





EPIDEMIOLOGICAL STUDY OF NECK AND LOW BACK PAIN PREVALENCE IN PROFESSIONAL MUSICIANS

ESTUDO EPIDEMIOLÓGICO DA PREVALÊNCIA DE CERVICALGIA E LOMBALGIA EM MÚSICOS PROFISSIONAIS

ESTUDIO EPIDEMIOLÓGICO DE LA PREVALENCIA DE CERVICALGIA Y LUMBALGIA EN MÚSICOS PROFESIONALES

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ABSTRACT

Objective: This study aimed to determine the prevalence of neck pain and back pain in professionals whose primary work activity is related to playing musical instruments. **Method:** A non-randomized quantitative cross-sectional clinical study was conducted, where data were collected through an online questionnaire. **Results:** Out of the 98 participating musicians, the majority (73.5%) were male, with an average age of 33. Approximately 70% of participants reported experiencing some type of pain, with back pain (20.4%), neck pain (14.3%), and the coexistence of both conditions (36.7%) being the most frequent complaints. The most common musical instruments were the guitar (19.4%), followed by the piano (11.2%), drums (8.2%), and keyboard (7.1%). Interestingly, most musicians (61.2%) did not warm up before practicing music. **Conclusions:** This study confirms that musicians face a significantly higher risk of developing neck and back pain than the general population, corroborating previous findings. Factors such as gender, weight, duration of musical practice, and age play complex roles in the manifestation of these pains, emphasizing the need for targeted prevention and intervention strategies for this community. **Level of Evidence IV; Retrospective Observational Study.**

Keywords: Prevalence; Neck pain; Low Back Pain; Music.

RESUMO

Objetivo: Este estudo teve como objetivo determinar a prevalência de cervicalgia e lombalgia em profissionais cuja principal atividade laboral está relacionada ao uso de instrumentos musicais. **Método:** Foi conduzido um estudo clínico transversal quantitativo não randomizado, no qual os dados foram coletados por meio de um questionário online. **Resultados:** Dos 98 músicos participantes, a maioria (73,5%) era do sexo masculino, com uma idade média de 33 anos. Aproximadamente 70% dos participantes relataram experimentar algum tipo de dor, sendo a lombalgia (20,4%), a cervicalgia (14,3%) e a coexistência de ambas as condições (36,7%) dentre as queixas mais frequentes. Os instrumentos musicais mais comuns foram o violão (19,4%), seguido pela guitarra (11,2%), piano (11,2%), bateria (8,2%) e teclado (7,1%). A maioria dos músicos (61,2%) não realizava aquecimento antes de praticar música. **Conclusões:** Este estudo confirma que músicos enfrentam um risco consideravelmente maior de desenvolver cervicalgia e lombalgia em comparação com a população em geral, corroborando descobertas prévias. Fatores como gênero, peso, tempo de prática musical e idade desempenham papéis complexos na manifestação dessas dores, ressaltando a necessidade de estratégias direcionadas para prevenção e intervenção voltadas para essa comunidade. **Nível de Evidência IV; Estudo Observacional Retrospectivo.**

Descritores: Prevalência; Cervicalgia; Dor Lombar; Música.

RESUMEN

Objetivo: Este estudio tuvo como objetivo determinar la prevalencia de cervicalgia y lumbalgia en profesionales cuya principal actividad laboral está relacionada con el uso de instrumentos musicales. **Método:** Se llevó a cabo un estudio clínico transversal cuantitativo no aleatorizado, en el que los datos se recopilaban a través de un cuestionario en línea. **Resultados:** De los 98 músicos participantes, la mayoría (73,5%) eran hombres, con una edad promedio de 33 años. Aproximadamente el 70% de los participantes informaron experimentar algún tipo de dolor, siendo la lumbalgia (20,4%), la cervicalgia (14,3%) y la coexistencia de ambas condiciones (36,7%) entre las quejas más frecuentes. Los instrumentos musicales más comunes fueron la guitarra (19,4%), seguida del piano (11,2%), la batería (8,2%) y el teclado (7,1%). Curiosamente, la mayoría de los músicos (61,2%) no realizaban calentamiento antes de practicar música. **Conclusiones:** Este estudio confirma que los músicos enfrentan un riesgo considerablemente mayor de desarrollar cervicalgia y lumbalgia en comparación con

Study conducted by the Faculdade de Medicina Santa Marcelina, Department of Orthopedics and Traumatology, Spinal Pathologies Group, São Paulo, SP, Brazil.

