Original article

Prevalence of chronic pain in different regions of the spine and association with biopsychosocial factors in university students: a cross-sectional study

Prevalência de dor crônica em diferentes regiões da coluna e associação com fatores biopsicossociais em universitários: um estudo transversal

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ABSTRACT | BACKGROUND: Despite the increase in studies on chronic back pain, there is still limited research that simultaneously evaluates different vertebral regions from a biopsychosocial perspective in university students, and an integrated approach is needed to guide preventive strategies in this population. **OBJECTIVE:** To analyze the prevalence of chronic pain in different regions of the spine and its association with biopsychosocial factors in university students. **METHODS:** This is a cross-sectional and analytical research with 358 university students, including adults (18 and 59 years old), regardless of gender, enrolled in undergraduate courses in the areas of health and technology of two higher education institutions in the Northeast of Brazil, and the data were collected through an online questionnaire containing instruments: socioeconomic questionnaire, general health assessment, lifestyle, Self-Report Questionnaire, Nordic Musculoskeletal Questionnaire, International Physical Activity Questionnaire and Pittsburgh Sleep Quality Index. Statistical analysis was performed using Pearson's chi-square test and logistic regression using the stepwise forward method. **RESULTS:** The participants had a mean age of 22 years (±4.5), and 57.5% were female. The prevalence of neck pain was 69.0%, higher than lumbar pain (55.3%). Chronic neck pain was associated with suspected common mental disorder (CMD) (OR=2.38; *p*=0.001), and low back pain with CMD (OR=1.66; *p*=0.038) and being physically active (OR=2.08; *p*=0.017). **CONCLUSION:** There is a high prevalence of chronic back pain, especially in the cervical region. Back pain was significantly associated with psychosocial factors and higher levels of physical activity, emphasizing the importance of addressing these factors in preventive interventions.

KEYWORDS: Neck Pain. Low Back Pain. Chronic Pain. Models, Biopsychosocial. Cross-Sectional Studies.

RESUMO | FUNDAMENTOS: Apesar do aumento dos estudos sobre dor crônica na coluna, ainda são limitadas as pesquisas que avaliam simultaneamente diferentes regiões vertebrais sob uma perspectiva biopsicossocial em estudantes universitários, sendo necessária uma abordagem integrada para orientar estratégias preventivas nessa população. **OBJETIVO:** Analisar a prevalência de dor crônica em diferentes regiões da coluna e associação com fatores biopsicossociais em universitários. **MÉTODOS:** Trata-se de uma pesquisa transversal e analítica com 358 universitários, foram inclusos adultos (18 e 59 anos), independente do gênero, matriculados nos cursos de graduação das áreas de saúde e tecnologia de duas instituições de ensino superior no Nordeste do Brasil, sendo os dados coletados por meio de questionário online contendo instrumentos: questionário socioeconômico, avaliação geral de saúde, estilo de vida, *Self-Report Questionnaire, Nordic Musculoskeletal Questionnaire, International Physical Activity Questionnaire* e *Pittsburgh Sleep Quality Index*. Na análise estatística aplicou-se o teste de Qui-quadrado de Pearson e regressão logística pelo método *stepwise forward*. **RESULTADOS:** Os participantes tinham média de idade de 22 anos (±4,5), sendo 57,5% do sexo feminino. A prevalência de dor cervical foi de 69,0%, superior à lombar (55,3%). A dor cervical crônica apresentou associação com suspeita de transtorno mental comum (TMC) (OR = 2,38; *p* = 0,001), e a dor lombar com TMC (OR = 1,66; *p* = 0,038) e ser fisicamente ativo (OR = 2,08; *p* = 0,017). **CONCLUSÃO:** Há elevada prevalência de dor crônica na coluna, principalmente na região cervical. A dor na coluna esteve significativamente associada a fatores psicossociais e maior nível de atividade física, enfatizando a importância de abordar esses fatores em intervenções preventivas.

