

## Original Research Article

### Prevalence and Associated Risk Factors of Low Back Pain Among Public Health Students in Papua Province, Indonesia

#### ABSTRACT

Low back pain (LBP) is a common musculoskeletal disorder affecting not only adults but also university students. Although LBP among university students has been extensively studied, evidence from Papua remains limited, where unique factors may influence its occurrence. This study aimed to examine the association between several risk factors and the occurrence of LBP. A cross-sectional study was conducted, and data were analyzed using binary logistic regression. Data were collected through direct measurements and questionnaire-based surveys among students of the Public Health Department at Universitas Cenderawasih, Papua Province, Indonesia. The results showed that the prevalence of LBP among students was 74%. A significant association was found between gender and LBP ( $p: 0.019$ ;  $\text{Exp(B)}: 2.201$ ; 95% CI: 1.136–4.263). Other variables, such as method of Using Backpack ( $p: 0.090$ ;  $\text{Exp(B)}: 1.668$ ; 95% CI: 0.924–3.015) and bag weight ( $p: 0.090$ ;  $\text{Exp(B)}: 1.645$ ; 95% CI: 0.925–2.924), were nearly significant. Prevention and intervention efforts should be tailored to gender differences to more effectively reduce the risk of LBP among students.

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#### INTRODUCTION

Musculoskeletal Disorders (MSDs) are injuries that can affect muscles, nerves, tendons, ligaments, and the circulatory system, usually caused by degenerative changes and inflammation.<sup>1</sup> Low back pain (LBP) is one of the most prevalent musculoskeletal disorders worldwide.<sup>2</sup> LBP represents a major public health problem in both developed and developing countries.<sup>3</sup> In addition to imposing substantial healthcare costs, untreated LBP may lead to long-term disability and reduced quality of life.<sup>4</sup>

Back pain turns out to be experienced not only by workers and the general public, but students also become one of the populations at risk of LBP, as evidenced by a study revealing a fairly high prevalence of pain among students, which is 42.9%.<sup>5</sup> Other studies also mention that over the last 12 months, health students reported back pain at a rate of 63.3%.<sup>6</sup> This research is important to prevent long-term exposure in students, as it will greatly affect them if the risk factors are not addressed promptly.<sup>7</sup> Back pain experienced by health science students is likely related to their curriculum<sup>8</sup>, because most health students do not move around much or engage in physical activity, and they

spend a lot of time reading books, typing reports on a computer or notebook, and carrying a bag for long periods.<sup>9</sup> Not engaging in physical activities, in this case sitting for long periods and frequently using a notebook or cellphone, turns out to have a significant correlation with the occurrence of LBP across all groups.<sup>6</sup>

Not only physical activity is associated with LBP. Age, for example, has been linked to the occurrence of LBP even within a relatively young age range. Several studies have shown that increasing age, even among university students, can elevate the risk of LBP due to changes in musculoskeletal tissue structure and the accumulation of risk factor exposure. In addition, gender differences are also frequently associated with LBP. Females tend to report a higher prevalence of LBP compared to males, which is thought to be related to hormonal differences, anatomical structure, and pain sensitivity.<sup>10</sup>

Body Mass Index (BMI) is also an important factor. Individuals with a higher BMI experience greater mechanical load on the spine, thereby increasing the risk of developing low back pain (LBP). Studies have shown a significant association between overweight and the occurrence of low back pain.<sup>11</sup> Behavioral factors such as smoking and alcohol consumption also contribute to low back pain (LBP). Smoking is known to impair blood supply to spinal tissues and accelerate intervertebral disc degeneration. Meanwhile, long-term alcohol consumption can affect bone and muscle health, although findings on this association remain inconsistent across studies.<sup>12</sup>

Among university students, ergonomic factors also play an important role, particularly in relation to bag use. Excessive bag weight and improper carrying methods can increase pressure on the spine and lead to muscle strain. Studies have shown that carrying a bag weighing more than 10–15% of body weight can increase the risk of low back pain (LBP). In addition, using a one-sided bag (shoulder bag) rather than a backpack may contribute to postural imbalance.<sup>13</sup> Psychological factors, such as stress, also play an important role in the occurrence of low back pain (LBP). The biopsychosocial approach explains that pain is influenced not only by physical factors but also by an individual's psychological condition. Stress can increase muscle tension and pain perception, thereby exacerbating LBP. Among university students, high levels of stress are often associated with academic demands and the social environment.<sup>14</sup>

