ORIGINAL ARTICLE

# PREVALENCE AND ASSOCIATED RISK FACTORS OF NECK PAIN AMONG UNIVERSITY STUDENTS IN KUANTAN, PAHANG DURING COVID-19 PANDEMIC.

**Tan Yea Huey, Sharmila Gopala Krishna Pillai**

*Department of Physiotherapy, Faculty of Health and Life Sciences, INTI International University, Persiaran Perdana BBN Putra Nilai, 71800 Nilai, Negeri Sembilan, Malaysia*

**Corresponding Author**
Sharmila Gopala Krishna Pillai
Department of Physiotherapy, Faculty of Health and Life Sciences, INTI International University, Persiaran Perdana BBN Putra Nilai, 71800 Nilai
Negeri Sembilan, Malaysia
Email: sharmila.gopala@newinti.edu.my

**Abstract**

**Background:** COVID-19 pandemic created a shift in academic learning. Majority university students are required to stay at home and continue their studies through online platform which predisposes to various musculoskeletal disorder. Among the various musculoskeletal disorder, neck pain is prominent and affect function, productivity and overall quality of life.
**Objective:** To determine the prevalence of neck pain and its associated risk factors among university students in Kuantan, Pahang.
**Methods:** A cross sectional study with a total of 121 eligible university students in Kuantan, Pahang. Online self-administered questionnaire with section A; demographic data, section B; standardized Nordic musculoskeletal questionnaire, section C; general risk factors and section D; ergonomic risk factors were administered. Results were analyzed using SPSS version 26.
**Results:** Overall neck pain prevalence among university students in Kuantan, Pahang during last 12-months is 58.7%. Prolonged sitting ($p$<0.001), uncomfortable posture ($p$<0.001), repetitive arm and hands movements ($p$<0.001), prolonged sustaining of same posture ($p$=0.001), neck bending or prolonged forward head position ($p$<0.01), elbow in 90 degrees angle when using laptop ($p$=0.035) are the associated risk factors of neck pain.
**Conclusion:** University students in Kuantan, Pahang have high prevalence of neck pain during COVID-19 pandemic. Habitual and ergonomic risk factors significantly associated with neck pain.

**Keywords:** Neck pain, risk factors, university student

## Introduction

It is estimated that 22-70% of the population will have neck pain sometimes in their lives. [1] At any given time, 10-20% of the population reporting neck problems with 54% of individuals experienced increases with age and especially women. [2] A previous study reported new neck pain episodes during college years and even continue after graduation. [3] However, most previous studies focused only on healthcare students and revealed high neck pain prevalence. High prevalence of neck pain among healthcare students maybe contributed by manual handling of patients during their clinical placements, [4] long training hours, [5] and even discipline-related stress as observed in nursing students.[6] In a recent study [7] in International Islamic University Malaysia (IIUM), Kuantan, neck pain prevalence of clinical students for the past week was 36.2%. 50.7% of clinical students claimed to have had neck pain for the past 12 months but this study only includes clinical students as the sample population in their study with a small sample size. Similarly, dentists spend the majority of working time bending their heads down causing severe spastic painful neck. [8]

Another study [9] evaluated the prevalence and risk factors of neck pain among healthcare students in a private university and concluded healthcare students are prone to neck pain. However, the study [9] focuses on healthcare students, and the lecture methods of each faculty of each university are different. Further, the current study focuses mainly on the COVID-19 pandemic which is suitable considering the shift from traditional face-to-face to online mode. While it is conceivable that students of different undergraduate programs may have a different prevalence of neck pain due to unique program-specific exposures (e.g. overhead work, or prolonged usage of computers), no research has determined the prevalence of neck pain and the related risk factors among undergraduates in both healthcare and non-health-related disciplines. Different programs in the university might cause different musculoskeletal pain due to the nature of the program and university students may exhibit different musculoskeletal disorder presentations.

