

Abstract:

Older women's muscle and gait response to a bout of exercise differs by physical activity level

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Changes in gait are a consequence of aging and likely contribute to knee osteoarthritis (OA) incidence. Decrements in muscle function with age, including muscle power and fatigue resistance, may contribute to changes in gait and, subsequently, knee OA. Examining the impact of habitual physical activity (PA) on gait mechanics and muscle function may provide insight for interventions to modify knee OA risk. As knee OA affects women at greater rates than men, the current study focused on older women. The aim of this study was to determine if older women with different levels of habitual PA experienced the same effect, in terms of muscle function and gait biomechanics, in response to 30 minutes of treadmill walking (30MTW). We hypothesized that sedentary women (SED) would display greater decreases in knee extensor strength and power and larger changes in gait biomechanics compared to highly active women (ACT). Twelve women (6 SED, 6 ACT) aged 61.3 ± 3.9 years with BMI 22.3 ± 2.2 participated in this study. Gait mechanics and knee extensor strength and power were collected pre- and post-30MTW. Unpaired t-tests were used to compare changes in knee extensor function and gait mechanics between SED and ACT with significance set at $p < 0.1$. In response to the 30MTW, there was a larger decrease in high-velocity knee extensor power for SED vs. ACT (-26.3 ± 12.2 vs. $-12.9 \pm 13.7\%$). In addition, SED compared to ACT had a larger increase in sagittal hip range of motion during stance ($+1.9 \pm 2.5$ vs. $+0.3 \pm 0.7^\circ$), a larger increase in dorsiflexion at heel strike ($+2.2 \pm 1.7$ vs. $+0.3 \pm 2.3^\circ$), a larger decrease in plantarflexion at toe-off (-1.6 ± 2.5 vs. $+0.9 \pm 1.9^\circ$), and a larger decrease in anterior position of the femur relative to the tibia during loading response (-2.6 ± 4.0 vs. $+0.5 \pm 2.9$ mm). These findings suggest PA level may affect biomechanical health in older women, especially with regard to exercise-induced fatigue.

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