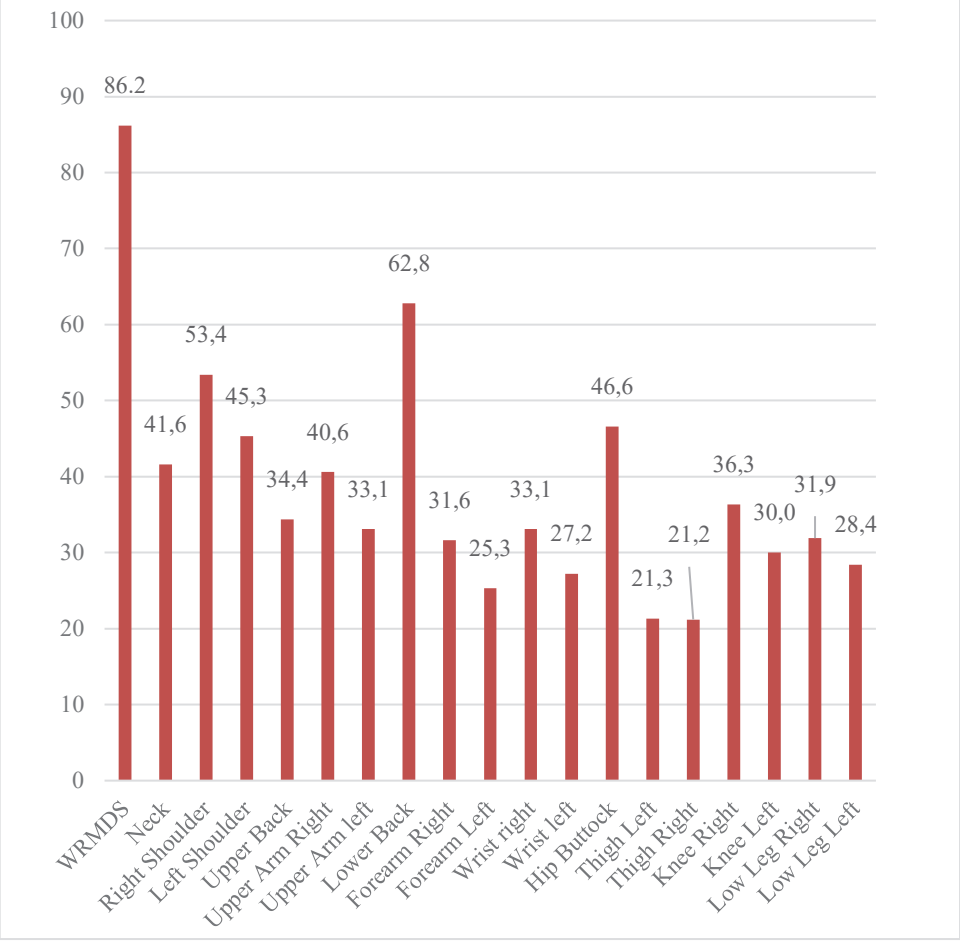

Figure 1. Prevalence of MSDs among computer user (N=320)

Table 1. The Demographics Characteristics among Computer Users at USM Health Campus in 2022 (N=320)

Variables	Mean (SD)	Frequency (n)	Percentage (%)
Age (years)	41.79 (8.14)		
21-30		23	7.2
31-40		120	37.5
41-50		125	39.1
51-60		52	16.2
BMI	26.97 (5.75)		
Underweight		7	2.2
Normal		106	33.1
Overweight		142	44.4
Obese		65	20.3
Gender			
Male		119	37.2
Female		201	62.8
Educational Level			
SPM/STPM		77	24.1
Diploma		110	34.4
BSc		105	32.7
Master or PhD		28	8.8
Work Experience (years)	16.62 (8.11)		
1-5		32	10
6-10		33	10.3
11-15		88	27.5
16-20		76	23.8
>21		91	28.4
Duration of Computer Use (hours)	6.28 (1.75)		
2-4		77	24.1
5-6		97	30.3
7-8		146	45.6
Distance from home to USM (km)			
1-10		202	63.1
11-20		76	23.8
21-40		32	10.0
Above 40		10	3.1
Smoking Habits			
Yes		21	6.6
No		299	93.4
Sport exercise hours per week			
Sport duration ≤ 2		315	98.4
Sport duration > 2		5	1.6

keyboard, mouse, telephone, and any other necessary peripherals for completing computer-related tasks (OSHA, 2023). Body Mass Index (BMI): if <18.5, is considered as underweight; if 18.5 to 24.9, is considered as normal; if 25.0 to 29.9, considered as overweight; and if ≥30.0, is considered as obese (Demissie *et al.*, 2022).

