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LOW BACK AND NECK PAIN IN PHYSICAL EDUCATION STUDENTS: PREVALENCE AND ASSOCIATED FACTORS

DOR LOMBAR E CERVICAL EM ESTUDANTES DE EDUCAÇÃO FÍSICA: PREVALÊNCIA E FATORES ASSOCIADOS

DOLOR LUMBAR Y CERVICAL EN ESTUDIANTES DE EDUCACIÓN FÍSICA: PREVALENCIA Y FACTORES ASOCIADOS

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ABSTRACT

Objective: To analyze the prevalence of low back and neck pain in Physical Education (PE) students at the Universidade Federal do Rio Grande do Sul (UFRGS) and the associated behavioral and postural factors. Methods: The study design is observational with descriptive analytics. Healthy PE students of both sexes participated in the study and answered the Back Pain and Body Postural Evaluation Instrument for Adults. Data were analyzed using SPSS software (21.0) using descriptive statistics, calculating the prevalence ratios and 95% confidence intervals. The significance level adopted was 0.05. Results: Ninety-two PE students answered the questionnaire, 45 of whom were females (48.9%) and 47 of whom were males (51.1%). The prevalence of low back pain was 76.1% and of neck pain was 58.7%. There was no association with most of the behavioral and postural factors assessed. Conclusions: The prevalence of low back and neck pain in PE students at UFRGS is high and this pain is not associated with the factors investigated. ***Level of Evidence II: Prospective study of less quality.***

Keywords: Pain Measurement; Posture; Students; Epidemiology.

RESUMO

*Objetivo: Analisar a prevalência de dor lombar e cervical em estudantes de Educação Física (EF) da Universidade Federal do Rio Grande do Sul (UFRGS) e os fatores comportamentais e posturais associados. Métodos: O desenho do estudo é observacional com delineamento descritivo analítico. Estudantes de EF de ambos os sexos e saudáveis participaram do estudo e responderam o Back Pain and Body Postural Evaluation Instrument for Adults. Os dados foram analisados no software SPSS (21.0) por meio de estatística descritiva, cálculo das razões de prevalência e intervalos de confiança de 95%. O nível de significância adotado foi de 0,05. Resultados: Noventa e dois estudantes de EF responderam ao questionário, 45 (48,9%) eram do sexo feminino e 47 (51,1%) do sexo masculino. A prevalência de dor lombar foi de 76,1%, e de dor cervical foi 58,7%. Não houve associação com a maioria dos fatores comportamentais e posturais avaliados. Conclusões: A prevalência de dor lombar e cervical em estudantes de EF da UFRGS é elevada e essas dores não estão associadas com os fatores investigados. **Nível de Evidência II: Estudo prospectivo de menor qualidade.***

Descritores: *Medição da Dor; Postura; Estudantes; Epidemiologia.*

RESUMEN

*Objetivo: Analizar la prevalencia de dolor lumbar y cervical en estudiantes de Educación Física (EF) de la Universidade Federal de Rio Grande do Sul (UFRGS) y los factores conductuales y posturales asociados. M**étodos**: El diseño del estudio es observacional con diseño analítico descriptivo. En el estudio participaron estudiantes de Educación Física de ambos sexos y sanos, que respondieron el Back Pain and Body Postural Evaluation Instrument for Adults. Los datos se analizaron con el software SPSS (21.0) mediante estadística descriptiva, calculando las razones de prevalencia e intervalos de confianza del 95%. El nivel de significancia adoptado fue 0,05. Resultados: Noventa y dos estudiantes de EF respondieron el cuestionario, 45 (48,9%) eran mujeres y 47 (51,1%) eran hombres. La prevalencia de dolor lumbar fue del 76,1% y del dolor cervical del 58,7%. No hubo asociación con la mayoría de los factores conductuales y posturales evaluados. Conclusiones: La prevalencia de dolor lumbar y cervical en estudiantes de EF de la UFRGS es alta y estos dolores no están asociados a los factores investigados. **Nivel de Evidencia II: Estudio prospectivo de menor calidad.***