Academic learning had shifted to online learning mode with students devoting more hours to electronic gadgets for learning purposes, social and entertainment. These may have increased the prevalence of musculoskeletal pain, especially on the neck with various risk factors as a contributing factor. The burden or consequences of neck pain include reducing neck movement, affecting the performance of daily tasks such as reaching and head-turning, poor concentration on the study, neck injury, psychological problems, and so on. Many studies focus on healthcare students and to the best of our knowledge, there is no study that evaluated prevalence and associated risk factors of university students from various faculties in Kuantan, Pahang. Hence, the objective of current study is to determine the prevalence and associated risk factors of neck pain among university students in Kuantan, Pahang.

## Methodology

This was a quantitative cross sectional study using structured and validated self-administrative questionnaire conducted in Kuantan, Pahang. The self-administrative questionnaire consisted of four sections; section A; demographic data, section B; standardized Nordic musculoskeletal questionnaire, section C; general risk factors and section D; ergonomic risk factors. The questionnaire was distributed through online platforms such as Facebook, WhatsApp, Instagram, Messenger and Telegram. Participants who were 18-40 years old, university students from Kuantan, Pahang were included in this study. Participants with neck related injury/ surgery before such as whiplash, cervical spondylosis or had seek medical attentions with issues related from neck and unwilling to provide informed consent were excluded from the study. The

sample size of the study was determined using unknown sample size calculation formula as the exact number of students in Kuantan, Pahang was not able to be obtained. However, this study was only able to recruit 121 participants. The data collected (prevalence and risk factors of neck pain among university students in Kuantan, Pahang) were analyzed using descriptive statistics. Current study was conducted after ethical approval was obtained from Ethical Committee of INTI International University. Prior to the commencement of the study, information sheet was distributed and informed consent was obtained from the participants. Respondents were informed on their rights to withdraw themselves from this study at any time during this research.

Frequency distribution of the demographic data, prevalence of neck pain and various risk factors were presented in a table form as descriptive statistics accordingly. Standard deviation was used as a measure of dispersion using Statistical Package for Social Sciences (SPSS) version 26. Chi-Square Test was used to determine the association between 12 months' prevalence of neck pain with general and student characteristic of participants and for association between 12-months prevalence of neck pain with ergonomic risk factors.

## Results

One hundred and twenty one participants met the inclusion criteria and were recruited in this study. Table 1 shows demographic data of participants. The mean age range of participants in this study was 22.45±1.18years with highest response rates from participants aged 23 years old. Most participants were female (59.5%) with normal Body Mass Index (BMI) (67.8%). Table 2 reports the general characteristics of participants. Majority participants were full time students (90.1%), undergraduates (88.4%) in Year 3 (40.5%), undergoing lecture hours of 11-20 hours per week (53.8%) and spend at least 9-12 hours per day (42.1%) on computers and smartphones. Most students were from Faculty of Engineering and Quantity Surveying (23.1%), Faculty of Health and Life Sciences (20.7%), Faculty of Accounting, Economics, Finance and Banking (18.2%), Faculty of Business, Communication and Law (16.5%). Prevalence of neck pain during the last 12-months and 7-days among the university students in Kuantan, Pahang were 58.7% and 16.5% respectively as shown in Table 3. 13.2% of the students were prevented from carrying out normal daily activities due to neck pain and 5.8% of them had seen by a physician, physiotherapist or other healthcare profession due to neck trouble in the past year.

Based on Table 4, study or work in uncomfortable posture is an associated risk factor of neck pain $\chi 2\ (1, N= 121) = 14.004, p<0.001$. The chi-square test was also statistically significant for maintaining same posture for prolonged period, $\chi 2\ (1, N= 121) = 10.753, p=0.001$ and for prolonged sitting specifically $\chi 2\ (1, N= 121) = 22.068, p<0.001$. Repetitive movement with arms or hands also are the associated risk factors of neck pain $\chi 2= (1, N= 121) = 11.983, p<0.001$. Majority participants bend or hold neck in a forward position for prolonged period and this is an associated risk factor of neck pain $\chi 2\ (1, N= 121) = 6.755, p=0.009$. Majority participants with neck pain also do not maintain elbow in 90 degrees when using laptop, and is also an associated risk factor of neck pain $\chi 2\ (1, N=121) = 4.440, p= 0.035$. Chi Square test was done to examine the association of 12-months neck pain prevalence and BMI, smoking status, carrying bag packs, lecture hours and physical activity and the results shows not significant, $p>0.05$.