RESULT

Characteristics of Participants

A total of 320 office staff participated in this study, with 92% response; the majority of the respondents were female (62.8%), and the males were 37.2%. The mean age was 41.79 ± 8.14 years, in which about 39.1% of the study participants were within the age range of 41-50 years closely followed by the 31-40 age range with 37.5%. The majority had a diploma based on their level of education (34.4%), and more than half of the study participants had overweight (and consequently obese) based on BMI (64.7%) with the mean BMI of 26.97 (SD = 5.75), whilst the mean years of experience was 16.62 ± 8.11 years, and duration of computer use was 6.28 ± 1.75 hours. According to the ROSA score, 12.2% of the participants were characterized as a high risk (Table 2).

Prevalence of Musculoskeletal Disorder

Among the 320 computer users, WRMSDs showed a prevalence rate of 86.2%, while MSDs affected 18 different body regions as detailed in Figure 1. The lower back emerged as the most prevalent area, accounting for 62.8% of MSD cases,

Table 2. ROSA score among computer users (N=320)

Workstation	Min	Max	ROSA score	
			Mean	SD
Chair	2	6	3.34	0.586
Monitor and Telephone	1	5	1.54	0.826
Mouse and Keyboard	1	7	2.59	1.681
Final ROSA score	3	7	3.81	1.058
Risk level	N (%)			
Low- risk level	281(87.8)			
High- risk level	39(12.2)			

followed by the right shoulder (53.4%), hip/buttock (46.4%), and left shoulder (45.3%).

Ergonomics Risk Level Assessment

The ROSA index scores, as presented in Table 2, revealed that the mean chair score was 3.34, while the scores for the monitor and phone were 1.54, and for the mouse and keyboard were 2.59. The mean final ROSA score was 3.81 (1.058), which indicates the 12.2% of workstation presented MSDs risk and needed ergonomic management.

Table 3. Multiple Logistic Regression Analysis of Risk Factors Associated with WRMSDs, and MSDs for Neck, Lower Back, and Upper Arm

	Adjusted OR (95% CI)	p-value
WRMSDs		
Age (years)		
21-30	1.00	
31-40	2.103(0.675-6.555)	0.200
41-50	1.192(0.388-3.660)	0.707
51-60	6.944(1.238-39.017)	0.028*
Neck MSDs		
Age (years)		
21-30	1.00	
31-40	0.406(1.59-1.039)	0.060
41-50	0.456(0.181-1.150)	0.096
51-60	3.908(1.342-11.377)	0.012*
Gender		
Male	1.00	
Female	2.042(1.199-3.475)	0.009*
Upper arm MSDs		
Gender		
Male	1.00	
Female	1.795(1.091-2.950)	0.021*
Age (years)		
21-30	1.00	
31-40	2.400(0.787-7.316)	0.124
41-50	2.107(0.693-6.408)	0.189
51-60	3.303(1.006-10.849)	0.049*
BMI		
Underweight	1.00	
Healthy	0.092(0.010-0.814)	0.046*
Overweight	0.127(0.014-1.123)	0.032*
Obese	0.131(0.014-1.192)	0.071
Lower back MSDs		
Duration of computer uses		
2-4	1.00	
5-6	1.096(0.597-2.013)	0.767
7-8	2.045(1.149-3.638)	0.015*

Factors related to musculoskeletal disorder

A simple logistic regression analysis was conducted for WRMSDs and MSDs of 18 body regions, in which variables with p-value less than 0.25, which were observed only in WRMSDs and MSDs in the neck, lower back, and upper arm, and, therefore, were included in multiple logistic regression as shown in Table 3. Those of older age (51-60 years) were seven times more likely to have WRMSDs (OR= 6.944, CI:1.238-39.017, p =0.028) and four times more likely to have neck MSDs (OR= 3.908, CI:1.342-11.377, p=0.012), while those with female gender were two times more likely to have neck MSDs (OR= 2.042, CI:1.199-3.475, p=0.009) and two times more likely to have upper arm MSDs (OR= 1.791, CI: 1.091- 2.50, p=0.021); those with older age (51-60 years) were three times more likely to have upper arm MSDs (OR= 3.303, CI: 1.006-10.849, p=0.049), while those with healthy and overweight were 0.092, 0.127 times less likely to have upper arm right MSDs (OR= 0.092, CI: 0.010-0.814, p=0.046) and (OR= 0.127, CI: 0.014- 1.123, p=0.032), respectively (Table 3).

