

PREVALENCE OF MUSCULOSKELETAL DISCOMFORT AND ASSOCIATED FACTORS IN COLLEGE STUDENTS

Prevalência de desconforto osteomuscular e fatores associados em estudantes universitários

Prevalencia de incomodidad y factores asociados em Estudiantes de grado

Original Article

ABSTRACT

Objective: To assess the prevalence and factors associated with musculoskeletal pain in college students. **Methods:** A descriptive cross-sectional study, with representative sample (n = 527) selected from two-stage cluster considering the ratio of students per course and period. The dependent variable - the musculoskeletal pain - was assessed by a questionnaire. The independent variables were divided into socioeconomic factors regarding the institution, health behaviors and health perception. Data was tabulated in EpiData 3.1 and further analysis was performed with SPSS 12.0 using the chi-square and Student's t test, adopting $p < 0.05$. For the logistic regression, the pain was considered dependent, the other variables being adjusted. **Results:** The thoracic region presented the highest average pain intensity (6.23), followed by lumbar (5.85) and cervical (5.80) pain. The discomfort was more prevalent in women, with negative perception of health due to remaining seated for longer. There was also a higher prevalence among students in the health area, when compared to students in the humanities. **Conclusion:** The result indicated thoracic, lumbar and cervical regions with greater intensity of referred pain. The associated factors were gender, study area and footwear, influencing the perception of health.

Descriptors: Musculoskeletal System; Pain; Students; Epidemiology.

RESUMO

Objetivo: Analisar a prevalência e os fatores associados à dor osteomuscular em estudantes universitários. **Métodos:** Estudo descritivo transversal, com amostra representativa (n = 527) selecionada a partir de conglomerado em dois estágios, considerando a proporção de estudantes por curso e período. A variável dependente - a dor osteomuscular - recebeu avaliação por meio de questionário. As variáveis independentes foram divididas em fatores socioeconômicos relacionados à instituição, comportamentos de saúde e percepção de saúde. Houve tabulação dos dados no EpiData 3.1 e posterior análise no SPSS 12.0, através dos testes de qui-quadrado e Teste t de Student, mantendo-se $p < 0,05$. Para a regressão logística, foi considerada como dependente a dor, sendo as demais variáveis ajustadas. **Resultados:** A região torácica apresentou a maior média de intensidade da dor (6,23), seguida pela lombar (5,85) e cervical (5,80). O desconforto foi mais prevalente nas mulheres, com percepção negativa de saúde por passarem mais tempo sentadas. Observou-se, ainda, uma maior prevalência entre os estudantes da área de saúde quando comparados aos da área de humanas. **Conclusão:** O resultado indicou as regiões torácica, lombar e cervical com maiores intensidades de dor referida. Os fatores associados foram o sexo, a área do curso e o calçado, influenciando a percepção de saúde.

Descritores: Sistema Musculoesquelético; Dor; Estudantes; Epidemiologia.

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RESUMEN

Objetivo: Analizar la prevalencia y los factores asociados al dolor osteomuscular en estudiantes de grado. **Métodos:** Estudio descriptivo trasversal, con muestra representativa ($n = 527$) elegida a partir de dos grupos de prácticas, considerando la proporción de estudiantes por curso y periodo. La variable dependiente – el dolor osteomuscular – recibió evaluación por medio de cuestionario. Las variables independientes fueron divididas en factores socioeconómicos relacionados a la institución, comportamientos de salud y percepción de salud. Hubo tabulación de los datos en el EpiData 3.1 seguido del análisis en el SPSS 12.0, a través de las pruebas de chi-cuadrado y el *t*-student, manteniéndose $p < 0,05$. El dolor fue considerado como variable dependiente para la regresión logística, siendo ajustadas las demás variables. **Resultados:** La región torácica presentó mayor media de intensidad de dolor (6,23), seguida de la región lumbar (5,85) y cervical (5,80). El incómodo fue más observado en las mujeres, con percepción negativa de la salud por el hecho de quedarse la mayor parte del tiempo sentadas. Aún se observó mayor prevalencia en los estudiantes del área de la salud al comparar con los del área de humanas. **Conclusión:** El resultado indicó las regiones torácica, lumbar y cervical con mayores intensidades de dolor referido. Los factores asociados fueron el sexo, el área del curso y el calzado, influyendo en la percepción de salud.