PALAVRAS-CHAVE: Cervicalgia. Dor Lombar. Dor Crônica. Modelos Biopsicossociais. Estudos Transversais.

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1. Introduction

Chronic back pain in the lumbar and cervical regions is a highly prevalent condition with a significant impact on both quality of life and healthcare systems[1]. It is characterized by its persistence and a complex individual experience, influenced by biological, psychological, and social factors[2]. This condition can result in functional impairment, increased economic burden due to high healthcare costs, and high rates of absenteeism[3].

Globally, neck pain affects more than 30% of the population, with a rate of 2,450 cases per 100,000 inhabitants, varying between countries and regions[4]. Lower back pain affects more than 619 million people globally, with projections indicating an increase to over 200 million cases by 2050[5]. In Brazil, the prevalence of chronic spinal pain is 21.6%, with a tendency to increase with age, being more frequent in adults between 25 and 44 years old[6]. Although this complaint is predominant in this age group, in recent years there has been a significant increase in the prevalence of neck and lower back pain among university students[7]. This increase is associated with several factors, such as maintaining a seated position for long periods and excessive use of electronic devices[8].

Scientific evidence considers these factors risky for the persistence and increased incidence of spinal pain in this population. Furthermore, poor sleep quality, physical inactivity, and psychological issues, including anxiety and depression, contribute to the development and increased perception of pain. Sleep deprivation emerges as a significant risk factor for the development and exacerbation of cervical and lumbar pain, demonstrating a bidirectional relationship with the presence of chronic pain. This occurs due to the increased release of inflammatory cytokines, which, in turn, sensitize nociceptors, intensifying pain perception[9].

Psychological factors also exert a significant influence on this process, since high levels of stress, anxiety, and depression are associated with greater functional disability, poorer academic performance, and a greater impact of pain on daily life[7]. The interaction between these factors can lead to hypervigilance regarding pain, intensifying its perception and hindering the individual's adaptation to the painful condition. This process can result in greater dysfunction, limitations in daily activities, and a significant impact on the quality of life of university students[2].

Physical inactivity, in turn, can be related to the presence of pain due to compromised spinal stability, resulting in discomfort and pain in these areas. Decreased muscle capacity, along with the absence of the release of endogenous substances that modulate pain perception, intensifies the pain and impairs the functionality of students[10].

Despite the growing number of studies investigating chronic pain in the cervical and lumbar regions, significant limitations remain in understanding the simultaneous influence of multiple health factors on the occurrence of these conditions in university students[9]. Existing literature has largely analyzed specific spinal regions or isolated risk factors, hindering an understanding of the multifactorial nature of musculoskeletal pain in this population. Recent studies indicate that university students have high exposure to factors potentially associated with pain, including prolonged sitting, prolonged use of electronic devices, high cognitive demands, academic stress, and altered sleep patterns—conditions that may act interdependently in the development and maintenance of chronic pain[7].

Furthermore, there is a scarcity of research that simultaneously assesses different regions of the spine from an integrated biopsychosocial perspective, considering both physical, behavioral, and psychological factors. This limitation reduces the ability to identify more comprehensive risk profiles and restricts the development of preventive strategies targeted at the specific needs of young adults in academic settings[11,12].

Given this scenario, it becomes relevant to investigate in an integrated way the prevalence of chronic pain in different regions of the spine and its association with biopsychosocial factors in university students, a population in transition to adulthood and particularly vulnerable to lifestyle changes and academic overload[13]. By broadening the understanding of the determinants associated with musculoskeletal pain in this group, the present study seeks to contribute to strengthening the evidence base necessary for planning preventive interventions and actions to promote physical and mental health in the university environment.

Therefore, the objective was to analyze the prevalence of chronic pain in different regions of the spine and its association with biopsychosocial factors in university students.

