Postural Hypervigilance and Perception of Correct Sitting Posture in Individuals With and Without Low Back Pain

Hipervigilância postural e percepção da postura correta sentada em indivíduos com e sem dor lombar

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Abstract

Objectives To verify if there is a difference in postural hypervigilance in sitting in individuals with and without low back pain. Additionally, to observe whether there is a difference in the perception of correct sitting posture between individuals with low back pain and without low back pain.

Methods The present study has a cross-sectional observational design, as a sample size of 92 individuals, later divided equally into two groups (with low back pain and without low back pain). Two instruments were used: the hypervigilance scale to analyze the frequency that volunteers correct their sitting posture during the day, and posture scans to investigate the perception of volunteers about the correct sitting posture. The data were submitted to the Shapiro-Wilk Normality test. To compare the values of Hypervigilance Scale, the Mann-Whitney, Chi-Square, and Fisher Exact tests were used to assess correct sitting posture.

Results There was no significant difference between postural hypervigilance in sitting between individuals with low back pain and without low back pain. There was no significant difference between the choice of correct sitting posture between the group of individuals with and without low back pain.

Conclusion There is no difference between the choice of correct sitting posture and the amount of postural hypervigilance in individuals with or without low back pain.

Keywords
- low back pain
- hypervigilance
- posture
- sitting position
- lordosis

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Resumo

Objetivos Verificar se há diferença na hipervigilância postural sentada em indivíduos com e sem dor lombar. Além disso, observar se há diferença na percepção da postura correta sentada entre indivíduos com dor lombar e sem dor lombar.

Métodos O presente estudo possui delineamento observacional transversal, como tamanho amostral de 92 indivíduos, posteriormente divididos igualmente em dois grupos (com dor lombar e sem dor lombar). Foram utilizados dois instrumentos: a escala de hipervigilância para analisar a frequência que voluntários corrigem a postura sentada no dia; e o quadro de posturas para investigar a percepção dos voluntários sobre a postura correta sentada. Os dados foram submetidos ao teste de Normalidade de Shapiro-Wilk. Para comparar os valores da Escala de Hipervigilância foi utilizado o teste de Mann-Whitney e o teste Qui-Quadrado e Exato de Fisher para avaliação da postura correta sentada.

Resultados Não houve diferença significativa entre a hipervigilância postural sentada entre indivíduos com dor lombar e sem dor lombar. Não houve diferença significativa entre a escolha da postura correta sentada entre o grupo de indivíduos com e sem dor lombar.

Conclusão Não há diferença entre a escolha da postura correta sentada e quantidade de hipervigilância postural em indivíduos com ou sem dor lombar.

Palavras-chave
- dor lombar
- hipervigilância
- postura
- postura sentada
- lordose

Introduction

Low back pain is complex and multifactorial, with global dysfunctions covering structural, biomechanical, and psychosocial changes, such as functional disability, social isolation, and absence and/or low productivity at work.[1] One of the deficiencies in structure and function resulting from this complaint may be deficit in neuromuscular control, such as difficulty in relaxing the paravertebral muscles during total trunk flexion, and decreased muscle resistance when compared to asymptomatic individuals.[2]

Thus, the musculature can be activated to try to prevent structural lesions and symptoms of low back pain.[3] This excessive recruitment of the musculature may demonstrate postural hypervigilance.

Individuals with low back pain report that they constantly focus on their pain and use beliefs to prevent the recurrence of pain, for example, in the adoption of different postures. These preexisting beliefs can be considered predictors of disability and generate little adjustment to chronic pain.[4] with this, patients focus on the perception of attitudes, especially postural perception, which can lead to an increase in pain.[4] Chronic pain and its overvaluation can lead to hypervigilance.[5] Thus, it is assumed that postural hypervigilance is higher in people with low back pain, and lordotic posture (extensor) is more frequently used, even with differences in age or gender, while flexion posture is commonly classified as the worst posture.[6]

Accordingly, there are two contrasting theories about what constitutes the correct sitting posture. One theory postulates that a flexed lumbar spine (cyphotic spine) provides the ideal sitting posture, as it reduces compressive stress in the posterior annulus.[7] The second theory indicates that maintaining lumbar lordosis, or extensor/lordotic posture, is important with the use of a lumbar support during sessions, as it can reduce disc pressure.[8]

There is a hypothesis that flexion postures are considered dangerous in people with low back pain, but there are no studies investigating the population that does not have it.[3] There were indications that both erect and curved postures have the same spinal load and compression forces.[3] Individuals with symptoms of low back pain may perform hypervigilance, possibly due to a belief that a more upright posture is visualized as correct, in comparison with the other, with the justification that the recruitment of the extensor musculature is able to reduce damage and pain associated with low back pain.[3]

Thus, the aim of the present study was to investigate whether there is a difference in the postural hypervigilance of the population with and without low back pain, as well as to observe the perception of correct sitting posture in these two populations.

