THE EFFECTS OF DIFFERENT AUDITORY CUEING FREQUENCIES ON GAIT: IMPLICATIONS FOR THERAPY GOAL SETTING

A. Nieuwboer

Background

Regulation of stride length is the basic gait deficit in patients with Parkinson’s disease (PD) (1) but recent evidence is emerging that also the timing of gait is affected in PD (2, 3). Increasing the step frequency by imposing auditory cues has been shown to improve gait speed (4). Because the step frequency of PD patients is relatively increased above normal values, we studied the effect of both increasing and decreasing cueing rhythms in people with PD and healthy controls. In addition we studied whether freezers responded differently to auditory cueing than non-freezers.

Subjects

Twenty PD-patients (mean age 64.5 ±7.5) and 10 controls (mean age 63.6 ±5.0) participated in the study. The patient group was subdivided in 2 groups: 10 freezers (freezing score 16.1 ±4.3) and 10 non-freezers (freezing score 5.5 ±4.9) with similar gait profiles and disease characteristics.

Methods

Gait analysis was performed with the eight camera 3D-VICON system (612). After walking at a comfortable speed to determine the baseline step frequency, patients underwent five different cueing conditions in a random order: baseline, +10%, +20%, -10% and -20%.

Results

With every increment of the cueing rhythm, speed was increased in both PD and control groups (p<.015), except for the highest frequency (+20%) where speed remained stable in the patient group only. When lowering the cueing frequency from baseline to -10%, stride length increased in both the freezer and the non-freezer group (p=0.046 and p=0.0003), a finding which was not seen in control subjects. Stride length decreased dramatically in freezers when the cueing rhythm was set above baseline, whereas the opposite trend was seen for non-freezers.
Conclusions

This study confirms that an increase of walking speed is achieved in PD by increasing the step frequency up to +10%. Unlike controls, both groups of patients are able to increase stride length when the cueing rhythm is lowered to -10%. This may indicate that by taking away the compensatory strategy of increasing cadence, the ability to modulate stride length is preserved, a potential which therapists may want to tap during gait rehabilitation. When setting the cueing frequency, therapists need to be aware of differential effects in subgroups of patients. Non-freezers are able to improve stride length at an increased cueing frequency of 10% above baseline. Freezers, on the contrary, may require lowering the cueing frequency below baseline as they tend to reduce stride length dramatically at the higher frequencies.

References


