ORIGINAL ARTICLE

Associated Factors of Lower Back and Neck Pain Among Health Sciences Undergraduate Students in a Public University in Malaysia

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ABSTRACT

Introduction: Musculoskeletal pain is a common health issue reported among young adults. Nevertheless, there is limited research data on lower back and neck pain among undergraduate students in the health sciences field in Malaysia. This study aimed to determine the prevalence of lower back and neck pain among health sciences undergraduate students and identify the associated factors of lower back and neck pain. **Methods:** A cross-sectional study was conducted among 330 health sciences students in a public university in Selangor, Malaysia. The symptoms of lower back and neck pain were assessed using the Nordic Musculoskeletal Questionnaire. Multiple logistic regression analysis was used to estimate odds ratio (OR) for the associations between the factors and the lower back and neck pain. **Results:** The prevalence of lower back and neck pain during the last 12 months were found to be relatively high, at 63.3% and 53.6%, respectively. The data revealed that gender, year of study, and programme of study were significantly associated with lower back pain. Male and the Nutrition and Dietetics programme students were less likely to have lower back pain, while students in the third year were more likely to have lower back pain. Meanwhile, only programme was significantly associated with neck pain, whereby students from the Optometry and Physiotherapy programmes were more likely to have neck pain. **Conclusion:** Lower back and neck pain were considered prevalent among health sciences undergraduate students in this university. Intervention strategies to reduce the pain among students should target these demographic factors.
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INTRODUCTION

Musculoskeletal pain (MSP) is a wide range of health problems that include degenerative and inflammatory conditions. It is also a widespread and common occupational health problem affecting people globally (1). Causes of MSP are multifactorial including physical, ergonomic, and personal factors. MSP may manifest as discomfort and persistent pain, that worsen if left unresolved. MSP affects everyone at least once in a lifetime, thus having a massive impact on the quality of life over a short and long period (2). In the working sector, MSP greatly affects work-related absence, focus and creates a new burden on social costs (1).

Several studies have reported a high prevalence of MSP among students in dentistry, with 91.2% experiencing MSP problems at least in one part of the body. Meanwhile, 64.8% of students enrolled in healthcare courses and 73.6% of allied health sciences students developed MSP in one or more body parts (3-6). These musculoskeletal problem statistics are alarming and reveals that healthcare students are engaged in an environment that enhances their risk of MSP-associated injury. Similar to selected healthcare professionals, undergraduate health sciences students are exposed to various psychological, physical, and environmental factors in the academic and

work settings that may contribute to a musculoskeletal problem episode (3).

More specifically, MSP may be caused by a variety of factors, including those work-related, of medical in origin (physical conditions, genetic predisposition, and age), and lifestyle (7). Undergraduate students from the allied health sciences programmes such as nutritional science, nursing and physiotherapy are required to handle patients during their clinical training. This requirement may pose risks to students. A past study had showed that an increased academic year of study and poorly designed seating will increase the risk of developing MSP among medical and nursing students (8). Academic stress among undergraduate students was also found to be significantly correlated with MSP in certain areas of the body, such as the neck, shoulders, lower back, and hips (9). Consequently, students who have MSP will experience extreme and long-term pain, loss of productivity, decreased quality of life, and reduced well-being. These effects contribute to lowered academic performance (9).

In light of the opportunities to contribute to the healthcare sector after graduation, an increased awareness towards MSP is crucial among the healthcare professionals especially health sciences undergraduate students. Additionally, it is vital to identify factors that contribute to MSP in order to recognize preventive measures and further treatment without the use excessive painkillers as well as to prevent working absentees due to MSP. Although several studies have researched on MSP in developing countries, there is still limited research in Malaysia, especially among university students. In view of the above, the purpose of this research was to examine the prevalence of MSP in the lower back and neck regions among health sciences undergraduate students and also to determine the associated factors of neck pain and lower back pain (LBP) in a local setting.

MATERIALS AND METHODS

Study Design and Setting

A cross-sectional survey was completed by 330 health sciences students from January to April 2021. The students took the survey online, thus participation was remote. Some of the participants filled in the questionnaire within the campus premises while others responded from their homes.