Although low back pain (LBP) has been widely studied as one of the most common musculoskeletal health problems across various age groups, including university students, significant research gaps still exist, particularly in the context of students in Papua. Most previous studies have been conducted in developed countries and in the western regions of Indonesia; therefore, the findings may not adequately represent the conditions of the population in Papua, which has distinct characteristics. Therefore, this study was conducted to investigate the prevalence and associated risk factors of LBP among Public Health students at Cenderawasih University. The researcher believes that LBP is one of the bodily function disorders that needs to be studied further, as it can affect mobility and potentially lead to paralysis in the future if not addressed seriously. The aim of this study is to determine the prevalence and risk factors associated with the occurrence of LBP among undergraduate students of Public Health at Cenderawasih University.

## **METHODS**

### **Research design**

This study employed a quantitative analytic observational method with a cross-sectional design to examine the association between independent variables and the dependent variable among undergraduate Public Health (IKM) students at Universitas Cenderawasih (Uncen). Cenderawasih University is a university located in the far east of Indonesia, in the city of Jayapura, Papua Province. This university is one of the best and oldest in Papua.

### **Setting and Sample**

Proportional stratified random sampling was employed to ensure representation across academic semesters. Each semester was selected proportionally to represent the students in that semester. The number of active students in the odd semester of 2025 is 1,579, with the distribution as follows: 577 in the first semester, 358 in the third semester, 288 in the fifth semester, and 356 in the seventh semester. The determination of the sample size in this study uses Slovin's formula<sup>15</sup>, so that the total number of samples is 319. After the samples were determined, the researcher calculated the proportion for each semester so that it could be represented using oversampling samples.<sup>16</sup>

### **Measurement and Data Collection**

Data collection was conducted by trained research assistants under the supervision of the investigators. The students, serving as respondents, had their body weight and height measured to determine their Body Mass Index (BMI), which was then recorded in the questionnaire. After all questionnaires were completed, the researcher processed the data using Microsoft Excel and categorized each variable in accordance with scientific standards. Several variables used as independent variables include: age, gender, Body Mass Index (BMI), smoking, alcohol consumption, and the way of using a bag/backpack<sup>3</sup>, heavy bag/backpack, and stress.<sup>17,18</sup>

BMI was calculated by dividing body weight in kilograms by height in meters. The stress questionnaire used the Perceived Stress Scale (PSS).<sup>19</sup> The dependent variable in this study is Lower Back Pain or Low Back Pain (LBP). The questionnaire for measuring LBP will use the Oswestry Low Back Pain Disability Questionnaire (ODI) (20) which is translated into Indonesian. The questionnaire will be categorized as follows: "No" if the total score is  $\leq 12$  and "Yes" if the total score is greater than 12. This classification is based on the cut-off value from a previous study.<sup>21</sup>

### Data analysis

The analysis model used in this study is the binary logistic regression model. Logistic regression is used because the dependent variable only has 2 categories. The Confidence Interval (CI) to be used is 95%. Data analysis is only carried out once by applying multivariate analysis without performing individual modeling on each variable. Data analysis in this study uses IBM SPSS 27 software.

### Ethical considerations

This research has undergone a series of feasibility tests with the ethics code registration number 116/KEPK-FKM UC12024, issued by the Faculty of Public Health, Cenderawasih University.

## RESULT AND DISCUSSION

The results of this study show that out of 319 students, 236 (74%) have experienced lower back complaints, with a 95% confidence interval (CI) estimated at 69.3% - 79.0%, while the remaining 83 (26%) students have never reported pain. Table 1 below shows the overall prevalence of the variables studied.