Descriptores: Sistema musculo esquelético; Dolor; Estudiantes; Epidemiología.

INTRODUCTION

The musculoskeletal pain is a multidimensional phenomenon that involves physical, sensory and emotional aspects and has a universal occurrence⁽¹⁾, being one of the most given reasons for the referral of patients in private or public healthcare services⁽²⁾. The onset of musculoskeletal symptoms is increasing worldwide, and when such symptoms are related to work they may receive different terminologies, such as Repetitive Strain Injury (RSI) or Work-Related Musculoskeletal Disorders (WMSDs)^(1,2).

The musculoskeletal system, like any other biological system isn't static. It is in a constant state of equilibrium that is called homeostasis. Thus, when subjected to a force or external stress, it will respond in a very particular way⁽³⁾.

According to estimates of the Brazilian Society for the Study of Pain (SBDE in Portuguese), the pain affects at least 30% of people at some point in their life, lasting more than a day in 10 to 40% of them. It is the primary cause of suffering, work disability, and it creates severe psychosocial and economic consequences⁽⁴⁾. However, it is known that the prevalence of pain may be higher according to the subgroups assessed.

Among the main causes of pain are the vicious posture, increased body weight, pregnancy, abdominal ptosis, regular use of high heels and muscle imbalances⁽⁵⁾. Furthermore, psychosocial factors like intense occupational stress, inadequate social support, monotony of activities, anxiety, depression, among others, are factors that contribute significantly for the occurrence of the problem^(6,7).

The literature points to consequences like increased anxiety, anguish, and depression, as well as hypertension, respiratory problems, thoracoabdominal pathologies and progressive osteomyoarticular disability⁽⁸⁾, it also causes temporary or permanent incapacity for work.

In Brazil, in the 90s, worker's health was recognized and started to intervene in work-health-disease relationships⁽⁹⁾. This relationship was established from the decision to conduct studies that allowed for the analysis of pain-related factors in the populations⁽¹⁾.

There are few epidemiological studies in Brazil that included self-rated health as its object of study, especially among young individuals⁽¹⁰⁾. Little has been investigated concerning individuals preparing for the labor market, that is, young adults in higher education programs. This subgroup, mainly the students in the health field, is daily exposed to situations of professional experience in which they may incorporate inadequate postures if not properly oriented.

Even with the progress achieved for pain control, the lack of studies in Brazil is still significant, especially studies with young people. This may be caused by either the complexity of the problem or the idea that pain is not common within this subgroup. Therefore, in order to fulfill this knowledge gap and contribute to the raising of hypotheses for future studies, the current study aimed to analyze the prevalence and factors associated with the osteomuscular pain in college students.

METHODS

This is a descriptive cross-sectional study conducted with students of a college in Caruaru, PE, Brazil, who had a total of 3,500 college students in 2010 distributed into 6 programs, 5 health programs ($n=2,700$) (Biomedicine, Physical Education, Nursing, Pharmacy and Physiotherapy) and one humanities program ($n=800$) (law school). The exclusion criteria were: (a) institutional exchange students, (b) pregnant students, and with (c) physical limitations (such as morbid obesity or amputation of a limb).

The sample size was calculated using the *SampleXS* calculator (available at www.brixtonhealth.com/samplexs.html) and adopting the following parameters: population ($n=3.500$); confidence interval of 95%; maximum tolerable

error of 5%; sample design effect of 1.5. Since this study has broad research project with diverse outcomes, the prevalence was set at 50%.