DISCUSSION

Characteristics of participants

The study found that most respondents (39%) were between 41 and 50 years old, followed by 37.5% aged 31-40. In comparison, Alias *et al* (2020) reported different percentages across the age ranges: 49.5% of respondents were in the 40-49 age group, while 32.5% were in the 30-39 age group. However, when considering the total percentage of respondents aged 30-50, more than three-quarters of participants fell within this age range. Another study by Nunus (2021) found that 38.4% of participants were in the 40-49 age range, which is similar to our result. In contrast, Chinedu (2021) noted a broader distribution, with 50.2% of respondents aged between 30 and 50 and 28.6% over the age of 50. This emphasizes the importance of age-related trends in understanding musculoskeletal injury risks, as older individuals typically face decline in muscle strength and flexibility.

The observed percentage of female participants in this study reveals that more than half of the respondents were female and constitute a significant majority, accounting for 62.8% of the respondents. This is consistent with trends observed in Lahore, where women made up 64.62% of participants, indicating a strong female presence in technology-related fields (Javed *et al.*, 2020), which is slightly higher than the 61% found in the study of office workers in China (Ye *et al.*, 2017). However, disparities remain; for instance, at Aimst University, only 43% of the workforce was female (Mishalini Nair *et al.*, 2019), reflecting broader societal factors influencing women's participation across various academic and professional settings.

Awareness of the consequences of an overweight BMI is crucial. In our study, 44.4% were classified as overweight, which is slightly higher than the 42% found in school teachers by Ehsani *et al.* (2018) It is also notably higher than the 36.6% reported by AlOmar *et al.* (2021) among office workers in Saudi Arabia and the 34% reported by Malińska, Bugajska and Bartuzi (2021) among office workers. These comparisons suggest that while overweight percentage varies across populations, it remains within a similar range Excess body weight imposes significant mechanical stress on joints, which can lead to discomfort, particularly in the knees and spine.

Furthermore, the study examined daily working hours and sedentary behaviors among participants and revealed that 45.6% work 7-8 hours daily, which is relatively lower compared to the 52% reported by Ardahan and Simsek (2016) for those working more than seven hours, and the 59% found in a study by Borhany *et al.* (2018), where participants sat for more than six hours a day, while Alhakami *et al.* (2022) reported that 60% of participants worked eight hours. Despite these discrepancies, our findings are consistent with the prevalent trend of working 7-8 hours per day. Prolonged sitting during these work hours, however, can lead to poor posture, spinal misalignment, and chronic back pain.

Prevalence of Musculoskeletal Disorder

This study revealed an extremely high prevalence of 86.2% for WRMSDs among computer users at the USM Health Campus. Further comparison of the result of this study with the findings of other studies in higher education sectors of Malaysia revealed similar findings as that reported among computer users, in which 73.5% of the workers reported experience of WRMSDs (Khan *et al.*, 2020) about 85.3% of the staff work with computers in the business service center office Kuala Lumpur reported experience of WRMSDs (Hasan, Zulkifly and Ali, 2020). The overall prevalence of 20 studies included in a systematic review was 74.4% (Dimitrijević *et al.*, 2023). Among higher education academicians staff in Saudi Arabia, WRMSDs amounted to 42.5% (Algarni, Kachanathu and AlAbdulwahab, 2020), while, in the same country, another study reported a prevalence of 32% (Alghadir, Khalid and Iqbal, 2022). Conclusively, most of the above mentioned percentages are smaller than the 86% found among computer users in the present study. This disparity in WRMSD rates can be attributed to job-specific conditions, particularly awkward postures and repetitive movements. When such postures are combined with other risk factors like high force, frequent repetition, or prolonged task duration, the likelihood of developing WRMSDs increases even further (Chinedu *et al.*, 2020; Hakam and Nabilah, 2021; Thamrin *et al.*, 2021). Similarly, the absence of regular ergonomic assessment and identification of the WRMSDs by competent persons reduce the appropriate interventions to be applied at suitable time at the workplace before WRMSDs developed to be high pain severity.