Descriptores: *Dimensión del Dolor; Postura; Estudiantes; Epidemiología.*

INTRODUCTION

Low back and neck pain are quite common musculoskeletal conditions.[1,2] The annual worldwide incidence is approximately 36% for low back pain[3] and approximately 18% for neck pain.[4] Two population-based studies conducted in Brazil in 2011 and 2015 reported prevalence of low back and neck pain in adults, at some point in life, of 63.1% (Pelotas/RS)[5] and 30.6% (Campinas/SP), respectively.[6]

In addition to its high prevalence, when compared against all health conditions, low back pain ranks as the number one cause of disability (discrepancy between an individual's actual performance in

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a specific role and the community's expectations of what is normal for that individual[7]) and neck pain is in fourth place.[8] Disability related to these conditions can be so pervasive that, in Brazil, in 2007, low back and neck pain were the main causes of disability and sick pay,[9] reflected in the financial impact that said conditions have had on health care and social security services. According to Meziat-Filho and Silva,[9] more than 12 million workdays were lost due to disability pensions resulting from pain, not counting the days lost to temporary leave and sick pay. The economic losses caused by low back and neck pain are high. According to Martin et al.,[10] lumbar and cervical problems account for a sizable proportion of health care expenditures.

In addition to affecting the economically active population, low back and neck pain have also been reported among university students, as per the studies by Bacchi et al.[11] and Vey et al.[12], who will soon be a part of this group. Thus, studies that investigate low back and neck pain to improve the understanding of these conditions are essential to developing public health policies. Studies of this nature will be able to guide specific health care education proposals and, thus, reduce the expense generated by these musculoskeletal conditions. To the best of our knowledge, investigations into the prevalence of pain among university students in the Physical Education Program have not been conducted.

In this sense, the objective of this study was to identify the prevalence of low back and neck pain among university students in the Physical Education Program and identify the association of pain with behavioral and postural factors. The hypothesis of the study is that the prevalence of low back and neck pain among university students in the Physical Education Program is high but is not associated with the adopted postural and behavioral habits.

METHODS

This is an observational field study of descriptive analytical design, approved by the university Institutional Review Board (CAAE: 55897216.6.0000.5347), that followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) recommendations.[13] The study was conducted from August to November 2019 at the Escola de Educação Física, Fisioterapia e Dança of the Universidade Federal do Rio Grande do Sul, in Porto Alegre, Rio Grande do Sul, Brazil.

The sample size was calculated using the equation proposed by Santos, Abbud and Abreu,[14] based on the following parameters: z-test family, error of 0.1, significance level of 0.05, low back pain prevalence of 69% in university students, as mentioned by Bacchi et al.,[11] and prevalence of neck pain of 59.7%, as described by Silva et al.[15] While the calculation with the prevalence of low back pain resulted in a sample size of 82 individuals, the calculation with the prevalence of neck pain resulted in a sample size of 92 individuals.

The inclusion criteria were healthy university students of both sexes in the Physical Education Program of the Escola de Educação Física, Fisioterapia e Dança of the Universidade Federal do Rio Grande do Sul. The exclusion criterion was failure to complete filling out the questionnaire.

Sample selection was performed by convenience and consecutively. After signing the Informed Consent Form, the students answered the Back Pain and Body Postural Evaluation Instrument for Adults (BackPEI-A) questionnaire, developed by Candotti et al.[16] The questionnaire asks 23 multiple-choice questions, is self-administered, and evaluates back pain and neck pain in the past three months, postural factors (posture when writing, conversing, using the computer or notebook and the cell phone or tablet, picking up an object from the floor, and sleeping), and behavioral factors (hours of sleep, hours using the computer or notebook and the cell phone or tablet, and the practice of physical activity). The questions about pain involve an assessment of the presence, frequency, disability, and intensity of pain over the past three months. Pain intensity is evaluated using a visual analog scale and the other questions are closed.

