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Biomechanical changes in the gastrocnemius medius–Achilles tendon complex in people with hypermobility spectrum disorders: A cross-sectional compression sonoelastography study

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Objective: This study aimed to assess the biomechanical impact of Hypermobility Spectrum Disorders (HSD) on the elasticity of the gastrocnemius medius–Achilles tendon (GM–AT) complex.

Methods: Using a cross-sectional design, the GM–AT complex elasticity was compared using sonoelastography (SEG) in an HSD group and healthy controls during rest and maximal isometric plantar flexion contraction.

Results: The HSD group comprised 28 patients (26 women); mean \pm SD age 28.7 ± 8.4 years, compared to 28 controls (26 women); 31.5 ± 8.7 years. During rest, greater elasticity was identified in HSD relative to controls at the GM–AT musculotendinous junction (strain ratio 2.05 ± 1.31 vs. 1.48 ± 0.49), mid–AT (3.60 ± 1.97 vs. 2.66 ± 1.00), and distal AT (4.57 ± 2.69 vs. 3.22 ± 1.94) (all $p < 0.05$). During contraction, no significant differences were found between groups at the GM–AT musculotendinous junction (3.40 ± 2.16 vs. 2.62 ± 1.07), mid AT (10.75 ± 5.29 vs. 8.49 ± 3.53), or distal AT (8.55 ± 5.39 vs. 8.83 ± 3.51) (all $p > 0.05$). No significant differences were found between groups in the GM strain ratio during rest (4.05 ± 1.43 vs. 3.62 ± 0.78), or contraction (4.23 ± 1.29 vs. 4.19 ± 1.31). Exploratory Receiver Operator Characteristics curve analysis suggested low sensitivity and specificity of the strain ratio for the diagnosis of HSD.

Conclusion: People with HSD have greater GM–AT complex elasticity. Although statistically significant group differences were identified, further research is required to establish the diagnostic, clinical, and research utility of strain ratio measurements.

KEYWORDS

connective tissue, hypermobility, Ehlers-Danlos, soft, ultrasound, sonoelastography

1. Introduction

Hypermobility Spectrum disorders (HSD) are connective tissue disorders characterized by symptomatic synovial joint hypermobility etiologically related to genetic and pathologic factors (1–5). HSD is a new terminology introduced in 2017 for hypermobility-related disorders to highlight the wide heterogeneities within joint hypermobility-related conditions, and to replace the terms “Joint Hypermobility Syndrome” (JHS) and “Ehlers-Danlos Syndrome Hypermobility