

Machine-based resistance training (RT) can reduce the age-related loss in muscle power (Pmax) [1]. However, weight-bearing exercises have a higher potential for large-scale implementation. This study investigated whether stair-climbing exercise (STAIR) was non-inferior to improve Pmax compared to machine-based RT among older adults. Functional capacity and cognition were included as secondary outcomes. Community-dwelling older adults (30 ♂, 16 ♀; 70.9 ± 4.3 years) were randomly assigned to RT or STAIR (n=23/group). Supervised lab-based training sessions were performed twice weekly for 12 weeks. In week 1-4, exercises were performed at controlled speed (hypertrophy-oriented; 4x12-15 repetitions; 55% of one-repetition maximum (1-RM) in RT; step-up exercise with height of 30-40 cm in STAIR), in week 5-12 as fast as possible (power-oriented, 4x12 repetitions; 40% of 1-RM for RT and 4x2 flights of 6 steps for STAIR; +10% load from week 9 on-wards in both groups). Leg-extensor Pmax, functional capacity and cognition were measured pre and post intervention, and Pmax also after 4 weeks of training. Pmax tended to increase more in RT versus STAIR (19.5 ± 12.2% versus 13.7 ± 16.5%, d = 0.39, p = 0.086). Non-inferiority analyses on Pmax were inconclusive. All functional capacity tests showed a significant improvement over time (p < 0.05). STAIR increased more in stair ascent performance (d = 0.45-0.61, p < 0.05) than RT, while similar improvements in both groups were found for 10-m fast walk, 5-repetition sit-to-stand performance and countermovement jump height (interaction effect: p > 0.05; time effect: p < 0.05). In contrast to the work of Yoon et al. on power training in older adults with cognitive frailty or mild cognitive impairment [2-3], neither RT nor STAIR induced significant gains in general cognitive performance and executive function in our cognitively healthy sample (p > 0.05). However, similar improvements in digit span test forwards were found in RT and STAIR (time effect: p = 0.004). To conclude, STAIR and RT both induced significant changes in Pmax and functional capacity in older adults. Although RT tended to be superior for gains in leg-extensor power, STAIR has a higher potential for implementation and might therefore be more effective in real life. Future research is necessary to investigate the optimal exercise dose and progression over a longer-term intervention and to examine the effects of STAIR when implemented in a home-based setting with limited expert oversight.