Based on these parameters, the sample size was estimated in 495 individuals. Additionally, predicting refusals, it was decided to multiply the sample by 1,2, reaching a final sample of 594 individuals. In the process of sample selection, it was considered the proportion of students distributed according to the programs and classes.

To do so, the sample selection was performed using a two-stage cluster sampling with random draws. In the first stage, the sample unit was the program, with all students eligible for participation in the study, considering the number of students per program. In the second stage, all classes (smaller sample unit) of the programs were eligible for the study. It was used a simple random sampling and the stratification criteria took into account the number of classes per period of each program, drawing at least one class that was in the early years at college (up to two years) and a class that was in the last years (from third to the last year of college).

Data was collected using a questionnaire – validated in a pilot study – composed by a general information section (sociodemographics and program-related information) and information on health (health perception, sleep and stress), physical activity, posture, computer use, footwear (self-defined as adequate or inadequate by the student). Pain was measured using a visual analog scale (0 to 10) and also the image proposed by McCaffery⁽¹¹⁾. So the students indicated in the picture the place where they felt pain and then they indicated the intensity.

The procedures adopted for the data collection included: (a) previous contact with students, sending of consent terms and scheduling of a visit to the class, and (b) training on procedures for data collection between the evaluators. The data collection occurred between the months of April and May 2010, and it was conducted by a researcher with all students present in the selected classes.

This study was approved by the Human Research Ethics Committee of the *Associação Caruaruense de Ensino Superior – ASCES* (Higher Education Association of Caruaru) under protocol number 211/10, respecting all the ethical aspects of the resolution 196/96 of the National Health Council.

Before collecting the data, the researcher explained the research objectives, informing the university students that the information provided would be kept confidential – without influencing their academic performance – and that they would only be used for research purposes. Besides that, they were informed not to identify themselves at any time. Then, the researcher conducted an individual interview using a questionnaire that lasted between 20 and 30 minutes.

The variables assessed were: sociodemographics (sex, age, marital status, place of residence, living with the family), economics (work and family income), health (physical activity, health perception, stress and sleep) and footwear, posture and computer use. Musculoskeletal pain was considered exposed when it was reported regardless of location.

The procedure of the final tabulation of data was performed using the program Epi Data (version 3.1). In order to detect errors in data entry, the information has been typed on another computer. Later on, the program “VALIDATE” of Epi Data generated a file containing information about the typing errors in order to correct them and guide the process of review and cleaning of the database. After checking the information, the data were exported to the analysis program (SPSS, version 12.0).

For descriptive analyses, it was used the distribution of frequency for categorical variables, and mean and standard deviation for the continuous variables (normal distribution). In the inferential tests, the proportions and means were compared using the chi-square test (categorical variables) and t test for continuous variables. In the regression analysis, pain (dichotomous) was considered the dependent variable and the other variables were considered independent, being adjusted in the model. It was adopted a significance level of 5%.

RESULTS

In the days of data collection, a total of 550 students were present but 23 (4.1%) refused to participate. Thus, the final sample was composed of 527 students (72.9% of women). Other sociodemographic characteristics are presented in Table I.

Regarding pain, there was a prevalence of 76.5% (CI 95% 69.8 – 81.8) with statistically significant difference between the sexes, with a greater proportion observed among women (Figure 1).

The bivariate analysis showed that four variables were significantly associated with musculoskeletal pain: sex, program, reported feeling pain in the past 3 months and health perception. It was observed that the female university students in the health field who reported feeling pain in the past three months and who had a negative perception of health presented a higher rate of musculoskeletal pain when compared to male students in the humanities field, who did not report feeling pain in the past 3 months and had a positive perception of health (Table II).

When adjusted for the confounding variables (independent), besides the variables that already presented significance in the bivariate analysis, spending more time sitting every day and using inappropriate footwear were

also significant, with a prevalence ratio of 1.65 (CI 95% 1.06 – 2.25) and 2.04 (CI 95% 1.03 – 3.26), respectively (Table III).