Materials and Methods

The present study presents a cross-sectional observational design. The research was approved by the Research Ethics Committee (CAAE: 38385320.4.0000.5134).

The sample calculation was performed a priori with the GPower (Heinrich Heine University, Düsseldorf, Nordrhein-Westfalen, Germany) software, version 3.1.9.7, considering a 5% significance, power of 80%, and effect size of 0.6. Thus, the sample size was 92 participants. The volunteers were recruited through social media publications. Inclusion criteria were male or female individuals, aged between 18 and 60 years, who were divided, during data processing, into two groups: with and without low back pain.

Exclusion criteria were professionals and students in the area of physiotherapy, individuals who were unable to understand the directions to answer the proposed questions, and volunteers who did not want to participate in the study after reading the TCLE or who gave up during data collection.

After analyzing the questionnaires regarding the inclusion and exclusion criteria, the individuals who passed this selection were divided and allocated into two groups, one with low back pain (group A) and another without low back pain (group B).

Two instruments were used in this study. One to assess the perception of correct sitting posture (►**Figure 1**) and the other to assess postural hypervigilance (►**Appendix 1**, Supplementary material).

In the first instrument, to evaluate the perception of correct sitting posture, a picture frame was used for the volunteers to choose which sitting posture would be considered correct.[9] The posture photos were numbered from 1 to 9, in a 3×3 grid (►**Figure 1**).

The second instrument, the hypervigilance scale, was aimed to analyze the frequency that volunteers with and without low back pain correct their posture daily while sitting. The scale went from 0, I do not correct my sitting posture at any time, to 10, I always correct my sitting posture. (►**Appendix 1**, Supplementary material).

Initially, the individuals were informed and instructed about the objectives and stages of the research and invited to sign the Informed Consent Form (TCLE). If they chose to participate in the research, they would be submitted to the initial evaluation through the questionnaires sent by social networks for identification and division of the respective groups through the verification of inclusion and exclusion criteria, followed by the application of the two instruments mentioned above.

Data collection was performed via the internet through a Google Forms questionnaire (Google LLC., Mountain View, CA, USA). The researchers contacted individuals via an e-mail containing information on the study, and an attached address that led them to a form created by the evaluators on Google Forms platform, with questions on their demographic information, the inclusion and exclusion criteria, and the instruments explained in 5th paragraph of Materials and Methods. The instruments were sent along with the proper instructions for filling out the form, and only the evaluators had access to the answers.

This form was presented through pages, the first containing explanations about the Informed Consent. Only if the volunteer chose to participate in the research would the following pages be presented, with questions about demographic information, inclusion and exclusion criteria, and the instruments to be completed.

The numerical variables obtained through the instruments were categorized into a table in the Microsoft Excel (Microsoft Corp., Redmond, WA, USA) software, and were subsequently submitted to an evaluation of the distribution of data through the Shapiro-Wilk normality test. When presenting a non-normal distribution, medians and percentiles were calculated.

