



Comparisons of Overground, Non-motorized Treadmill, and Omnidirectional Treadmill gait

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Introduction

● Aim of this study

- To resolve the problems of the traditional treadmill & omnidirectional treadmill
- To determine which is closer to actual walking between the omnidirectional treadmill and the non-motorized treadmill



Figure 1. Omnidirectional treadmill, Which is made up of a harness applied to the waist and shoes attached with sensors, and can make the subjects walk at 360 degrees



Figure 2. Non-motorized treadmill, which can change its speed in real time by the subjects' gait speeds

Methods

● Subjects

- 20 participants walking on overground, omnidirectional treadmill, and non-motorized treadmill

● Data

- Gait parameters: Gait speeds, cadences, step lengths, stance phase, swing phase, and cycle duration
- Using an algorithm that automatically detects the gait events for the 3D data from wild images in 3D motion capture system

● Statistical analysis

- using SPSS 20.0 for Windows
- one-way ANOVA test
- p-value < 0.05 was considered to be statistically significant

Results

- No significant differences between the Overground and Non-motorized treadmill
- Significant differences between the Overground and Omnidirectional Treadmill gait in gait speeds, cadences, step lengths, and cycle duration (P<0.00)

Table 1. Gait parameters of Overground, Non-motorized Treadmill, and Omnidirectional Treadmill gait

Variables	Overground	Omnidirectional	Non-motorized
Gait speeds (m/s)	1.08±0.11	0.65±0.19	1.07±0.22
Cadence (steps/min)	110.93±9.46	84.04±14.36	105.60±12.86
Step length (cm)	58.97±4.21	45.94±7.36	60.55±8.61
Stance phase(%)	63.23±0.89	62.04±2.21	62.84±1.33
Swing phase(%)	36.77±0.89	37.96±2.21	37.16±1.33
Cycle duration(s)	1.10±0.83	1.48±0.26	1.14±0.13

* Value: Mean ± SD

Table 2. Comparisons of gait parameters between Overground and Non-motorized Treadmill gait

Variables	MD ± SE	P value
Gait speeds (m/s)	0.02± 0.06	<0.001*
Cadence (steps/min)	5.33± 4.06	0.393
Step length (cm)	1.58± 2.29	0.772
Stance phase(%)	0.38± 0.52	0.741
Swing phase(%)	0.38± 0.52	0.741
Cycle duration(s)	0.04± 0.6	0.751

Table 3. Comparisons of gait parameters between Overground and Omnidirectional Treadmill gait

Variables	MD ± SE	P value
Gait speeds (m/s)	0.44± 0.06	<0.00*
Cadence (steps/min)	26.89± 4.06	<0.00*
Step length (cm)	13.03± 2.29	<0.00*
Stance phase(%)	1.18± 0.52	0.07
Swing phase(%)	1.18± 0.52	0.07
Cycle duration(s)	0.38± 0.06	<0.00*

Conclusion

- **The non-motorized treadmill has the difference : The speed of the treadmill is adjusted according to the subjects' walking speed**
 - ➔ the closest to ground walking
 - ➔ more suitable alternative for gait analysis & training in stroke patients