

ASSOCIATION BETWEEN PELVIC MISALIGNMENT AND SCOLIOSIS IN DANCERS WITH LOW BACK PAIN

ASSOCIAÇÃO DO DESALINHAMENTO PÉLVICO E A ESCOLIOSE EM BAILARINOS COM LOMBALGIA

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ABSTRACT

Introduction: Dancers are exposed to high physical demands, requiring strength, coordination, endurance, balance, flexibility, and postural control, which may predispose them to musculoskeletal dysfunctions. **Objective:** To identify the presence of pelvic misalignment and the incidence of idiopathic scoliosis in dancers with low back pain. **Methods:** This quantitative, exploratory, cross-sectional study included ten dancers from the cities of Maringá and Sarandi, Paraná, Brazil. Participants with low back pain were assessed using the trunk flexion test and the Gillet test to identify sacroiliac joint dysfunction, as well as spinal radiography to measure the Cobb angle for scoliosis evaluation. **Results:** All participants with low back pain (100%) showed positive results in the trunk flexion and Gillet tests, indicating the presence of sacroiliac joint dysfunction. Idiopathic scoliosis was identified in 90% of the sample. **Conclusion:** The findings indicate that dancers with low back pain commonly present sacroiliac joint dysfunction and a high prevalence of associated scoliosis, highlighting the complexity of musculoskeletal conditions in this population.

RESUMO

Introdução: Bailarinos estão submetidos a elevadas exigências físicas, que envolvem força, coordenação, resistência, equilíbrio, flexibilidade e controle postural, podendo favorecer o desenvolvimento de disfunções musculoesqueléticas. **Objetivo:** Identificar a presença de desalinhamento pélvico e a incidência de escoliose idiopática em bailarinos com lombalgia. **Métodos:** Trata-se de um estudo quantitativo, exploratório e transversal, realizado com dez bailarinos dos municípios de Maringá e Sarandi, Paraná, Brasil. Os participantes com lombalgia foram avaliados por meio do teste de flexão anterior do tronco e do teste de Gillet para identificação de disfunção sacroilíaca, além de exame radiográfico da coluna para mensuração do ângulo de Cobb. **Resultados:** Todos os participantes com lombalgia (100%) apresentaram resultados positivos nos testes de flexão anterior do tronco e de Gillet, indicando presença de disfunção sacroilíaca. A escoliose esteve presente em 90% da amostra. **Conclusão:** Os resultados indicam que bailarinos com lombalgia apresentam, com frequência, disfunção da articulação sacroilíaca e alta prevalência de escoliose associada, evidenciando a complexidade das alterações musculoesqueléticas nessa população.

Keywords: Low back pain. Dancers. Pelvic misalignment.

Descritores: Lombalgia. Bailarinos. Desalinhamento pélvico.

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INTRODUCTION

Low back pain is a common musculoskeletal condition characterized by pain in the lumbar region of the spine and may occur in the absence of a specific pathological cause or as a result of factors such as repetitive mechanical overload, inadequate posture, excess body weight, physical inactivity, and recurrent direct or indirect microtrauma¹. It is currently recognized as one of the leading public health problems worldwide, affecting individuals across all age groups and occupational settings, with a projected increase in prevalence over the coming decades².

Low back pain is the primary cause of physical disability globally, and in most cases, its etiology remains nonspecific. However, several predisposing factors have been identified, including sedentary behavior, obesity, smoking, physical and mental comorbidities, and prolonged exposure to activities that impose high physical demands on the musculoskeletal system¹.

Dancers constitute a population at increased risk for the development of low back pain due to the unique biomechanical and physiological demands of dance practice³. Dance requires high levels of strength, coordination, balance, flexibility, endurance, and postural control, with movements performed repetitively and often at extreme ranges of motion⁴. Previous studies have reported a high prevalence of lumbar symptoms among dancers, ranging from 20.3% to 79%, particularly in those practicing classical ballet, regardless of professional status^{3,4}.