**Table 1. Overall prevalence of categorical variables**

| Variable                   | f   | %    |
|----------------------------|-----|------|
| <b>Age</b>                 |     |      |
| <20                        | 176 | 55.2 |
| $\geq 20$                  | 143 | 44.8 |
| <b>Gender</b>              |     |      |
| Male                       | 69  | 21.6 |
| Female                     | 250 | 78.4 |
| <b>BMI</b>                 |     |      |
| Good                       | 220 | 69   |
| Bad                        | 99  | 31   |
| <b>Smoking</b>             |     |      |
| Yes                        | 30  | 9.4  |
| No                         | 289 | 90.6 |
| <b>Alcohol Consumption</b> |     |      |
| Yes                        | 14  | 4.4  |
| No                         | 305 | 95.6 |
| <b>Using Backpack</b>      |     |      |
| One shoulder               | 67  | 21   |
| Two shoulders              | 244 | 76.5 |
| Using the arms             | 8   | 2.5  |
| <b>Heavy Backpack</b>      |     |      |
| Light                      | 207 | 64.9 |
| Heavy                      | 112 | 35.1 |
| <b>Stress</b>              |     |      |
| Low                        | 13  | 4.1  |
| Medium                     | 221 | 69.3 |
| High                       | 85  | 26.6 |

| Variable   | f   | %  |
|------------|-----|----|
| <b>LBP</b> |     |    |
| Yes        | 236 | 74 |
| No         | 83  | 26 |

The table above also shows that the prevalence of BMI in the “poor” category was 99 (31%) students, the incidence of stress in students in the “high” category was 85 (26.6%), and the weight of the bag carried was 112 (35.1%) in the “heavy” category. Smoking and alcohol consumption habits were low, with 30 (9.4%) smoking and 14 (4.4%) consuming alcohol. Most FKM Uncen students carried their bags using both shoulders, amounting to 244 (76.5%).

The results of this study also found that only the gender variable was significantly associated with LBP ( $p = 0.019$ ), with an Exp(B) value of 2.201 (95% CI: 1.136–4.263). Females had a higher risk compared to males, with 76% of females reporting LBP complaints. This means that students who are female have a 2.202 times greater likelihood of experiencing LBP compared to males. Detailed information can be seen in the table below.

**Tabel 2. The effect of independent variables on the occurrence of LBP**

| Variable                   | LBP |    | Sig.  | Exp (B) | CI (95%)    |
|----------------------------|-----|----|-------|---------|-------------|
|                            | Yes | No |       |         |             |
| <b>Age</b>                 |     |    | 0.485 | 1.206   | 0.713-2.042 |
| <20                        | 128 | 48 |       |         |             |
| ≥20                        | 108 | 35 |       |         |             |
| <b>Gender</b>              |     |    | 0.019 | 2.201   | 1.136-4.263 |
| Male                       | 46  | 23 |       |         |             |
| Female                     | 190 | 60 |       |         |             |
| <b>BMI</b>                 |     |    | 0.438 | 1.243   | 0.717-2.154 |
| Good                       | 165 | 55 |       |         |             |
| Bad                        | 71  | 28 |       |         |             |
| <b>Smoking</b>             |     |    | 0.246 | 1.887   | 0.645-5.521 |
| Yes                        | 24  | 6  |       |         |             |
| No                         | 289 | 77 |       |         |             |
| <b>Alcohol Consumption</b> |     |    | 0.727 | 1.285   | 0.315-5.243 |
| Yes                        | 11  | 3  |       |         |             |
| No                         | 225 | 80 |       |         |             |
| <b>Using Backpack</b>      |     |    | 0.090 | 1.668   | 0.924-3.015 |
| One shoulder               | 46  | 21 |       |         |             |
| Two shoulders              | 182 | 62 |       |         |             |
| Using the arms             | 8   | 0  |       |         |             |
| <b>Heavy Backpack</b>      |     |    | 0.090 | 1.645   | 0.925-2.924 |
| Light                      | 146 | 61 |       |         |             |
| Heavy                      | 112 | 22 |       |         |             |
| <b>Stress</b>              |     |    | 0.207 | 1.401   | 0.829-2.367 |
| Low                        | 8   | 5  |       |         |             |
| Medium                     | 161 | 60 |       |         |             |
| High                       | 67  | 16 |       |         |             |

Based on the table above, age was not significantly associated with low back pain (LBP) ( $p$ : 0.485; Exp(B): 1.206; 95% CI: 0.713–2.042). Body Mass Index (BMI) was also not associated with LBP ( $p$ : 0.438; Exp(B): 1.243; 95% CI: 0.717–2.154). Smoking was likewise not significantly associated with LBP ( $p$ : 0.264; Exp(B): 1.887; 95% CI: 0.645–5.521). Alcohol consumption in this study was also not associated with LBP ( $p$ : 0.727; Exp(B): 1.285; 95% CI: 0.315–5.243). This study found that the confidence intervals (CIs) were relatively wide for the smoking and alcohol consumption variables, with a lower CI of 0.645 and an upper CI of 5.521 for smoking, and a lower CI of 0.315 and an upper CI of 5.243 for alcohol consumption.