In addition, this study also identified MSDs in 18 body regions, with prevalence rates exceeding 40% observed in six body regions. The lower back had the highest prevalence rate, at 62.8%, followed by the right shoulder 53.4%, the hip buttock 46.6%, the left shoulder 45.3%, the neck 41.6%, and the upper arm (right) 40.6%. Several previous studies reported similar results for MSDs of lower back, shoulder and neck. In line with this study, a published study reported that 64.62% of females in Pakistan have lower back pain among computer users (Javed *et al.*, 2020), while in Malaysia, it was a bit higher (73.5%) (Khan *et al.*, 2020). On the other hand, among 200 participants, lower back MSDs prevalence was 44% (Borhany *et al.*, 2018). Moreover, the prevalence of shoulder and neck MSDs ranged between 5.0-47.0% and 17.0-45.0%, respectively (Malińska, Bugajska and Bartuzi, 2021; Arora and Khatri, 2022; Kibria *et al.*, 2023). It's possible that the variations can be attributed to the recurring ergonomic posture alterations that occur in various workplaces. Therefore, it is recommended that computer users in high risk for MSDs receive ergonomic training targeted to their specific job duties.

Ergonomics Risk Level Assessment

Based on the level of risk assigned by the ROSA method, in this study 39(12%) were at high-risk level, while other studies reported 27(28%) (Ghanbary-Sartang and Habibi, 2015) and 75(32%) (Davudian-Talab *et al.*, 2017) were at high-risk level. In Iran, three separate studies showed 81(26%), 27(21%), and 69(21%) respondents were in high risk (Ghanbary and Habibi, 2015; Askarianzadeh Mahabadi *et al.*, 2017; Mohammadipour *et al.*, 2018). The variation of percentage of respondents in high risk level can be controlled by complying with ROSA recommendations. Differences in workstation configuration and the duration of computer use may result in disparities in the reported proportions of individuals categorized as high-risk across various studies (Redivo and Olivier, 2021).

Factors Related to Musculoskeletal Disorder

Multiple logistic regression analysis in this study revealed that only age was a significant predictor of WRMSDs among respondents. The older respondents (51-60 years) had seven times higher potential of experiencing WRMSDs compared to the younger employees (21-30 years). These findings are consistent with Alias *et al.* (2020) study among primary school female teachers, indicating females with age range between 40 and 59 years are 2.21 times more likely to have WRMSDs. Similarly, in another study, Nunes *et al* (2021) reported that office workers with age range between 50 and 65 years increased almost two times the risk for WRMSDs. In another study, a significant correlation (p=0.028) between WRMSDs and 51-60 years aged employees was observed, this age showed high prevalence of 83.9%. of MSDs (Chinedu *et al.*, 2020). These results align with AlOmar *et al.* (2021) findings which reported that older age was associated with a higher rate of WRMSDs. Obviously, WRMSDs have been linked with aging, which causes degenerative changes in bones, joints, and muscles. Pain in the musculoskeletal system can worsen by reducing blood flow, leading to chronic musculoskeletal disorders (AlOmar *et al.*, 2021).

Furthermore, multiple logistic regression analysis indicated that age and gender were significantly associated with neck MSDs among computer users; older respondents had 3.9 higher odds of experiencing neck MSDs. The finding is in line with previous study which reported a significant relationship between age ($p<0.05$) and experience of neck MSDs, with 1.08 times per year increase (Medin-Ceylan *et al.*, 2023). According to the findings of the Global Burden of Diseases 2017 study, the observed prevalence of neck MSDs reaches its highest point during middle ages and then gradually decreases afterward. The study found that the age groups 45–49 and 50–54 had the largest burdens of neck MSDs for both men and women (Safiri *et al.*, 2020; Kazeminasab *et al.,* 2022). A similar study by Kashif *et al* (2020) showed that there was a significant relationship between neck MSDs and age (p=0.024). Other study demonstrated that computer users in the age group 50–65 reported an increase in the ratio of neck MSDs to 1.92 times (Nunes *et al.*, 2021). In addition, Ehsani, Mosallanezhad and Vahedi (2017) demonstrated that older age of computer users was more likely to increase neck MSDs compared to younger age (p=0.001).