Study Participants

The study population was undergraduate students from the Faculty of Health Sciences of Universiti Teknologi MARA (UiTM) Puncak Alam Campus, Selangor, Malaysia. The students were enrolled in either of these eight programmes: Nursing, Physiotherapy, Nutrition and Dietetics, Environment Health and Safety, Medical Imaging, Optometry, and Medical Laboratory Technology, and Occupational Therapy. The students were listed according to their years of study (year two to year four). Study participants were of the following inclusion criteria: (i) full-time and undergraduate students; (ii) students who are in year two to year four of a bachelor's degree; (iii) able to understand the English language. Students who met the above requirements but were not willing to participate in the study were excluded.

The stratified random sampling method was used to select participants, by stratifying the study population into different strata based on their year of study (years two to four). The number of elements selected in the sample from each stratum was proportionate to the total population. Finally, the required number of elements from each stratum were selected using the simple random sampling technique. Sample size was determined using the Raosoft sample size calculator. With an accepted margin error of 5%, confidence level of 95%, a population size of 1301, and considering a 10% drop-out rate, the recommended sample size was calculated at 330 students.

Data Collection Method

Primary-sourced information was gathered through the self-administered questionnaires. Google Forms was used and distributed through email and WhatsApp. The students filled up their background information and other relevant questions in the questionnaires. Ethical clearance was earned by the Research Ethics Committee (REC) of UiTM. All responded questionnaires were solely made identifiable by respondent codes to maintain participants' confidentiality. The approval code for the study was (Reference no: REC 11/2020 (UG/MR/213).

Research Instruments

A set of self-administered questionnaires consisting of a Background Information Section and the Standardised Nordic Musculoskeletal Questionnaire (NMQ) was used to measure the socio-demographic characteristics and MSP symptoms, respectively. The questionnaire was delivered in English.

Background Information Sheet

The Background information Sheet consists of socio-demographic characteristics of the students including age, gender, weight, height, programme of study, year of study and clinical training experience as well as duration of training. Body mass index (BMI) was calculated based on the self-reported measure of weight and height. BMI was calculated with the formula of weight (kg)/height^2 (metre)^2. Self-reported weight and height were used as the previous study has found that self-reported weight and height were consistent with direct measurements (10).

Standardised Nordic Musculoskeletal Questionnaire (NMQ)

The NMQ is divided into two sections: general and specific. The general section consists of 27 forced-choice items identifying nine body areas which are causing musculoskeletal problems. The areas of the body are depicted with a diagram (neck, shoulders, elbows, wrists/hands, upper back, low back, hips/thighs, knees and ankles/feet). Each respondent was asked to indicate whether she or he had an episode of pain or discomfort in different anatomical regions of the body in the last seven days (point prevalence) and 12 months (period prevalence). The second section consists of an additional 25 forced-choice questions, relating to the lower back, neck, and shoulder with further detail to relevant issues such as any accidents affecting each area, functional impact at home and work (change of job or duties), duration of the problem, assessment by a health professional and musculoskeletal problems in the last seven days. The NMQ is a binary response questionnaire, with 'yes' and 'no' indicating the presence and absence of MSP (11,12). The NMQ was validated by the original authors and it was concluded as an acceptable screening tool. However, medical examination is essential to establish a clinical diagnosis (11, 12). This tool is a commonly used method to measure the prevalence of MSP among young adults (1,3-6,8,9). In this study, we only reported the 12-month and 7-day prevalence of LBP and neck pain. For the examination of associated factors, the 12-month prevalence of LBP and neck pain was used.

Data Analysis

Data were coded and analyzed using the IBM SPSS Statistics version 25 software (IBM Corp., USA). A descriptive method was used to estimate the prevalence of MSP among health sciences students and describe the demographic data. Categorical variables were described as frequency (n) and percentages (%), while numerical variables were reported as mean and standard deviation (SD). Simple and multiple logistic regression was utilized to assess the association of LBP and neck pain during the last 12 months with independent variables, such as age, programme of study, year of study, clinical training experience, duration of clinical training, and body mass index (BMI). The odds ratio (OR) with a 95% confidence interval (CI) was used to summarise the associations. The level of statistical significance was set at 5%.

RESULTS

Characteristics of Health Sciences Undergraduate Students

A total of 330 health sciences undergraduate students participated in this study. Most of them were females (89.1%). The mean age of the students was 21.92 (SD= 1.42). Most of the participated students were from the Physiotherapy (20.0%), Environmental Health and Safety (13.3%), Nutritional and Dietetics (13.0%) programmes, followed by Nursing, Medical Imaging, Occupational Therapy, Optometry, and Medical Laboratory Technology programmes at 11.5%, 10.9%, 9.7%, and 9.1%, respectively. The socio-demographic data are presented in Table I.