The widening of these CIs may not only be due to sample size but could also result from irregular data distribution between smoking and alcohol consumption variables and LBP. The variable of Using Backpack was not significantly associated with LBP ( $p$ : 0.090; Exp(B): 1.668; 95% CI: 0.924–3.015). Heavy Backpack was also not found to be associated with LBP ( $p$ : 0.090; Exp(B): 1.645; 95% CI: 0.925–2.924). Psychological factors, in this case stress, were also not significantly associated with LBP ( $p$ : 0.207; Exp(B): 1.401; 95% CI: 0.829–2.367). Although most variables were not statistically

significant in their partial association with LBP, the Exp(B) values indicate a relatively increased likelihood for several variables, such as smoking, using backpack, heavy backpack, and stress, among students with LBP. For instance, smoking carries a 1.887 times chance of experiencing LBP, and the bag-carrying method also has a 1.668 times chance of influencing LBP occurrence. The same results were also shown for the variables of Heavy Backpack and stress in students, with Exp (B) values of 1.645 and 1.401, respectively.

This study's results indicate that the overall probability value (Nagelkerke R Square) of the independent variables in explaining the dependent variable is only 0.064, meaning that the independent variables as a whole can only explain 6.4% of the dependent variable. Although this value is considered very small, it can still explain the dependent variable, in this case, LBP. The prevalence of LBP among students in this study was found to be quite high, with 74% having experienced pain. Other studies reporting high prevalence of LBP among students were also found, including 47.5% among elementary school students<sup>22</sup>, 42.9% in distance learners<sup>23</sup>, 66% among general students<sup>24</sup>, and 44% among health students.<sup>25</sup> Although this study is higher than several other studies, its findings indicate that complaints of LBP are also quite common among students.

As a person gets older, the pain experienced will also become more noticeable, as seen in the research from Santos et al., (2021) which states that there is an increase in LBP complaints at older ages. However, this study differs from the results of that research, where it was found that age does not have a significant effect on the occurrence of LBP. These results are in line with the research from Morais et al., (2018) which states that age does not have a significant effect on the occurrence of LBP. The difference in results may be due to the age of FKM Uncen students being statistically homogeneous, namely 19.5 years old.

The results of this study are in line with other research which states that gender has a statistically significant relationship with the occurrence of LBP among student.<sup>24</sup> However, there are also studies that indicate that gender does not have a significant effect on the occurrence of LBP.<sup>28</sup> In line with this research, several studies mention that females are more prone to experiencing LBP compared to males.<sup>24,25</sup> Women experience hormonal fluctuations, particularly in estrogen and progesterone, which play a role in influencing the structure and function of body tissues, including ligaments and muscles. Estrogen can increase ligament elasticity; however, it may also lead to joint instability, including in the lumbar spine. This condition makes women more susceptible to repetitive micro-injuries, which can ultimately trigger LBP.<sup>29</sup>

Anatomically, women also have a wider pelvic structure compared to menhe occur.<sup>29</sup> This results in differences in spinal curvature (lumbar lordosis) as well as body load distribution.<sup>30</sup> These biomechanical changes can increase pressure on the lumbar segments. In addition, women generally have lower muscle mass than men, resulting in reduced muscular support for the spine. Consequently, the spine is more prone to mechanical fatigue, especially when maintaining prolonged sitting positions or carrying loads.<sup>31</sup> There are research findings reporting that BMI has a statistically significant relationship with the occurrence of LBP<sup>24</sup>, so that the results of that study differ from the findings in this research.

