PREVALENCE AND ASSOCIATED FACTORS OF NECK AND SHOULDER PAIN AMONG MEDICAL STUDENTS IN A MILITARY MEDICAL SCHOOL IN THAILAND

Sirada Udombhakdibongse, Chanwit Phongamwong

Department of Rehabilitation Medicine, Phramongkutklao Hospital and Phramongkutklao College of Medicine, Bangkok, Thailand

Abstract

Background: Medical students often face intense coursework and prolonged study hours, contributing to stress and potential neck and shoulder pain. The integration of technology in learning further increases this risk. Neck and shoulder pain (NSP) can decrease learning efficiency and well-being. Previous studies have reported varying prevalence rates globally, but specific data for Thai medical students are lacking.

Objectives: This study aimed to determine the prevalence and associated factors of NSP among medical students in Thailand.

Methods: A cross-sectional study was conducted among medical students at Phramongkutklao College of Medicine, Thailand, from December 2022 to November 2023. Data was collected using an online self-reported questionnaire adapted from the Nordic Musculoskeletal Questionnaire. The questionnaire included demographic data, neck and shoulder pain symptoms, pain intensity (Numeric Rating Scales - NRS), pain-related factors, and stress levels (Srithanya Stress Scale - ST-5).

Results: Of 500 medical students, 360 completed the questionnaire with a 72% response rate. The prevalence of significant NSP (NRS ≥ 4) was 38.33% (95% CI: 33.42%-43.43%). Multivariable analysis revealed significant associations between significant NSP and factors such as having experienced these symptoms in the past year (AOR: 7.73, 95% CI: 2.60-22.98), being female (AOR: 1.72, 95% CI: 1.06-2.77), adopting rounded shoulder and forward head postures (AOR: 2, 95% CI: 1.0 -3.80), and high-stress levels (ST-5 score ≥ 8) (AOR: 2.14, 95% CI: 1.27-3.59).

Conclusion: NSP is common among medical students, especially females. Key risk factors identified include a history of neck and shoulder pain, poor posture, and elevated stress levels. Medical schools are recommended to implement ergonomic interventions and stress management programs to reduce those risks.

Keywords: neck pain, shoulder pain, medical students, prevalence, associated factors, Thailand

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Correspondence to:
Phongamwong C, Department of Rehabilitation Medicine, Phramongkutklao Hospital and Phramongkutklao College of Medicine, Bangkok 10400, Thailand.
E-mail: chanwit.p@pcm.ac.th

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Introduction

Medical students often face intense coursework and long study hours, contributing to stress and potential neck and shoulder pain. Technology use (computers, iPads, smartphones) further increases this risk.[1, 2] These symptoms can decrease learning efficiency and well-being.[1]

Musculoskeletal pain (MSP), including neck and shoulder pain, has various causes, including physical and psychological factors and personal habits. The prevalence of MSP among medical students varies widely across different countries and settings. For example, previous studies have reported prevalence rates of 67.6% in Chinese medical students,[3] 36.9% of Japanese nursing students,[4] and 73.3% of Korean nursing students.[5] In Saudi Arabia, 56.5% of medical students reported neck pain in the past year,[6] while in Malaysia, 41.8% experienced neck pain over one year.[1] These variations highlight the need for localized studies to understand the specific factors affecting different populations.

Limited research has been conducted on this topic in Thailand. Namwongsa et al. studied 779 undergraduate students using smartphones across 17 faculties of Khon Kaen University, Thailand. They reported that the prevalence of neck and shoulder pain was 32% and 27%, respectively.[7] However, data specifically targeting medical students was lacking.

This study aimed to determine the prevalence and associated factors of NSP among medical students in Thailand. The findings could help raise awareness about the issue and inform the development of effective prevention and intervention strategies to improve their health and academic performance.

Methods

Study Design and Participants

This cross-sectional study included all medical students (Years 2-6) at Phramongkutklao College of Medicine, Thailand, from December 2022 to November 2023. Students with neck/shoulder surgery or neurological diseases were excluded. The invitation to participate in this study and the participant information sheet were electronically distributed. Informed consent was obtained online, and the study protocol was approved by the Institutional Review Board of the Royal Thai Army Medical Department (R133q/65_Exp).

Sample size calculation

The number of participants was determined based on the study of Algarni AD and colleagues, in which the prevalence of neck/shoulder pain among medical students in Saudi Arabia was approximately 0.25.[6] A sample size calculation determined that a minimum sample size of 289 individuals was required for the study. Considering an online questionnaire's 60% response rate, 484 participants were needed. There were approximately 100 medical students for each academic year at Phramongkutklao College of Medicine. Hence, this study was a total population survey.

Data Collection

Data were collected anonymously via an online questionnaire (Google form) in Thai, based on the Standardized Nordic Questionnaire. The self-reported questionnaire included sociodemographic data, neck and shoulder pain symptoms (severity, duration, impact on study/work), and pain-related factors (previous pain, trauma, exercise, technology use, neck and shoulder posture, backpack weight, personal stress). The questionnaire was pre-tested on ten students before being distributed to the subjects to ensure it was easily comprehensible for assessing reliability and validity.

