TEMPORAL CHANGES IN GAIT IN HEALTHY OLDER INDIVIDUALS DURING PROLONGED TREADMILL WALKING

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INTRODUCTION

Previous researchers have suggested that changing various gait kinematics can significantly influence mechanical loading of the knee [1-3]. Specifically, the magnitude of toe out [1] of the stance limb and/or lateral trunk lean over the stance limb [2] have been shown to be associated with the external adduction moment about the knee during walking, a valid and reliable proxy for the dynamic load on the medial compartment. It is unclear, however, whether such gait kinematics simply represent normal variation between individuals in the way they walk, or are truly compensatory mechanisms in response to various factors such as fatigue, pain, or disease. Similarly, the stability of toe out and lateral trunk lean measures during prolonged walking for healthy individuals is currently unknown. Therefore, the purpose of the present study is to evaluate toe out and lateral trunk lean measures during prolonged walking in healthy older adults.

METHODS

To date, four subjects with no previous health concerns related to mobility were asked to complete 60 minutes of walking on a dual force plate instrumented treadmill (hp Cosmos, Kistler Instrument Corp., Amherst, U.S.A.) surrounded by four high resolution cameras (Motion Analysis Corp., Santa Rosa, U.S.A.).

All subjects were instrumented with a modified Helen Hayes marker set. Treadmill walking speed for each subject was determined by calculating his/her over ground walking speed. A random trial was averaged using the sacral marker.

To ensure familiarization to the treadmill and surroundings prior to beginning the session, the subject was asked to walk on the treadmill for at

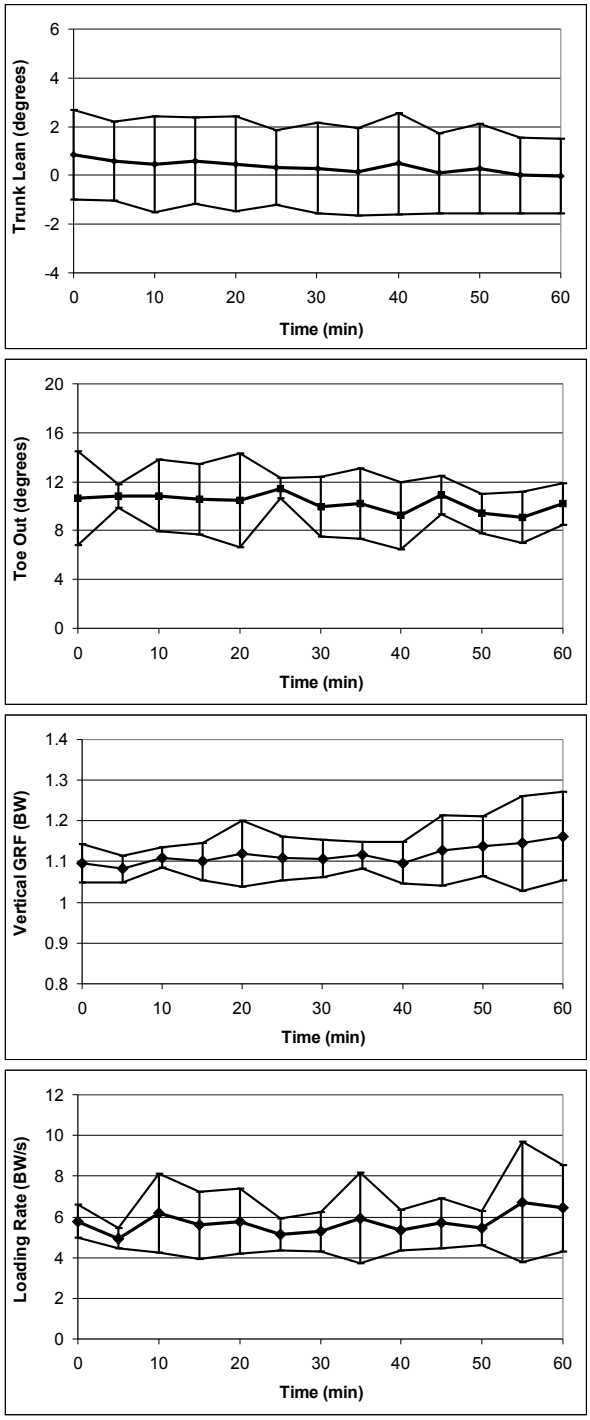

Figure 1: Mean (±SD) Trunk lean, toe out, vertical GRF, and loading rate over time.

least six minutes. A rest period was given if needed. The subject increased walking speed at his/her own preferred pace. Data collection commenced when the treadmill speed met that of the over ground calculated walking velocity. Data collection during 15 second intervals was completed every 5 minutes for 60 minutes. Three successive right foot strikes were cropped and averaged. Data reduction and post processing was completed using EVaRT, Orthotrak (Motion Analysis Corp., Santa Rosa, U.S.A.) and custom software. Primary variables of interest were the maximum toe out angle and lateral trunk lean during stance. Vertical Ground Reaction Force (GRF) and loading rate were also evaluated.

Data were analyzed using a one way repeated measures ANOVA for all variables to determine if a change occurred with respect to time. Statistical significance will be reported at $p < .05$.

RESULTS AND DISCUSSION

Subject demographics are reported in Table 1. Gait variables over 60 minutes are shown in Figure 1. Relatively small changes in all variables were observed over time. Maximum trunk lean occurred at the 0 minute mark (0.85±1.84 degrees) with minimum occurring at 60 minutes (-0.03±1.54 degrees). Maximum toe out occurred at the 25 minute mark (11.48±0.82 degrees) with minimum occurring at 55 minutes (9.04±2.10 degrees). Maximum VGRF occurred at 60 minutes (1.16±0.11 BW) while minimum occurred at 5 minutes (1.08±0.03 BW). Maximum loading rate occurred at 55 minutes (6.7±2.96 BW/s) with minimum occurring at 5 minutes (4.9± 0.51BW/s). With the present sample size, no significant changes occurred in any variables with respect to time.

CONCLUSIONS

These preliminary findings suggest that healthy older adults with no previous history of disability affecting mobility do not significantly change trunk lean or toe out over prolonged walking.

With a greater sample size, this investigation will lay the ground work for subsequent studies comparing subjects with and without disease.

REFERENCES

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Table 1. Demographic information

	Sex	Age (years)	Mass (kgs)	Height (m)	BMI	Gait Speed (m/s)
Average ± SD	2M 2F	48.5 ± 10.0	67.7 ± 13.1	1.71 ± 0.05	23.0 ± 3.6	1.25±0.13