

## **A pilot investigation into lower-limb resistance exercise training and relative operating strength levels during walking in people with diabetes**

**Brown, S.J.; Boulton, A.J.M., Bowling, F.L.; Handsaker, J.C.; Reeves, N.D.**

**Aims:** People with diabetes fall more frequently than non-diabetic controls. Lower muscular strength results in people with diabetes working closer to their maximal capabilities during walking with implications for falling. In this study, we aimed to increase maximum muscle strength and thereby lower the operating strength requirement of walking through resistance exercise training.

**Methods:** Ten individuals with diabetes (mean±SD age: 62±9yrs, weight: 79±12kg, height: 1.65±0.07m) undertook a 16-week intervention of ankle plantarflexion and knee extension resistance exercises. Six participants with diabetes took part as non-exercise controls (50±11yrs, 84±18kg, 1.79±0.17m). Participants performed gait assessment on a level walkway and strength assessment using a dynamometer before and after the exercise intervention.

**Results:** Resistance training yielded increased maximal ankle (+22%,  $p<0.01$ ) and knee (+30%,  $p<0.05$ ) strength. During walking, ankle and knee joint torques remained similar to pre-intervention (difference post-training: Ankle: +2%, Knee -7%,  $p>0.1$ ), but operating strengths during walking were lower after training (ankle: -25%, knee: -12%,  $p>0.1$ ). No differences were observed in the untrained control group.

**Summary:** Resistance exercise training shows efficacy for increasing maximal lower-limb strength in people with diabetes and for lowering the relative strength demands of walking. This has implications for reducing the effects of fatigue during walking as well as increasing the level of 'reserve' strength available if an individual was to slip/stumble, potentially aiding the recovery of balance and preventing falls. However, further studies are required to strengthen the case for resistance exercise training and its potential impact upon reducing falls during walking in people with diabetes.

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