

# Factors Associated with Low Back Pain in Pre-Clinical Students in The Faculty of Medicine at Pelita Harapan University: Original Research

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## Abstract

**Citation:** Samudra Edeline, Kalumpiu Jane Florida. Factors Associated with Low Back Pain in Pre-Clinical Students in The Faculty of Medicine at Pelita Harapan University: Original Research. *Medicinus*. 2024 June. 13(3): 145-152.

**Keywords:** Low back pain; psychological history; history of spinal problems; family history; body mass index (BMI); sleep quality; physical activities.

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Online First : June 2024

**Background:** Low back pain is one of the most common health problems globally, including in Indonesia, and can result in limitations on a person's activities. While low back pain is typically associated with adults and the elderly, its prevalence is also notably high among students, particularly medical students. Despite the various factors contributing to low back pain, there is limited data on its prevalence and associated factors in Indonesia.

**Methods:** A cross-sectional study was conducted at the Faculty of Medicine, Pelita Harapan University, utilizing consecutive sampling. Data were collected using the Nordic Musculoskeletal Questionnaire, Pittsburgh Sleep Quality Index (PSQI), International Physical Activity Questionnaire (IPAQ), and Perceived Stress Scale (PSS).

**Results:** Out of 179 students, 144 (80%) experienced low back pain, while 35 (20%) did not. Among students with low back pain, 1.4% had psychological history, 7.3% had history of spinal problems, 0.7% had family history, 15.3% were obese, 75% had poor sleep quality, 8.3% had high-risk physical activity, 6.9% had a high-risk position, and 7.6% had a high-risk stress level. While other factors showed no significant association with low back pain, sleep quality demonstrated a significant association with a p-value of 0.022 (OR 2.52, CI 1.18-5.43).

**Conclusion:** There is a significant association between sleep quality and low back pain in pre-clinical medical students at UPH, while other factors did not exhibit significant correlations.

## Introduction

Low back pain is a sensation of pain that occurs in the lower back and can be defined as a consequence of manual handling, which is a problem resulting from one's efforts to maintain the speed and load they are lifting. Prolonged manual handling can lead to low back pain. This pain can originate from muscles, the lower part of the spine, nerves, or other surrounding structures. Therefore, based on the type of pain, it can be categorized as local pain,

pain referring to the back, pain originating from the spine, radicular pain, and pain accompanied by muscle spasms. Furthermore, based on the onset of discomfort or discomfort, it can be categorized as acute (<4 weeks), subacute (4-12 weeks), and chronic (>12 weeks).

While low back pain itself is not fatal, it can diminish productivity and quality of life, becoming an economic burden for individuals and families.<sup>1</sup> According to the International Classification of Disease (11th version, 2021), low back pain is common,

affecting nearly everyone above 20 years old.<sup>2</sup> It was the leading cause of disability in 1990 and 2017, according to the Global Burden of Disease 2017.<sup>3</sup>

In Indonesia, low back pain remains a common issue. Studies indicate prevalence, such as 68.1% in Banda Aceh and around 40% in Central Java.<sup>4,5</sup> Among students, prevalence is high, reaching 81.1% at Universitas Kristen Indonesia in 2018, 94.3% at FK Universitas Yarsi in 2019, and 50.54% at FK Universitas Pelita Harapan (UPH) in 2022.<sup>6-8</sup>

Low back pain can be caused by various underlying conditions, including congenital factors, degenerative diseases, spinal infections, trauma, neoplasms, and other diseases such as metabolic disorders, visceral diseases, and chronic pain syndromes. Additionally, various factors can contribute to low back pain, such as age, gender, psychological disorders and stress, medical history, physical activity, position, lifestyle factors (smoking, obesity, sleep disturbances), and family and social history.<sup>1,9-12</sup> Broadly speaking, low back pain can impact daily life, work ability, and sexual function, but there's a lack of research on low back pain in adolescents.<sup>13,14</sup>

## Material And Methods

### *Study Design and Variables*

This study utilized an unmatched categorical comparative analytic study design with a cross-sectional method and was conducted at the Faculty of Medicine, UPH, from January 2023 to May 2023. The independent variable in this study is psychological history, history of spinal problems, family history, body mass index (BMI), sleep quality, physical activities, position, and stress. Meanwhile the dependent variable is low back pain, and the confounding variable is the duration of lectures.