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la población en general, corroborando hallazgos previos. Factores como el género, el peso, la duración de la práctica musical y la edad desempeñan roles complejos en la manifestación de estos dolores, lo que enfatiza la necesidad de estrategias dirigidas a la prevención e intervención específicas para esta comunidad. **Nivel de Evidencia IV; Estudio Observacional Retrospectivo.**

Descriptor: Prevalencia; Dolor de Cuello; Dolor de la Región Lumbar; Músico.

INTRODUCTION

Neck pain and low back pain are two of the most prevalent musculoskeletal disorders, affecting approximately 11.9% of the global population chronically, with about 80% of people experiencing these symptoms at some point in their lives.¹ These complaints are especially common in individuals aged between 40 and 60 years.² However, several factors contribute to the increased prevalence of these symptoms, including a sedentary lifestyle, the average weight gain of the population, obesity, and changes in work demands. The COVID-19 pandemic exacerbated this situation, with a 69% increase in remote work and a 41% increase in back pain.³

Neck pain is characterized by pain in the posterolateral region of the neck, in the cervical vertebrae C1 to C7. This pain is common due to the high mobility of this part of the spine.⁴ Artists who use musical instruments often keep their heads tilted, increasing the risk of musculoskeletal injuries in this region.⁵ This pain can radiate to the head, shoulders, and upper limbs, configuring a condition known as cervicobrachialgia.

Low back pain, in turn, is defined as pain in the lumbar region between the L1 and L5 vertebrae. Although less prevalent than headache as a complaint, low back pain is a common problem, often related to postural issues.⁶ Although these pains are generally acute and self-limiting, lack of correction can lead to chronic conditions and functional limitations. Low back pain is the leading cause of functional limitations in individuals under 45 years old.²

Neck pain and low back pain can result from various structures, including ligaments, intervertebral fibrous rings, joints, muscles, blood vessels, and nerves, originating in about 90-95% of indeterminate cases.⁵ These complaints are classified based on duration, ranging from acute (less than six weeks), subacute (between 6 and 12 weeks), and chronic (more than 12 weeks). In addition, they can be classified according to their causes, being primary, of mechanical origin (which represents about 97% of cases), or secondary, of systemic or visceral origin.²

Studies indicate that low back pain is one of the main causes of occupational health problems and one of the major risk factors for back pain, especially in work environments that involve exposure to factors such as temperature, vibration, noise, mechanical pressure, or ergonomics.⁵ Repetitive tasks and lack of posture changes also contribute to these pains, which are particularly relevant for the population in question. In addition, factors such as advanced age, BMI, sedentary lifestyle, smoking, depression, and other psychosocial conditions, such as anxiety and pregnancy, are also significant risk factors.⁷

Musical practice involves ergonomic and mechanical factors ranging from posture to delicate finger movements. Searching for an adequate technique and understanding how the body responds to musical practice is essential. These factors require musicians to maintain an adequate physical condition, especially when it comes to an activity that extends over many years and, for many, is the foundation of their careers.

In recent years, there has been an increase in awareness about musicians' health, with studies indicating the presence of pain, joint stiffness, and muscle fatigue among professionals in the field.⁸ This study explores an important characteristic: categorizing instruments as risk groups. For example, suppose guitarists experience less back pain than keyboardists. In that case, this can be attributed to factors such as the shape and size of the instruments, weight variation, change of position during performance, and the positioning of limbs to achieve a better musical result, among others. These factors influence the type and intensity of injuries.⁹

It is relevant to highlight that although health problems related to musicians have aroused interest, research in this field, especially in Brazil, remains limited. A musician's health directly affects their quality of work, making musculoskeletal injuries a potential threat to their careers. Therefore, it is crucial to study the symptoms in the work environment to understand the causal factors, their frequency, and impact. By identifying these factors and collecting data on the prevalence of low back pain and neck pain in musicians, we can raise awareness among the class about the risks and promote preventive measures.

The main objective of this study was to determine the prevalence of neck pain and lower back pain in professional musicians. The secondary objectives include assessing the relationship between low back and neck pain with age, gender, height, time working in music, and weekly practice time. Furthermore, it seeks to investigate whether the incidence of low back pain and neck pain varies among specific musical instruments.