Nevertheless, there are results in this study that are in line with other research reporting that there is no significant effect of BMI on the occurrence of LBP among students<sup>27,32</sup>, one study reported that the effect of BMI on the incidence of LBP was almost significant with a p-value of 0.08.ence.<sup>28</sup> This study reports that there is no effect of smoking on the occurrence of LBP, which differs from other findings that report that smoking has a significant effect on the occurrence of LBP in students<sup>32</sup>. However, there are other studies in line that report that smoking has no effect on the incidence of LBP in students.<sup>33</sup> In the variable of alcohol consumption, there are studies that report no association with LBP, but approaching a value of less than  $p=0.05$  with a p-value of 0.054.<sup>28</sup>

This research is in line with the results of previous studies Heuscher et al., (2010) which states that there is no evidence that LBP can increase with the increase in the weight of the bags used by students. Nevertheless, some studies report otherwise, stating that the weight of the bag increases the likelihood of experiencing LBP by 1.450 times<sup>26</sup>, and other reports also mention that the weight of the bag/backpack is found to be associated with LBP.<sup>33</sup> Regarding the stress variable, another research report that is also aligned with this study states that there is no influence between stress and tMorais et al., (2018)<sup>27</sup>, meanwhile, other studies have also reported findings that contradict this research, stating that stress in the classroom has a significant relationship with the occurrence of LBP in students.<sup>32</sup>

The differences in these research reports can be caused by several factors, particularly regarding sample size, data criteria, data categorization, and the number of variables included in logistic regression. The researchers also believe that the differences in research findings contribute to a broader wealth of knowledge. The limitation of this study is that it only examines a few variables

without exploring other variables that might be the main causes of LBP occurrences, such as work posture and the duration of standing/sitting among students. Another limitation of this study is the sample, which is still limited to the student population of FKM Uncen only, without comparison to students outside of FKM Uncen.

Nevertheless, this study has several important strengths, particularly within the socio-cultural context of Papuan students. It provides an initial contextual overview of the occurrence of low back pain (LBP) among students living in an environment with unique geographical, social, and cultural characteristics. Papuan students have distinct activity patterns, lifestyle habits, and environmental challenges compared to students in other regions of Indonesia. Therefore, the findings of this study can serve as a more relevant basis for understanding the factors associated with LBP in this population.

## **CONCLUSION**

This study showed that, among the five SERVQUAL dimensions, empathy was the only dimension that Based on the results of the study, it can be concluded that among all variables analyzed, only gender showed a significant association with the occurrence of LBP among students. The p-value of 0.019 indicates that this relationship is statistically significant. In addition, the Exp(B) value of 2.201 suggests that female students have approximately 2.201 times higher odds of experiencing LBP compared to male students.

The high prevalence of LBP, reaching 74%, indicates that this condition is a considerable health concern among students. These findings reinforce that gender is an important determinant of LBP, while other variables examined in this study did not show significant associations. Therefore, preventive efforts and interventions should take into account gender differences to be more effective in reducing the risk of LBP among students.

## **AUTHOR'S CONTRIBUTION STATEMENT**

The contributions of each researcher were as follows: IL was responsible for preparing the research proposal, writing the methodology section, and developing the results and discussion of this article. PYIA contributed to the research data collection process. AI provided input and reviewed the research article. ASWD revised the article during the editor's revision stage. GRDB and AH translated the manuscript into English and identified suitable target journals. Meanwhile, RF assisted in formatting the article template in accordance with the requirements of the intended journal.

## **CONFLICTS OF INTEREST**

There was no conflict of interest throughout any stage of this research process.

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## **REFERENCE**

1. Zamri EN, Hoe VCW, Moy FM. Predictors of Low Back Pain among Secondary School Teachers in Malaysia: A Longitudinal Study. *Ind Health*. 2020 Jun;58(3):254–64.
2. Mongkonkansai J, Narkkul U, Rungruangbaiyok C, Punsawad C. Exploring Musculoskeletal Discomfort and School Bag Loads among Thai Primary School Students: A School-Based Cross-Sectional Survey. *Sci Rep*. 2024;14(1):30287.
3. Assiri A, Mahfouz AA, Awadalla NJ, Abolyazid AY, Shalaby M. Back Pain and Schoolbags among Adolescents in Abha City, Southwestern Saudi Arabia. *Int J Environ Res Public Health*. 2020;17(1):5.
4. Situmeang IF, Ilmidin, Sarasnita N. The Prevalence and Risk Factors of Low Back Pain Among Healthcare Workers in Asia. *The Indonesian Journal of Occupational Safety and Health*. 2023;12(3):449–56.
5. Hawamdeh M, Altaim TA, Shallan A, Gaowgzeh RA, Obaidat SM, Alfawaz S, et al. Low Back Pain Prevalence among Distance Learning Students. Vol. 20, *International Journal of Environmental Research and Public Health*. 2023.
6. Sany SA, Tanjim T, Hossain MI. Low Back Pain and Associated Risk Factors among Medical Students in Bangladesh: A Cross-Sectional Study. *F1000Res*. 2021;10:698.
7. Feleke M, Getachew T, Shewangizaw M, Gebremickael A, Boshe M. Prevalence of Low Back