### *Study Subjects*

The subjects of this study are UPH Medical Faculty students from the 2020, 2021, and 2022 cohorts who were willing to

participate as respondents and met the inclusion criteria of the study. These criteria include pre-clinical UPH Medical Faculty students who have experienced low back pain or discomfort in the lower back within the last month and students who were willing to participate in the study and had filled out the consent form. A total of 209 students were obtained with consecutive sampling techniques, of which 179 students were included in the final analysis.

### *Materials and Study Procedures*

The materials used in this study include the Nordic Musculoskeletal Questionnaire to assess the prevalence of low back pain, the Pittsburgh Sleep Quality Index (PSQI) questionnaire to assess sleep quality, the International Physical Activity Questionnaire (IPAQ) to assess physical activity, and the Perceived Stress Scale (PSS) questionnaire to measure stress levels.

The study began by selecting study samples using consecutive sampling. Then, the selected subjects were asked to read and fill out the consent form. After agreeing to complete the questionnaires, the study participants were given questionnaires related to low back pain, sleep quality, physical activity, stress, and other factors that could influence the prevalence of low back pain. Data collection continued until the predetermined sample size was reached.

### *Study Ethics*

This study was approved by Ethical Clearance from the Ethics Committee of the Faculty of Medicine, UPH, with approval number 029/K-LKJ/ETIK/I/2023.

### *Data Management and Statistical Analysis*

The collected data were checked for completeness and clarity of responses. Then, the data were categorized based on their respective categories in Microsoft Excel. Subsequently, the classified data were input and analysed using SPSS

Statistics software. Chi-square Test and Fisher's Exact Test were employed based on expected cell counts.

## Result

**Table 1.** Factors associated with low back pain in pre-clinical UPH Medical Faculty students

Risk Factors	%	OR (95% CI)	P-value
Psychological History	1.40%	1.246 (1.16-1.34)	1
History of Spinal Problems	7.30%	1.134 (0.3-4.3)	0.739
Family History	0.70%	1.245 (1.16-1.34)	1
BMI	15.30%	0.721 (0.28-1.86)	0.671
Sleep Quality	75%	2.526 (1.18-5.43)	<b>0.022</b>
High Risk Physical Activities	8.30%	0.79 (0.73-0.86)	0.127
High Risk Position	6.90%	1.537 (0.31-20.51)	0.694
Stress	7.60%	1.365 (0.29-6.46)	1

## Discussion

### *Psychological history and its association with low back pain*

In our study, a history of psychological issues did not show a significant association with LBP. This result aligns with the findings of Arma (2019) but contradicts the study by Mei (2019), which found a significant association between chronic LBP and unhealthy mental status (such as depression, anxiety, coercion, paranoia, and interpersonal sensitivity).<sup>15,16</sup> Takekawa (2015) discovered that chronic pain from LBP is associated with psychological stress or depression, kinesiophobia, and a passive coping style. This is because limitations in physical movement can lead to

psychological distress, which can, in turn, worsen the pain.<sup>17,18</sup> However, in our study, the majority of participants experienced acute LBP, explaining why there were fewer instances of psychological issues, which are more common in chronic LBP.