The gender of the respondents had significant association with neck MSDs experienced by the computer users, whereby female gender was two times more likely to experience neck MSDs. The result of this study agrees with the findings of a systematic review which reported the worldwide incidence of neck MSDs in females higher than in males (Safiri *et al.*, 2020). Additionally, other study has reported a significant relationship between females and increasing of neck MSDs (Ehsani, Mosallanezhad and Vahedi, 2017). Similarly, a significant relationship of gender ($p<0.05$) with development of neck MSDs in females by 1.855 times than male was reported (Medin-Ceylan *et al.*, 2023). Conversely, a study in Iran revealed that a school showed significant relationship between gender ($p<0.001$) and neck MSDs, where female teachers were less likely to have neck MSDs than males by 0.43 times (Ehsani *et al.*, 2018). In another study conducted among Ministry of Health office workers in Saudi Arabia, females were 0.52 times less likely to suffer from neck MSDs than males (Alhakami *et al.*, 2022). Collectively, studies have shown differences in MSDs between male and female participants, and the reason for the higher prevalence of neck MSDs in females remains unclear. There are changes in the anatomy and structure of neck muscles and joints between men and women that may explain why women have more neck MSDs than men (Demissie, Bayih and Demmelash, 2024). Besides, women are more likely to work in jobs like typing and data entry that require them to sit for long periods and move their

necks over and over again. These tasks can put more strain on the muscles and joints in the neck, which can cause neck MSDs.

Furthermore, this study found that gender, age, and BMI were significantly associated with right upper arm MSDs among computer users (p=0.021, p=0.049, p=0.032), respectively, female gender had 1.795 higher odds to have upper arm right MSDs, elder age (51-60 years) were 3.3 times more likely to have upper arm right MSDs, and healthy and overweight were 0.092, 0.127 times less likely to have upper arm right MSDs, respectively. These findings conform to a previous study in Nigeria that reported university staff aged between 50 and 59 years were significant with upper arm MSDs (Fatudimu, Odekunle and Hamzat, 2022). In Pakistan, previous study was conducted among 773 office computer users and showed that there was a significant correlation between upper arm MSDs and age (p=0.024); the higher prevalence of MSDs was in age over 30 years (Kashif *et al.*, 2020).

Additionally, this study reported that lower back MSDs were associated with long computer use duration for 7-8 hours and had a statistically significant p-value of 0.015, with those computer users 2.045 times more likely to experience lower back MSDs. The outcome of the current study is consistent with the findings of other observational studies, which have revealed that the number of hours of time spent working is a significant indicator of lower back MSDs. In a study conducted for 395 office workers, a significant association (p=0.014) of lower back MSDs with daily computer usage duration (>7 hours) was reported, indicating that daily computer usage duration (>7 hours) was 1.63 times more likely to have lower back MSDs (Ardahan and Simsek, 2016). Similarly, in Poland, Malińska, Bugajska and Bartuzi (2021) revealed that working with a computer for long hours was around two times more likely to experience lower back MSDs. In contrast, a separate study found that no significant association was observed between computer usage and lower back or upper back MSDs; however, an essential and positive association was identified between neck MSDs and total computer usage (r=0.068, p=0.043) (Calik *et al.*, 2014). Moreover, the study conducted by Gosain *et al* (2022) reported that there was no significant relationship between lower back MSDs and working hours, but there was a significant relationship between shoulder MSDs and working hours (p=0.018). It is worth noting that the association between long hours and neck MSDs and shoulders MSDs may be influenced by additional factors, such as age and gender (Hasan, Zulkifly and Ali, 2020). The result of this study agrees with findings of other empirical studies which reported MSDs to be strongly linked with prolonged sitting (Pattath and Webb, 2022). This result could be interpreted as a longer period of work per day causes strain and exhaustion in the muscles and joints, which ultimately leads to pain and discomfort. Furthermore, work that requires people to remain in awkward positions for five to eight hours per day raises the risk of MSDs and has been related to fatigue, which in turn renders workers more prone to injury while performing their jobs (Fatudimu, Odekunle and Hamzat, 2022).

CONCLUSION

In conclusion, MSDs are prevalent among computer users in the USM Health Campus. The most reported affected area by MSDs was lower back followed by the right shoulder. Furthermore, the ergonomics risk level assessment score indicated medium risk for the studied respondents and workstations.

Age factor was significantly associated with WRMSDs among computer users; age and gender were significantly associated with neck MSDs among computer users and gender, age, and BMI were significantly associated with right upper arm MSDs among computer users; the computer use of 7-8 hours was significantly associated with lower back MSDs.

These findings emphasize the importance of USM Health Campus management in increasing awareness, creating attention, as well as the necessary action to have corrective plan measures and good working practices to lessen the impact of ergonomic risk factors and increase the productivity of its employees.

CONFLICT OF INTEREST

The authors state there are no conflicts of interest.

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