2. Methods

This is an analytical cross-sectional study, derived from a broader research project entitled "Smartphone use and associated factors among university students after strict social distancing during the Covid-19 pandemic". The research was conducted at two leading higher education institutions (HEIs) located in the city of Fortaleza, in the state of Ceará, Brazil, one private and one public. This study was approved by the Research Ethics Committee on Human Beings of the participating institutions, with opinions nº 5.526.758 and nº 5.739.427, and all participants gave their consent by signing the Informed Consent Form (ICF). Data collection took place between September and December 2022.

The study population consisted of undergraduate students from the Health Sciences Center (CCS) and the Science and Technology Center (CCT) of the aforementioned institutions. The sample size calculation was based on the formula $n=(Z^2.\sigma^2.N)/(E^2(N-1)+Z^2\sigma^2)$ for cross-sectional studies[14], considering a finite population (N) of 12,677 university students enrolled in 2021 at the CCS and CCT of the institutions, a standard deviation (σ) of 3.2 h for the smartphone usage time variable, a margin of error (E) of 20 min (0.33 h)[15], and a 95% confidence interval. Inclusion criteria were: ages between 18 and 59 years, regardless of gender, enrolled in one of the selected centers of the two participating institutions. Students who were absent from classes due to sick leave or course withdrawal were excluded, as were university students with visual impairments due to the inadaptability of the data collection instrument used in the study.

Recruitment was conducted through direct and personal invitations to university students at the selected institutions, by a properly trained data collection team. After an initial screening to verify inclusion and exclusion criteria, the objectives, risks, and benefits of the research were explained. Finally, the university student was asked if they were interested in participating in the research, and if so, invited to access an electronic form via a QR code. The average time to complete the survey was approximately 30 minutes.

Data collection was carried out by completing an instrument developed in the Google Forms application. The online form included, on its first page, an invitation that recapped all the guidelines provided by the team responsible for data collection, regarding the research, along with access to the Informed Consent Form.

The online form contained the following instruments: socioeconomic questionnaire, general health assessment, lifestyle assessment, Self-Report Questionnaire (SRQ-20), Nordic Musculoskeletal Questionnaire (NMQ), International Physical Activity Questionnaire (IPAQ) and Pittsburgh Sleep Quality Index (PSQI-BR).

The first instrument covered sociodemographic data (such as age, gender, self-declared race, social class, institution of study, and area of graduation), general health assessment, and lifestyle (smoking and alcohol consumption). The SRQ-20, Brazilian version, was used to investigate the suspicion of Common Mental Disorder (CMD). It has 20 dichotomous questions, and the score is obtained by summing the responses. In this study, the cutoff point adopted for suspected CMD was eight, regardless of sex, and is based on other studies in Brazil[16].

The presence of musculoskeletal pain was assessed using the NMQ, a questionnaire adapted and cross-culturally validated that presents a human figure divided into nine anatomical regions: cervical, shoulders, thoracic, elbows, wrists/hands, lumbar, hips/thighs, knees, and ankles/feet. The instrument uses binary choices for each area, asking respondents if they had experienced pain in the last twelve months and seven days[17]. The Visual Analogue Scale (VAS) was used in conjunction with the NMQ to measure pain intensity on a scale of 0 to 10[18]. In the present study, only information regarding cervical and lumbar pain in the last 12 months was analyzed, which characterizes chronic pain according to the new pain classification defined by the International Association for the Study of Pain (IASP)[2].

Physical activity levels and sedentary behavior were assessed using the IPAQ, validated for use in Brazil, whose short version contains eight open-ended questions that estimate the weekly time spent on physical activities and sitting time. Participants were initially classified as active (>150 min/week), irregularly active (10–150 min/week), or sedentary (<10 min/week), and subsequently categorized as active and inactive (irregularly active and sedentary), in addition to calculating the mean and standard deviation of sitting time[19-21]. Sleep quality was assessed using the PSQI-BR, an instrument validated for Portuguese consisting of 19 self-administered questions, with a total score ranging from 0 to 21 points, where values ≤5 indicate good sleep quality and >5 indicate poor sleep quality[22].