### *History of spinal problems and its association with low back pain*

The history of spinal problems did not show a significant association with LBP. This result is consistent with the findings of Ahmed (2022), who reported that the majority had no history of back injury, and most did not seek medical care due to the busy schedules of medical students.<sup>19</sup> In our study, most participants with LBP did not consult physicians or visit hospitals, making it challenging to obtain a diagnosis for spinal problems. This is supported by the studies of Negash (2022) and Pratami (2020), indicating that individuals with LBP often do not receive medical treatment or interventions.<sup>7,20</sup> Grabovac's study (2019) also found that as long as patients with LBP maintain work and sexual capacity, indicating satisfaction in the health domain, medical treatment is not necessary.<sup>13</sup> However, this contradicts the findings of Latina (2020), Mulfianda (2021), and Ganesan (2017), who reported that LBP is one of the most common reasons for hospital visits.<sup>4,9,21</sup>

### *Family history and its association with low back pain*

No significant association was found between family history and LBP. This result aligns with the studies by Heikkala (2022) and Arma (2019) but contradicts the findings of Kientchockwiat (2022), who reported that chronic LBP has a genetic factor that can predict future occurrences.<sup>15,22,23</sup> Given that the majority of participants with LBP in this study experienced acute symptoms, the results did not show a significant association between family history and LBP. Arma (2019) explained that genetic factors leading to LBP are certain spinal disorders

such as scoliosis, disc prolapse, ankylosing spondylitis, and spondylolisthesis. For non-specific LBP, there is no genetic association.<sup>15</sup> Kamson (2020) found that certain genes are related to the development of LBP and pain sensitivity, but environmental factors also play a role, indicating that not everyone with a family history will necessarily experience LBP.<sup>24</sup>

### ***BMI and its association with low back pain***

BMI did not show a significant association with LBP. This result is consistent with the study by Alturkistani (2020), which reported that only 14.3% of obese students reported LBP, and the majority of LBP participants had a normal BMI.<sup>25</sup> However, this contradicts the findings of Arma (2019), who reported that a BMI at risk ( $\geq 23.0$ ) could lead to LBP because excessive weight can decrease abdominal muscle tone, making it easier for the center of gravity to shift forward, leading to fatigue in the paravertebral muscles.<sup>15</sup> This result also contradicts Boszczowski's study (2021), which found that underweight individuals could overwhelm the lumbar spine and ligaments due to a lack of lean body mass.<sup>26</sup> Kientchockwiwat's study (2022) reported an association between LBP and atrophy of the paraspinal and multifidus muscles, which commonly occurs in underweight individuals. This is because there is a connection between vitamin D insufficiency or deficiency and LBP, possibly mediated by IL-6. Vitamin D deficiency is more common in underweight people, explaining the association between being underweight and LBP.<sup>23</sup> However, in this study, there were not many participants who were underweight, so a significant association was not observed at the Faculty of Medicine Pelita Harapan University.

### ***Sleep quality and its association with low back pain***

Sleep quality showed a significant association with LBP, where poor sleep

quality could increase the prevalence of LBP. This result is consistent with the studies by Gehart (2017) and Vinstrup (2020) but contradicts Looveren's study (2021), which found no strong association, only a high risk in the future.<sup>27-29</sup> Sleep itself is an essential process in maintaining homeostasis in various systems within the human body, particularly regarding human physical health.<sup>28</sup> Poor sleep quality can be a risk factor for both physical and physiological problems. The mechanisms can be divided into direct and indirect mechanisms.

Indirect mechanisms are based on sleep disturbances that can initially affect the immune system, where the immune system will be activated and enter a pro-inflammatory state mediated by glia. As a result, hyperalgesia occurs, interpreted as an increase in sensitivity and responsiveness to stimulation around damaged tissues.<sup>29,30</sup>

On the other hand, direct mechanisms are based on physiological processes and circadian rhythms during the sleep cycle, where human sensitivity increases at night, specifically from midnight to 3 am. This begins with the increased work of the sleep drive, a system that signals that the body needs sleep. The sleep drive then reduces the inhibition of pain and actually increases sensitivity to pain, especially chronic pain. Ultimately, poor sleep quality increases the body's response to pain stimuli, generally referred to as nociceptive stimuli, causing hypersensitivity to pain stimuli on that day.