Sacroiliac joint dysfunction has been identified as an important biomechanical factor associated with low back pain in physically demanding populations⁵. Anatomically, the sacroiliac joint is located at the transition between the trunk and the lower limbs and plays a fundamental role in the transfer and distribution of loads between the spine and the lower extremities⁶. Alterations in sacroiliac joint mechanics may compromise lumbopelvic stability and contribute to the onset and persistence of lumbar pain⁷.

Such dysfunctions are characterized by biomechanical abnormalities, including pelvic misalignment, hypomobility, fixation, subluxation, and mobility deficits, which may occur unilaterally or bilaterally⁸. These alterations can generate compensatory mechanisms along the kinetic chain, potentially affecting spinal alignment. Among these compensatory changes, idiopathic scoliosis stands out as a relevant postural alteration, characterized by lateral curvature and vertebral rotation, and is associated with pain, functional limitations, aesthetic concerns, and, in more severe cases, respiratory impairment⁹.

Given the high physical demands of dance and the frequent exposure to repetitive and extreme movements, dancers may be particularly susceptible to the coexistence of sacroiliac joint dysfunction, pelvic misalignment, scoliosis, and low back pain¹⁰. However, the relationship between these conditions remains insufficiently explored in this population.

Therefore, the objective of this study was to investigate the association between pelvic misalignment, sacroiliac joint dysfunction, idiopathic scoliosis, and the presence of low back pain in dancers.

METHODS

This was a quantitative, exploratory, cross-sectional study. The sample consisted of 10 dancers recruited from the cities of Maringá and Sarandi, Paraná, Brazil.

Participants of both sexes, aged between 18 and 30 years, practicing different dance modalities, and reporting low back pain for at least seven days were included. All participants agreed to

take part in the study by signing an informed consent form. Individuals with a history of direct trauma to the spine, previous surgery in the lumbosacral region, clinical diagnosis of autoimmune diseases, structural bone malformations, or pre-existing musculoskeletal disorders that could interfere with the outcomes were excluded.

Sacroiliac joint assessment was performed through a biomechanical evaluation using the trunk flexion test and the Gillet test, aiming to identify the presence of sacroiliac joint dysfunction or pelvic misalignment, as described in the literature¹¹. Positive findings in these tests were considered indicative of sacroiliac joint restriction or dysfunction¹¹.

The presence of scoliosis was evaluated using an anteroposterior radiographic examination of the spine. The Cobb angle was measured by identifying the most inclined superior and inferior vertebrae of the curve and drawing lines parallel to their superior endplates, according to the method described by Cunha et al.¹². Cobb angle values greater than 0° were considered indicative of scoliosis.

Data were organized in spreadsheets and analyzed descriptively. Results were expressed as absolute values and percentages and are presented in the Results, Discussion, and Conclusion sections of this study.

RESULTS

Table 1 presents the individual data obtained from the sample, including the results of the trunk flexion test, the Gillet test, and the thoracic and lumbar Cobb angles measured through spinal radiography.

Table 1. Resultados da avaliação biomecânica e exame de raio-x.

Indivíduo da amostra	Teste de flexão anterior de tronco	Teste de Gillet	Ângulo de Cobb torácico	Ângulo de Cobb lombar
1	positivo	positivo	25,0°	0°
2	positivo	positivo	15,5°	0°
3	positivo	positivo	15,2°	0°
4	positivo	positivo	6,7°	0°
5	positivo	positivo	3,0°	0°
6	positivo	positivo	2,5°	0°
7	positivo	positivo	0°	0°
8	positivo	positivo	3,8°	9,3°
9	positivo	positivo	5,6°	10,0°
10	positivo	positivo	16,5°	18,7°

All participants with low back pain (100%) showed positive results in the trunk flexion test, indicating the presence of motion restriction during anterior trunk flexion. Similarly, all participants (100%) also presented positive findings in the Gillet test, suggesting restricted mobility or dysfunction of the sacroiliac joint.

Thoracic Cobb angle values ranged from 0° to 25.0°. Considering Cobb angles greater than 0° as indicative of scoliosis, thoracic scoliosis was identified in 90% of the participants, while one individual (10%) did not present thoracic curvature. Lumbar Cobb angle values ranged from 0° to 18.7°. Using the same criterion, lumbar scoliosis was identified in 90% of the sample, with one participant (10%) presenting no lumbar curvature.

