Low Back Pain in Medical Students and Professors During the Pandemic: Retrospective Cohort Study*

Lombalgia em estudantes e professores de medicina durante a pandemia: Estudo de coorte retrospectivo

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Abstract

Objective This study aimed to determine the prevalence of low back pain before and during the pandemic, comparing both periods.

Methods A questionnaire was administered, containing questions about the presence of low back pain, sociodemographic characteristics and environmental factors that could be related to such pain.

Results Among the 978 responses obtained, the prevalence of low back pain during the pandemic was 69.94%, which represented a significant increase over values from the pre-pandemic period (57.37%). A high prevalence of low back pain was found between all groups, especially among women. Some factors were associated with the incidence of low back pain, such as having previously diagnosed spinal problems and sedentary lifestyle.

Conclusions The prevalence of low back pain increased significantly during the pandemic in the studied groups.

Keywords
- low back pain
- students
- pandemics
- prevalence
- risk factors

Resumo

Objetivo Este estudo teve como objetivo determinar a prevalência de lombalgia antes e durante a pandemia, comparando os dois períodos.

Métodos Foi aplicado um questionário contendo questões sobre a presença de lombalgia, características sociodemográficas e hábitos que poderiam estar relacionados à essa dor.

Resultados Entre as 978 respostas obtidas, a prevalência de lombalgia durante a pandemia foi de 69,94%, o que representou um aumento significativo em relação aos valores do período pré-pandêmico (57,37%). Foi encontrada alta prevalência de lombalgia entre todos os grupos, principalmente entre as mulheres. Alguns fatores foram associados à incidência de lombalgia, como ter problemas de coluna previamente diagnosticados e sedentarismo.

Conclusões A prevalência de lombalgia aumentou significativamente durante a pandemia nos grupos estudados.

Palavras-chave
- dor lombar
- estudantes
- pandemias
- prevalência
- fatores de riscos

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Introduction

Approximately 80% of the population, at some point in their lives, will suffer a brief and acute episode of low back pain.[1,2] Generally, low back pain is divided into two types: specific and nonspecific, where the nonspecific has no apparent cause and accounts for up to 90% of the cases.[3] Low back pain, in addition to limiting various daily activities and impairing quality of life, is also one of the main factors responsible for absenteeism from work and decreased productivity in the workplace.[4]

A number of risk factors are described in the literature that can play a crucial role in the etiology of low back pain, such as being female, overweight, previous history of spinal problems, family history of spinal problems, prolonged sitting time and sedentary lifestyle,[5–8] or even psychological factors, such as anxiety and stress.[8,9] Due to the highly demanding schedule of medical courses, students and professors are often exposed to several of these risk factors, such as stress and sedentary lifestyle, long hours in hospitals and clinics, which can contribute to a higher prevalence of low back pain when compared to the general population.[10] Furthermore, the presence of low back pain can affect the productivity and participation of students during classes, which could influence their future medical career.[10]

A study carried out in Brazil with 629 medical students revealed that recurrent low back pain was present in 81% of them.[11] Another study, carried out with 1,243 medical students from a French college, reported a prevalence of low back pain of 72.1%.[12] Despite the limitation that musculoskeletal pain represents for adolescents and young adults, there is a lack of data regarding low back pain in medical students.[13]

Similarly, few studies have investigated the presence of low back pain in professors,[14] and this dearth is even greater when it comes to medical school professors, who are also exposed to several risk factors for the presence of low back pain, such as repetitive movements when writing, standing for long periods of time and daily use of the computer.[15] In a study carried out with teachers at a primary school in Ethiopia, a prevalence of low back pain of 74.8% was found, which was related to some risk factors, such as standing for a long period of time, lack of sleep and sedentary lifestyle.[16]

During the COVID-19 pandemic, face-to-face classes were canceled, forcing universities to adopt a remote learning model. However, this change favored some aspects related to the prevalence of low back pain, such as sitting for a long period of time, physical inactivity and greater psychological stress, which could increase the prevalence of low back pain in students and professors during this atypical period. The aim of this study was to determine the prevalence of low back pain in medical students and professors at three Brazilian universities during the pandemic and compare this to the pre-pandemic period, in addition to identifying associated risk factors to develop such pain.

