Back muscle flexion relaxation phenomenon under uneven ground conditions

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In agriculture, construction and fishing industries workers often perform deep trunk bending task on uneven ground surfaces. Although the load sharing mechanism between lumbar active and passive tissues during trunk bending motion has been extensively investigated in flat, balanced ground conditions, the effect of uneven ground surface on this mechanism has not yet been explored. The objective of the current study was to investigate the effects of slanted ground surfaces on the back muscle flexion relaxation phenomenon (FRP) during trunk flexion-extension motion. Sixteen subjects performed fifteen trunk flexion-extension motions in three different slanted ground conditions (0o, 15o and 30o). Motion sensors were attached to the skin over C7, T12 and S1 vertebras to collect trunk kinematics data. Muscular electromyography (EMG) data were collected from Multifidus and Longissimus muscles using EMG electrodes. Results of this study demonstrated significant differences in the onset location of FRP between contralateral and ipsilateral side of back muscles. Strong interaction effect was also observed between slanted ground angle and the location (i.e. contralateral vs. ipsilateral) of back muscles. Subjects' ground weight distribution on lower extremities and their knee flexion angles were identified as the main contributors to the changes.

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