The data were analyzed using the Social Package for the Social Sciences (SPSS) version 21.0 software, through a descriptive analysis of the data (mean, standard deviation (SD), and frequency) and calculation of prevalence ratios and their respective confidence intervals of 95% (CI 95%). The dependent variable was the presence of pain, and the independent variables were the behavioral and postural variables. The prevalence ratios were calculated via multivariate analysis using the Poisson regression model with robust variance. The level of significance adopted for all analyses was 0.05.

RESULTS

We evaluated 92 physical education students from the Escola de Educação Física, Fisioterapia e Dança of the Universidade Federal do Rio Grande do Sul, 45 (48.9%) of whom were female and 47 (51.1%) of whom were male. The mean age was 26.3 (SD 6.5) years, the mean body mass was 72.1 (SD 13.2) kilograms, and the mean height was 169.8 (SD 14.4) centimeters. There was no sample loss.

Regarding the results related to the characterization of low back pain, most students complained of pain (76.1%) with a mean intensity of 4 on a scale of 0 to 10. Pain frequency was reported as at least once a week in 31.4% of cases and more than once a week in 27.1% of cases. Low back pain was disabling in 22.9% of cases, that is, it prevented the individual from performing tasks such as studying and/or working (Table 1).

Regarding the results related to the characterization of neck pain, we observed that most students complained of pain (58.7%) with a mean intensity of 4 on a scale of 0 to 10. In addition, the frequency of neck pain was more than once a week in 12.7% of cases and was disabling in 20% of cases (Table 1).

As for low back pain, the results showed that there was no association between pain and most of the behavioral and postural factors evaluated (Table 2), except for variables posture when sitting down to use the computer or notebook ($p = 0.040$) and hours using the computer or notebook ($p = 0.047$). The calculation of the prevalence ratios showed that (1) those who sit in an "improper" position when using a computer or notebook had a prevalence of low back pain 16% lower than those who sit in a "proper" position and (2) those who use the computer or notebook for more than 3 hours have a prevalence of low back pain 17% higher than those who use it for up to 3 hours.

The results showed that there was no association between neck pain and most of the factors evaluated (Table 3), except for the regular practice of physical activity ($p = 0.049$). The prevalence ratios calculation showed that those who do not practice physical activity regularly have a prevalence of neck pain 19% lower than those who practice physical activity.

Most of the students had habits considered "improper" when sitting to write, converse, use the computer or notebook, and use the cell phone or tablet. They also had "improper" habits when standing up to use the cell phone or tablet. Most students practice regular physical activity and, of these, most participate non-competitively (Table 2).

Table 1. Descriptive results of the presence, intensity, and frequency of low back and neck pain in the past 3 months and the associated disability (n = 92).

Pain n (%)	Low back pain	Neck pain
Presence of pain	70 (76.1%)	54 (58.7%)
Absence of pain	22 (23.9%)	37 (40.2%)
Did not answer	0 (0.0%)	1 (1.1%)
Intensity x (SD)	4.0 (1.9)	4.0 (2.2)
Frequency n (%)		
Only once	9 (12.9%)	14 (25.5%)
At least once a month	19 (27.1%)	16 (29.1%)
At least once a week	22 (31.4%)	15 (27.3%)
More than once a week	17 (24.3%)	7 (12.7%)
I do not know how to answer	3 (4.3%)	3 (5.5%)
Disability n (%)		
Has disability	15 (21.4%)	10 (18.2%)
Does not have disability	54 (77.1%)	44 (80%)
Did not know how to answer	1 (1.4%)	1 (1.8%)

Key: mean (x), standard deviation (SD)

Table 2. Results of the association (χ^2) and prevalence ratios for the low back pain variable by the associated behavioral and postural factors.