Table I: Participant's characteristics (n=330)

Variables	Mean (SD)	n (%)
Age	21.92 (1.42)	
Gender		
Female		294 (89.1)
Male		36 (10.9)
Clinical training experience		
Yes		158 (47.9)
No		172 (52.1)
Year of study		
2nd Year		84 (25.4)
3rd Year		118 (35.8)
4th Year		128 (38.8)
Programme of study		
Nursing		41 (12.42)
Medical Laboratory Technology		30 (9.09)
Medical Imaging		38 (11.52)
Environmental Health and Safety		44 (13.33)
Physiotherapy		66 (20.0)
Occupational Therapy		36 (10.91)
Optometry		32 (9.70)
Nutritional and Dietetics		43 (13.03)
Duration of clinical training (month)	1.75 (2.50)	
BMI (kg/m²)	22.23 (4.238)	

SD= Standard Deviation
BMI = Body Mass Index
Kg/m² = Kilogram/meter²

Prevalence of Lower Back Pain and Neck Pain among Health Sciences Undergraduate Students

As shown in Table II, 209 (63.3%) students reported LBP and about half of the students (53.6%) reported neck pain during the previous 12-month period. During the last seven days, students reported that they also had symptoms in their lower back region (47.0%), followed by the neck (39.7%). When asked if the pain or discomfort had hindered them from engaging in professional, home, or recreational activities within the last 12 months, more than 80% of the students responded 'No' for both body regions.

Table II: Prevalence of musculoskeletal pain on lower back and neck regions during last 12 months and 7 days among health sciences undergraduate students (n=330)

Body region	Prevalence during last 12 months	Prevalence during last 7 days	Pain interferes normal activities within last 12 months
	n (%)	n (%)	n (%)
Lower back	209 (63.3)	155 (47.0)	46 (13.9)
Neck	177 (53.6)	131 (39.7)	26 (7.9)

Associated Factors of Lower Back Pain among Health Sciences Undergraduate Students

Results from simple logistic regression showed that gender, year and programme of study, duration of clinical training, and BMI had p-values of less than 0.25. These variables were included in the multiple logistic regression analysis. Meanwhile, results of multiple logistic regression showed that only gender, year of study and programme of study were significant, with p-values of less than 0.05. Table III shows the results obtained from simple and multiple logistic regression analyses of associated factors of self-reported LBP.

Table III: Associated factors of lower back pain among health sciences undergraduate students (n=330)

Variable	Simple Logistic Regression			Multiple Logistic regression		
	B	Crude OR (95%CI)	*p*-value	B	Adjusted OR (95%CI)	*p*-value
Gender						
Female	0	1.0		0	1.0	
Male	-1.325	0.27(0.12,0.57)	0.001*	-1.145	0.32(0.16,0.66)	0.001*
Programme of study						
Nursing	0	1.0		0	1.0	
Medical Laboratory Technology	0.475	1.61(0.51,5.05)	0.416	0.380	1.46(0.52,4.10)	0.470
Medical Imaging	0.394	1.48(0.53,4.12)	0.450	0.354	1.43(0.54,4.77)	0.475
Environmental Health and Safety	-0.296	0.74(0.25,2.18)	0.589	-0.457	0.63(0.25,1.59)	0.329
Physiotherapy	0.541	1.72(0.69,4.24)	0.241	0.544	1.72(0.72,4.14)	0.223
Occupational therapy	0.215	1.24(0.37,4.19)	0.729	0.029	1.03(0.36,2.91)	0.957
Optometry	0.092	1.09(0.36,3.36)	0.872	-0.020	0.98(0.35,2.74)	0.969
Nutrition and Dietetics	-0.857	0.43(0.13,1.38)	0.155	-0.987	0.37(0.14,0.98)	0.046*
Year of study						
2nd year	0	1.0		0	1.0	
3rd year	0.818	2.27(1.16,4.43)	0.017*	0.682	1.98(1.09,3.56)	0.023*
4th year	0.523	1.69(0.73,3.88)	0.219	0.564	1.76(0.99,3.12)	0.053
Duration of clinical training	-0.149	0.86(0.74,0.99)	0.045*	-0.108	0.89(0.81,1.00)	0.053
BMI (kg/m²)	0.036	1.04(0.98,1.09)	0.197	0.046	1.04(0.98,1.09)	0.200

