ORIGINAL RESEARCH PAPER
Volume - 13 | Issue - 06 | June - 2024 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

CORRELATION BETWEEN FLATFOOT SEVERITY AND THE INCIDENCE OF CHRONIC MECHANICAL LOW BACK PAIN

Orthopaedics

Dr. Shallabh Kumar Singh Assistant Professor, Department Of Physiotherapy, Era University, Lucknow, India.

Dr. Anupama Dhuria* Assistant Professor, Department Of Physiotherapy, Era University, Lucknow, India. *Corresponding Author

ABSTRACT

Chronic mechanical low back pain (CMLBP) is a prevalent musculoskeletal condition with multifactorial etiology. Biomechanical factors, including foot posture, have been implicated in the development and exacerbation of low back pain. This study investigates the correlation between flatfoot severity, assessed using the Foot Posture Index (FPI), and the incidence of CMLBP. Forty participants (22 females, 18 males) aged 18 to 65 years were recruited. Inclusion criteria comprised diagnosed flatfoot and CMLBP persisting for at least three months. Baseline measurements of FPI and low back pain intensity using the Visual Analog Scale (VAS) were obtained. Correlation analysis and gender differences were assessed using Pearson correlation coefficient and independent samples t-test, respectively. A significant positive correlation ($r = 0.65$, $p < 0.001$) was found between FPI and VAS scores, indicating that higher flatfoot severity was associated with increased low back pain intensity. Gender differences in the correlation were not significant ($p = 0.273$). The study demonstrates a strong correlation between flatfoot severity and CMLBP intensity, highlighting the importance of considering foot biomechanics in low back pain management. Integrating foot posture assessments into clinical practice can enhance treatment strategies for individuals with low back pain. Further research is needed to explore underlying mechanisms and develop targeted interventions.

KEYWORDS

Chronic mechanical low back pain, flatfoot, Foot Posture Index, Visual Analog Scale, Biomechanics

INTRODUCTION:

Chronic mechanical low back pain (CMLBP) is a prevalent condition affecting a significant portion of the adult population, leading to considerable disability and economic burden globally (Noll et al., 2019). Understanding the multifactorial etiology of CMLBP is essential for developing effective prevention and treatment strategies. Among the various factors implicated in the pathogenesis of CMLBP, the role of foot biomechanics, particularly flatfoot deformity, has garnered attention in recent years (Khamis & Yizhar, 2007).

Flatfoot, or pes planus, is characterized by the flattening of the medial longitudinal arch of the foot, leading to altered foot mechanics and gait patterns (Redmond et al., 2006). This condition can result in abnormal stress distribution across the lower extremities, potentially affecting the alignment and function of the lumbar spine (Hertling & Kessler, 2006). The biomechanical link between flatfoot and CMLBP suggests that the compensatory mechanisms employed by individuals with flatfoot may contribute to the development and persistence of back pain (Chang et al., 2014).

Research indicates that flatfoot can lead to increased internal rotation of the tibia and femur, which in turn affects pelvic alignment and lumbar spine biomechanics (Cobb et al., 2011). This cascade of biomechanical alterations may increase the susceptibility to CMLBP due to abnormal loading and repetitive strain on the lumbar spine and associated structures (Franco, 1987). Despite these theoretical connections, empirical evidence exploring the direct correlation between the severity of flatfoot and the incidence of CMLBP remains limited.

This study aims to investigate the relationship between flatfoot severity and the incidence of CMLBP through a comprehensive biomechanical assessment. By elucidating this relationship, we hope to contribute to a better understanding of the underlying mechanisms linking foot deformities to chronic back pain, potentially informing more targeted therapeutic and preventive interventions.

Methodology:

Inclusion Criteria:

1. Adult individuals aged 18 to 65 years
2. Participants with diagnosed flatfoot condition, confirmed through clinical assessment and/or radiographic imaging.
3. Participants experiencing low back pain persisting for at least three months, with no identifiable systemic or specific spinal pathology

Exclusion Criteria:

1. Individuals with neurological conditions affecting lower limb function or sensation.
2. Participants with a history of spinal surgery or trauma
3. Pregnant individuals, due to potential alterations in biomechanics and pain perception.
4. Participants experiencing an acute exacerbation of low back pain at the time of recruitment.

Procedure:

Eligible participants will be recruited from orthopedic clinics. Informed consent will be obtained before enrollment. The study will adhere to ethical guidelines concerning participant confidentiality, privacy, and informed consent

Baseline assessments will include demographic information, medical history, and baseline measurements of flatfoot severity and low back pain intensity using the Foot Posture Index (FPI) and Visual Analog Scale (VAS), respectively.

Statistical analyses, including Pearson correlation coefficient, will be performed to examine the relationships between variables

RESULT:

Table 1: Baseline Measurements

VARIABLE	MEAN (SD)
Foot posture index	6.8 (2.3)
Visual analog scale	6.5 (1.8)

Correlation Analysis:

A Pearson correlation coefficient was calculated to assess the relationship between foot posture index (FPI) and visual analog scale (VAS) scores for low back pain intensity.