Variable	n	%	Low back pain		χ^2	PR (CI 95%)
			n	%		
Sit down to write (n = 92)						
Proper	13	14.1	11	15.7	$\chi^2(1) = 0.754$, p = 0.385	1
Improper	79	85.9	59	84.3		1.09 (0.90 – 1.31)
Sit down to converse (n = 92)						
Proper	18	19.6	14	20	$\chi^2(1) = 0.036$, p = 0.849	1
Improper	74	80.4	56	80		1.02 (0.85 – 1.21)
Sit down to use the computer/notebook (n = 92)						
Proper	22	23.9	13	18.6	$\chi^2(1) = 4.213$, p = 0.040*	1
Improper	70	76.1	57	81.4		0.84 (0.71 – 0.99)
Sit down to use the cell phone/tablet (n = 92)						
Proper	4	4.3	3	4.3	$\chi^2(1) = 0.003$, p = 0.959	1
Improper	88	95.7	67	95.7		0.99 (0.70 – 1.40)
Stand up to use the cell phone/tablet (n = 92)						
Proper	3	3.3	1	1.4	$\chi^2(1) = 3.394$, p = 0.065	1
Improper	89	96.7	69	98.6		0.74 (0.53 – 1.02)
Pick up an object from the floor (n = 92)						
Proper	43	46.7	31	44.3	$\chi^2(1) = 0.709$, p = 0.400	1
Improper	49	53.3	39	55.7		0.94 (0.82 – 1.08)
Sleeping posture (n = 92)						
Proper	55	59.8	42	60	$\chi^2(1) = 0.006$, p = 0.940	1
Improper	37	40.2	28	40		1.01 (0.87 – 1.61)
Hours using the computer/notebook (n = 92)						
Up to 3 hours	66	71.7	54	77.1	$\chi^2(1) = 3.942$, p = 0.047*	1
More than 3 hours	26	28.3	16	22.9		1.17 (1.00 – 1.37)
Hours using the cell phone/tablet (n = 92)						
Up to 3 hours	47	51.1	32	45.7	$\chi^2(1) = 3.620$, p = 0.057	1
More than 3 hours	45	48.9	38	54.3		0.88 (0.76 – 1.00)
Hours of sleep per night (n = 92)						
More than 7 hours	50	54.3	40	57.1	$\chi^2(1) = 0.922$, p = 0.337	1
Less than 7 hours	42	45.7	30	42.9		1.07 (0.93 – 1.23)
Regular practice of physical activity/sports (n = 92)						
Yes	81	88	60	85.7	$\chi^2(1) = 2.638$, p = 0.104	1
No	11	12	10	14.3		0.87 (0.73 – 1.03)
Practice of competitive physical activity/sports (n = 81)						
No	51	63	36	51.4	$\chi^2(1) = 0.929$, p = 0.335	1
Yes	30	37	24	34.3		0.93 (0.80 – 1.08)

Key: prevalence ratio (PR), chi squared (χ^2), statistically significant (*).

Table 3. Results of the association (χ^2) and prevalence ratios for neck pain and the behavioral and postural factors.