*p-value<0.05
B=Regression estimate; OR=the odds ratio; 95% CI=95% Confidence Interval

The final model of multiple logistic regression revealed that male students were less likely to have LBP than female students (adjusted OR=0.32; 95% CI=0.16, 0.66; p<0.001), the third-year students had 1.98 the odds of having LBP than second-year students (adjusted OR=1.98; 95% CI=1.09, 3.56, p=0.023), and students in the Nutrition and Dietetics programme were less likely to have LBP (adjusted OR=0.37; 95% CI=0.14, 0.98, p=0.046), than students from the Nursing programme. On the other hand, other variables, such as age, clinical training experience, and BMI showed no significant association with LBP.

Associated Factors of Neck Pain among Health Sciences Undergraduate Students

Three independent variables (age, year of study and programme of study) that had p-values of less than 0.25 in the simple logistic regression were included in the multiple logistic regression analysis to identify the most associated risk factors of neck pain. However, only programme of study was significantly associated with neck pain in the final model. Students from the Physiotherapy and Optometry programmes were significantly associated with neck pain, meanwhile other programmes were not significant. Table IV shows the results of the associated factors of self-reported neck pain. Physiotherapy students have 3.04 times the odds to have neck pain (adjusted OR=3.04; 95% CI=1.26, 7.33; p= 0.013) and Optometry students have 3.85 times the odds (adjusted OR=3.85; 95% CI=1.33, 11.17; p= 0.013), compared to Nursing students.

Table IV: Associated factors of neck pain among health sciences undergraduate students (n=330)

Variable	Simple Logistic Regression			Multiple Logistic regression		
	B	Crude OR (95%CI)	p-value	B	Adjusted OR (95%CI)	p-value
Age	0.096	1.10 (0.94, 1.29)	0.229	-0.035	0.97 (0.77, 1.22)	0.764
Programme of study						
Nursing	0	1.0		0	1.0	
Medical Laboratory Technology	-0.307	0.74(0.31,1.75)	0.489	0.060	1.06(0.35,3.22)	0.915
Medical Imaging	0.140	1.15(0.45,2.93)	0.790	0.111	1.12(0.41,3.09)	0.830
Environmental Health and Safety	0.140	1.15(0.48,2.76)	0.754	0.000	1.00(0.36,2.77)	0.999
Physiotherapy	0.231	1.26(0.54,2.92)	0.591	0.111	3.04(1.26,7.33)	0.013*
Occupational therapy	1.045	2.85(1.28,6.34)	0.011*	0.288	1.33(0.46,3.89)	0.597
Optometry	0.140	1.15(0.47,2.79)	0.757	1.348	0.98(0.35,11.17)	0.013*
Nutritional and Dietetics	0.519	1.68(0.67,4.24)	0.272	0.122	1.13(0.39,3.32)	0.825
Year of study						
2nd year	0	1.0		0	1.0	
3rd year	-0.540	0.58(0.33,1.02)	0.057	0.163	1.18(0.60,2.29)	0.633
4th year	-0.445	0.64(0.39,1.06)	0.085	0.275	1.32(0.57,3.03)	0.519

*p-value<0.05
B = Regression estimate; OR = the odds ratio; 95% CI = 95% Confidence Interval

DISCUSSION

This current study discovered that LBP was most prevalent among the health sciences undergraduate students, followed by neck pain. This result was consistent with previous research that used the same questionnaire. These studies also demonstrated that LBP and neck pain were the most commonly reported musculoskeletal problem among health sciences students, as well as medical and dental students (8,13-16). Comparatively, the prevalence of LBP in this study was relatively higher than that reported by a study also conducted among the local Malaysian population (17). The high prevalence of LBP and neck pain among students could be attributed due to their prolonged time sitting on a chair, different postures during the learning or studying processes, clinical training experience, duration of clinical training, dominant hand, and other causes. These factors may collectively implicate the incidence of MSP (18,19).