MATERIALS AND METHOD

Study design

This study adopted a non-randomized cross-sectional research approach. The data was collected through an online questionnaire completed by 98 participants over 18 years old, of both sexes, literate, and without ethnic restrictions. The inclusion of participants was based on the condition that their main means of work was related to using a musical instrument and that they had at least one year of experience in this practice.

Participants who refused to share their data or met the inclusion criteria but had congenital spinal deformities were excluded from the research.

All volunteers who agreed to participate in this study confirmed that they had read and accepted the terms of the research. The participants were informed that their data would be used anonymously, as approved by the Research Ethics Committee (CEP) for online research. Consent was obtained through a statement that the participants agreed to accept. The full document of the Informed Consent Form (ICF), as applied in this study, is available in the project appendix.

The variables evaluated included Gender, Age, Height, Weight, Time of Musical Practice, Main Instrument of Practice, Weekly Physical Activity Hours, Main Area of Activity in Music, Daily Hours Working in Front of a Computer, Number of Daily Hours Dedicated to Direct Work with the Musical Instrument, Warm-up and Stretching, History of Pain.

Interrogation about Pain: A specific questionnaire about pain was conducted, including information on duration, type, factors of improvement, factors of worsening, use of medication, irradiation, and history of diagnosis of orthopedic diseases after the start of the study.

Statistical analysis

For the statistical analysis of the data, the following software was used: R (version 4.0.2, 2020-06-22), R Studio (version 1.2.5033), and Microsoft Office Pro Plus. Statistical tests, including the Kruskal-Wallis and Fisher's exact tests, were applied to assess the correlations between the variables.

RESULTS

General Characterization of the Sample

The sample of this study consisted of 98 participants, of which 26 (26.5%) were female and 72 (73.5%) were male. The average

age was 33.0 years, with a standard deviation of 8.0 years, ranging from 19 to 55 years. The average height of the sample was 170.7 cm, with a standard deviation of 14.7 cm, while the average weight was 74.2 kg, with a standard deviation of 14.4 kg. The details about age, height, and weight are summarized in Table 1.¹⁰

Characterization of Pain and Work

Only 28 (28.6%) participants reported not feeling any kind of pain. The most common occurrence was neck and back pain, reported by 36 participants (36.7%). The table presented detailed information about the occurrence of pain.

The variety of types of musical instruments among the participants was remarkable, with emphasis on guitar, electric guitar, piano, drums, and keyboard, all with at least 7 participants, which totaled 57.1% of the sample. The details about the distribution of participants by type of instrument are summarized in Table 2.

Regarding warm-up practices, 60 participants (61.2%) said they did not perform them. Before and after the pandemic, the main predominant activity for the sample was in shows and performances, with 50% and 43.9%, respectively. These data are presented in Table 2.

The average number of years of musical practice in the sample was 15.6 years, with a standard deviation of 7.96. Regarding the amount of time dedicated to working with music, 39.1% of participants reported dedicating 1 to 2 hours per week, while 32.6% dedicated 2 to 4 hours per week. Regarding the time spent working seated in front of a computer, 37.7% reported doing so for 1 to 2 hours per week, and 30.6% reported 2 to 4 hours per week. Regarding weekly physical activity, 20.4% did not engage in physical activity, 37.7% reported practicing 1 to 2 hours per week, and 27.5% 2 to 4 hours per week (Table 3).

To identify correlations between qualitative variables and the occurrence of pain, we performed cross-tabulations and Fisher's exact tests. Fisher's exact test was chosen due to the presence of several cells with a low number of participants. The results of Fisher's Exact Tests are summarized in Table 4.^{11,12}

All variables related to musical instruments were cross-tabulated and tested for only 56 participants. Due to the scarcity of data in other categories, the sample was restricted to instruments with at least 7 participants to enable the analysis. Furthermore, the gender variable remained an explanatory factor for the occurrence of pain. It showed an association between the type of instrument and areas of activity before and after the pandemic. This association suggests the presence of gender issues in the field of music, as discussed in the next results section.¹²

We then performed Kruskal-Wallis tests with the quantitative variables and the pains to identify their association. The Kruskal-Wallis test is a non-parametric test suitable for the subject because we have a relatively small sample and want to test if there is statistical significance in the central measures of the variables in the type of pain.¹³

Before conducting tests with quantitative variables, we present boxplots to illustrate the relationship between the variables and the types of pain. Figure 1 shows the boxplots for each type of pain about the quantitative variables of interest.