To reduce potential biases, recruitment across different academic courses and shifts was adopted, along with the use of validated instruments and the application of an anonymous electronic questionnaire, minimizing selection and information biases, as well as possible responses influenced by constraint. Potential confounding factors were controlled by including theoretically relevant variables[9] and with $p<0.20$ in the multiple logistic regression models.

Statistical analysis was performed using IBM® SPSS Statistics software, version 23.0. Initially, the distribution of numerical variables was assessed using the Kolmogorov–Smirnov (KS) normality test. Variables with a normal distribution were described as mean ± standard deviation (SD), while categorical variables were presented as absolute (n) and relative (%) frequencies. For comparison between means, the Student's t-test for independent samples was applied, as per the previously verified normality assumption.

Chi-square test was used to investigate the association between the outcomes of chronic neck pain and chronic low back pain (in the last 12 months) and the socioeconomic, lifestyle, mental health, and sleep quality variables. Effect measures were estimated using odds ratios. Crude ratio (OR) and respective 95% confidence intervals (95% CI), calculated from the coefficients obtained in the simple binary logistic regression models.

Variables with a p-value<0.20 in the bivariate analysis, as well as those considered relevant based on theoretical plausibility (sex and age), were included as candidates in the multiple logistic regression models. The final model was constructed using the stepwise forward method, with progressive inclusion of variables according to statistical significance and contribution to fit models. The results were expressed as odds. Adjusted ratios (OR) and their respective 95% confidence intervals (CI) were obtained by exponentiating the β coefficients of the logistic regression. The fit and quality of the models were evaluated using the Hosmer–Lemeshow test, the Nagelkerke pseudo-R^2 coefficient of determination, and the overall accuracy of the predictive classification. A statistical significance level of 5% ($p<0.05$) was adopted.

3. Results

The average age was 22 years (±4.5), with higher proportions of women (57.5%; n=26), brown skin color (46.9%; n=168), social class D (33%; n=118), and those not engaged in paid activity (62.3%; n=223). It was found that 39.9% (n=143) reported poor self-assessment of health, 84.9% (n=304) were classified as physically active, and only 9.8% (n=35) smoked. However, 45.8% (n=164) consumed alcoholic beverages, 53.9% (n=193) presented suspected Common Mental Disorder (CMD), and 69.6% (n=249) presented poor sleep quality (Table 1).

Regarding chronic back pain, the highest prevalence was in the cervical region (69.0%; n=247) compared to the lumbar region (55.3%; n=198). However, despite the higher prevalence in the cervical region, the average pain intensity was higher in the lumbar region at 4.6 (± 2.6). Furthermore, complaints of pain in both the cervical and lumbar regions simultaneously were reported by 44.1% of university students (Table 1).

Table 1. Demographic characteristics, prevalence of chronic back pain, and biopsychosocial factors of university students. Fortaleza, Ceará, Brazil, 2022

Variables	*n*	%	Mean ± SD
Age			22.7 ±4.5
Female	206	57.5	
Self-reported skin color			
Brown	168	46.9	
White	153	42.7	
Black	27	7.5	
Yellow	7	2.0	
Indigenous	3	0.8	
Social class by salary range			
A (> 20 SM)	20	5.8	
B (10 to 20 SM)	67	18.7	
C (4 to 9 SM)	98	27.4	
D (2 to 3 SM)	118	33	
E (≤ 1 SM)	55	15.4	
Engages in paid activity (no)	223	62.3	
Self-assessment of health (poor)	143	39.9	
Level of physical activity (active)	304	84.9	
Cigarette use (yes)	35	9.8	
Alcohol consumption (yes)	164	45.8	
Suspected Common Mental Disorder (CMD)	193	53.9	
Poor sleep quality	249	69.6	
Chronic back pain (within the last 12 months)			
Cervical	247	69.0	
Pain intensity			4.0 ± 2.5
Lumbar	198	55.3	
Pain intensity			4.6 ± 2.6
Simultaneous pain in the cervical and lumbar regions	159	44.1	

n = absolute frequency; % = percentage; SD = standard deviation. SM = minimum wage.
Minimum wage in 2022 = R$ 1,212.00.