- Pain and Associated Factors among Medical Students in Wachemo University Southern Ethiopia. *Sci Rep*. 2024 Oct;14(1):23518.
8. Tavares C, Salvi CS, Nisihara R, Skare T. Low Back Pain in Brazilian Medical Students: A Cross-Sectional Study in 629 Individuals. *Clin Rheumatol*. 2019 Mar;38(3):939–42.
  9. Ikram MA, Burud I, Gobu SG, Ravendran SK, Lin PJ, Adibi S. Prevalence and Risk Factors Associated with Low Back Pain among Medical Students in Malaysia: A Cross-Sectional Study. *Med Sci*. 2020;24(103):1677–83.
  10. Bermudez-Lekerika P, Crump KB, Tseranidou S, Nüesch A, Kanelis E, Alminnawi A, et al. Immuno-Modulatory Effects of Intervertebral Disc Cells. *Front Cell Dev Biol* [Internet]. 2022;10. Available from: <https://api.semanticscholar.org/CorpusID:250275579>
  11. Zhang C, Zi S, Chen Q, Zhang S. The Burden, Trends, and Projections of Low Back Pain Attributable to High Body Mass Index Globally: An Analysis of the Global Burden of Disease Study from 1990 to 2021 and Projections to 2050. *Front Med (Lausanne)* [Internet]. 2024;11. Available from: <https://api.semanticscholar.org/CorpusID:273553602>
  12. Shokri P, Zahmatyar M, Falah Tafti M, Fathy M, Rezaei Tolzali M, Ghaffari Jolfayi A, et al. Non-Spinal Low Back Pain: Global Epidemiology, Trends, and Risk Factors. *Health Sci Rep* [Internet]. 2023 Sep 1;6(9):e1533. Available from: <https://doi.org/10.1002/hsr2.1533>
  13. Akbar F, AlBesharah M, Al-Baghli J, Bulbul F, Mohammad D, Qadoura B, et al. Prevalence of Low Back Pain among Adolescents in Relation to the Weight of School Bags. *BMC Musculoskelet Disord* [Internet]. 2019;20(1):37. Available from: <https://doi.org/10.1186/s12891-019-2398-2>
  14. Kasza BB, Nákity K, Finta R, Pásztor N, Kurokawa T, Sápi M, et al. Investigating the Impact of Perceived Stress and Anxiety on Nonspecific Low Back Pain among Future Health Care Professionals in Hungary: A Cross-Sectional Study. *Front Psychol* [Internet]. 2025;Volume 16-2025. Available from: <https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2025.1463414>
  15. Sugiyono. Metode Penelitian Kualitatif Dan R&D. Alfabeta, Bandung. 2016;
  16. Vaughan R. Oversampling in Health Surveys: Why, When, and How? Vol. 107, *American Journal of Public Health*. American Public Health Association; 2017. p. 1214–5.
  17. Baradaran Mahdavi S, Riahi R, Vahdatpour B, Kelishadi R. Association between Sedentary Behavior and Low Back Pain; A Systematic Review and Meta-Analysis. *Health Promot Perspect*. 2021;11(4):393–410.
  18. Yirdaw G, Lamore Y, Lette A, Daba S. Back and Upper Body Musculoskeletal Pain and Associated Factors among Medicine and Nursing Practicing Students at University of Gondar, Ethiopia. *Afr J Med Health Sci*. 2021;20(7):88–97.
  19. Program State of New Hampshire Employee Assistance. Perceived Stress Scale Score Cut Off. C (Basel). 2020;2.
  20. Alcántara-Bumbiedro S, Flórez-García MT, Echávarri-Pérez C, García-Pérez F. Oswestry Low Back Pain Disability Questionnaire. *Rehabilitacion (Madr)*. 2006;40(3):150–8.
  21. Tonosu J, Takeshita K, Hara N, Matsudaira K, Kato S, Masuda K, et al. The Normative Score and the Cut-off Value of the Oswestry Disability Index (ODI). *European Spine Journal* [Internet]. 2012;21(8):1596–602. Available from: <https://doi.org/10.1007/s00586-012-2173-7>
  22. Miñana-Signes V, Monfort-Pañego M, Bosh-Bivià AH, Noll M. Prevalence of Low Back Pain among Primary School Students from the City of Valencia (Spain). In: *Healthcare*. MDPI; 2021. p. 270.
  23. Hawamdeh M, Altaim TA, Shallan A, Gaowgzeh RA, Obaidat SM, Alfawaz S, et al. Low Back Pain Prevalence among Distance Learning Students. Vol. 20, *International Journal of Environmental Research and Public Health*. 2023.
  24. Alshehri MM, Alqhtani AM, Gharawi SH, Sharahily RA, Fathi WA, Alnamy SG, et al. Prevalence of Lower Back Pain and Its Associations with Lifestyle Behaviors among College Students in Saudi Arabia. *BMC Musculoskelet Disord*. 2023;24(1):646.
  25. Wong AYL, Chan LLY, Lo CWT, Chan WWY, Lam KCK, Bao JCH, et al. Prevalence/Incidence of Low Back Pain and Associated Risk Factors among Nursing and Medical Students: A Systematic Review and Meta-analysis. *Pm&r*. 2021;13(11):1266–80.
  26. Santos EDS, Bernardes JM, Noll M, Gómez-Salgado J, Ruiz-Frutos C, Dias A. Prevalence of Low Back Pain and Associated Risks in School-Age Children. *Pain Management Nursing*. 2021;22(4):459–64.
  27. Morais ML, Silva VKO, Silva JMN da. Prevalence of Low Back Pain and Associated Factors among Physiotherapy Students. *BrJP*. 2018;1(3):241–7.
  28. Boszczowski N, Pinto RCR, Araújo Junior FADE. Low Back Pain in Medical Students:

