

Does self-reported postural instability correspond with objective measures of balance in patients with diabetic neuropathy?

Steven Brown, Andrew JM Boulton, Loretta Vileikyte & Neil D Reeves

Manchester, UK.

Postural Instability (PI) is common in patients with diabetic PERIPHERAL neuropathy (DPN) and is the strongest predictor of depression and non-adherence to foot ulcer treatment. However, as PI was assessed by self-report in PREVIOUS studies, some have challenged the accuracy of self-report in capturing PI. We therefore compared the quantified PI measures during walking to patients' perception of their own unsteadiness, as measured with 2 item scale from the NeuroQoL questionnaire ($\alpha=.87$). During walking, PI was quantified by the maxima and range of motion of the centre-of-mass and temporal spatial measures of step length, width and walking speed. Fifteen individuals with diabetes and no DPN (D: 56 ± 2 yrs, 78 ± 3 kg, 1.70 ± 0.02 m, 10:5 [M:F], Vibration Perception Threshold (VPT) <25), 15 with diabetes and severe DPN (N: 62 ± 3 yrs, 91 ± 4 kg, 1.70 ± 0.03 m, 11:4 [M:F], VPT >25) and 19 controls without diabetes (C: 56 ± 2 yrs, 79 ± 3 kg, 1.72 ± 0.02 m, 13:6 [M:F], VPT <25). Group N reported poorer balance than group C on NeuroQoL (D:10, N:6, C:10; [score/10]; $p<0.05$), and perception of balance correlated with individual vibration perception thresholds ($r=0.6$, $p<0.001$). Group N walked slower (D:1.5, N:1.2, C:1.5; [m/s]; $p<0.05$) with shorter step lengths (D:73, N:65, C:77; [cm]; $p<0.05$), both variables also correlated with NeuroQoL perception of balance ($r=0.6$, $p<0.001$). Anterior range of motion for the centre of mass was also decreased in group N (D: 92, N:83, C:94; [cm]; $p<0.05$). Shortening step length is a commonly observed trait of patients with physiological weakness in walking. Shorter step length also explains the slower speed and a smaller range of motion of the centre of mass. As these parameters significantly correlate with individuals' perception of balance, more research is needed to determine whether self-reported postural instability prompts individuals to walk slower, thereby contributing to balance control.