In the bivariate analysis, using simple binary logistic regression between neck pain and health factors of university students, a significant association was observed between sex and neck pain, with women showing a higher prevalence (64.8%; *n*=160) compared to men (35.2%; *n*=87) (OR=2.59; *p*<0.001). Furthermore, self-rated health was significantly associated with neck pain, with a higher prevalence among students who reported poor health (45.7%) (OR=2.27; *p*<0.001). Similarly, the presence of suspected CMD (OR=2.88; *p*<0.001) and poor sleep quality (OR=2.19; *p*=0.001) were also associated with neck pain (Table 2).

Table 2. Relationship between prevalence of chronic neck pain and biopsychosocial factors among university students. Fortaleza, Ceará, Brazil, 2022

Variables	Chronic neck pain (in the last 12 months)			
	No *n* (%)	Yes *n* (%)	OR (95% CI)	*p*-value
Age range				
≥ 25 years	15 (13.5)	50 (20.2)	1	0.082
Under 25 years old	96 (86.5)	197 (79.8)	1.64 (0.868-3.039)	
Sex				
Masculine	65 (58.6)	87 (35.2)	1	<0.001*
Feminine	46 (41.4)	160 (64.8)	2.59 (1.642-4.113)	
Self-assessment of health				
Good	81 (73.0)	134 (54.3)	1	<0.001*
Bad	30 (27.0)	113 (45.7)	2.27 (1.270-1.715)	
Level of physical activity				
Not active	17 (15.3)	37 (15.0)	1	0.935
Active	94 (84.7)	210 (85.0)	1.02 (0.550-1.915)	
Cigarette use				
No	100 (90.1)	223 (90.7)	1	0.867
Yes	11 (9,9)	23 (9,3)	0.93 (0.438-1988)	
Alcohol consumption				
No	54 (48.6)	140 (56.7)	1	0.158
Yes	57 (51.4)	107 (43.3)	0.72 (0.462-1.135)	
Suspected CMD				
No	71 (64.0)	94 (38.1)	1	<0.001*
Yes	40 (36.0)	153 (61.9)	2.88 (1.815-4.599)	
Sleep Quality				
Good	47 (42.3)	62 (25.1)	1	0.001*
Bad	64 (57.7)	185 (74.9)	2.19 (1.364-3.519)	

n = absolute frequency; % = percentage; OR = odds ratio. 95% Confidence Interval = 95% Confidence Interval;
**p*<0.05, obtained by Pearson's Chi-square test; OR estimated by simple binary logistic regression.

Regarding low back pain, a higher prevalence was observed in adults under 25 years of age (82.2%, *n*=164). However, no statistically significant differences were found compared to those who did not present with low back pain. Similarly, no significant differences were observed in relation to health perception, alcohol consumption, cigarette use, and sleep quality ($p>0.05$). A significant association was found between low back pain and being physically active, as well as suspected chronic musculoskeletal disorders ($p<0.05$), compared to those who did not present with these conditions (Table 3).

