

## THE FEASIBILITY OF USING SONOELASTOGRAPHY TO IDENTIFY THE EFFECT OF JOINT HYPERMOBILITY SYNDROME ON ELASTICITY OF GASTROCNEMIUS MUSCLE

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**Background:** Joint hypermobility syndrome (JHS) is a heritable connective tissue disorder in which multiple synovial joints demonstrate a painful and extraordinary range of motion. Genetically there are abnormal changes in the connective tissue matrix in people with JHS, and that may alter the viscoelasticity of their muscular tissue. Sonoelastography (SEG) is a new technology in musculoskeletal practice for assessing tissue elasticity. This study aimed to determine the feasibility of using SEG to distinguish between those with and without a diagnosis of JHS. Gastrocnemius muscle (GM) elasticity was examined, as it is essential for balance and walking.

**Methods:** Twenty participants were examined in a cross-sectional feasibility study: 10 participants diagnosed with JHS and 10 age- and gender-matched healthy controls. The dominant GM was scanned three times using SEG. The colours of the SEG images indicate soft (red), intermediate (green) and hard (blue) tissues. ImageJ software was used to analyse the images by identifying the mean percentage of pixels of each colour.

**Results:** For the JHS group, nine females and one male were examined, with a mean age of 38.9 years (S.D. 15.53). Similarly, for the non-JHS group, nine females and one male were examined, with a mean age of 38.9 years (S.D. 12.37). The groups were comparable in terms of age, gender and BMI ( $P=1.00$ ,  $1.00$ , and  $0.77$ , respectively). The JHS group had a significantly higher percentage of blue (hard tissue) pixels when compared with the control group ( $P=0.035$ ). No significant differences were found in the mean percentage of green (intermediate) and red (soft) pixels ( $P=0.55$  and  $P=0.051$ , respectively). SEG required a reasonable amount of training for clinicians with sufficient background in musculoskeletal anatomy, ~4 h of observation and practical training. The examination was completed in <5 min, so it may be reasonable for use in clinical practice, and it was well tolerated by patients. The SEG image was analysed in <5 minutes.

**Conclusion:** The results indicate that the GM in people with JHS had more areas of hard tissue when compared with the control group, contradicting the expected results. However, GM hyperactivity has been identified during walking in people with JHS, and increased muscle tone might therefore explain the findings. The findings need to be verified in a much larger future study. The SEG seems a feasible tool for quantifying muscular tissue elasticity in JHS.