Results gained from the logistic regression analysis revealed that gender, year of study, and programme of study were associated with the development of MSP in the lower back region. This study found that male students were less likely to have LBP compared to their female counterparts. This could be due to the comparatively smaller body frame, reduced muscle tone, higher stress levels and psychosocial factors that affect females more than males (8,16,19,20). Furthermore, this study also found that the third-year students had a higher risk of having LBP compared to second-year students. This finding was supported by a local research among health sciences students that found years of study also had a significant association with LBP (17) and a study conducted in Ethiopia that showed that as the students' year of study increased, the odds of developing musculoskeletal disorders was also higher (8). This could be attributed to the increased duration spent by students in the third and fourth years in front of the computer and in clinical practice, and have a higher workload within a packed schedule compared to first- and second-year students (8,15). Additionally, the programme of study was also found to be significantly associated with LBP, whereby undergraduate students from the Nutrition and Dietetics programme were less likely to have LBP compared to students from the Nursing programme, meanwhile other programmes showed no significant results. This finding indicated that Nursing students had a higher risk of LBP occurrence than Nutrition and Dietetics students. A previous local study showed that the occurrence of LBP is relatively high among nurses in public hospitals (21). Twisting of the body and manual handling of patients in wards were found to be significantly associated with LBP. These repetitive works and uncomfortable postures are common practices among nurses in Malaysia (21). It postulated the practices have been applied among Nursing students during their practical and clinical sessions which might increase the risk of LBP, whereby Nutrition and Dietetics students did not perform such practices. A systematic review showed that the nursing personnel is ranked in the top ten professions which have a substantial risk of LBP due to multitasking in healthcare settings (22). They carried out various activities that are considerably presumed in causing heavy workload, such as lifting and transporting patients or equipment in their daily practice. Such physical tasks cause a formidable effect on the back region and resulting musculoskeletal complaints among nurses (22).

In this study, neck pain was found to be only significantly associated with the programme of study. Students from two programmes: Optometry and Physiotherapy showed three times the likelihood to develop neck pain compared to Nursing students. These students are more prone to develop neck pain probably due to their engagement in more repetitive and physical movements, prolonged static or awkward posture, duration of involvement in clinical practice, increased use of a computer, and exposure to psychosocial hazards compared to other students. Previous studies revealed that Physiotherapy students often need to sustain awkward postures during patient transfer or manual lifting during clinical or practical classes (18, 23). The combined effects of requirements associated with the programme of study (e.g., patient transfer), may increase the risk of experiencing neck pain over time (23). Furthermore, an Optometrist's repetitive movements, prolonged awkward/static posture, and twisting/bending are everyday tasks. These repetitive activities can cause the muscle to overload (3, 24).

Other factors such as age, body mass index and clinical training experience showed no significant association with the occurrence of lower back and neck pain. The non-significant result could be due to the conduct of the study during the enforcement of movement control orders. As a result of this nationwide restriction, students were learning remotely and had not attended clinical training. These consequences may have reduced the significant association between training experience and the occurrence of lower back and neck pain among the participants.

This study is one of the few studies that has examined the prevalence and factors associated with LBP and neck pain among undergraduate students in the allied health sciences practice, particularly in Malaysia. This study used a large sample size and stratified random sampling method, which can represent students in the health sciences field. Nevertheless, there are several possible limitations in this study. Like many other studies that used the same questionnaire (NMQ), the process of data collection through self-reported events in the past 12 months may cause recall bias when answering the question, especially on the recall of MSP symptoms. However, the instrument used is well-established and validated both internationally and locally. Future studies

might consider to include a detailed assessment of LBP in terms of severity and intensity or medical diagnosis in order to get as accurate information as possible. Moreover, this study was only confined to the health sciences students in the UiTM Puncak Alam Campus and may not be generalized to all students in Malaysia. Therefore, extensive research on MSP among health sciences students need to be carried out involving large-scale sample from many higher learning institutions in Malaysia. The current study also did not include the factors such as ergonomics and nature or mechanism of work during clinical placement of the students. A future investigation inclusive of duration per day or week in clinical practice, computer usage, duration of sitting, and physically demanding activities could accurately determine the trajectory of LBP and neck pain among health sciences students.

CONCLUSION

The prevalence of LBP and neck pain among health sciences undergraduate students in this study were considered to be relatively high. Lower back was the most common region to experience pain and cause the most disabling effect, followed by the neck region. The socio-demographic data of the health sciences undergraduate students such as gender, year of study, and programme of study showed significant association with the LBP, whereas only programme of study had significant association with neck pain. The current findings would be beneficial for the programme coordinators to emphasize the importance of ergonomics during students' practical or clinical sessions and also help future researchers to design appropriate interventions for undergraduate students in reducing the occurrence of lower back and neck pain.

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