We note that age plays an important role in pain, with the median age being higher in the three types of pain. In the same way, height, weight, and years of work also showed differences between those with and without pain. Regarding the hours spent on the computer, a lower median was observed among participants with neck pain. On the other hand, the median hours dedicated to the instrument were higher among those with neck pain. The median hours dedicated

Table 1. Age, height, and weight variables of the participants.

	Average	Standard Deviation	Median	Minimum	Maximum
Age (years)	33.0	8.0	32.0	19.0	55.0
Height (cm)	170.7	14.7	173.0	68.0	191.0
Weight (kg)	74.2	14.4	74.5	47.0	110.0

Table 2. Data related to pain, types of musical instruments, warm-up exercises, and work area before and after the pandemic.

	Total	%
Frequency of pain		
None	28	28.6
Only back	20	20.4
Only neck	14	14.3
Both	36	36.7
Total	98	100.0
Musical instruments		
Guitar	19	19.4
Guitar	11	11.2
Piano	11	11.2
Battery	8	8.2
Keyboard	7	7.1
Vocal	6	6.1
Low	6	6.1
Cavaquinho	6	6.1
Violin	6	6.1
Clarinet	4	4.1
Percussion	3	3.1
Saxophone	3	3.1
Cello	2	2.0
Trombone	2	2.0
Transverse Flute	2	2.0
Accordion	1	1.0
Trumpet	1	1.0
Total	98	100.0
Warm-up exercise		
No	60	61.2
Yes	38	38.8
Total	98	100.0
Pre-pandemic area of expertise		
Classes	21	21.4
Shows and Presentations	49	50.0
Content Creation	7	7.1
Composition	13	13.3
Mixing and Recording	8	8.2
Total	98	100.0
Post-pandemic area of expertise		
Classes	22	22.4
Shows and Presentations	43	43.9
Content Creation	9	9.2
Composition	15	15.3
Mixing and Recording	9	9.2
Total	98	100.0

Table 3. Data related to time spent on musical, work, and physical activities.

Time and hands of musical practice – average (SD)	
15.63 (7.96)	
Hours of work with the musical instrument per week – n(%)	
0	0
1-2	39 (39.8)
2-4	32 (32.6)
4-6	18 (18.4)
+6	9 (9.2)
Hours of computer work per week – n(%)	
0	0
1-2	37 (37.7)
2-4	30 (30.6)
4-6	12 (12.3)
+6	19 (19.4)
Hours of physical activity per week – n(%)	
0	20 (20.4)
1-2	37 (37.7)
2-4	27 (27.5)
4-6	9 (9.2)
+6	5 (5.2)

Table 4. Association between variables.

Variable 1	Variable 2	N	P-Value
Pain	Gender	98	0.0011 *
Pain	Instrument	56	0.0638
Pain	Area Before	98	0.1528
Pain	Post Area	98	0.0796
Pain	Heating	98	0.0920
Instrument	Gender	56	0.0165 *
Instrument	Area Before	56	0.2959
Instrument	Post Area	56	0.0042 *
Instrument	Heating	56	0.1005
Gender	Area Before	98	0.0420 *
Gender	Post Area	98	0.0021 *
Gender	Heating	98	0.0992
Heating	Area Before	98	0.8977
Heating	Post Area	98	0.7826
Age	Pain	98	0.0020
Height	Pain	56	0.0103 #
Weight	Pain	98	<0.0001 #
Years of work	Pain	98	<0.0001
Hours on the computer	Pain	98	0.8410 #
Hours with the instrument	Pain	56	0.0784 #

Fisher's Exact Tests *; Kruskal-Wallis Tests #.

to the instrument were also higher among those who reported neck and back pain.

We present boxplots for the same quantitative variables based on gender in Figure 2. However, the analysis was limited due to uneven sampling, with the maximum age for women being 39 years, while for men, it was 55 years. This made it impossible to compare older women with older men. The variable "years of work" also showed an obvious correlation with age, contributing to the absence of female participants with more than 26 years of experience. Weight and height data were also influenced by gender. Regarding the working time with computers and instruments, the medians did not show significant differences between genders.