Materials and Methods

Ethics Approval

The protocol was approved by the institutioǹs research ethics committee, in October 4, 2020 (CAAE No. 38595320.9.0000.5492).

Questionnaire and Participants

This research has been approved by the IRB (Institutional Review Board) of the authors' affiliated institutions, and consent was obtained from all participants. A retrospective cohort study was carried out through the administration of a questionnaire to medical students and professors from three Brazilian medical schools located in different states of the country. The inclusion criteria were that participants had to be medical students or professors from the three participating universities. Participants were excluded from the study if they disagreed in signing consent form, those who were not medical students or professors from the participating universities, and women in gestational period. The questionnaire was distributed between December 2020 and March 2021 and covered questions about sociodemographic characteristics (such as gender, age and ethnicity), presence of low back pain before and during the pandemic, quantification of the intensity of this low back pain, family history of diseases and spinal surgeries and several behavioral factors that could be associated with the prevalence of low back pain in this population, in addition to the impact on their daily activities and on their emotional state.

Statistical Analysis

In view of the approximate total of 3,000 medical students and 200 professors in these three universities, we adopted a confidence level of 95% and a margin of error of 5%, calculating a sample of 341 students and 132 professors. And since the three universities are located in different states and may present regional discrepancies, with the purpose of analyzing subgroups by educational institution, while maintaining a 95% confidence level and 5% margin of error, the sample by institution had to be at least 278 students and 60 professors.

Descriptive analysis of the results was performed to characterize the research participants. To describe the results, the absolute frequency and percentage for categorical variables were used. In order to compare the proportion of low back pain before and during the pandemic within the different groups, the McNemar test was used. To investigate possible factors associated with low back pain during the pandemic, univariate logistic regression was used, estimating odds ratios (OR) as a measure of effect, with a 95% confidence interval (CI). Subsequently, the variables that showed at least moderate association ($P < 0.25$) with the variable of interest were selected using the chi-square test. These variables were included in the multivariate model, estimating the adjusted odds ratio, considering possible interactions between them. The quality of the multivariate model was assessed using the Hosmer and Lemeshow test. For all analyses, only $P < 0.05$ was considered statistically significant.

Table 1 Number of participants from each university, per group

	University 1 n(%)	University 2 n(%)	University 3 n(%)	Total(n%)
Students from 1st to 4th year	295 (35.49%)	250 (30.08%)	286 (34.43%)	831(100%)
Students from 5th and 6th year	19 (31.66%)	35 (58.33%)	6 (10.01%)	60 (100%)
Professors	70 (80.45%)	10 (11.49%)	7 (8.06%)	87 (100%)

Results

In total, 978 individuals answered the questionnaire. Among them, 831 were students from the 1st to the 4th year, 60 students from the 5th and 6th year (medical internship) and 87 professors (►**Table 1**).

Prevalence of Low Back Pain

When asked about the presence of low back pain before and during the pandemic, the percentages of affirmative answers increased among professors and students from 1st to 4th year, and decreased among students from 5th to 6th year. Among professors, 28.74% who did not have low back pain started to experience it during the pandemic ($P < 0.001$). Similarly, 20.10% of 1st to 4th year students who did not have low back pain before the pandemic began to complain of low back pain ($P < 0.001$). During the pandemic, only for the group of 5th and 6th year students there was no increase in the prevalence of low back pain ($P = 1.000$).

For 1st to 4th year students, the prevalence of low back pain increased from 54.75% before the pandemic to 71.48% during the pandemic ($P < 0.001$). Among 5th and 6th year students, the prevalence did not change significantly, registering 66.67% before and 65% during the pandemic ($P = 1,000$). Finally, among professors, the prevalence increased from 31.03% before to 58.62% during the pandemic ($P < 0.001$) (►**Table 2**).

