RESEARCH ARTICLE

Musculoskeletal disorders (MSD), stress, and elements of home environment among health sciences students in Malaysia

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Abstract:

The COVID-19 pandemic has impacted Malaysia's education system where the learning medium shifted from face-to-face to online learning platforms. Consequently, it might impact students' stress levels and the prevalence of musculoskeletal disorders (MSD). In addition, the difference in home elements might influence the development of MSD. This study aimed to determine the prevalence of MSD and stress levels. Furthermore, to investigate the association between MSD with elements of the home environment. One hundred and thirty-six (n=130) health sciences students around Malaysia participated in this study. A cross-sectional study was carried out via an online survey using the Cornell Musculoskeletal Discomfort questionnaire (CMDQ) and Stress Student Inventory (SSI). More than 30% of participants reported the presence of MSD in almost all body parts. The majority of participants reported having mild stress (57.7%). The presence of MSD in 20 body parts showed a significant association ($p<0.05$) with physical, interpersonal relationships, academic, and environmental stress. Moreover, the presence of MSD in 7 body parts showed significant differences ($p<0.05$) with elements of the home environment. In conclusion, health sciences students have a high prevalence of MSD and the development of MSD was associated with stress and elements of the home environment.

Keywords: Musculoskeletal disorders, Stress, Health Sciences students.

1. INTRODUCTION

The COVID -19 pandemic was an ongoing global rating crisis and has impacted millions of people worldwide regardless nationalities, genders, ages, income levels, and educational levels (Zu et al., 2020). All Malaysian higher education institutions whether public or private institutions were required to postpone all learning programs and online education became the preferred methodology for educators. An online education platform became the preferred methodology for educators such as Google Meet, Microsoft Teams, etc (Mamat, 2020; Yusuf, 2020). Students are restrained in their homes or hostels and they use laptops, computers, or mobile phones to access educational materials, such as assignments or study materials and this might expose them to the development of musculoskeletal disorders (MSDs) due to repetitive movement while using this equipment (Katz et al., 2000; Shobhit Mahajan, 2020).

MSDs were defined as body structure impairment, including muscles, tendons, nerves, ligaments, bones, joints, and blood circulation systems (Podniece, 2008). Studies have shown that MSDs were highly prevalent among medical and other health sciences students, ranging from 45.7% to 80.0% as it affects various body regions which are the neck, upper back, wrist or hand, low back, shoulder, and elbow or forearm (Smith & Leggat, 2004; Alshagga et al., 2013; Smith et al., 2014; Abledu & Offei, 2015; James et al., 2018; Wami et al., 2020).

Psychological risk factors may have the same effect on MSDs as physical risk factors (Warren,2010). Psychological disorders such as anxiety, high level of stress, and depression have been involved in the development of MSDs (Nahit et al., 2003; Magnavita et al., 2011). Stress is an emotional imbalance that can occur because of various factors such as academic pressure, the nature of one's desired career, financial considerations regarding school, and future work chances (Rana et al.,2019). A conducive home environment is one of the crucial components of online learning. The significant challenges associated with online learning are unconducive physical space, environment, and mental health-related issues (Mseleku, 2020). Students are unable to concentrate on their coursework in the absence of a favourable learning environment which can cause study performance to drop as a result of unconducive home environment during lockdown implemented (Kapasia et al. (2020); Wenjun et al., 2020).

Most of the studies conducted confined their study population to non-health science students and a single academic program ~~only~~. Then, for health science students, the researcher only focused on nursing students, although there were various health science programs such as physiotherapy, occupational therapy, dietetics, etc (Smith & Leggat, 2004; Alshagga et al., 2013; Smith et al., 2014; Abledu & Offei, 2015; James et al., 2018; Wami et al., 2020). There are limited studies focusing on the stress level, elements of the home environment, the relationship between MSD with stress, and elements of the home environment among health sciences students in Malaysia (Grimes et al., 2004; Alshagga et al., 2013; Smith et al., 2014; Abledu & Offei, 2015; Heidari et al., 2018; James et al., 2018; Wami et al., 2020; Hendi et al., 2021). Therefore, this study aims to investigate the prevalence of MSD and the level of stress among health sciences students in Malaysia. Besides, this study also attempts to determine the association between the level of stress and elements of the home environment with the prevalence of MSD among health sciences students in Malaysia.