DISCUSSION

In this study, we identified some interesting associations between qualitative variables and the incidence of musculoskeletal pain among musicians. Although the main objective of the research is to investigate the incidence of pain, the results suggest that the field of music may present significant differences in gender behavior among musicians. These differences were noted, especially when the analysis focused on activities before and after the pandemic.

Before the pandemic, the distribution of musicians across various fields did not reveal a significant association with gender, but a notable change was observed after the pandemic. Increased content production at the expense of live shows was more evident among

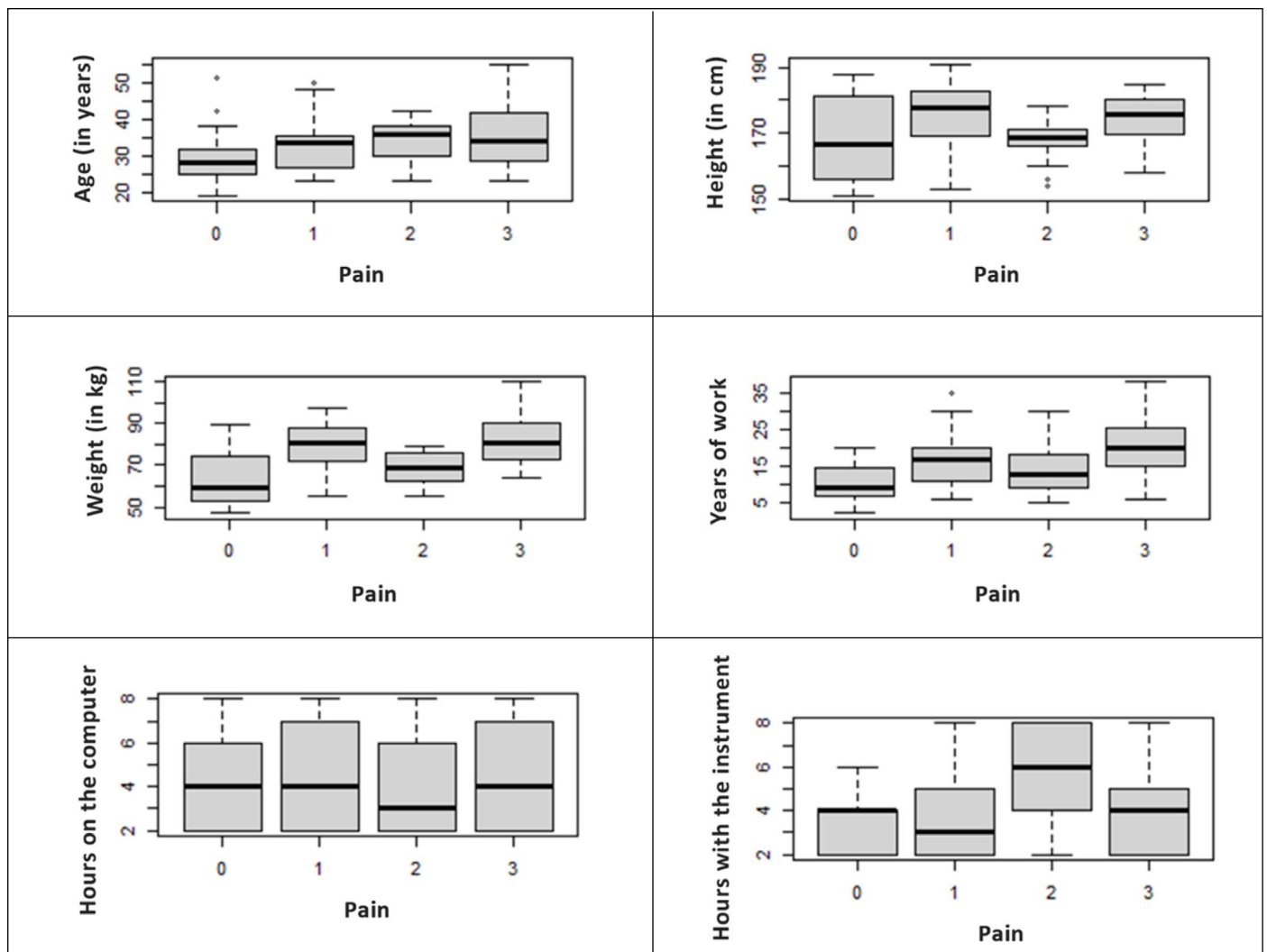


Figure 1. Boxplots for age, height, weight, years of work, hours on the computer, and hours with the instrument according to the type of pain (0 = no pain, 1 = low back pain, 2 = neck pain, 3 = both pains).