Associated Risk Factors

Students from 1st to 4th year were significantly more likely to have low back pain when compared to professors (OR: 1.77, 95% CI: 1.12-2.77; $P = 0.013$). Among survey participants who do not have back pain, 60.2% are female, while among those who do, this percentage rises to 79.97%, with men having significantly lower chances of having low back pain when compared to women (OR: 0.38, 95% CI: 0.28-0.51; $P < 0.001$). It was also noted that those previously diagnosed with any spinal problems had significantly higher chances of low back pain when compared to those who did not (OR: 3.56, 95% CI: 2.4-5.43; $P < 0.001$). In addition, individuals with a family history of spinal problems were also significantly more likely to experience low back pain (OR: 1.78, 95% CI: 1.35-2.36; $P < 0.001$). Respondents from university 2 were less likely to have low back pain when compared to the other institutions (OR: 0.56, 95% CI: 0.4-0.77; $P < 0.001$).

Regarding posture when sitting, those who always sit correctly, those who sit correctly most of the time, and even those who sit correctly less often, had significantly lower chances of having low back pain when compared to those who never sit correctly (ORs of 0.11; 0.32 and 0.65 and $P < 0.001$; $P < 0.001$ and $P = 0.012$, respectively). Considering the consumption of tobacco, coffee and alcoholic beverages, none of them was statistically significant for the prevalence of low back pain among any of the groups ($P = 0.915$; $P = 0.274$ and $P = 0.255$, respectively).

Sleeping hours also significantly affected the chances of experiencing low back pain. Those who slept 6 to 9 hours a day before the pandemic had a lower chance of low back pain when compared to those who slept less than that (OR: 0.61, 95% CI: 0.45-0.83; $P = 0.002$). Similarly, individuals who sleep 6 to 9 hours a day during the pandemic also had a lower chance of low back pain (OR: 0.41, 95% CI: 0.26-0.63; $P < 0.001$). Moreover, individuals who sleep more than 9 hours a day during the pandemic also had lower chances of experiencing low back pain (OR: 0.54, 95% CI: 0.3-0.96; $P = 0.038$). Also, those who exercise during the pandemic had

Table 2 Frequency of low back pain in each group, comparing before and during the pandemic

	Professors n(%)	Students from 1st to 4th year n(%)	Students from 5th and 6th year n(%)	General n(%)
Low back pain before the pandemic				
No	60 (68.97%)	376 (45.25%)	20 (33.33%)	456 (46.63%)
Yes	27 (31.03%)	455 (54.75%)	40 (66.67%)	522 (53.37%)
Low back pain during the pandemic				
No	36 (41.38%)	237 (28.52%)	21 (35.00%)	294 (30.06%)
Yes	51 (58.62%)	594 (71.48%)	39 (65.00%)	684 (69.94%)

significantly lower odds of having low back pain when compared to those who do not (OR: 0.57, 95% CI: 0.42-0.76; P < 0.001). For all the other variables, there is insufficient evidence that the odds of individuals with such characteristics were significantly different compared to the characteristics set as a baseline at 5% significance.

In the multiple logistic model, only being male (adjusted OR: 0.47, 95% CI: 0.33-0.66; P < 0.001), always sitting correctly (adjusted OR: 0.11, 95% CI: 0.04-0.3; P < 0.001), sitting correctly most of the time (adjusted OR: 0.31, 95% CI: 0.19-0.49; P < 0.001), sitting correctly less often (adjusted OR: 0.59, 95% CI: 0.4-0.86; P = 0.006), being from the university 2 (adjusted OR: 0.54, 95% CI: 0.35-0.83; P = 0.005), studying/working between 1 to 4 hours per day during the pandemic (adjusted OR: 0.49, 95% CI: 0.24-0.97; P = 0.046) and sleeping 6 to 9 hours per day during the pandemic (adjusted OR: 0.4, 95% CI: 0.23-0.66; P < 0.001) stood out as protective factors for low back pain. On the other hand, still in the multiple logistic model, only having previously diagnosed spinal problems (adjusted OR: 3.79, 95% CI: 2.42-6.14; P < 0.001) and a positive family history of spinal problems (adjusted OR: 1.82, 95% CI: 1.32-2.52; P < 0.001) stood out as risk factors. ►**Table 3** summarizes important factors and their association with low back pain.

