

Viscoelastic Tissue Compliance and Lumbar Muscles Activation during Passive Cyclic Flexion-Extension

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BACKGROUND: Human [1] and animal models [2] using electromyography (EMG) based methods have hypothesized that viscoelastic tissue properties becomes compromised by prolonged repetitive cyclic trunk flexion-extension which in turn influences muscular activation. Empirical evidence to support this hypothesis, especially the development of viscoelastic tension-relaxation and its associated muscular response in passive cyclic activity in humans, is incomplete.

PURPOSE: The objective of this study was to examine the response of lumbar muscles to tension-relaxation development of the viscoelastic tissue during prolonged *passive* cyclic trunk flexion-extension.

METHODS: Eighteen men stood in place with their pelvis and thighs secured to ensure minimal movement while the trunk was passively moved through flexion-extension movement. Myoelectric activity was collected during the passive session and active sessions performed prior to and after the passive session.

RESULTS: Activity of the lumbar muscles remained low and steady during the passive exercise session. Tension supplied by the posterior viscoelastic tissues decreased over time without corresponding changes in muscular activity. *Active* flexion, following the passive flexion session, elicited significant increase in paraspinal muscles EMG together with increase in the median frequency.

CONCLUSION: Reduction of tension in the lumbar viscoelastic tissues of humans occurs during cyclic flexion-extension and is compensated by increased activity of the musculature in order to maintain stability. The ligamento-muscular reflex is inhibited during passive activities but becomes hyperactive following active cyclic flexion, indicating that movement requirements are the controlling variable. It is conceived that prolonged routine exposure to cyclic flexion minimizes the function of the viscoelastic tissues and places increasing demands on the neuromuscular system which over time may lead to a disorder and possible exposure to injury.

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REFERENCES

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