2. MATERIALS AND METHODS

Data collection procedure

This cross-sectional study was executed after being granted ethical approval (FERC/FSK/MR/2021/1146) from the Ethics Committee of the Health Sciences Faculty, University Technology MARA (UiTM). A total of 130 (n=130) health sciences students fulfilled the inclusion criteria and were recruited via purposive sampling in this study. The inclusion criteria for this study include; (1) full-time undergraduate health sciences student (2) does not have any medical diagnosis or any musculoskeletal disease while the exclusion criteria include: (1) less than 1 semester/year being a full-time student. Participants have given their consent to take part in the study, an online survey was used to administer a self-reported questionnaire.

Instrument

The questionnaire used in this study consisted of three sections: Section 1: Demographic Data of participants and information of participant's home environment, Section 2: Cornell Musculoskeletal Discomfort Questionnaire (CMDQ) and Section 3: Student Stress Inventory (SSI). The questionnaire was distributed through several online platforms such as WhatsApp, Instagram, and Telegram using Google Forms. Participants were required to answer all questions as responses for all items in all three sections.

Data Analysis

The data gathered was analyzed using the Statistical Package for the Social Sciences (SPSS) version 26. To describe the variables derived from the demographic data, descriptive analyses (frequency, percentage, mean) were carried out. On the other hand, the Kruskal-Wallis H test was carried out to find the differences between the prevalence of MSD with demographic variables (elements of the home environment).

3. RESULTS

The age of the participants of this study ranged from 19-31 years old. Females constituted 86.20 % of the participants (n=112) while the males formed 13.80% (n=18). Seventy-six

point two percent of the participants (n=99) were studying in public universities and 49.20% (n=64) of the study population were studying at Universiti Teknologi MARA (UiTM). Besides that, 39.20% (n=51) of the study population were studying occupational therapy programs and 25.40% of the participants were in semester 8 of their current semester as shown in Table 1.

Table 1: Summaries of demographic data

Variables	Frequency (n)	Percentage (%)
Gender		
Male	18	13.80
Female	112	86.20
Age		
19- 21	28	21.50
22-24	93	71.50
25 -27	7	5.40
28- 31	2	1.50
Type of University		
Public University	99	76.20
Private University	31	23.80
Name of University		
Universiti Teknologi Mara (UiTM)	64	49.20
Universiti Kebangsaan Malaysia (UKM)	8	6.20
Universiti Sultan Zainal Abidin (UniSZA)	13	10.00
Universiti Sains Malaysia (USM)	10	7.70
Universiti Putra Malaysia (UPM)	4	3.10
Universiti Selangor (UNISEL)	8	6.20
Universiti Tunku Abdul Rahman (UTAR)	6	4.60
Perdana University	5	3.80
KPJ Healthcare University College	12	9.20
Programmed		
Occupational Therapy	51	39.20
Physiotherapy	15	11.50
Nutrition and Dietetics	13	10.00
Optometrist	4	3.10
Environment Health and Safety	16	12.30
Medical Laboratory Technology	13	10.00
Nursing	5	3.80
Medical Imaging	13	10.00
Current Semester		
Semester 2	9	6.90
Semester 3	21	16.20
Semester 4	18	13.80
Semester 5	17	13.10
Semester 6	21	16.20
Semester 7	11	8.50
Semester 8	33	25.40

Table 2: Summaries of the participant's demographic variable (Elements of Home Environment)

Variable	Frequency (n)	Percentage (%)
Do you have a conducive/ ergonomic study station and good elements of the home environment		
Yes	78	60.0
No	82	40.0
Described study station according to the statement below:		
Has good lighting during the daytime, which natural light from the sun		
Absent	46	35.4
Present	84	64.6
Use a static chair and/or static table		
Absent	49	35.4
Present	84	64.6
Has own room or private place		
Absent	55	42.30
Present	75	57.70

The participant's home environment elements are illustrated in Table 2 and 60% (n=78) of participants have conducive or ergonomic study stations and good aspects of the home environment. However, 40% (n=52) of participants do not

have a conducive or ergonomic study station and a good element of a home environment. In addition, 64.6% (n=84) of the study population had good lighting during the daytime, which was natural light from the sun, 62.3% (n=81) of the study population were using the static chair and/or static table, and 57.7% (n=75) had own room or private place.

Table 3 showed the prevalence of MSD present in the body region. More than 40% of participants (n=61) claimed the presence of discomfort in their neck region. It is also the highest prevalence of MSD among all body parts. The right foot region had the least complaints by the study population, about 24.6% (n=32).