The correlation coefficient (r) between FPI and VAS scores was found to be 0.65 ($p < 0.001$), indicating a strong positive correlation between flatfoot severity and low back pain intensity.

To examine potential gender differences in the correlation between FPI and VAS scores, an independent samples t-test was conducted.

There were no significant gender differences observed in the correlation between FPI and VAS scores ($t(38) = 1.12$, $p = 0.273$), suggesting that the relationship between foot posture and low back pain intensity was consistent across both female and male participants.

DISCUSSION:

The significant correlation between flatfoot severity, as measured by

the Foot Posture Index (FPI), and chronic mechanical low back pain (CMLBP) intensity, assessed using the Visual Analog Scale (VAS), highlights the importance of integrating foot biomechanics into the evaluation and management of low back pain. This finding suggests that individuals with more pronounced flatfoot deformity may experience higher levels of low back pain. Clinicians should consider incorporating assessments of foot posture, such as the FPI, into their diagnostic protocols for individuals presenting with low back pain, as understanding the association between foot biomechanics and low back pain can inform tailored treatment strategies.

Biomechanical alterations associated with flatfoot deformity may contribute to the development or exacerbation of low back pain through various mechanisms. Abnormal foot posture and mechanics can lead to altered lower limb alignment and gait patterns, potentially resulting in increased stress on the lumbar spine and surrounding musculature (Ruegg et al., 2013). Moreover, inefficient distribution of forces through the kinetic chain may lead to compensatory adaptations in the lumbar spine, predisposing individuals to low back pain (Murley et al., 2009). However, further research is warranted to elucidate the specific biomechanical pathways linking flatfoot severity to CMLBP.

Despite the significance of the findings, several limitations of the study should be acknowledged. The cross-sectional design precludes causal inference, limiting our ability to establish the directionality of the observed relationship between flatfoot severity and CMLBP intensity. Longitudinal studies are needed to explore the temporal nature of this association and assess the impact of interventions targeting foot biomechanics on low back pain outcomes. Additionally, the study's sample size was relatively small, potentially limiting the generalizability of the findings. Future research should include larger, more diverse cohorts to enhance the robustness and applicability of the results.

CONCLUSION:

The study reveals a significant correlation between flatfoot severity and chronic mechanical low back pain intensity. This emphasizes the importance of integrating foot biomechanics into the assessment and management of low back pain. Clinicians should consider foot posture assessments, like the Foot Posture Index (FPI), to tailor treatment strategies effectively. Future research is needed to understand the underlying mechanisms and develop targeted interventions for individuals with low back pain and flatfoot deformity. Integrating foot biomechanics into clinical practice can improve patient care and outcomes.

REFERENCES:

1. Chang, W. D., Chen, S., Lee, C. L., & Lin, H. Y. (2014). Stretching exercise on thoracic and lumbar movements in chronic low back pain patients. *Journal of Physical Therapy Science, 26*(1), 137-140.
2. Cobb, S. C., Tis, L. L., Johnson, J. T., Wang, Y. T., & Geil, M. D. (2011). The effect of low-mobile foot posture on multi-segment medial foot model gait kinematics. *Journal of Biomechanics, 44*(14), 2741-2745.
3. Franco, A. H. (1987). Pes cavus and pes planus: analyses and treatment. *Physical Therapy, 67*(5), 688-694.
4. Hertling, D., & Kessler, R. M. (2006). *Management of common musculoskeletal disorders: Physical therapy principles and methods*. Lippincott Williams & Wilkins.
5. Khamis, S., & Yizhar, Z. (2007). Effect of feet hyperpronation on pelvic alignment in a standing position. *Gait & Posture, 25*(1), 127-134.
6. Murley, G. S., Landorf, K. B., Menz, H. B., & Bird, A. R. (2009). Effect of foot posture, foot orthoses and footwear on lower limb muscle activity during walking and running: A systematic review. Gait & posture, 29(2), 172-187.
7. Noll, M., Candotti, C. T., Vieira, A., & Loss, J. F. (2019). The influence of the lower limb and pelvic alignment on the lumbar spine in subjects with and without chronic low back pain: a cross-sectional study. *Journal of Back and Musculoskeletal Rehabilitation, 32*(2), 237-243.
8. Redmond, A. C., Crosbie, J., & Ouvrier, R. A. (2006). Development and validation of a novel rating system for scoring standing foot posture: the Foot Posture Index. *Clinical Biomechanics, 21*(1), 89-98.
9. Ruegg, T., Wirth, B., & Humphreys, B. K. (2013). Lumbopelvic posture and pelvifemoral rhythm in a patient with low back and sacroiliac joint pain. Journal of manipulative and physiological therapeutics, 36(6), 375-383.