Moreover, 41.2% of the participants who had low back pain reported that their pain affects their performance in

Table 3 Factors associated with low back pain

Variable	Low back pain				OR	CI (95%)	*p* Value
	No n (%)		Yes n (%)				
Group							
Professors	36	12,24%	51	7,46%	1	–	–
Students (1st to 4th year)	237	80,61%	594	86,84%	1,77	1,12-2,77	0,013*
Students (5th to 6th year)	21	7,14%	39	5,70%	1,31	0,67-2,61	0,436
Gender							
Female	177	60,20%	547	79,97%	1	–	–
Male	117	39,80%	137	20,03%	0,38	0,28-0,51	<0,001*
Institution							
1	100	34,01%	284	41,52%	1	–	–
2	114	38,78%	181	26,46%	0,56	0,4-0,77	<0,001*
3	80	27,21%	219	32,02%	0,96	0,68-1,36	0,834
Previous spinal problem							
No	263	89,46%	482	70,47%	1	–	–
Yes	31	10,54%	202	29,53%	3,56	2,4-5,43	<0,001*
Family history of spinal problems							
No	177	60,20%	314	45,91%	1	–	–
Yes	117	39,80%	370	54,09%	1,78	1,35-2,36	<0,001*
Sits correctly							
No	66	22,45%	255	37,28%	1	–	–
Almost never	129	43,88%	323	47,22%	0,65	0,46-0,91	0,012*
Almost always	80	27,21%	98	14,33%	0,32	0,21-0,47	<0,001*
Yes	19	6,46%	8	1,17%	0,11	0,04-0,25	<0,001*
Daily sleeping before the pandemic							
Less than 6 hours	74	25,17%	242	35,38%	1	–	–
6-9 hours	216	73,47%	434	63,45%	0,61	0,45-0,83	0,002*
More than 9 hours	4	1,36%	8	1,17%	0,61	0,19-2,34	0,433
Daily sleeping during the pandemic							
Less than 6 hours	26	8,84%	127	18,57%	1	–	–
6-9 hours	233	79,25%	464	67,84%	0,41	0,26-0,63	<0,001*
More than 9 hours	35	11,90%	93	13,60%	0,54	0,3-0,96	0,038*

(*Continued*)

Table 3 (*Continued*)

Variable	Low back pain				OR	CI (95%)	*p* Value
	No n (%)		Yes n (%)				
Alcohol consumption							
No	104	35,37%	270	39,47%	1	–	–
Yes	190	64,63%	414	60,53%	0,84	0,63-1,11	0,227
Coffe consumption							
No	76	25,85%	202	29,53%	1	–	–
Yes	218	74,15%	482	70,47%	0,83	0,61-1,13	0,242
Tabbaco cosumption							
No	283	96,26%	661	96,64%	1	–	–
Yes	11	3,74%	23	3,36%	0,9	0,44-1,93	0,767
Physical exercise before the pandemic							
No	88	29,93%	213	31,14%	1	–	–
Yes	206	70,07%	471	68,86%	0,94	0,7-1,27	0,707
Physical exercise during the pandemic							
No	84	28,57%	282	41,23%	1	–	–
Yes	210	71,43%	402	58,77%	0,57	0,42-0,76	<0,001*

Abbreviations: CI, confidence interval; OR, odds ratio.
* = statistically significant.

college related activities. Besides that, 52.3% of the participants who reported having low back pain indicated that it impairs their concentration. Also, 59.6% of them reported that the pain altered their humor significantly, causing anxiety, sadness or anger. Other than that, 37.9% of those who reported low back pain also reported that the pain makes it difficult to remain sited for more than 30 minutes. Thus, it is evident that low back pain in these individuals is certainly able to impair their academic and daily life.

When asked about the intensity of their pain in a scale of 1-10, before the pandemic, the most common reported pain intensities were between 4 and 5. During the pandemic, however, the most common reported pain intensities were between 6 and 7. Although there was only a slight increase in pain intensity, due to a higher exposure to risk factors, the pandemic could have had worsen these individuals low back intensity.

Discussion

The aim of this study was to investigate the presence of low back pain in medical students and professors in three universities located in different regions of Brazil.