Among the anatomical regions affected by pain, the highest prevalence was concentrated in the spine. The

thoracic region had the highest average of pain intensity (6.23), followed by lumbar (5.85) and cervical (5.80) regions. Figure 2 shows the intensity of the three main regions affected by pain in the students participating in the study.

Table I – Socioeconomic and demographic profile of college students stratified by sex. Caruaru (PE, Brazil), 2010.

Variables	Male (n=143) % (n)	Female (n = 384) % (n)	All (n = 527) % (n)
Course			
Biomedicine	16.8 (24)	14.3 (56)	14.8 (80)
Physical Education	24.5 (35)	5.2 (20)	10.3 (55)
Nursing	9.8 (14)	22.7 (87)	18.9 (101)
Pharmacy	13.3 (19)	14.1 (54)	13.6 (73)
Physiotherapy	18.2 (26)	32.0 (122)	29.4 (148)
Law School	17.4 (25)	11.7 (45)	13.0 (70)
Marital Status			
Single	86.0 (123)	88.0 (338)	87.4 (461)
Married	11.2 (16)	10.7 (41)	10.8 (57)
Other	2.8 (4)	1.3 (5)	1.7 (9)
Paid Work *			
Yes	53.1 (76)	22.9 (88)	31.1 (164)
No	46.9 (67)	77.1 (296)	68.9 (363)
Family Income *			
Up to 1 MW	7.0 (10)	6.0 (23)	6.2 (33)
1 to 3 MW	28.0 (40)	31.9 (122)	30.7 (162)
3 to 6 MW	32.2 (46)	40.7 (156)	38.3 (202)
Over 6 MW	32.8 (47)	21.4 (82)	24.4 (129)
Living with			
Parents	65.7 (94)	68.5 (263)	67.7 (357)
Spouse	4.2 (6)	3.4 (13)	3.6 (19)
Spouse and children	8.4 (12)	7.6 (29)	7.7 (41)
Children	0 (0)	0.3 (1)	0.2 (1)
Alone	4.9 (7)	5.2 (20)	5.1 (27)
Other	16.8 (24)	15.0 (58)	15.5 (82)

*p<0.05 – Chi-square Test. MW = minimum wage

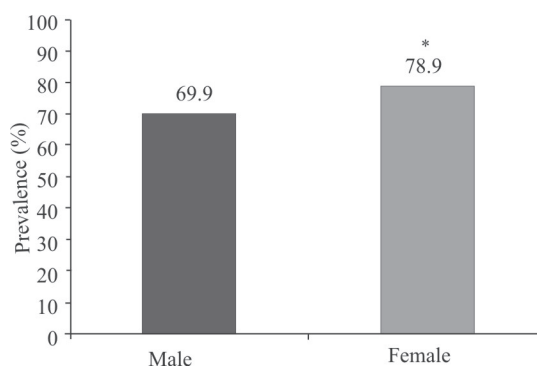


Figure 1 - Prevalence of musculoskeletal pain among college students stratified by sex.

* $p < 0.05$. Caruaru (PE, Brazil), 2010.

Table II - Association between the presence of muscle pain and related factors in college students. Caruaru (PE, Brazil), 2010.

Variables	Muscle Pain % (n)	<i>p</i>
Sex		
Male	69.9 (100)	
Female	78.9 (303)	0.03
Field		
Humanities	57.1 (40)	
Health	79.4 (363)	0.00
Physical Activity		
No	76.7 (297)	
Yes	75.7 (106)	0.81
Spends more time		
Standing	69.4 (34)	
Sitting	76.6 (245)	
Equal	78.5 (124)	0.42
Pain in the past 3 months		
No	69.7 (230)	
Yes	87.8 (173)	0.00
Footwear		
Adequate	75.5 (360)	
Inadequate	86.0 (43)	0.09
Analgesic and Anti-inflammatory		
No	75.1 (169)	
Yes	77.5 (234)	0.53
Health		
Positive	74.1 (304)	
Negative	84.6 (99)	0.01
Stress		
No	70.5 (31)	
Yes	77 (372)	0.33
Sleep		
Positive	76.2 (275)	
Negative	77.1 (128)	0.81

Table III - Prevalence, gross and adjusted prevalence ratio between self-reported muscle pain and associated factors in college students. Caruaru (PE, Brazil), 2010.