Variable	n	%	Neck pain		χ^2	PR (CI 95%)
			n	%		
Sit down to write (n = 92)						
Proper	13	14.1	10	18.5	$\chi^2(1) = 2.646$; p = 0.104	1
Improper	79	85.9	44	81.5		1.18 (0.97 – 1.45)
Sit down to converse (n = 92)						
Proper	18	19.6	12	22.2	$\chi^2(1) = 0.754$; p = 0.385	1
Improper	74	80.4	42	77.8		1.08 (0.90 – 1.30)
Sit down to use the computer/notebook (n = 92)						
Proper	22	23.9	12	22.2	$\chi^2(1) = 0.108$; p = 0.742	1
Improper	70	76.1	42	77.8		0.97 (0.82 – 1.15)
Sit down to use the cell phone/tablet (n = 92)						
Proper	4	4.3	3	5.6	$\chi^2(1) = 0.586$; p = 0.444	1
Improper	88	95.7	51	94.4		1.15 (0.81 – 1.62)
Stand up to use the cell phone/tablet (n = 92)						
Proper	3	3.3	1	1.9	$\chi^2(1) = 0.946$; p = 0.331	1
Improper	89	96.7	53	98.1		0.85 (0.61 – 1.18)
Pick up an object from the floor (n = 92)						
Proper	43	46.7	26	48.1	$\chi^2(1) = 0.251$; p = 0.616	1
Improper	49	53.3	28	51.9		1.04 (0.90 – 1.20)
Sleeping posture (n = 92)						
Proper	55	59.8	31	57.4	$\chi^2(1) = 0.500$; p = 0.480	1
Improper	37	40.2	23	42.6		0.95 (0.82 – 1.10)
Hours using the computer/notebook (n = 92)						
Up to 3 hours	66	71.7	42	77.8	$\chi^2(1) = 1.951$; p = 0.163	1
More than 3 hours	26	28.3	12	22.2		1.12 (0.96 – 1.30)
Hours using the cell phone/tablet (n = 92)						
Up to 3 hours	47	51.1	28	51.9	$\chi^2(1) = 0.141$; p = 0.709	1
More than 3 hours	45	48.9	26	48.1		1.03 (0.89 – 1.19)
Hours of sleep per night (n = 92)						
More than 7 hours	50	54.3	32	59.3	$\chi^2(1) = 0.808$; p = 0.369	1
Less than 7 hours	42	45.7	22	40.7		1.07 (0.92 – 1.24)
Regular practice of physical activity/sports (n = 92)						
Yes	81	88	45	83.3	$\chi^2(1) = 3.883$; p = 0.049*	1
No	11	12	9	16.7		0.81 (0.66 – 1.0)
Practice of competitive physical activity/sports (n = 81)						
No	51	63	17	37.8	$\chi^2(1) = 0.016$; p = 0.899	1
Yes	30	37	28	62.2		1.01 (0.86 – 1.19)

Key: prevalence ratio (PR), chi squared (χ^2), statistically significant (*).

DISCUSSION

The objective of the present study was to identify the prevalence of low back and neck pain among university students in the Physical Education Program and identify the association of these pains with behavioral and postural factors. To do this, we used a sample of Universidade Federal do Rio Grande do Sul students. The hypothesis that there was a high prevalence of low back and neck pain in students in the Physical Education Program at this university was confirmed. The results showed a prevalence of low back pain of 76.1% and of neck pain of 58.7%. It is important to mention that the BackPEI-A questionnaire was used to evaluate the presence of pain in the past three months.

The results found in the present study are very close to the findings from the 2011 population-based study conducted by Ferreira et al.[5] in Pelotas, also in the South Region of Brazil, who found a prevalence of low back and neck pain of 63.1% in a sample of 972 adults (mean age of 41 years, SD of 13.4 years). In their 2015 study, Bacchi et al.[11] reported a prevalence of low back pain of 69% among 42 university students in the Physical Therapy Program at the Universidade Federal do Rio Grande do Sul, similar to our findings in the present study. In 2016, Vey et al.[12] studied 90 undergraduate students from nine courses of study (Architecture, Physical Therapy, History, Nutrition, Tourism, Information Systems, Accounting Sciences, Business Administration, and Social Services), 82.23% of

whom reported feeling spinal pain. Santana and Sandoval,[17] also in 2016, investigated the prevalence of spinal pain among 116 recently graduated physical education teachers and found a high prevalence of pain, similar to the results of the present study (62.1%).

Two of the studies mentioned above also used questionnaires as an assessment tool.[5,11] This kind of tool is commonly used, as it is an inexpensive option that is easy to access, use, and analyze. The choice of a data collection tool must be based on scientific parameters, such as validity and reproducibility, thus avoiding any limitations on the applicability of the instrument. The BackPEI-A is a validated, reproducible questionnaire for assessing postural and behavioral habits, in addition to the presence, frequency, and intensity of low back and neck pain, and related disability in adult between 17 and 80 years of age.[16]

Lumbar and cervical pain are complex conditions and are highly prevalent in the overall population. As seen in the present study, this pain is also prevalent among students in the Physical Education Program. According to Martin et al.,[10] health care expenditures related to the spine increased significantly between 1997 and 2005. However, there has been no improvement in self-reported health status, functional disability, work-related or social limitations among individuals with back problems during this period, that is, over time there have been no improvements in health care outcomes proportional to the growing costs. In this sense, it is of utmost importance that various measures are taken, among them, the following stand out: conduct further studies on the subject to improve understanding of these conditions, update the knowledge of health care professionals working in this area, and promote public policies that support health care education programs aimed at reducing the prevalence of low back and neck pain and, consequently, the costs generated by these health conditions.

