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Original Research

Jogging Kinematics After Lumbar Paraspinal Muscle Fatigue

Joseph M. Hart, PhD ATC¹, D. Casey Kerrigan, MD MS¹, Julie M. Fritz, PhD PT ATC², and Christopher D. Ingersoll, PhD ATC FNATA FACSM¹

¹University of Virginia, Charlottesville, VA

²University of Utah, Salt Lake City, UT. Dr Ingersoll is now at Central Michigan University, Mount Pleasant, MI

Abstract

Context: Isolated lumbar paraspinal muscle fatigue causes lower extremity and postural control deficits.

Objective: To describe the change in body position during gait after fatiguing lumbar extension exercises in persons with recurrent episodes of low back pain compared with healthy controls.

Design: Case-control study.

Setting: Motion analysis laboratory.

Patients or Other Participants: Twenty-five recreationally active participants with a history of recurrent episodes of low back pain, matched by sex, height, and mass with 25 healthy controls.

Intervention(s): We measured 3-dimensional lower extremity and trunk kinematics before and after fatiguing isometric lumbar paraspinal exercise.

Main Outcome Measure(s): Measurements were taken while participants jogged on a custom-built treadmill surrounded by a 10-camera motion analysis system.

Results: Group-by-time interactions were observed for lumbar lordosis and trunk angles ($P < .05$). A reduced lumbar spine extension angle was noted, reflecting a loss of lordosis and an increase in trunk flexion angle, indicating increased forward trunk lean, in healthy controls after fatiguing lumbar extension exercise. In contrast, persons with a history of recurrent low back pain exhibited a slight increase in spine extension, indicating a slightly more lordotic position of the lumbar spine, and a decrease in trunk flexion angles after fatiguing exercise. Regardless of group, participants experienced, on average, greater peak hip extension after lumbar paraspinal fatigue.

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Conclusions: Small differences in response may represent a necessary adaptation used by persons with recurrent low back pain to preserve gait function by stabilizing the spine and preventing inappropriate trunk and lumbar spine positioning.

Keywords: [gait analysis](#), [spine](#)

Joseph M. Hart, PhD, ATC, contributed to conception and design; acquisition and analysis and interpretation of the data; and drafting, critical revision, and final approval of the article. D. Casey Kerrigan, MD, MS; Julie M. Fritz, PhD, PT, ATC; and Christopher D. Ingersoll, PhD, ATC, FNATA, FACSM, contributed to conception and design; analysis and interpretation of the data; and drafting, critical revision, and final approval of the article.

Address correspondence to Joseph M Hart, PhD, ATC, University of Virginia, Department of Orthopaedic Surgery, 400 Ray C. Hunt Drive, Suite 330, Charlottesville, VA 22908-0159, e-mail: jmh3zf@virginia.edu.

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