Table 3. Relationship between prevalence of chronic low back pain and biopsychosocial factors among university students. Fortaleza, Ceará, Brazil, 2022

Variables	Chronic low back pain (in the last 12 months)			
	No *n* (%)	Yes *n* (%)	OR (95% CI)	*p*-value
Age range				
≥ 25 years	31 (19.4)	34 (17.2)	1	0.344
Under 25 years old	129 (80.6)	164 (82.8)	0.86 (0.503-1.478)	
Sex				
Masculine	73 (45.6)	79 (39.9)	1	0.276
Feminine	87 (54.4)	119 (60.1)	1.26 (0.829-1.927)	
Self-assessment of health				
Good	105 (65.6)	110 (55.6)	1	0.053
Bad	55 (34.4)	88 (44.4)	0.65 (0.426-1.007)	
Level of physical activity				
Not active	32 (20.0)	22 (11.1)	1	0.019*
Active	128 (80.0)	176 (88.9)	2.00 (1.110-3.603)	
Cigarette use				
No	143 (89.4)	180 (91.4)	1	0.523
Yes	17 (10.6)	17 (8.6)	0.79 (0.390-1.602)	
Alcohol consumption				
No	84 (52.5)	110 (55.6)	1	0.564
Yes	76 (47.5)	88 (44.4)	0.88 (0.582-1.343)	
Suspected CMD				
No	87 (54.4)	78 (39.4)	1	<0.001*
Yes	73 (45.6)	120 (60.6)	1.83 (1.202-2.796)	
Sleep quality				
Good	56 (35.0)	53 (26.8)	1	0.092
Bad	104 (65.0)	145 (73.2)	1.47 (0.937-2.316)	

n = absolute frequency; % = percentage; OR = odds ratio. 95% Confidence Interval = 95% Confidence Interval;
**p*<0.05 obtained by Pearson's Chi-square test; OR estimated by simple binary logistic regression.

In the bivariate analysis, it was observed that simultaneous pain in the cervical and lumbar regions was significantly associated with female sex (OR=1.55; *p*=0.042), poor self-rated health (OR=1.56; *p*=0.050), being physically active (OR=1.90; *p*=0.039), suspected CMD (OR=2.45; *p*=<0.001) and poor sleep quality (OR=1.86; *p*=0.011) (Table 4).

Table 4. Relationship between prevalence of simultaneous pain in the cervical and lumbar regions and biopsychosocial factors of university students. Fortaleza, Ceará, Brazil, 2022

Variables	Simultaneous pain in the cervical and lumbar regions (in the last 12 months)			
	No *n* (%)	Yes *n* (%)	OR (95% CI)	*p*-value
Age range				
≥ 25 years	35	30	1	0.784
Under 25 years old	164	129	0.91 (0.535-1.574)	
Sex				
Masculine	94	58	1	0.042
Feminine	105	101	1.55 (1.018-2.388)	
Self-assessment of health				
Good	129	86	1	0.050
Bad	70	73	1.56 (1.021-2.396)	
Level of physical activity				
Not active	37	17	1	0.039
Active	162	142	1.90 (1.029-3.535)	
Cigarette use				
No	178	145	1	0.475
Yes	21	13	0.76 (0.368-1.570)	
Alcohol consumption				
No	106	88	1	0.749
Yes	93	71	0.92 (0.605-1.398)	
Suspected CMD				
No	111	54	1	0.000
Yes	88	105	2.45 (1.593-3.775)	
Sleep quality				
Good	72	37	1	0.011
Bad	127	122	1.86 (1.171-2.985)	

n = absolute frequency; % = percentage; OR = odds ratio. 95% Confidence Interval = 95% Confidence Interval;
**p*<0.05, obtained by Pearson's Chi-square test; OR estimated by simple binary logistic regression.

In the multiple logistic regression analysis for chronic neck pain, it was observed that female university students and those with suspected chronic musculoskeletal disorders (CMD) had twice the occurrence of chronic neck pain (OR=2.25 and OR=2.38; *p*=<0.001, respectively). The other variables analyzed—self-assessment of health, alcohol consumption, and sleep quality—did not show a significant association with the outcome (*p*>0.05). For chronic low back pain, suspected CMD remained associated with the outcome (OR=1.66; *p*=0.038). Furthermore, students classified as physically active had a higher prevalence of chronic low back pain (OR=2.08; *p*=0.017). Regarding simultaneous pain in the cervical and lumbar regions, being physically active showed a significant association, indicating twice the chance of reporting simultaneous cervical and lumbar pain (OR=2.04; *p*=0.028). Furthermore, suspected CMD showed a strong association (OR=2.45; *p*=<0.001), suggesting a significantly elevated risk for the occurrence of concomitant pain (Table 5).

