ABSTRACT

Background: Flatfoot deformity represents a common musculoskeletal condition affecting foot biomechanics and gait patterns. Understanding the compensatory mechanisms and functional limitations in flatfoot patients is crucial for developing effective treatment strategies.

Objective: To compare spatiotemporal gait parameters, muscle strength, and biomechanical characteristics between flatfoot patients and healthy controls.

Methods: This cross-sectional study analyzed 38 participants (19 flatfoot patients, 19 healthy controls). Measurements included spatiotemporal gait parameters (cadence, gait speed, step length, stride length, gait cycle time, double support time), bilateral muscle strength assessment of seven muscle groups, and anthropometric data.

Results: Flatfoot patients demonstrated significantly shorter stride length (108.42 ± 11.88 cm vs 126.38 ± 16.46 cm, $p<0.05$), reduced double support time (0.25 ± 0.61 s vs 0.98 ± 0.88 s, $p<0.01$), and marked weakness in gastrocnemius/soleus complex (12.23 ± 3.91 vs 19.13 ± 5.04, $p<0.001$). Compensatory increases in gait speed (200.58 ± 71.57 cm/s vs 160.40 ± 73.76 cm/s) were observed.

Conclusions: Flatfoot deformity results in significant biomechanical alterations characterized by stride inefficiency, muscle weakness patterns, and compensatory gait strategies. These findings support targeted rehabilitation approaches focusing on posterior chain strengthening and gait optimization.

Keywords: flatfoot, gait analysis, biomechanics, muscle strength, rehabilitation

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