ABSTRACT

This study was conducted to investigate whether hamstring muscle activation rate could potentially serve as an indicator for slip-induced falls, particularly for older adults. Kinematics (heel contact velocity, walking velocity, slip distance, and step length), kinetics (friction demand), and electromyography (EMG) while walking over a slippery surface were collected and examined in the study. Normalized EMG data were examined in term of activation rate and compared to heel contact velocity. Twenty-eight subjects from two age groups (14 young and 14 elderly) walked across a track with embedded force platforms while wearing a fall arresting harness attached to an arresting rig for safety. In order to obtain realistic unexpected slip-induced fall data, the slippery surface was hidden from the subjects and unexpectedly introduced. The primary objective of the study was to evaluate if hamstring activation rate could be a valid indicator for the initiation of slip-induced falls. The results suggested that hamstring activation rate in younger adults was higher than older adults, whereas, younger adults’ heel contact velocity was not different from older adults. These results suggested that heel contact velocity in younger adults was sufficiently reduced before the heel contact phase of the gait cycle. This could be due to the outcome of higher hamstring activation rate in younger adults in comparison to older adults. However, an equal number of falls in two age groups, in spite of older adults’ slower walking velocity, lower RCOF, shorter slip distance, and slower peak sliding heel velocity, suggested that the recovery phase of the slip-induced fall accidents should be studied further.