Table 5. Multiple logistic regression analysis of chronic neck and low back pain with biopsychosocial factors in university students. Fortaleza, Ceará, Brazil, 2022

Variables	Adjusted OR (95% CI)	*p -value*
Chronic neck pain		
Age range	0.56 (0.286-1.097)	0.091
Sex	2.25 (1.396-3.645)	<0.001*
Self-assessment of health	1.42 (0.825-2.450)	0.205
Alcohol consumption	0.69 (0.431-1.127)	0.141
Suspected CMD	2.38 (1.396-4.086)	<0.001*
Sleep quality	1.36 (0.796-2.330)	0.260
Chronic low back pain		
Age range	1.13 (0.650-1.968)	0.663
Sex	1.13 (0.732-1.751)	0.577
Level of physical activity	2.08 (1.142-3.790)	0.017*
Suspected CMD	1.66 (1.028-2.710)	0.038*
Sleep quality	1.13 (0.681-1.876)	0.636
Simultaneous pain in the cervical and lumbar regions		
Age range	1.41 (0.909-2.198)	0.125
Sex	1.05 (0.747-1.481)	0.774
Level of physical activity	2.04 (1.081-3.853)	0.028*
Suspected CMD	2.45 (1.582-3.808)	<0.000*

OR = odds ratio. 95% Confidence Interval = 95% Confidence Interval; *p<0.05, logistic regression. Model quality: cervical: Hosmer-Lemeshow = 0.355, Nagelkerke R^2 = 0.162 and accuracy = 72.6%; lumbar: Hosmer-Lemeshow = 0.919, Nagelkerke R^2 = 0.058 and accuracy of 58.4%.

4. Discussion

This study identified a high prevalence of chronic pain in the cervical and lumbar regions among university students, with a higher frequency of cervical pain compared to lumbar pain and a significant occurrence of multisite pain. An association was observed between cervical pain and female sex, suspected common mental disorder, and poor sleep quality, while lumbar pain was associated with suspected common mental disorder and level of physical activity. These findings reinforce the influence of biopsychosocial factors on the experience of musculoskeletal pain in young adults in the academic context.

Our results corroborate the evidence described in the international literature. Studies conducted in Brazil[23] and in countries such as Italy[24], the United Arab Emirates[25], and Poland[26] point to a predominance of this condition among women, possibly due to structural, hormonal, and emotional factors, which are frequently more prevalent in this population and considered risk factors for the development of neck pain[4,25,26]. This information highlights the need to direct policies and proposals for preventive interventions and health promotion primarily among women, considering chronic spinal pain.

The prevalence of chronic neck pain was 69.0%, while chronic low back pain had a prevalence of 55.3%. Furthermore, 44.1% of university students reported simultaneous pain in the cervical and lumbar regions, highlighting a high occurrence of multi-site pain in this population. These findings are consistent with studies describing a high frequency of musculoskeletal symptoms in university students, possibly attributed to academic demands and behavioral habits characteristic of this group, such as long periods of sitting and frequent use of electronic devices[27]. The high proportion of concomitant pain in both spinal regions reinforces the importance of healthcare approaches that consider the presence of multiple painful sites, rather than the isolated analysis of each anatomical region.

Studies suggest that the cervical region has a greater potential for chronicity due to its anatomical complexity and frequent associated psychosocial involvement, increasing the risks of persistent pain and the development of secondary symptoms, such as tension headaches and compensatory postural changes[28]. Another important aspect evidenced in the literature is that individuals with cervical pain are more likely to present with multisite pain, possibly due to the biomechanical interrelationships between different regions of the body, further aggravating the pain28. In addition, the presence of cervical pain frequently coexists with other musculoskeletal conditions and mental health disorders[29].

