

Effect of Elastic Band-based High-Speed Power Training on Cognitive Function, Physical Function and Muscle Strength in Older Women with Mild Cognitive Impairment: A Community-Base Randomized Control Trial

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Background: It is known that exercise increase muscular strength and functional ability. Particularly for elder adults, one of the important role of exercise is improvement of cognitive function. Many studies demonstrated effect of various exercise training, effect of resistance training has been emphasized to maintain and improve cognitive function among elderly. Currently, high speed power training, one form of resistance training, has been proposed to be one of effective protocol for elder adults to enhance muscular strength and functional ability. However, the effects of high speed power training (HSPT) on cognitive function of elderly people with mild cognitive impairment (MCI) are unknown. In addition, elastic band-based exercise has been shown to be effective and safe for elder adults. In this study, after the 12 weeks of HSPT with elastic band, cognitive function, body composition, muscular strength, functional ability of elder adults with MCI were measured to demonstrate effectiveness of elastic band-based HSPT.

Method: Between February and December of 2013, participants were recruited from silver academy college of Y-church in Seoul. Fifty eight women aged over 65 years were recruited, and only thirty participants met our criteria. Participants were randomly assigned into an elastic band-based high-speed power training group [$n = 14$, age = 75.0 ± 0.9 y], a slow speed strength training (SSST) group [$n = 9$, age = 76.0 ± 1.3 y], and a control group [balance and tone, $n = 7$, age = 78.0 ± 1.0 y]. One hour exercise program was provide twice a week and each sessions were consisted with 10 min of warm-up exercises, 40 min of elastic band training(HSPT group: elastic band-based high speed power training; SSST group: elastic band-based slow speed strength training), and 10 min of cool down exercises.

Results: The result show significant increase in change rate of cognitive function, physical function, and muscle strength. For cognitive function, change rate of MMSE and MoCA showed significant increase in both HSPT and SSST compared to control group(MMSE: HSPT vs CON, 20.94 vs -5.11 ($p < 0.05$); SSST vs CON, 13.83 vs -5.11 ($p < 0.05$), MoCA: HSPT vs CON, 30.40 vs -2.70 ($p < 0.05$); SSST vs CON, 8.18 vs -2.70 ($p < 0.05$)). For the physical functions, change rate of SPPB scores increased significantly in HSPT and SSST compared to control group as well(HSPT vs CON, 48.74 vs. 9.37 ($p < 0.05$);

MoCA: HSPT vs CON, 17.56 vs 9.37 ($p<0.05$)). In addition, change rate of grip strength, isokinetic 60 degree right extensor and isokinetic 180 degree extensor were also increased significantly in both HSPT and SSST compared to control group as well (Grip strength: HSPT vs CON, 25.99 vs 8.28 ($p<0.05$); isokinetic 60 degree right extensor: HSPT vs CON, 35.67 vs, 9.84 ($p<0.05$); isokinetic 180 degree extensor: HSPT vs CON, 25.51 vs 17.68 ($p<0.05$)).

Conclusion: Although, both 12 weeks of Elastic Band-base high speed power training and slow speed strength training were effective in improving cognitive function, physical function, and muscle strength in older adults with MCI, because elastic band-based HSPT showed greater improvement in cognitive function, physical function, and muscular strength compare to elastic band-based SSST, elastic band-based high-speed power training is more efficient and safe way to treat elder adults with the MIC compare to the slow speed strength training program

Keywords: Mild cognitive impairment, Resistance training, Cognition, Muscle strength, Frail elderly