- Prevalence and Related Factors. *Coluna/Columna*. 2021;20:197–200.
29. Yang N, Di J, Wang W, Feng H. Global Burden of Low Back Pain from 1990 to 2021: A Comprehensive Analysis of Risk Factors and Trends Using the Global Burden of Disease Study 2021. *BMC Public Health* [Internet]. 2025;25(1):1886. Available from: <https://doi.org/10.1186/s12889-025-23178-1>
  30. Gaikwad DV, Kanase DrSB, Aranake DrAP. Prevalance of Lumbo-Sacral Dysfunction in Multiparous Women. *South East Eur J Public Health* [Internet]. 2024; Available from: <https://api.semanticscholar.org/CorpusID:273720507>
  31. Kamal EE, Hamada HA, Ashour RS, Yousef AM, Elbesh RM. Biomechanical Changes in Females with Poly Cystic Ovarian Syndrome: A Case–Control Study. *Sci Rep* [Internet]. 2025;15(1):11190. Available from: <https://doi.org/10.1038/s41598-025-93481-9>
  32. Ilic I, Milicic V, Grujicic S, Macuzic IZ, Kocic S, Ilic MD. Prevalence and Correlates of Low Back Pain among Undergraduate Medical Students in Serbia, a Cross-Sectional Study. *PeerJ*. 2021;9:e11055.
  33. AlShayhan FA, Saadeddin M. Prevalence of Low Back Pain among Health Sciences Students. *European Journal of Orthopaedic Surgery & Traumatology* [Internet]. 2018;28(2):165–70. Available from: <https://doi.org/10.1007/s00590-017-2034-5>
  34. Haroon H, Mehmood S, Imtiaz F, Ali SA, Sarfraz M. Musculoskeletal Pain and Its Associated Risk Factors among Medical Students of a Public Sector University in Karachi, Pakistan. *J Pak Med Assoc* [Internet]. 2018 [cited 2026 Apr 12];68(4):682–8. Available from: <https://pubmed.ncbi.nlm.nih.gov/29808072/>
  35. Heuscher Z, Gilkey DP, Peel JL, Kennedy CA. The Association of Self-Reported Backpack Use and Backpack Weight with Low Back Pain among College Students. *J Manipulative Physiol Ther*. 2010;33(6):432–7.