Table 3: Prevalence of MSD over each body region

Body region	Frequency (n)	Percentage (%)
Neck	61	46.90
Right shoulder	50	38.50
Left shoulder	54	41.50
Upper back	49	37.70
Right upper arm	46	35.40
Left upper arm	47	36.20
Lower back	37	28.50
Right forearm	44	33.80
Left forearm	44	33.80
Right wrist	41	31.50
Left wrist	43	33.10
Hip/buttock	43	33.10
Right thigh	37	28.50
Left thigh	41	31.50
Right knee	45	34.60
Left knee	46	35.40
Left lower leg	39	30.00
Right lower leg	41	31.50
Right foot	32	24.60
Left foot	33	25.40

Figure 1 showed the level of stress experienced by the participants. Present in upper body parts. More than 50% of participants (n=75) experienced mild stress, 41.50% (n=54) of the participants experienced moderate stress, and 0.80% (n=1) has severe stress.

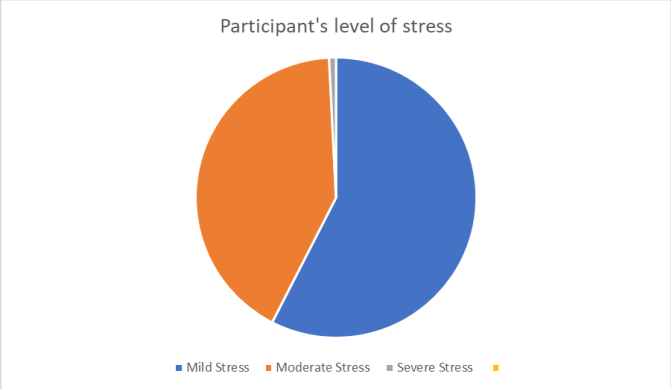

Figure 1. Participant's Level of Stress

The result in Table 4 showed there are significant differences between MSD and elements of the home environment which has good lighting during the daytime. For example, natural light from the sun, including left upper arm (x^2= 0.107, p=0.030), lower back (x^2= 0.000, p=0.010), right forearm (x^2= 1.258, p=0.002), left wrist (x^2= 4.604, p=0.032), hip/ buttock (x^2= 4.406, p=0.0.36), right foot (x^2= 6.390, p=0.010), and left foot (x^2= 6.063, p=0.010). There is no significant difference between MSD with good lighting during daytime. For example, natural light from the sun, including the neck, right shoulder, left shoulder, upper back right upper arm, left forearm, right wrist, right and left thigh, right and left knee, and right and left lower leg.

The result in Table 5 showed there is significant differences between MSD and element of the home environment using a static chair and/or table, including the left shoulder (x^2= 3.668, p=0.050) and left upper arm (x^2= 3.867, p=0.040). There is no significant difference between MSD with using a static chair and/or table, including neck, right shoulder, upper back, right upper arm, lower back, left and right forearm, right and left wrist, hip/ buttock, right and left thigh, right and left knee, left and right lower leg, and right and left foot.

The result in Table 6 showed there are non-significant differences between MSD and elements of the home environment which has their room or private place, including neck, right and left shoulder, upper back, right and left upper arm, lower back, right and left forearm, right and left wrist, hip/buttock, right and left thigh, right and left knee, right and left lower leg and right and left foot.

Table 4: Differences between MSD with elements of home environment (Has good lighting during daytime)

Variable	Frequency (n)	x^2	p- value (p)
Neck	130	0.107	0.740
Right shoulder	130	0.000	0.980
Left shoulder	130	1.258	0.260
Upper back	130	0.355	0.550
Right upper arm	130	0.741	0.380
Left upper arm	130	0.107	0.030*
Lower back	130	0.000	0.010*
Right forearm	130	1.258	0.002*
Left forearm	130	2.421	0.120
Right wrist	130	0.004	0.940
Left wrist	130	4.604	0.032*
Hip/ buttock	130	4.406	0.036*
Right thigh	130	1.688	0.190
Left thigh	130	2.721	0.090
Right knee	130	3.145	0.070
Left knee	130	2.540	0.110
Left lower leg	130	3.108	0.070
Right lower leg	130	3.465	0.060
Right foot	130	6.390	0.010*
Left foot	130	6.063	0.010*

*Difference;(p<0.05) statistical test; Kruskal Wallis

Table 5: Differences between MSD with elements of home environment (Using static chair and/or table)

Variable	Frequency (n)	x^2	p- value (p)
Neck	130	0.069	0.790
Right shoulder	130	2.033	0.150
Left shoulder	130	3.668	0.050*
Upper back	130	0.009	0.920
Right upper arm	130	2.144	0.140
Left upper arm	130	3.867	0.040*
Lower back	130	0.220	0.630
Right forearm	130	0.869	0.350
Left forearm	130	0.098	0.750
Right wrist	130	1.338	0.240
Left wrist	130	0.057	0.810
Hip/ buttock	130	0.535	0.460
Right thigh	130	0.430	0.510
Left thigh	130	0.460	0.490
Right knee	130	1.418	0.230
Left knee	130	2.108	0.140
Left lower leg	130	1.630	0.200
Right lower leg	130	3.012	0.080
Right foot	130	1.306	0.250
Left foot	130	2.959	0.080

