

## Diabetic Peripheral Neuropathy and Gait: Does Footwear Modify This Association?

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### Abstract

#### Background:

Gait-related fall risk is the leading cause of mortality among patients with diabetes, especially those older than 65 years. Deterioration in balance and loss of protective sensation in lower extremities contribute significantly to fall risk in patients with diabetic peripheral neuropathy (DPN). This study aimed to explore the impact of neuropathy and foot ulcer on gait.

#### Methods:

We recruited 39 participants (age,  $56.9 \pm 8.2$  years; body mass index,  $29.6.3 \pm 4.7$  kg/m<sup>2</sup>), including 15 DPN patients without foot ulcers, 16 DPN patients with foot ulcers, and 8 healthy aged-matched controls. Patients with active foot ulcers wore an offloading device during gait examination, including removable cast walker.

#### Results:

Results suggest that neuropathy alters gait mainly by increasing gait initiation, gait variability (coefficient of variation of gait velocity), and double support (DS) time, while reducing knee range of motion and center of mass sway ( $p < .05$ ). Interestingly, the presence of foot ulcer does not impact gait velocity ( $p > .1$ ) but enhances some of the gait parameters such as gait variability and DS time.

#### Conclusions:

This study demonstrates that neuropathy deteriorates gait, but the presence of foot ulcers does not alter gait parameters further than neuropathy. In addition, patients with foot ulcers demonstrated a better gait compared with DPN patients without ulcers. We speculate that offloading footwear may be enhancing the somatosensory feedback from sensate skin, thereby positively affecting gait parameters. A study with a larger sample is required to explore the effect of prescribed footwear in the DPN population in order to validate the findings of this research study.

*J Diabetes Sci Technol* 2013;7(5):1138–1146

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**Abbreviations:** (BMI) body mass index, (COM) center of mass, (CV) coefficient of variation, (DPN) diabetic peripheral neuropathy, (DS) double support, (SD) standard deviation

**Keywords:** diabetes, foot ulcer, gait, offloading, wearable sensors

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