From this perspective, a significant association was found between neck pain, suspected Common Mental Disorder (CMD), and poor sleep quality. This complex interaction between physiological and psychosocial aspects reinforces previous findings, which indicate that individuals with CMD may present with dysfunctions in sleep regulation and greater sensitivity to pain. Simultaneously, poor sleep quality can intensify both pain and psycho-emotional symptoms[30–32].

In the university setting, academic stress, represented by excessive demands, short deadlines, and constant assessments, has been identified as a significant factor. This situation fosters emotional changes, such as anxiety and depressed mood, which not only intensify the perception of pain but also contribute to a decline in sleep quality, establishing a feedback loop between stress, sleep, and pain[33].

Regarding lower back pain, although no significant association was observed with sleep quality or sex, a relationship was found with CMD and physical activity level. A higher intensity of pain was also noted in the lumbar region, although the overall perception was moderate in both locations. These findings reiterate the role of psychological factors in the maintenance of musculoskeletal pain, even in young and healthy populations[34].

In the present study, physically active university students showed a greater chance of this outcome, possibly due to inadequate or unsupervised practices, which may have generated mechanical overload. Although physical activity is recognized as beneficial to musculoskeletal health, its relationship with low back pain is complex and may follow a U-shaped pattern, in which both low and high levels of activity increase the risk of chronic low back pain[35]. Thus, it is observed that both sedentary lifestyles and excessive and unregulated exercise represent risks to spinal health[36]. In this sense, physical activity should be analyzed not only in terms of frequency, but also in terms of quality, intensity, and suitability to individual needs[37].

Based on the findings, this research is believed to make a significant contribution to understanding the prevalence of cervical and lumbar spine pain among university students, highlighting associations with psychosocial factors such as CMD and level of physical activity. By integrating multiple health factors, this study reinforces the relevance of a biopsychosocial approach in the assessment and management of musculoskeletal pain in young populations, which are frequently neglected in public health policies[38]. Furthermore, the results obtained can support the development of institutional strategies aimed at promoting mental and physical health in the academic environment, signaling the need for health education programs.

Furthermore, limitations in this study are acknowledged, particularly regarding the sample size, such as data collection from university students in only two fields (health and technology) and the lack of adaptability of instruments for visually impaired individuals. These limitations hinder the generalization of the results to the studied population. The use of a self-administered electronic questionnaire may have introduced self-reporting biases, such as potential memory errors and differing interpretations of the questions. However, the results of this study encourage and contribute to the discussion of the topic.

5. Conclusion

It was found that chronic pain in the cervical and lumbar spine regions, occurring simultaneously, has a high prevalence among university students, being more pronounced in the cervical region and with greater intensity in the lumbar region. The presence of chronic spinal pain was significantly associated with psychosocial factors, such as suspected chronic musculoskeletal disorders (CMD) in the lumbar and cervical regions, as well as a higher level of physical activity in the lumbar region. These findings reinforce the multifactorial complexity of pain, highlighting the importance of integrated approaches for its prevention and management.

The study also highlights the need for special attention to the physical and mental health of the university population. Therefore, it recommends the implementation of health promotion actions in the academic environment, involving psychological support and encouragement of appropriate physical activity, in order to reduce the burden of morbidity associated with back pain.

Authors' contributions

The authors declared that they made substantial contributions to the work in terms of the conception or design of the research; the acquisition, analysis, or interpretation of data for the work; and the writing or critical revision of relevant intellectual content. All authors approved the final version to be published and agreed to assume public responsibility for all aspects of the study.

Competing interests

No financial, legal, or political conflicts involving third parties (government, private companies and foundations , etc.) have been declared for any aspect of the submitted work (including, but not limited to, grants and funding, participation on advisory boards, study design, manuscript preparation, statistical analysis, etc.).

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