

Effects of different obstacle height and movement pattern on supported leg sway during lateral stepping over in healthy young adults: analysis using a small triaxial accelerometer

Takashi Sato, author

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Abstrak

ABSTRACT

The purpose of this study was to determine sway characteristics of a supported leg during a lateral stepping over obstacle task with different obstacle height and movement patterns, using a small triaxial accelerometer. We examined 20 healthy young adults to assess their trochanter malleolar distance traveled during a lateral stepping over obstacle task with obstacle heights of 30%, 50%, and 70%. The lateral stepping over tasks revealed flexion and extension patterns. We directed the subjects to grasp a forward handrail, perform the lateral step, and subsequently step over to the side. We calculated synthetic acceleration (SA) from acceleration data measured using two small triaxial accelerometers and two web cameras. We calculated supporting leg sway; RMS phases of X-, Y-, and Z-axes; and SA data. The subjects showed increased RMS of Y-axis and SA according to the obstacle height for the flexion pattern; however, they did not show change in RMS of Y-axis and SA according to the obstacle height for the extension pattern. During lateral stepping over, the RMS of Y-axis and SA for the flexion pattern were higher than for the extension pattern. The findings for the flexion pattern suggest that the center of gravity shifts higher according to increased obstacle height; consequently, the supporting leg becomes unstable. The findings for the extension pattern suggest that the "screw-home" rotation effect of the supporting leg during movement can support lateral stepping over better than the flexion pattern.