



Induced Leg Length Discrepancy and Symmetry of Step Length; Cadence

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INTRODUCTION

The purpose of this study is to investigate how acute induced leg length discrepancy may impact the force loads on the limb. A subject blinded cross over study was performed assessing spatial temporal data collected on 20 healthy adults after being fit with heel lifts of varying thickness. Data was collected on a Zeno Walkway (Protokinetics, Havertown, PA) with heel lift order randomized to limit any effect of participant fatigue. It is expected that increasing leg length discrepancy will result in a greater amount of time percent spent on the longer limb through a complete stride at a self selected speed.

METHOD

Spatial temporal data was collected from all participants using the Zeno Mat walkway system both before and after the heel lift intervention was applied. The step length ratio (left/right) was analyzed as well as cadence (steps/minute). A higher value of step length ratio equates to a longer step taken with the left foot without the lift.

RESULTS

Participants ranged in age from 23 to 31 years (mean 24.7). The sample consisted of 4 male and 2 female participants. No participants reported any of the exclusion criteria and all participants completed all components of the study. Partial steps were the only data collected that were excluded from analysis. The heel lift condition is the independent variable, step length ratio and cadence are the independent variables analyzed.

No changes in spatial temporal data were deemed significant in amplitude after t-tests were performed.

Average Step Length Ratio (L/R)		
	Control	Heel Lift
Average	69.5	71.2
Std Deviation	3.5	2.8
t-test=0.95; p-test=0.18		

Cadence (steps/min.)		
	Control	Heel Lift
Average	106.0	101.6
Std Deviation	4.9	4.6
t-test=1.59; p-test=.072		

DISCUSSION

No conclusion can be made from these insignificant results though further research with an increased sample size and a more representative population. Our sample consisted of only young healthy adults which does not accurately reflect the demographics of AFO users. A larger sample will improve the probability of demonstrating that step length of the shorter limb increased as a result of the heel lift within an acceptable confidence interval. The sample used in this experiment was predominately male, below 30, and healthy, limiting the ability to generalize this data to the typical population of AFO users. In future research, greater lengths should be taken to blind participants to the experimental condition and to randomize trials to reduce any order effects. The data should be collected in one day rather than months apart and the side the heel lift is applied to should also be randomized.

CONCLUSION

This prospective study suggests that further research on the introduction of a heel lift as a component of orthotic intervention may be merited. No significant results were found however data trends were in line with the hypothesis that step length ration would increase and cadence would decrease, warranting further research with an adequately large and representative sample to determine if these trends are a statistical anomaly or clinically relevant.

CLINICAL APPLICATIONS

No clinical application can be made with current data.

REFERENCES

- A.L. Woerman, S.A. Binder-MacLeod, 1984
- Bhave A, Paley D, Herzenberg JE, 1999
- Friberg, O., 1982

Cadence (steps/min.)

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