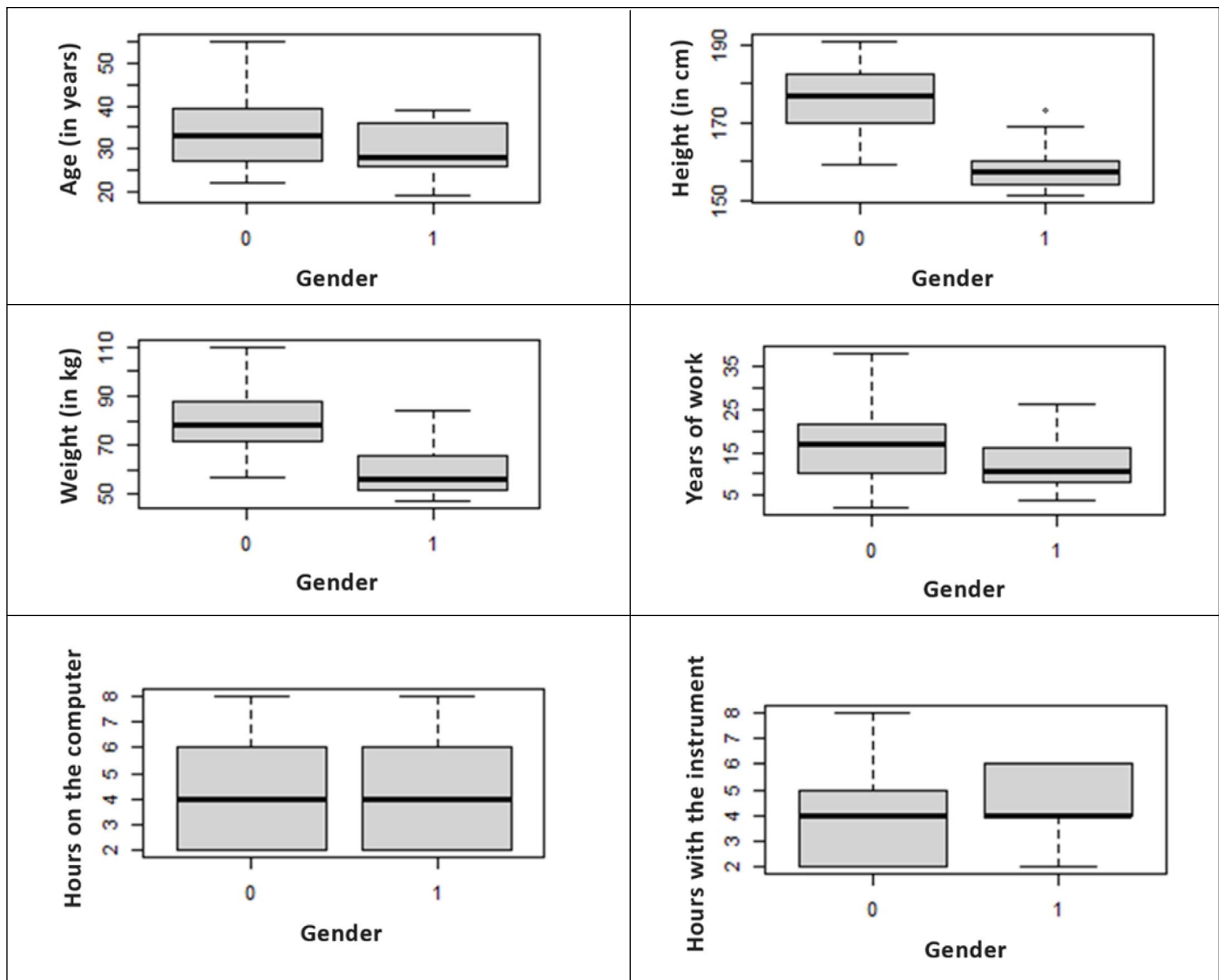


Figure 2. Boxplots for age, height, weight, years of work, hours on the computer, and hours with the instrument according to gender (0 = male and 1 = female).

female musicians. This migration is likely related to the fact that the pandemic forced many musicians to adapt their activities to the home environment, which may significantly impact the future occurrence of muscle pain. This association can be further explored in future studies with larger samples and more details about working conditions during and after the pandemic.