This increased sensitivity to pain can also impact the pain healing process, where recovery is hindered and, in turn, worsens the perceived pain by the patient. Therefore, based on several previous studies, it can be concluded that one of the supportive therapy targets in pain management is to pay attention to good sleep quality.<sup>29</sup>

### **Physical activity and its association with low back pain**

Physical activity did not show a significant association with LBP. This result is consistent with Kientchockwiwat's study (2022), which also investigated medical students.<sup>23</sup> There are many factors in medical students that can contribute to vulnerability to LBP, such as stress and high use of computers and laptops.<sup>19</sup> On the other hand, because medical students spend a lot of time studying, physical activity generally decreases, so other factors play a more crucial role in LBP among medical students.

### **Position and its association with low back pain**

Position did not show a significant association with LBP. This result aligns with the studies by Boszczowski (2021) and Kientchockwiwat (2022) but contradicts Medicina's study (2021), which found greater discomfort after prolonged sitting compared to the control group.<sup>23,26,31</sup> Kientchockwiwat (2022) explained that there are various results due to differences in target populations, protocols, and environments. Bad postural habits indeed play a crucial role as a risk factor in the development of LBP, but not everyone has the same position, so answers can vary.<sup>23</sup> What generally leads to LBP is forward-leaning and slumped sitting, where discomfort in the lumbar region significantly increases with increasing stress on passive tissues due to decreasing lumbar lordosis, and passive tissues take the load of the upper body.<sup>31</sup> Therefore, to assess the relationship between position and LBP, specific interventions and settings regarding

position and duration are necessary, then compared with a control group.

### **Stress and its association with low back pain**

Stress did not show a significant association with LBP. This result is consistent with the studies by Alturkistani (2020) and Arma (2019) but contradicts Choi's study (2021).<sup>15,25,32</sup> Arma (2019) and Pillay (2016) explained that LBP is not caused by stress but that individuals with LBP or limited physical movement due to pain can cause psychological stress. This, in turn, worsens the pain because psychological vulnerabilities can alter the brain's perception, intensifying the pain. Someone with psychological stress has abnormalities in hormone regulation in the brain (dopamine), so when someone experiences stress or anxiety, everything becomes negative, and they cannot focus on anything, and the pain experienced becomes all-consuming.<sup>15,18</sup>

### **Conclusion**

The results of this study show that there is a significant association between sleep quality and low back pain in pre-clinical medical students at UPH, with a p-value of 0.022. Other variables did not show significant correlations, but psychological history, history of spinal problems, family history, sleep quality, position, and stress were identified as risk factors for low back pain with an odds ratio >1.

### **Acknowledgment**

The authors would like to thank the Faculty of Medicine, Pelita Harapan University, and all study participants for their contributions during the study.

### **References**

1. Fitriani TA, Salamah QN, Nisa H. Keluhan Low Back Pain Selama Pembelajaran Jarak Jauh pada Mahasiswa UIN Syarif Hidayatullah Jakarta Tahun 2020. *Media Penelit dan Pengemb Kesehat.* 2021;31(2):133–42. <https://doi.org/10.22435/MPK.V31I2.4180>