Operational Definitions

Neck and shoulder pain (NSP) is defined as soreness, discomfort, and aches in the neck and shoulders **(Figure 1)**.

The numeric Rating Scale (NRS) is a Pain severity scale, where ≥ 4 is considered significant. Previous pain or trauma is any pain or trauma that participants can recognize. Rounded shoulder and forward head: the head and shoulder are positioned forward of the body's midline.

Srithanya Stress Scale (ST-5) is a stress assessment scale comprising five items, each rated on a scale from 0 to 3. A higher score indicates a

more significant problem, and a total score of ≥8 indicates high stress.[8]

Statistical analysis

Descriptive statistics included mean (SD) for continuous variables and frequency/percentage for categorical variables. A Chi-square test was used to assess the significant differences in proportions. To identify associated factors for significant NSP, factors with a $p < 0.2$ from the univariable analysis were included in a multivariable model using binary logistic regression. A $p < 0.05$ was considered as statistical significance and presented with adjusted odds ratio (AOR) with 95% confidence intervals (CI).

Results

Five hundred questionnaires were distributed, of which 360 students (206 males, 154 females) responded, resulting in a 72% response rate. The respondents' mean age was 21.5 ± 1.6 years. More than half of the participants (226; 62%) were in the clinical year (Years 4-6). The participants' BMI was categorized as average weight (22.6 ± 3.3).

The overall self-reported prevalence of significant NSP was 38.3% (95% CI: 33.4%-43.4%), with the severity of pain measured at NRS 2.7 ± 2.5. The duration of pain was 10.7 ± 34.6 weeks. Moreover, 27.8% reported that the pain interfered with their work and study.

From the binary logistic regression analysis, NSP was significantly associated ($p < 0.05$) with past year neck and shoulder pain (AOR: 7.73, 95% CI: 2.60-22.98), being female (AOR: 1.72, 95% CI: 1.06-2.77), rounded shoulder and forward head postures (AOR: 2, 95% CI: 1.05-3.80), and high-stress levels (ST-5 score ≥ 8) (AOR: 2.14, 95% CI: 1.27-3.59) **(Table 1).**

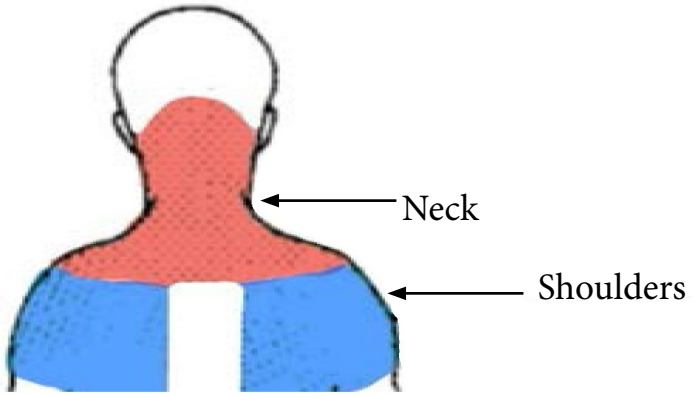

Figure 1. Illustration of neck and shoulders area in the online questionnaire

Table 1. Univariable and multivariable analysis for associated factors of neck and shoulder pain among medical students

	VAS < 4 (n=222)		VAS ≥ 4 (n=138)		Crude Odds ratio (95%CI)	*p*-value	Adjusted Odds ratio (95%CI)	*p*-value
	n	%	n	%				
Sex								
Male	140	67.96	66	32.04	Ref.		Ref.	
Female	82	53.25	72	46.75	1.86 (1.21 - 2.86)	**0.005**	1.72 (1.06 - 2.77)	**0.026**
Academic year								
2-3	88	65.67	46	34.33	Ref.		-	
4-6	134	59.29	92	40.71	1.31 (0.84 - 2.04)	0.229	-	-

Table 1. Univariable and Multivariable analysis for associated factors of neck and shoulder pain among medical students (Cont.)