*Difference;(p<0.05) statistical test; Kruskal Wallis

Table 6: Differences between MSD with elements of home environment (Has own room or private place)

Variable	Frequency (n)	x^2	p- value (p)
Neck	130	0.046	0.830
Right shoulder	130	1.026	0.310
Left shoulder	130	2.608	0.100
Upper back	130	1.135	0.280
Right upper arm	130	2.617	0.100
Left upper arm	130	2.314	0.120
Lower back	130	0.188	0.660
Right forearm	130	0.957	0.320
Left forearm	130	0.047	0.820
Right wrist	130	0.641	0.420
Left wrist	130	0.073	0.780
Hip/ buttock	130	0.285	0.590
Right thigh	130	1.162	0.280
Left thigh	130	0.804	0.370
Right knee	130	1.387	0.230
Left knee	130	0.024	0.360
Left lower leg	130	0.182	0.670
Right lower leg	130	0.029	0.860
Right foot	130	1.224	0.260
Left foot	130	0.959	0.320

*Difference;(p<0.05) statistical test; Kruskal Wallis

4. DISCUSSION

Prevalence of MSD among health sciences students

Based on the result obtained, this study found that there was a higher number of MSD among the health sciences student in Malaysia, especially in the neck region. This finding is also supported by other previous studies that investigated a similar study (Smith & Leggat, 2004; Alshagga et al., 2013; Smith et al., 2014; Abledu & Offei, 2015; James et al., 2018; Wami et al., 2020 Karinganda & Sony., 2021). A previous study reported that the neck (28.0%) was predominance and followed by the lower back (23.6%), wrist/hands (22.9 %,) and upper back (27.4 %) (Abledu & Offei, 2015). Another study revealed the common site of MSD neck (39.4%), followed by the lower back (34.0%), shoulders (30.9%), and upper back (35.1 %) (Tantawy et al., 2017).

The level of stress among health sciences students

In this study, it was revealed that 57.7% of participants had mild stress. Then, 41.5% of participants have moderate stress, and 0.8% have severe stress. It was similar to the previous study when 52.6% of participants had low-stress levels, 45.1% had moderate stress levels, and 2.3% experienced severe levels of stress (Sawai et al., 2022). However, the result was contradicted by the previous study when no students were there in the category of no stress and severe level of stress. Still, in this study, 0.8% of participants have a severe level of stress (Shetty et al., 2022).

Differences between MSD and elements of the home environment

This study has proved that there is a significant difference between MSDs in certain body regions which are the left upper arm, lower back, right forearm, left wrist, hip/ buttock, right and left foot and the element of the home environment which is "good lighting during daytime" which refers "natural light from the sun" among health sciences students in Malaysia. According to Ekpenyong et al., (2013), unfavorable aspects of the learning environment such as poor lighting, stifling heat, and noise can also raise the possibility of accidents and the subsequent emergence of musculoskeletal disorders (MSDs).

Other than that, this study has proved there is a significant difference between MSDs in certain body regions which are left shoulder and left upper arm and the element of the home environment which is "static chair and/ or static table" among health sciences students in Malaysia. The results were supported by Shohel Parvez et al. (2022) that students were prone to have MSD problems due to inappropriate furniture. Therefore, it is necessary to alter the design of the academic furniture to prevent or minimize MSD issues. Other than that, proper designing of chairs can increase efficiency, promote education quality that leads to correct posture in students, and reduces the risk of musculoskeletal disorders (Ansari et al., 2018).

Moreover, this study also revealed there is a non-significant difference between MSD in body regions and an element of a home environment, having an own room or private place. This finding was supported by the previous study when the living environment may also be a factor in inducing the stress in which the place may be noisy or lack equipment for studying (Mankus et al., 2015).

5. CONCLUSION

In conclusion, a high prevalence of MSD among health sciences students was revealed in this study, with pain in the neck being the most common body region affected. Next, more than half of the participants has mild stress ~~and~~ followed by moderate stress and severe stress. There were non-significant differences between MSD's overall body regions and elements of the home environment, which has their room or private place. However, there was a significant difference between MSD over certain body regions with the element of the home environment, which uses the static chair and/ or static table and has good lighting during daytime. The findings of this study give clear information about prevalence of MSDs among health sciences student. Hence,

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