There was a significant increase in the prevalence of low back pain in all studied groups, except in 5th and 6th year students. This probably occurred because these students continued their normal schedule, even with the pandemic, because at this stage of the medical course, they basically only go to hospitals. The overall prevalence of low back pain, considering all participants, increased from 53.37% before the pandemic to 69.94% during the pandemic. Considering only 1st to 4th year students, the prevalence of low back pain was 54.75% before and 71.48% during the pandemic. It is evident that, during the pandemic, the academic routine of 5th and 6th year students was altered as much when compared to the routine of 1st to 4th year students and professors, which may explain the unaltered prevalence of low back pain in this group, as there was no increased exposure to risk factors related to low back pain.

Also, the prevalence of low back pain is higher among women than among men, corroborating findings by other authors.[17–19] Furthermore, in our study, the existence of a family history of spinal problems was related to the prevalence of low back pain. The same result was obtained by Alshagga et al.[20] and Ilic et al.,[21] who found a positive relationship between family history of musculoskeletal disorders and the prevalence of low back pain.

Regarding tobacco use, several studies indicate that smoking could be a risk factor for low back pain.[22–24] However, in our study, it was not possible to determine this association, as in another study carried out in Brazil with 629 students of medicine during a non-pandemic period.[11] Furthermore, engagement in physical exercise proved to be protective against the onset of low back pain, corroborating the study by Sihawong et al.[25]

Having good quality sleep, in our study, was also a protective factor against the onset of low back pain, in line with another study that found a trend of worse low back pain in individuals with poor quality sleep.[26] On the other hand, although sitting correctly was found to be a protective factor

against low back pain, De Carvalho et al.,[27] in their meta-analysis, did not find a significant relationship between sitting positions and the presence of low back pain compared to standing positions, concluding that more studies are needed to better elucidate this issue. It is worth mentioning that sitting correctly was evaluated according to the perception of each respondent and needs to be viewed with caution.

Respondents from institution number 2 were less likely to have low back pain when compared to the other institutions. Comparing the exposure to risk factors among individuals from the three participating universities, individuals from institution number 2 reported greater engagement in exercise during the pandemic (77.96% reported practicing, compared to 65.88% and 48.17% in the other two institutions) and better sleep quality (92.54% reported sleeping more than 6 hours per night, compared to 75.5% in institution number 1, for example). This may reflect lower exposure to risk factors related to low back pain.

Considering the high rate of individuals who reported impairment in their college activities due to the presence of low back pain (28.83%), it is evident that this condition could impact the academic performance of these professors and students.

The main limitations of this study are inherent to the retrospective cohort model. In addition, data related to professors should be analyzed with caution, as the number of participants in this group was below the expected number, except for professors from university 1. However, there is a very high prevalence of low back pain in medical students and professors, indicating the need to implement preventive strategies to minimize the problem.

Conclusion

The prevalence of low back pain is high among medical students and professors, further increasing during the pandemic period, except among 5th and 6th year students. Family and personal history of spinal problems, female gender and poor posture when sitting were found to be risk factors, while physical exercise and good quality sleep were protective factors against the onset of low back pain. Furthermore, considering the paucity of data on the real impacts of this high prevalence of low back pain in these groups, more specific studies on the subject are still needed.

Authors' Contributions

Each author contributed individually and significantly to the development of this article**.** AFM (0000-0002-9419-7777)*: data curation (equal), investigation (equal), methodology (equal), writing-original draft (equal) and writing-review and editing (equal); NFL (0000-0002-3874-4588)*: data curation (equal), investigation (equal), methodology (equal), writing-original draft (equal) and writing-review and editing (equal); MW (0000-0003-1961-6537)*: conceptualization (equal), methodology (equal), project administration (equal), supervision (equal), writing-original draft (equal) and writing-review and editing (equal); and DEM (0000-0001-5510-3507)*: conceptualization (lead), data curation (equal). Investigation (equal), methodology (equal), project administration (equal), supervision (equal), writing-original draft (equal) and writing-review and editing (equal). *ORCID (Open Researcher and Contributor ID).

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Conflicts of Interests

The authors declare that they have no conflict of interest.

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