## Discussion

Most of the previous studies reported prevalence of neck pain among university students. [5], [9], [10] However, the current study investigated the prevalence and risk factors of neck pain among university students of various faculties in Kuantan, Pahang. Mean age of the students in the

current study were 22.45 years. This is similar to a study reporting prevalence of neck pain among the students were 41.8% where the participants mean age was 20.3 years. [5] Another study by Gerr (2002) [11] however, reported older computer users (age more than 40 years) were more likely to develop neck or shoulder disorders than younger population.

The findings of the current study revealed prevalence of neck pain among female undergraduate students as 33.8% while male undergraduate students as 19.8%. This shows female students suffered neck pain more than male as many other studies shares similar result [3], [4], [5] This may be due to female willing to report pain more than male or female has a lower pain tolerance threshold. [12] Besides, the effect of hormones such as estrogen and testosterone will affect the central nervous system, which is responsible for perceiving and transmitting sensation of pain. [12] BMI and smoking history was not associated with 12 months' neck pain prevalence in current study and similar to a previous study. [13] On contrary, another study reported BMI to be a risk factor for musculoskeletal pain. [14]

A recent study [7] stated that 36.2% of clinical students had prevalence of neck pain in the past 7 days and 50.7% of the students had prevalence of neck pain in the past 12-months. Compared to the current study, the prevalence of neck pain during the last 12-months has a similar result which is 58.7% whereas the prevalence of neck pain during the last 7-days was only 16.5%. Results of current study shows most of the students did not seek medical help when they have neck pain. Only 5.8% of the participants in this study seek medical help and the result is almost similar with the previous study. [10]

Furthermore, the finding of the study revealed that students from faculty of engineering and quantity surveying (14.1%) reported the highest prevalence of neck pain in the last 12-months compared to other programme of study. On contrary, personnel in healthcare field usually sustain in an awkward position for a long period and often have to lift/ transfer heavy patients during their posting which causes high prevalence of neck pain. [15], [16]

Carrying bag packs with musculoskeletal pain was established as a musculoskeletal risk factor among both medical and non-medical groups. [13] Strain at the neck and poor posture of the neck and lower back might be caused by often carrying a heavy laptop bag. However, current study reported no significant association between neck pain and carry a heavy laptop bag. Surprisingly, this study showed that physical activity level has no relationship with neck pain.

A study by Cote and co researchers (2008) [17] reported prolonged sitting and maintaining neck in forward flexion are the risk predictors for neck pain. Neck flexion position will cause extra gravitational load to the cervical extensor and might cause strain on the neck extensor as well. [18] Previous studies are also in agreement as maintaining or holding neck in a static posture for a long period during computer usage, reading and writing will increase the risk of neck pain among undergraduate students. [4], [9], [19], [20] Students are prone to elevate the shoulders during laptop usage which shortens the length of trapezius and levator scapulae muscles. This may cause some muscles to be overactive causing neck pain. [21] A study conducted in Thailand [20] reported 50.8% of participants did not position the computer screen at a level horizontal with eyes and it showed significant association with neck pain *($p= 0.008$).* Nevertheless, the result of the current study showed 68.6% of the participants did not position their computer screen at a level horizontal with eyes and is not significantly associated with neck pain.

There are some limitations in the current study. Firstly, the self-administered online questionnaire received low response rates via social media and

hence only 121 eligible participants were recruited. Future study can include larger population and other population. Outcome measures for neck such as Neck Disability Index (NDI), numerical rating scale (NRS) and Pain Catastrophizing Scale (PCS) can be used for upcoming research.

## Conclusion

This study concludes high prevalence of neck pain among university students in Kuantan, Pahang. Many participants lack appropriate ergonomic and although many students developed neck pain, only a few seek medical help. The awareness of maintaining a proper ergonomic and seeking help from healthcare professionals among university students in Kuantan, Pahang is relatively low. Therefore, some educational programe, exercises related with neck pain and awareness should be spread out through social media by the effort of healthcare professionals.