	Prevalence Ratio	Adjusted Prevalence Ratio	p
Sex			
Male	1.0	1.0	
Female	1.60 (1.04 – 2.48)	1.62 (1.10 – 2.51)	0.02
Field			
Humanities	1.0	1.0	
Health	2.89 (1.71 – 4.89)	2.35 (1.44 – 4.10)	0.00
Physical Activity			
No	1.0	1.0	
Yes	0.94 (0.60 – 1.48)	0.99 (0.62 – 1.55)	0.80
Spends more time			
Standing	1.0	1.0	
Sitting	1.44 (0.92 – 1.45)	1.65 (1.06 – 2.25)	0.04
Equal	1.60 (0.79 – 1.32)	1.58 (0.77 – 1.28)	0.45
Pain in the past 3 months			
No	1.0	1.0	
Yes	3.13 (1.92 – 5.12)	3.14 (1.96 – 5.18)	0.00
Footwear			
Adequate	1.0	1.0	
Inadequate	1.99 (0.94 – 3.15)	2.04 (1.03 – 3.26)	0.04
Analgesic and Anti-inflammatory			
No	1.0	1.0	
Yes	1.14 (0.76 – 1.71)	1.15 (0.77 – 1.75)	0.52
Health			
Positive	1.0	1.0	
Negative	1.91 (1.10 – 3.32)	1.92 (1.11 – 3.36)	0.02
Stress			
No	1.0	1.0	
Yes	1.40 (0.71 – 2.77)	1.38 (0.69 – 2.70)	0.34
Sleep			
Positive	1.0	1.0	
Negative	1.05 (0.68 – 1.62)	1.07 (0.71 – 1.66)	0.82

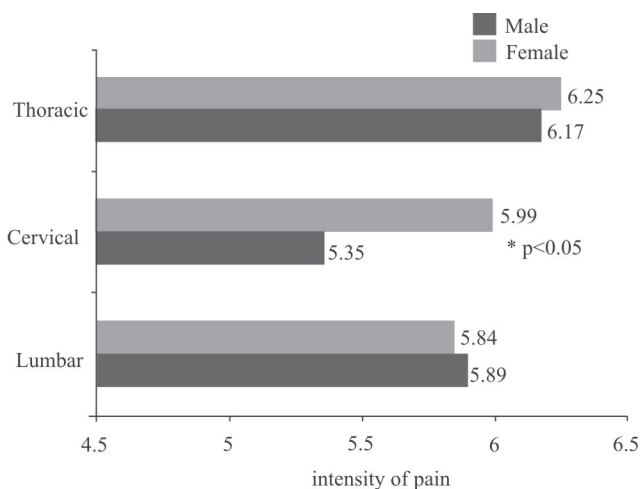


Figure 2 - Average (0-10) of pain intensity in the three main regions affected by pain in college students. Caruaru (PE, Brazil), 2010.

DISCUSSION

The present study aimed to investigate the prevalence of musculoskeletal pain and associated factors in college students. The sampling procedure allows for saying that the sample size is representative of the number of programs and students of the institution investigated. The data collection followed what was planned, respecting the proportion of students enrolled in each course and period, what allows for extending the results to the population of the institution.

The musculoskeletal pain is a multidimensional phenomenon that involves physical, sensory and other aspects. There are factors linked to work organization, psychological aspects, social and economic contexts which are widely discussed, reinforcing the complexity of the human being as one who interacts with the environment and his peers⁽¹²⁻¹³⁾. The pain surpasses all aspects of social life and human emotions since ancient times⁽¹⁴⁾. Because man is a complex individual with individual characteristics and

needs, it is necessary to study him and his interaction with the environment in which he lives.