Regarding the postural habits investigated that are related to sitting postures, using the cell phone or tablet, picking up objects from the floor, and sleeping, it is important to emphasize that the terms "improper" and "proper" used to classify the answers were chosen based on common beliefs that there is a correct or proper posture for each activity of daily living. The results showed that most students have habits considered "improper". However, the results also showed that there was no association between low back and neck pain and most of the factors evaluated (Tables 2 and 3), except for the postural habit when using the computer and the behavioral habit when practicing physical activity, respectively, confirming our initial hypothesis.

It is important to note that the sample size was calculated based on the main objective of the study, which was to verify the prevalence of lumbar and cervical pain among physical education students, and not on the secondary objective, which was to verify the association between lumbar and cervical pain and postural and behavioral habits. Thus, it is important to interpret the results, especially the association results, with caution, since the sample size is not adequate for this objective.

There is a common belief that spinal pain is caused by standing, sitting, or picking something up from the floor incorrectly.[18,19] However, there is no strong evidence that avoiding incorrect posture prevents low back pain.[20] The findings of the present study show that there is no association between low back and neck pain and the adoption of "improper" sitting, standing, or sleeping postures. Nonetheless, it is important to point out that the study design does not allow any inferences about causality, but only about the association between two variables.

The systematic revision conducted by Kim et al.[21] showed that the factors that protect against the first episode of cervical pain are perceived empowered leadership, perceived high social interaction, leisure-time physical activity, cervical extensor muscle strength, and diffuse noxious inhibitory control, and that the main risk factors include obesity (body mass index > 30 kg/m^2), high work demand, high muscle tension, depression, low level of support at work, and a poor health self-assessment. Regarding lumbar pain, the systematic review conducted by Taylor et al.[22] was not able to draw conclusion on the topic because of the heterogeneity of the studies on risk factors for the first episode of lumbar pain. In this sense, further studies are necessary in this area. The present study, despite the methodological flaw in the sample calculation, shows that, in general, there is no association between low back pain and behavioral habits such as, for example, the number of hours of sleep and using the computer/notebook or cell phone/tablet; nor is there any association between postural habits, such as, for example, sitting in a "proper" position while using the cell phone/tablet, picking up an object from the floor, or sleeping.

Other limitations of the study need to be emphasized. Firstly, the sample selection was non-probabilistic, which may have influenced the study results, since a convenience sample may not represent the population of interest, in this case physical education students. Secondly, the questionnaire was applied at the end of the semester, a period that is tense and with an increased workload due to final exams. Thirdly, the evaluation of variables such as the characteristics of the practice of physical activity (the intensity of physical activity) and pain was superficial. And finally, only certain behavioral and postural habits were evaluated, leaving out some other important biopsychosocial characteristics within the context of lumbar and cervical pain.

Despite the limitations, to the best of our knowledge, the present study is a pioneer in the investigation of the prevalence of low back and neck pain among Physical Education Program students, at least in the South Region of Brazil, and the results point to the need for strategies that improve the current disturbing scenario.

CONCLUSION

In the present study we investigated the prevalence of low back and neck pain in physical education students and the association between these types of pain and several behavioral and postural habits using a validated and reproducible questionnaire. We found that the prevalence of lumbar and cervical pain in this sample was high and that these conditions were not associated with the behavioral and postural habits evaluated. However, further studies with probabilistic samples need to be conducted to confirm these findings and improve our understanding of the factors associated with low back and neck pain. Even so, it is important to pay attention to the high prevalence of pain in this population.

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