2. Harrison JE, Weber S, Jakob R, Chute CG. ICD-11: an international classification of diseases for the twenty-first century. *BMC Med Inform Decis Mak.* 2021 Nov 1;21.
3. Institute for Health Metrics and Evaluation (IHME). Findings from the Global Burden of Disease Study 2017. Seattle, WA: IHME; 2018.
4. Mulfianda R, Desreza N, Maulidya R. Faktor-faktor yang Berhubungan dengan Kejadian Nyeri Punggung Bawah (NPB) pada Karyawan di Kantor PLN Wilayah Aceh. *J Healthc Technol Med.* 2021;7(1):253–62. <https://doi.org/10.33143/jhtm.v7i1.1415>
5. Minghelli B. Low back pain in childhood and adolescence phase: consequences, prevalence and risk factors - a revision. *J Spine.* 2017; 6(1). <http://dx.doi.org/10.4172/2165-7939.1000351>
6. Anggiat L, Hon WHC, Baait S. The Incidence of Low Back Pain Among University Students. *J Pro-Life.* 2018; 5(3):677–87.
7. Pratami AR, Zulhamidah Y, Widayanti E. Hubungan Antara Sikap Duduk dengan Kejadian Low Back Pain pada Mahasiswa Fakultas Kedokteran Universitas YARSI Tahun Pertama dan Tahun Kedua. *Maj Kesehat Pharmamedika.* 2020;11(2):105–15. <http://dx.doi.org/10.33476/mkp.v11i2.1324>
8. Thiono J. Hubungan antara Prevalensi Low Back Pain dengan Body Mass Index pada Mahasiswa Pre-Klinik Fakultas Kedokteran Unviersitas Pelita Harapan. Tangerang: Universitas Pelita Harapan; 2022.
9. Ganesan S, Acharya AS, Chauhan R, Acharya S. Prevalence and risk factors for low back pain in 1,355 young adults: A cross-sectional study. *Asian Spine J.* 2017;11(4):610–7. <https://doi.org/10.4184/asj.2017.11.4.610>
10. Institute of Neurological Disorders N. Low Back Pain fact sheet. Natl Institutes Heal. 2020.
11. Bento TPF, Genebra CV dos S, Maciel NM, Cornelio GP, Simeão SFAP, Vitta A de. Low back pain and some associated factors: is there any difference between genders? *Brazilian J Phys Ther.* 2020;24(1):79. <https://doi.org/10.1016%2Fj.bjpt.2019.01.012>
12. Zaina F, Balagué F, Battié M, Karppinen J, Negrini S. Low back pain rehabilitation in 2020: new frontiers and old limits of our understanding. *Eur J Phys Rehabil Med.* 2020;56(2):212–9. <https://doi.org/10.23736/s1973-9087.20.06257-7>
13. Grabovac I, Dorner TE. Association between low back pain and various everyday performances: Activities of daily living, ability to work and sexual function. *Wien Klin Wochenschr.* 2019;131(21):541. <https://doi.org/10.1007%2Fs00508-019-01542-7>
14. Ferrari S, Vanti C, Frigau L, Guccione AA, Mola F, Ruggeri M, et al. Sexual disability in patients with chronic non-specific low back pain—amulticenter retrospective analysis. *J Phys Ther Sci.* 2019;31(4):360-365. <https://doi.org/10.1589/jpts.31.360>
15. Arma M, Septadina IS, Legiran. Factors Affecting Low Back Pain (LBP) among Public Transportation Drivers. *Maj Kedokt Sriwij.* 2019;51(4):206–15.