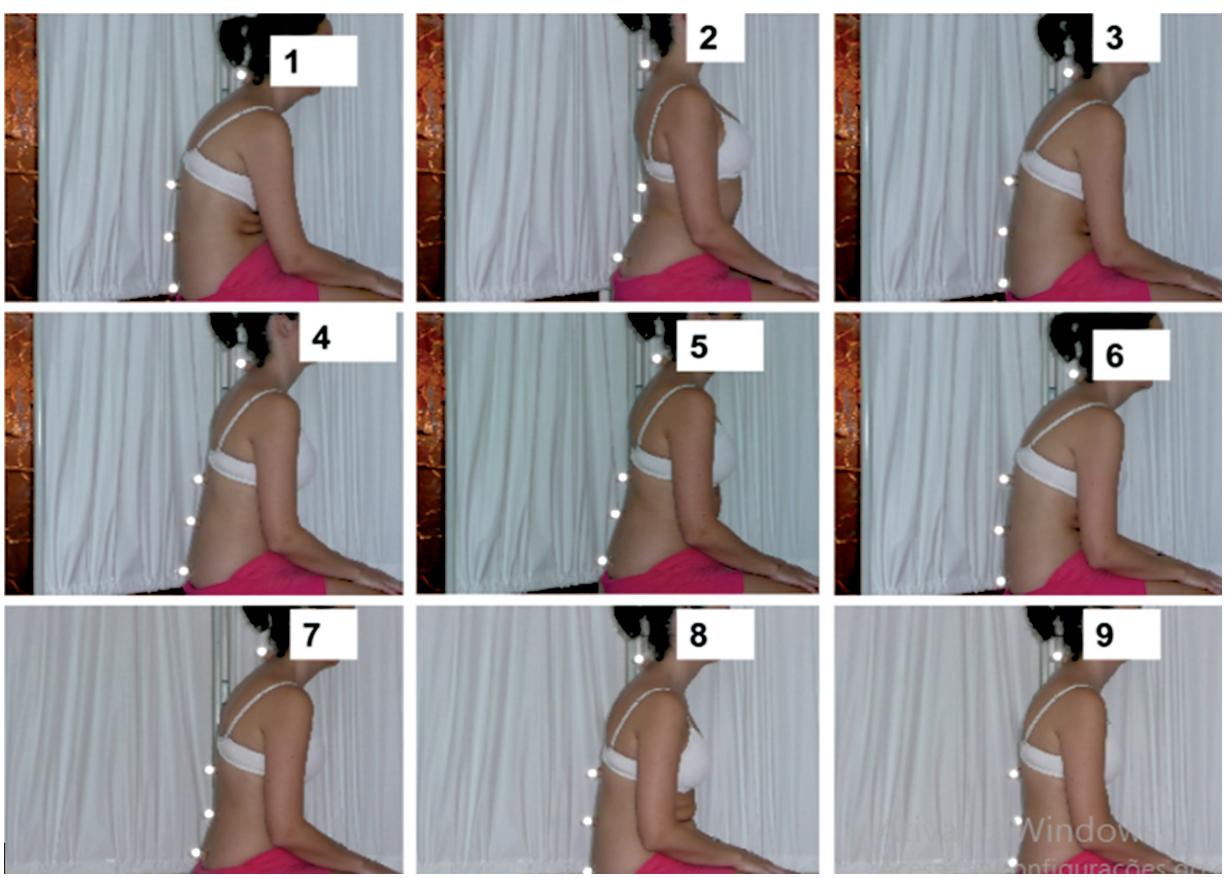

Fig. 1 Sitting postures.

To compare the values of the hypervigilance scale between groups A (with low back pain) and B (without low back pain), the Mann-Whitney test was used.

To evaluate the frequency of choice of correct sitting posture in both groups, the Fisher Chi-square and exact statistical tests were used, and the absolute and relative frequencies were calculated. Descriptive statistics were demonstrated by means and standard deviations for data analysis.

All statistical analyses were performed in the R (R Foundation for Statistical Computing, Vienna, Austria) software, version 3.6.3, with a significance level of 5% ($\alpha < 0.05$) adopted for all analyses.

Results

A total of 253 questionnaires were collected through Google Forms, containing demographic information, images about sitting postures, and the hypervigilance scale; 161 of those forms were excluded by the criteria mentioned in the 3rd paragraph of Materials and Methods. Thus, 92 forms were used, divided into two groups of 46 volunteers each, with and without low back pain. The presentation of data related to descriptive analysis was presented in ►**Table 1**.

After statistical analysis, it was possible to notice that there was no significant difference in the visual analog numerical scale of sitting postural hypervigilance between the groups of individuals with and without low back pain ($p = 0.498$).

Additionally, there was also no significant difference in the choice of photos of the different sitting postures that were considered correct by the volunteers. That is, there was no higher frequency of choice of one posture over the others ($p = 0.089$). Both results were detailed in ►**Table 2**.

