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A comparison of functional walking training using concentric-eccentric resistance on hip muscle strength, balance, and functional mobility in working and retired older adults

Carol A Maritz

University of the sciences, USA

Many falls occur while older adults are performing walking. Age-related lower extremity weakness has been associated with difficulty with stair negotiation, gait, and balance. There were two purposes of this study: 1) to determine the impact of functional walking training using concentric-eccentric resistance on hip muscle strength, balance, and functional mobility among community-dwelling working and retired older adults and 2) to compare if there were any differences in the outcome between the two groups. 27 subjects were recruited for this study. 12 healthy working adults (10 females and 2 males; mean age of 66 years) were recruited from the campus community. 15 retired community-dwelling adults (13 females and 2 males; mean age of 75 years) were recruited from a local church. Subjects completed pre-post-test measurements: hip muscle strength (flexion, abduction, and extension) were tested in standard muscle testing positions using hand held dynamometer; Timed Up and Go (TUG) assessed mobility; 30-Second Chair Rise test assessed lower body strength; and static and dynamic balance were tested using the Zeno Walkway System. Subjects completed 8 training sessions of functional walking using the BTE TM Primus RS. Subjects were connected to the Primus using cable attachment and waist belt. Primus was set in the concentric-eccentric mode and resistance was applied. Subjects walked seven feet (distance allowed by machine) in four directions: forward; backward; sideways left and right. Participants completed 5 repetitions in each direction. A one--two pound increase in resistance was applied during each of the session. The subjects from the working group were significantly ($p=0.01$) younger than the retired group. The working group had significant improvements ($p=0.02-0.0003$) in TUG, 30 second CRT, and hip muscle strength following the intervention. The retired group had significant ($p=0.01-0.0002$) improvements in TUG, 30 second CRT, hip muscle strength, and dynamic balance using the FSST. Neither group showed statistically significant changes in static balance. There were no significant differences in the amount of change, between the pre- and post-test, between the groups in any of the variables. Resistive functional walking training can impact falls prevention through improvements in hip strength, dynamic balance, and functional mobility. Despite the lack of significant changes in static balance, there were positive trends suggesting that there may have been changes if the training continued longer. For many older adults traditional hip extension strengthening exercises are difficult due inability to lie prone. Standing leg lifts are an alternative but substitution makes them less desirable. Functional walking with resistance allows older adults to benefit from walking without having them assume difficult positions. This exercise protocol can be easily modified to use in the clinical setting.

Biography

Carol A Maritz is a board-certified geriatric clinical specialist. She holds a doctoral degree in education from Nova Southeastern University in Florida, a Master's degree in gerontology from Saint Joseph's University and a physical therapy certificate from Hahnemann University. She also earned a BS in biology from Glassboro State College (now Rowan University). She is a member of the geriatric and education sections of the American Physical Therapy Association and sits on the board of directors of ElderNet of Lower Merion and Narberth. She has presented at numerous conferences and has co-authored publications on aging and teaching methodologies.

c.maritz@uscience.edu