16. Mei Q, Li C, Yin Y, Wang Q, Wang Q, Deng G. The relationship between the psychological stress of adolescents in school and the prevalence of chronic low back pain: A cross-sectional study in China. *Child Adolesc Psychiatry Ment Health*. 2019;13(1):1–10. <https://doi.org/10.1186/s13034-019-0283-2>
17. Takekawa KS, Gonçalves JS, Moriguchi CS, Coury HJCG, De Sato TO. Can a self-administered questionnaire identify workers with chronic or recurring low back pain? *Ind Health*. 2015;53(4):340–345. <https://doi.org/10.2486/indhealth.2014-0241>
18. Pillay S. The psychology of low back pain - Harvard Health [Internet]. Harvard Health Publishing. 2016. Available from: <https://www.health.harvard.edu/blog/psychology-low-back-pain-201604259537>
19. Ahmed SSEKA, Bahar RKM, Ahmed LAM, Abbas AAE, Ahmed ESAE, Seedahmed RJA, et al. Prevalence and Associated Factors of Back Pain among Medical Students in Sudan. *Health (Irvine Calif)*. 2022;14(9):931–938. <https://doi.org/10.4236/health.2022.149066>
20. Negash NA, Tadele A, Ferede AJ. Prevalence and Associated Factors of Low Back Pain Among Healthcare Professionals at University of Gondar Comprehensive and Specialized Hospital, Northwest Ethiopia: Cross-Sectional Study. 2022; 2022(15):1543-1552. <https://doi.org/10.2147/jpr.s351987>
21. Latina R, Petruzzo A, Vignally P, Cattaruzza MS, Buratti CV, Mitello L, et al. The prevalence of musculoskeletal disorders and low back pain among Italian nurses: An observational study. *Acta Biomed*. 2020;91(12-S):1–10. <https://doi.org/10.23750/abm.v91i12-s.10306>
22. Heikkala E, Karppinen J, Mikkola I, Hagnäs M, Oura P. Association Between Family History of Surgically Treated Low Back Pain and Adolescent Low Back Pain. *Spine (Phila Pa 1976)*. 2022;47(9):649–655. <https://doi.org/10.1097/brs.0000000000004345>
23. Kientchockwiwat K, ... Low Back Pain Prevalence and Associated Factors among Medical Students. *Vajira Med J ...* [Internet]. 2022. Available from: <https://he02.tci-thaijo.org/index.php/VMED/article/view/259078%0Ahttps://he02.tci-thaijo.org/index.php/VMED/article/download/259078/177333>
24. Kamson S. Is Family History a Predictor of Low Back Pain? - Fix My Pain [Internet]. Spine Institute Northwest. 2020. Available from: <https://www.fixmypain.ca/family-history-predictor-low-back-pain/>
25. Alturkistani L, Hendi O, Bajaber A, Alhamoud M, Althobaiti S, Alharthi T, et al. Prevalence of Lower Back Pain and its Relation to Stress Among Medical Students in Taif University, Saudi Arabia. *Int J Prev Med*. 2020;11(1). [https://doi.org/10.4103/ijpvm.ijpvm\\_264\\_19](https://doi.org/10.4103/ijpvm.ijpvm_264_19)
26. Boszczowski N, Pinto RCR, de Araújo Junior FA. Low back pain in medical students: Prevalence and related factors. *Coluna/ Columna*. 2021;20(3):197–200. <https://doi.org/10.1590/S1808-185120212003244850>

27. James I. Gerhart, John W. Burns, Kristina M. Pos, David A. Smith LSP. Relationships Between Sleep Quality and Pain-Related Factors for People with Chronic Low Back Pain: Tests of Reciprocal and Time of Day Effects. *Physiol Behav.* 2017;176(3):139–148. <https://doi.org/10.1007/s12160-016-9860-2>
28. Vinstrup J, Jakobsen MD, Andersen LL. Poor sleep is a risk factor for low-back pain among healthcare workers: Prospective cohort study. *Int J Environ Res Public Health.* 2020;17(3): 996. <https://doi.org/10.3390/ijerph17030996>
29. Van Looveren E, Bilterys T, Munneke W, Cagnie B, Ickmans K, Mairesse O, et al. The association between sleep and chronic spinal pain: A systematic review from the last decade. *J Clin Med.* 2021;10(17): 3836. <https://doi.org/10.3390/jcm10173836>
30. Grandner MA, Kripke DF, Yoon IY, Youngstedt SD. Criterion validity of the Pittsburgh Sleep Quality Index: Investigation in a non-clinical sample. *Sleep Biol Rhythms.* 2006; 4(2):129. <https://doi.org/10.1111/j.1479-8425.2006.00207.x>
31. Jung KS, Jung JH, In TS, Cho HY. Effects of Prolonged Sitting with Slumped Posture on Trunk Muscular Fatigue in Adolescents with and without Chronic Lower Back Pain. *Medicina (B Aires).* 2021;57(1):1–8. <https://doi.org/10.3390/medicina57010003>
32. Choi S, Nah S, Jang HD, Moon JE, Han S. Association between chronic low back pain and degree of stress: a nationwide cross-sectional study. *Sci Rep.* 2021;11(1):1–7. <https://doi.org/10.1038/s41598-021-94001-1>