	VAS < 4 (n=222)		VAS ≥ 4 (n=138)		Crude Odds ratio (95%CI)	*p*-value	Adjusted Odds ratio (95%CI)	*p*-value
	n	%	n	%				
BMI								
≤25	183	62.89	108	37.11	Ref.		-	
>25	39	56.52	30	43.48	1.30 (0.76 - 2.21)	0.329	-	-
Previous pain at neck and shoulder*								
No	51	92.73	4	7.27	Ref.		Ref.	
Yes	171	56.07	134	43.93	9.99 (3.52 - 28.33)	**<0.001**	7.73 (2.60 - 22.98)	**<0.001**
Previous trauma at neck and shoulder*								
No	207	62.54	124	37.46	Ref.	0.254	-	
Yes	15	51.72	14	48.28	1.55 (0.72 - 3.33)		-	-
Regular physical exercise**								
No	90	57.69	66	42.31	Ref.		Ref.	
Yes	132	64.71	72	35.29	0.74 (0.48 - 1.14)	**0.175**	0.84 (0.52 - 1.35)	0.475
Rounded shoulder and forward head postures**								
No	70	80.46	17	19.54	Ref.		Ref.	
Yes	152	55.68	121	44.32	3.27 (1.83 - 5.86)	**<0.001**	2.00 (1.05 - 3.80)	**0.033**
Carrying backpacks weighing more than 20% of body weight**								
No	169	64.02	95	35.98	Ref.		Ref.	
Yes	53	55.21	43	44.79	1.44 (0.89 - 2.31)	**0.129**	0.94 (0.55 - 1.59)	0.817
Hours of computer, tablet, and smartphone use/day**								
5	74	64.91	40	35.09	Ref.		-	
>5	148	60.16	98	39.84	1.22 (0.77 - 1.94)	0.389	-	-
Hours of study or working/ day**								
<3	34	73.91	12	26.09	Ref.		Ref.	
≥3	188	59.87	126	40.13	1.89 (0.94 - 3.80)	**0.071**	1.70 (0.78 - 3.67)	0.176
ST 5 score								
<8	179	67.29	87	32.71	Ref.		Ref.	
≥8	43	45.74	51	54.26	2.44 (1.51 - 3.94)	**<0.001**	2.14 (1.27 - 3.59)	**0.004**

*In the past year

**In the past three months

Discussion

The present study aimed to determine the prevalence and associated factors of neck and shoulder pain among military medical students at Phramongkutklao College of Medicine, Thailand. The key result of this study demonstrated that approximately 40% of medical students had significant neck and shoulder pain. This study also identified several factors associated with neck and shoulder pain among medical students, including female gender, a history of neck and shoulder pain, rounded shoulder and forward head posture, and self-perceived stress as measured by the ST-5 questionnaire.

This study's prevalence was lower than those conducted in Malaysia, China, Saudi Arabia, India, and Pakistan.[1, 3, 6, 9, 10] This discrepancy may primarily be attributed to differences in the definition of pain. Our research reported and analyzed ongoing significant NSP (NRS ≥4), whereas previous studies used yes-no questions to determine prevalence over one week or year.

Our study found that female students were approximately two times more likely to report NSP, which aligns with findings from studies in Malaysia and the United States.[1, 11] Based on the review by Fillingim and colleagues in 2009, the female generally has lower pain thresholds, possibly due to fluctuations in sex hormone levels and psychosocial factors.[12]

Additionally, medical students with a history of neck and shoulder pain in the past year were approximately eight times more likely to experience these symptoms compared to those without such a history. This finding was consistent with research conducted in Malaysia and Ethiopia,[1, 13] suggesting that individuals with a prior history of pain may be more susceptible to recurrent pain due to habitual activities. Also, a systematic review of nine prospective studies of non-specific neck pain identified a previous history of neck disorders as a significant factor for unfavorable outcomes in patients suffering from neck problems.[14]

Poor (rounded shoulder and forward head) posture was associated with twice the odds of neck and shoulder pain, corroborating the previous research by Namwongsa and colleagues, which found a flexed neck posture as a factor associated with neck problems (AOR: 2.44).[7] This postural abnormality causes musculoskeletal issues that may develop gradually due to muscle imbalance in the neck and shoulder.[15]

Self-perceived stress, indicated by an ST-5 score of ≥ 8, was significantly associated with neck and shoulder pain (AOR: 2.14). This finding aligns with a study conducted among Chinese medical and dental students, which found that high scores on the Perceived Stress Scale (PSS)-10 questionnaire were a risk factor for neck pain ($p = 0.002$, AOR: 1.034).[16] This could be supported by the fact that high levels of stress lead to increased production of cortisol and adrenaline, which causes muscle tension and spasms, particularly in the neck and shoulders.[17]

Based on a systematic review by Jahre et al., several studies examined the risk factors of female sex, body mass index (BMI), physical activity, computer usage duration, and perceived stress. None of the studies found associations between neck pain and physical activity or BMI. In contrast, the results for the female, the duration of computer use each day, and perceived stress were inconsistent.[18] This systematic review supported our findings that NSP was not associated with physical exercise and BMI.

The study encountered some limitations. Firstly, this study's findings rely on self-reported data. The absence of clinical examination data may affect the validity of the results. The present study also did not statistically evaluate the validity and reliability of the research questionnaire. Next, the unique context of Phramongkutklao College of Medicine, a military medical school where pre-clinical students (Years 2-3) engage in more physical activity than those in other medical schools, may have impacted the outcomes.

Furthermore, we did not report the prevalence of neck and shoulder pain separately. The decision to treat the neck and shoulders as a single area was based on the consideration that these two regions are anatomically and functionally interconnected. Differentiating between them could confuse respondents and complicate the data collection process. Lastly, the cross-sectional design could not establish causal relationships between neck and shoulder pain and the associated factors, which requires further longitudinal research.

Conclusion

Neck and shoulder pain symptoms are prevalent among medical students, particularly among female students. Key risk factors include a history of neck and shoulder pain in the past year, adopting rounded shoulder and forward head postures, and high-stress levels. Medical schools should emphasize the importance of maintaining suitable ergonomic postures during learning and implement strategies to manage stress effectively to reduce the incidence of pain.

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