**Sources of support or finance:** Self-funded

## Acknowledgement

We would like to thank the Head of Physiotherapy program, questionnaire validators and all participants for the support in the research.

## Criteria for inclusion in the authors'/contributors' list

Data collection and analysis, manuscript draft writing (Tan Yea Huey), Supervision and manuscript writing (Sharmila Gopala Krishna Pillai).

## Disclaimer

Manuscript has been read and approved by all the authors, that the requirements for authorship as stated earlier in this document have been met, and that each author believes that the manuscript represents honest work.

**Table 1.** Frequency distribution of general characteristic of the participants

| Variables | Frequency (N=121) | Percentage (%) |
|---|---|---|
| **Age (years)** | | |
| 19 | 2 | 1.8 |
| 20 | 5 | 4.1 |
| 21 | 21 | 17.4 |
| 22 | 17 | 14.0 |
| 23 | 66 | 54.5 |
| 24 | 5 | 4.1 |
| 25 | 5 | 4.1 |
| **Gender** | | |
| Female | 72 | 59.5 |
| Male | 49 | 40.5 |
| **BMI** ($kg/m^2$) | | |
| Underweight | 27 | 22.3 |
| Normal | 82 | 67.8 |
| Overweight | 8 | 6.6 |
| Obese | 4 | 3.3 |
| **Other medical condition** | | |
| Yes | 5 | 4.1 |
| No | 116 | 95.9 |

**Table 2.** Frequency distribution of student characteristics of the participants

| Variables | Frequency (N=121) | Percentage (%) |
|---|---|---|
| **Current Educational Level** | | |
| Foundation/ A-level/ equivalent | 2 | 1.7 |
| Diploma | 8 | 6.6 |
| Degree | 107 | 88.4 |
| Masters | 4 | 3.3 |
| **Year of Study** | | |
| Year 1 | 20 | 16.5 |
| Year 2 | 11 | 9.1 |
| Year 3 | 49 | 40.5 |
| Year 4 | 34 | 28.1 |
| Others | 7 | 5.8 |
| **Smoking** | | |
| Yes | 3 | 2.5 |
| No | 118 | 97.5 |
| **Self-perceived stress level** | | |
| Low stress | 33 | 27.3 |
| Moderate stress | 80 | 66.1 |
| High stress | 8 | 6.6 |
| **Often carry heavy laptop/school bag** | | |
| Yes | 20 | 16.5 |
| No | 101 | 83.5 |
| **Part/full time student** | | |
| Part time | 12 | 9.9 |
| Full time | 109 | 90.1 |
| **Total number of lecture hours per week (hours)** | | |
| 1-10 | 30 | 24.8 |
| 11-20 | 65 | 53.8 |
| 21-30 | 17 | 14.0 |
| 31-40 | 8 | 6.6 |
| 41-50 | 1 | 0.8 |
| **Hours of computer and smartphone usage per day** | | |
| 1-4 | 8 | 6.6 |
| 5-8 | 41 | 33.9 |
| 9-12 | 51 | 42.1 |
| 13-16 | 19 | 15.7 |
| 17-20 | 2 | 1.7 |

**Table 3** Prevalence of neck pain during last 12-months and last 7-days

| Variables | Frequency (N=121) | Percentage (%) |
|---|---|---|
| **12-months neck pain** | | |
| Yes | 71 | 58.7 |
| No | 50 | 41.3 |
| **Prevented from carry out normal activities during last 12-months** | | |
| Yes | 16 | 13.2 |
| No | 105 | 86.8 |
| **Seen a physician during last 12-months** | | |
| Yes | 7 | 5.8 |
| No | 114 | 94.2 |
| **7-days neck pain** | | |
| Yes | 20 | 16.5 |
| No | 101 | 83.5 |