Overall, the results demonstrate a high prevalence of sacroiliac joint dysfunction and spinal alignment alterations in dancers presenting with low back pain.

DISCUSSION

The present study demonstrated a high prevalence of sacroiliac joint dysfunction and spinal alignment alterations in dancers presenting with low back pain. All participants showed positive findings in the trunk flexion and Gillet tests, indicating restricted sacroiliac joint mobility, while the majority also presented thoracic and lumbar scoliosis. These findings support the hypothesis that sacroiliac joint dysfunction and spinal curvature may be associated with the presence of low back pain in dancers.

The sacroiliac joint plays a crucial role in the transfer of loads between the trunk and the lower limbs. Alterations in its mobility can disrupt lumbopelvic stability, leading to compensatory mechanical adjustments in the lumbar spine¹³. In populations exposed to high physical demands, such as dancers, repetitive movements, extreme ranges of motion, and asymmetrical loading patterns may exacerbate these dysfunctions, increasing stress on the lumbosacral region¹⁴.

The high prevalence of scoliosis observed in both thoracic and lumbar regions further highlights the presence of postural and biomechanical alterations in this population. Scoliosis is a tridimensional deformity characterized by lateral curvature and vertebral rotation, which may alter load distribution along the spine and contribute to the development or persistence of low back pain^{9,15}. Spinal asymmetry can result in muscle imbalances and uneven joint loading, potentially aggravating lumbar discomfort during physically demanding activities such as dance¹⁶.

The coexistence of sacroiliac joint dysfunction and scoliosis suggests a biomechanical interrelationship between pelvic alignment and spinal curvature. Pelvic misalignment may act as a compensatory mechanism in response to spinal deviations, or conversely, spinal curvature may increase mechanical demands on the sacroiliac joint, promoting dysfunction¹⁷. This reciprocal relationship may help explain the persistence of low back pain in dancers, even in the absence of acute injury.

In the context of dance, movements requiring repeated hip rotation, single-leg support, trunk flexion, and extension may intensify lumbopelvic overload, particularly when underlying postural asymmetries are present¹⁸. Restrictions in sacroiliac joint mobility may further limit movement efficiency, leading to compensatory strategies that increase the risk of pain and injury¹⁹.

These findings emphasize the importance of comprehensive musculoskeletal assessment in dancers with low back pain, including evaluation of sacroiliac joint function and spinal alignment. Early identification of these alterations may contribute to the development of targeted preventive and therapeutic strategies, such as physiotherapy, postural reeducation, and movement retraining, aiming to reduce pain, improve functional performance, and prevent recurrence²⁰.

Overall, this study highlights the complex interaction between sacroiliac joint dysfunction, scoliosis, and low back pain in dancers, reinforcing the need for an integrated, multidisciplinary approach to assessment and management in this population.

This study has some limitations that should be considered when interpreting the results. The small sample size and the use of a convenience sample may limit the generalizability of the findings to the broader population of dancers. In addition, the cross-sectional design does not allow for causal inferences regarding the relationship between sacroiliac joint dysfunction, scoliosis, and low back pain. The assessment of sacroiliac joint dysfunction was based on clinical tests, which may be influenced by examiner experience and inter-rater variability. Furthermore, the use of Cobb angle values greater than 0° as a criterion for identifying scoliosis may not capture the full clinical relevance or severity of spinal curvature. Despite these limitations, the findings provide relevant preliminary insights into the association between lumbopelvic dysfunction and spinal alignment in dancers with low back pain.

CONCLUSION

This study demonstrated a high prevalence of sacroiliac joint dysfunction and scoliosis in dancers presenting with low back pain. All participants showed clinical signs of sacroiliac joint restriction, and the majority exhibited thoracic and lumbar spinal curvature. These findings suggest an association between pelvic misalignment, spinal alignment alterations, and low back pain in this population.

The results highlight the importance of comprehensive lumbopelvic and spinal assessment in dancers with low back pain and support the need for targeted preventive and therapeutic strategies aimed at improving joint mobility, postural alignment, and functional performance.

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