Table 1 Descriptive analysis of data

Variables	N (% of total)
Gender	
Female	65 (70.7)
Male	27 (29.3)
Age	
18–39 years old	70 (76.1)
40–60 years old	22 (23.9)
Physical activity	
Yes	1 (1.1)
No	91 (98.9)
How long are you sitting?	
2–4h	15 (16.3)
4–8h	33 (35.9)
8–16h	42 (45.7)
> 16h	2 (2.2)

Table 2 Sitting postural hypervigilance and correct sitting posture among individuals with and without low back pain

Variables	Median (total N %)		
	With low back pain	Without low back pain	*p*-value
Correct sitting posture			0.089[F]
1	1 (2.2)	0 (0.0)	
2	9 (19.6)	14 (30.4)	
3	6 (13.0)	2 (4.3)	
4	5 (10.9)	8 (17.4)	
5	12 (26.1)	7 (15.2)	
6	1 (2.2)	0 (0.0)	
7	0 (0.0)	4 (8.7)	
8	2 (4.3)	0 (0.0)	
9	10 (21.7)	11 (23.9)	
Hypervigilance Scale	5.0 (4.0–6.0)*	6.0 (3.2–7.0)*	0.498[M]

Notes: [F] Fisher exact test; [M] Mann-Whitney test; *Average (standard deviation).

Discussion

The objectives of this study were to investigate whether there is a difference in postural hypervigilance in individuals with and without low back pain, and to observe whether there is a difference in the perception of correct sitting posture between individuals with and without low back pain.

The first result found in the present study was that there was no significant difference between sitting postural hypervigilance between individuals with and without low back pain. It is known that the human biological system is integrated in a complex way and dysfunctions and complaints are multifactorial.[1] In the present study, only two variables (perception of correct sitting posture and postural hypervigilance) were analyzed in a linear observational form, which could not justify the relationship between them.

In addition to its complexity, low back pain also has multiple contributors to its onset and associated deficiencies, including psychological, social, and biophysical factors, comorbidities, and pain processing mechanisms.[10] Furthermore, it is not possible to accurately identify its specific nociceptive source.[11] Having said that, it is likely that there is some relationship between these variables, when analyzed in other contexts,[12] making future studies involving the perception of sitting posture and postural hypervigilance necessary.

It is suggested that postural correction may be a behavioral response presented unconsciously or automatically. For example, a patient denies protecting his back by flexing his spine to carry a load, but when asked to perform the movement, that same patient can develop behaviors to avoid flexing the spine to "protect" the back while getting up.[13]

Other studies have shown that individuals with acute musculoskeletal pain and who have incorrect beliefs are likely to develop avoidance behaviors that might predict the severity of a future disability due to these beliefs.[14] This behavioral response can be manifested as a protective response, restricting movement, as shown in previous studies, in which people with low back pain moved more slowly, with greater stiffness and muscle activity, which could justify postural hypervigilance.[15]

There is evidence that these behavioral responses perpetuate the pain and disability generated by it. Also, a pronociceptive response generates an increase in tissue load, increasing the experience of pain and feeding a vicious cycle of avoidance due to fear,[16] generating a picture of greater pain and deficiency.[17]

Furthermore, the methodological use of an unvalidated scale to assess sitting postural hypervigilance in this study may have influenced the results, since it is not possible to affirm that this scale evaluates what was proposed. Thus, it is likely that the numbering given as a result in the visual analogue scale (VAS), according to each volunteer, does not represent reality in relation to the number of times they reported correcting their postures.

The second result found in the present study was that there was no significant difference between the choice of correct sitting posture between the group of individuals with and without low back pain. It is possible that there is no ideal posture that is related to low back pain, because contextual factors, that is, personal and environmental, influence the structure and function of each person.[18] Individuals with psychological and/or social influences are more likely to develop low back pain and become more incapacitated by their symptoms.[19]

Therefore, observational analyses cannot be established only in aspects of structure and function, as was performed in the present study. This is because all factors interact with each other, being: health condition, activity, participation, and contextual factors described above.[18]

According to the basic law of energy saving, the body spends a high percentage of energy in postures contrary to the natural sense of the individual.[20] Thus, when an individual maintains isometric contractions of only certain muscles for a greater amount of time, the body invests more energy to make it happen. Therefore, it is possible that individuals without pain do not direct a single posture of their choice, being considered correct.

Summarizing, the present study used the observation of multifactorial variables in their linear forms. Therefore, it is necessary to conduct future studies with different methodologies and nonlinear analyses that can better observe the multifactorial relationships that low back pain represents.

Conclusion

The results obtained in this study suggest that there was no difference between the correct sitting posture and hypervigilance between individuals with or without low back pain. Therefore, other studies are needed to better investigate the multifactoriality of this health condition, enabling a better understanding of its complexity in a nonlinear way and, consequently, better treatments in clinical practice.

Conflict of Interests
The authors have no conflict of interests to declare.

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