**Table 4** Association between 12-months prevalence of neck pain with various factors

| | 12 months prevalence of neck pain | | | |
|---|---|---|---|---|
| Variables | Yes (%) | No (%) | $\chi 2$ | *p* |
| **Gender** | | | 3.194 | .074 |
| Male | 24(19.8%) | 25(20.7%) | | |
| Female | 47(38.8%) | 25(20.7%) | | |
| **Self-perceived stress level** | | | 1.944 | .378 |
| Low stress | 16(13.2%) | 17(14.0%) | | |
| Moderate stress | 50(41.3%) | 30(24.8%) | | |
| High stress | 5(4.1%) | 3(2.5%) | | |
| **Hours of computer and smartphone usage per day** | | | 4.114 | .391 |
| 1-4 | 4(3.3%) | 4(3.3%) | | |
| 5-8 | 24(19.8%) | 17(14.0%) | | |
| 9-12 | 27(22.3%) | 24(19.8%) | | |
| 13-16 | 14(11.6%) | 5(4.1%) | | |
| 17-20 | 2(1.7%) | 0(0.0%) | | |
| **Sit for a long period** | | | 22.068 | < .001* |
| Yes | 62(51.2%) | 24(19.8%) | | |
| No | 9(7.4%) | 26(21.5%) | | |
| **Study/work in uncomfortable posture** | | | 14.004 | < .001* |
| Yes | 65(53.7%) | 32(26.4%) | | |
| No | 6(5.0%) | 18(14.9%) | | |
| **Maintain same posture for a long period** | | | 10.753 | .001* |
| Yes | 64(52.9%) | 33(27.3%) | | |
| No | 7(5.8%) | 17(14.0%) | | |
| **Doing repetitive movements with arms/hands** | | | 11.983 | < .001* |
| Yes | 31(25.6%) | 7(5.8%) | | |
| No | 40(33.1%) | 43(35.5%) | | |
| **Position that you often have to (can select more than 1 option):** | | | | |
| Bend your neck forward or hold your neck in a forward position for long period | 44(36.4%) | 19(15.7%) | 6.755 | .009* |
| Bend your neck backward or hold your neck in a backward position for long period | 8(6.6%) | 5(4.1%) | .049 | .825 |
| Twist your neck or hold your neck in a twisted posture for a long period | 16(13.2%) | 6(5.0%) | 2.189 | .139 |
| None of the above | 17(14.0%) | 23(19.0%) | - | - |
| **Elbows remain 90 degrees when using laptop** | | | 4.440 | .035* |
| Yes | 17(14.0%) | 21(17.4%) | | |
| No | 54(44.6%) | 29(24.0%) | | |
| **Adjustable desk and chair** | | | 3.723 | .054 |
| Yes | 18(14.9%) | 21(17.4%) | | |
| No | 53(43.8%) | 29(24.0%) | | |
| **Position computer screen at eye level** | | | 1.856 | .173 |
| Yes | 20(16.5%) | 20(16.5%) | | |
| No | 51(42.1%) | 30(24.8%) | | |
| **Wrist in a neutral position when using mouse** | | | .262 | .609 |
| Yes | 51(42.1%) | 38(31.4%) | | |
| No | 20(16.5%) | 12(9.9%) | | |

