Frequency analysis of the center of pressure in tandem stance by community-dwelling elderly women

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**key words**  Tandem stance • Center of pressure • Community-dwelling elderly

**[Purpose]**
The present study aimed to clarify the effects of balance control on ankle strategy in community-dwelling elderly women by conducting frequency analysis of the center of pressure (COP) during tandem stance.

**[Methods]**
COP was measured using a pressure distribution measuring device with a sampling frequency of 100 Hz in community-dwelling elderly women (n = 29; mean age, 73.8 ± 6.2 years). Participants stood barefoot in tandem stance with the projected center of gravity at the point of contact between the left heel and the right second toe. COP data obtained from the measurements were analyzed using MATLAB. The frequency power spectra were computed and classified into three frequency bands (LFB, 0-less than 0.02 Hz; MFB, 0.02-less than 2 Hz; and HFB, 2-less than 5 Hz). Each power spectral value was divided by the total sum of the power spectral values to obtain the %power. Statistical analysis was performed with respect to the frequency bands for the COP medial-lateral (COP_ML) and anterior–posterior (COP_AP) components using the two-sample t-test and the Mann–Whitney U test. The significance level was set at p<0.05.

**[Results]**
Significant differences were evident between the groups with regard to HFB %power values for both the COP_ML (p<0.01) and COP_AP components (p<0.05).

**[Discussion]**
It is very notable that a significant difference was observed, particularly in HFB %power, depending on balance control. The present findings indicate that elderly participants with diminished balance control had difficulty with rapid adjustment centered on the ankles, suggesting that rapid joint movement involving interlimb coordination centered on the ankles is required to maintain a tandem stance.