The association between gender and warming up before playing an instrument is also interesting. Although this association did not reach statistical significance, a higher proportion of women reported warming up, resulting in fewer women experiencing pain than men. The relationship between gender and musical instruments is also notable, with more women playing the piano while men more commonly play the guitar. This association suggests that there may be intrinsic differences in instrument preference between genders in the studied sample. However, this issue requires further investigation, possibly in specific studies on gender and music.

Regarding the association of pain with other qualitative variables, the only statistically significant relationship observed was about gender. A relevant fact is that the proportion of women without pain is significantly higher than that of men. Although the reasons for this association were not explored in this study, it may result from a complex combination of factors, including the type of musical instrument (such as the piano), the performance of warm-ups, and the activity area after the pandemic. Furthermore, the possible presence

of sampling bias in the selection of participating musicians cannot be ruled out.

Analyzing the data separately by gender, a significant difference was observed in the incidence of pain between men and women. Women showed a lower pain incidence than men, which is an intriguing finding. Furthermore, most people who perform warm-up and stretching activities before playing an instrument are female. The incidence of pain was also lower among those who warm up, emphasizing the importance of this practice in maintaining spinal health.

Regarding quantitative variables, such as weight and height, the results matched the general population's expectations, where greater weight and height were associated with a higher incidence of muscle pain.

Regarding the incidence of pain in musicians, it was observed that low back pain affected 57.1% of the sample, while neck pain affected 51%. These rates are comparable to the results found in previous studies.^{14,15} Considering the incidence of both pains, 71.4% was reached, much higher than the rate of 11.9% in the general population suffering from chronic pain. However, this is within the range of approximately 80% of the population that will experience some type of pain at some point. Given that the average age of the participants was 33 years, below the onset of the increase in the incidence of chronic pain in the general population, it can be inferred

that playing a musical instrument did not increase the incidence of pain but possibly brought forward the age of onset of this pain.

It is important to note that although most participants experienced pain, the majority of them reported improvement after using common painkillers. This suggests that many cases of pain among musicians are acute and have a low likelihood of developing into chronic conditions.

The change in work styles during the pandemic was significant, with 6.1% of participants moving from show and performance areas to activities that can be done at home, such as teaching, mixing, recording, and musical composition. This change may have contributed to the early increase in the incidence of pain, a phenomenon that has already been observed in other work sectors.

When we examine the relationship between pain, the time spent practicing music, and the number of years of practice, we do not find statistically significant data. This lack of association can be attributed to the need for a larger sample to draw more solid conclusions. Another possibility is that practice time is not the critical factor but rather the way the musician plays the instrument.

The analysis of differences in the incidence of pain among musical instruments revealed that only instruments with more than 7 participants were relevant for statistical analysis. The piano, played mainly by women, showed a lower incidence of pain. In contrast, the drums, which involve standing and supporting the instrument's weight, had the highest incidence of low back pain. The guitar was the instrument with the highest incidence of neck pain. These findings open the possibility of further investigating how playing an instrument, such as sitting or standing, can affect spinal health.

Despite the limited sample size of this study, it is suggested that warm-up exercises before playing an instrument and regular physical activity can have a positive impact on musicians' spinal health. These findings highlight the importance of considering preventive

and wellness measures for musicians, a population often overlooked in studies and occupational disease prevention campaigns.

The analysis of gender and weight variables highlights the influence of these epidemiological factors on the manifestations of these symptoms among musicians. This demonstrates that musical practice does not exempt this population from the common neck pain and low back pain risks.

Regarding the time of musical practice and age, our results indicate a complex relationship between these variables and the incidence of pain. Although the pains were slightly more prevalent in musicians with more accumulated practice time, age also seems important in this context.

These insights are essential for raising awareness about the health risks musicians face and can guide the development of more effective prevention and intervention strategies to improve the well-being of this community. However, it is important to emphasize that more research is needed to deepen our understanding of these complex interactions and to develop more targeted approaches for mitigating neck and lower back pain in musicians. Therefore, future studies with larger samples are crucial to gain a more comprehensive understanding of these issues and to develop more effective preventive strategies for musicians.

CONCLUSION

We conclude that musicians are at a significantly higher risk of developing neck and lower back pain than the general population.

All authors declare no potential conflict of interest related to this article.

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