%=percentage $\chi 2$=chi square *p*=*p*-value *=statistically significant

## References


1. Blanpied PR, Gross AR, Elliott JM. Neck Pain: Revision. Journal of Orthopaedic & Sports Physical Therapy. 2017;47(7):A1-A8
2. Childs JD, Cleland JA, Elliott, JM. Neck pain: Clinical practice guidelines linked to the International Classification of Functioning, Disability, and Health from the Orthopedic Section of the American Physical Therapy Association. The Journal of Orthopedic and Sports Physical Therapy. 2008;38(9): A1-A34.
3. Croft PR, Lewis M, Papageorgiou AC. Risk factors for neck pain: a longitudinal study in the general population. Pain. 2001;93(3):317-325
4. Bialocerkowski AE, Grimmer KA, Nyland LJ. Prevalence of and Risk Factors Associated with Neck Problems in Undergraduate Physiotherapy Students. Physiotherapy Canada 2005;57(4):293-304.
5. Alshagga MA, Nimer AR, Yan LP. Prevalence and factors associated with neck, shoulder and low back pains among medical students in a Malaysian Medical College. BMC research notes. 2013;1(6):244.
6. Joslin LE, Davis CR, Dolan P, Clark, EM. Quality of life and neck pain in nurses. International journal of occupational medicine and environmental health. 2014;27(2):236-242.
7. Mohd Nasir WAB, Mohamad MYB. View of Association of sleep deprivation and neck pain among International Islamic University Malaysia (IIUM) clinical year Students. International Journal of Allied Health Sciences. 2020;4(4):1619-1625.
8. Varmazyar, Sakineh. Ergonomic evaluation of work conditions in Qazvin Dentists by REBA method and its association with musculoskeletal disorders in 2008. The Journal of Islamic Dental Association of IRAN (JIDA). 2012;24:229237.
9. How TY, Nadamurni NUB, Pui SW. Prevalence and risk factors of neck pain among medical and health sciences undergraduate students in University Tunku Abdul Rahman (UTAR): A cross sectional study. Final Year Project, UTAR. 2013. http://eprints.utar.edu.my/1709/1/UTAR_Final_Research_Project.pdf.
10. Ayanniyi O, Mbada CE, Iroko OP. Neck Pain Occurrence and Characteristics in Nigerian University Undergraduates. TAF Preventive Medicine Bulletin. 2010;1:9(3).
11. Gerr F, Marcus M, Ensor C, Kleinbaum D, Cohen S, Edwards A, et al. A prospective study of computer users: I. Study design and incidence of musculoskeletal symptoms and disorders. American journal of industrial medicine. 2002;41(4):221-235.
12. Fillingim RB, King CD, Ribeiro-Dasilva MC, Rahim-Williams B, Riley III JL. Sex, gender, and pain: a review of recent clinical and experimental findings. The journal of pain. 2009;10(5): 447-485.
13. Hasan MM, Yaqoob U, Ali SS, Siddiqui AA. Frequency of musculoskeletal pain and associated factors among undergraduate students. Case Reports in Clinical Medicine. 2018;7(2):131-145.
14. Butterworth PA, Landorf KB, Smith SE, Menz HB. The association between body mass index and musculoskeletal foot disorders: a systematic review. Obesity reviews. 2012;13(7):630-642.
15. Cromie JE, Robertson VJ, Best MO. Work-related musculoskeletal disorders in physical therapists: prevalence, severity, risks, and responses. Physical therapy. 2000;80(4):336-351.

16. Salik Y, Özcan A. Work-related musculoskeletal disorders: a survey of physical therapists in Izmir-Turkey. BMC musculoskeletal disorders. 2004;5(1):1-7.
17. Côté P, van der Velde G, Cassidy JD, Carroll LJ, Hogg-Johnson S, Holm LW, Carragee EJ, Haldeman S, Nordin M, Hurwitz EL, Guzman J. The burden and determinants of neck pain in workers: results of the Bone and Joint Decade 2000–2010 Task Force on Neck Pain and Its Associated Disorders. Journal of manipulative and physiological therapeutics. 2008;32(2):S70-86.
18. Straker LM, O'Sullivan PB, Smith AJ, Perry MC. Relationships between prolonged neck/shoulder pain and sitting spinal posture in male and female adolescents. Manual therapy. 2009;14(3):321-329.
19. Hakala PT, Rimpelä AH, Saarni LA, Salminen JJ. Frequent computer-related activities increase the risk of neck–shoulder and low back pain in adolescents. The European Journal of Public Health. 2006;16(5):536-541.
20. Kanchanomai S, Janwantanakul P, Pensri P, Jiamjarasrangsi W. Risk factors for the onset and persistence of neck pain in undergraduate students: 1-year prospective cohort study. BMC public health. 2011;11(1):1-8.
21. Andersen JH, Kaergaard A, Mikkelsen S, Jensen UF, Frost P, Bonde JP, Fallentin N, Thomsen JF. Risk factors in the onset of neck/shoulder pain in a prospective study of workers in industrial and service companies. Occupational and environmental medicine. 2003;60(9):649-654.