According to the results obtained in this study it is possible to identify that most students reported discomfort in at least one region. Regarding pain intensity and location, it was observed that lumbar, cervical and thoracic regions were the mostly reported ones. This result can be explained by the specificity of the programs offered at the institution, since there is a divergence between their activities and the use of various regions of the body during their practices.

The deconditioning of the cardiovascular and locomotor systems, the physical constitution, sexual characteristics and the high degree of stress are factors involved in the genesis and perpetuation of the symptomatology. The accumulation of tasks, in addition to the double day's journey and other factors, can explain the higher prevalence of pain among women, as it is observed in another study⁽¹³⁾.

Women are more affected by pain than men⁽¹⁵⁻¹⁷⁾, what may be caused by various factors, such as the differences in muscle mass, body composition and size, which can represent a predisposing risk factor for painful symptomatology⁽¹⁶⁾, corroborating with the current study.

Recent studies have shown that inappropriate footwear has been considered the main cause of alterations on the forefoot⁽¹⁸⁻²¹⁾. Women, in the name of fashion, adopt inappropriate footwear in their daily lives, a habit that can lead to complications like feet and legs discomfort, muscle shortenings, spine alterations, foot deformities, among others. Regarding sitting posture, the main problem is related to the spine and back muscles, that in many ways of sitting are not relieved, but overloaded^(9,22,23). In the present study, both the use of inappropriate footwear and sitting most of the day were considered risk factors for the emergence of musculoskeletal discomforts.

The intensity of pain, inflammation, fatigue and functional disability depends on the interaction of various factors: disease-onset time, nature of the involved structures, maintenance of the mechanisms that cause the injuries, response to appropriate or inappropriate therapeutic procedures, biopsychosocial profiles of patients, including active or passive attitudes to fight the diseases, secondary losses and gains, and also previous experience of pain^(2,12). In the present study, the body regions with the highest intensity levels of pain were the spine segments.

Physical activity, in a broad conception, can be understood as a natural human behavior; however it is complex and can influence and be influenced by biopsychosocial aspects⁽²³⁾. Studies have associated the practice of physical exercises with decreased rates of morbidity and mortality and the control of risk factors, such as: hypertension, high levels of blood lipids, high

resistance to insulin, obesity, low resistance to stress, mild and moderate emotional depression, and somatic pain^(24,25).

There is almost a consensus among researchers that physical activity is beneficial to health. However, there is a knowledge gap concerning its association with the reduction or increase of painful situations. It was observed that physical activity can relieve the musculoskeletal discomforts because the students of programs that required practice of physical activity in their daily lives presented lower levels of pain.

Repetitive Strain Injuries (RSI) and/or Work Related Musculoskeletal Disorders (WMSDs) are syndromes that affect a large number of individuals and feature multifactorial etiology, presenting a great diagnostic complexity⁽²⁶⁻²⁸⁾. Hence the importance of further research on this issue addressing many different ages and environmental exposures, which will favor a better support for the qualification of healthcare professionals and their practices.

The data cited above indicate that some results were compatible with the literature, such as the prevalence of pain among women – probably due to biological factors. However, other results presented higher specificity, such as the prevalence of pain among Pharmacy and Biomedicine students, which are programs that require little physical activity if compared to Physical Education and Physiotherapy – these programs presented, respectively, the lowest results regarding pain.

It is understood that the treatment of musculoskeletal pain must be based on an accurate and multiprofessional diagnosis with drug and non-drug measures⁽²⁹⁾.

CONCLUSION

It was observed that the biggest complaint of pain among students was in the thoracic, lumbar and cervical regions, which indicates that it is associated with the activities developed by the students. The women carry a higher risk of reporting pain, especially among those who are studying in the health field. In addition, inappropriate footwear doubled the chance of reporting pain and has directly influenced a negative perception of health.

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