

# Assistive Devices and Spatiotemporal Parameters of Gait in Persons With MS

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## BACKGROUND

- Gait disturbance is commonly reported by patients with multiple sclerosis (MS) and results in mobility limitations, which in turn have a significant impact on the patients' functional status and quality of life.<sup>1,2</sup>
- Spatiotemporal (ST) parameters of gait are increasingly assessed to characterize gait deviations in MS.<sup>3,4,5</sup>
- Assistive devices and orthoses are frequently recommended and prescribed, but there is little information on the effect of walking aides on ST gait parameters, both at slow (preferred) and fast (but safe) pace.<sup>6</sup>
- The goal of our study was to assess immediate changes in ST parameters of gait with and without several types of walking aides (cane, walker, hip flexion assist device (HFAD),<sup>7</sup> and ankle foot orthosis (AFO), at slow and fast pace.

## METHODS

A retrospective chart review was conducted on all adult patients with Multiple Sclerosis who underwent gait analysis using the GAITRite® electronic walkway during an outpatient visit at our MS center between 1/1/2010 and 11/20/2012.

The gait parameters analyzed included velocity, step length, single limb support, double limb support, step width, base of support, and the functional ambulation profile (FAP) score.

Patients were instructed to walk first at their usual pace, then at fast (but safe) pace, with and without a walking aide, as deemed appropriate by the treating clinician. Rest periods were provided.

Descriptive statistics were generated with significance level  $p < 0.05$ . Within-group differences were assessed using the Wilcoxon signed-rank test. Between-group differences were assessed using the Kruskal-Wallis test.

## RESULTS

- 156 subjects were included in the analysis. (Table 1)
- There was a statistically significant improvement in most ST gait parameters between slow and fast pace ( $p < 0.001$  for all but 2 of the variables), with the notable exception of step width, when all subjects were assessed with their usual walking aide.

Table 1 – Baseline characteristics of patient sample

Patient Population	N=156
Mean Age ± SD (years)	49.83 ± 10.28
Sex	67% women
Mean Time From Onset ± SD (years)	14.0 ± 9.1
Disease Course	Relapsing-Remitting: n=85 (54%) Secondary Progressive: n=49 (30%) Primary Progressive: n=13 (8%) Progressive Relapsing: n=9 (8%)

Figure 1 – Spatiotemporal gait parameters by level of support

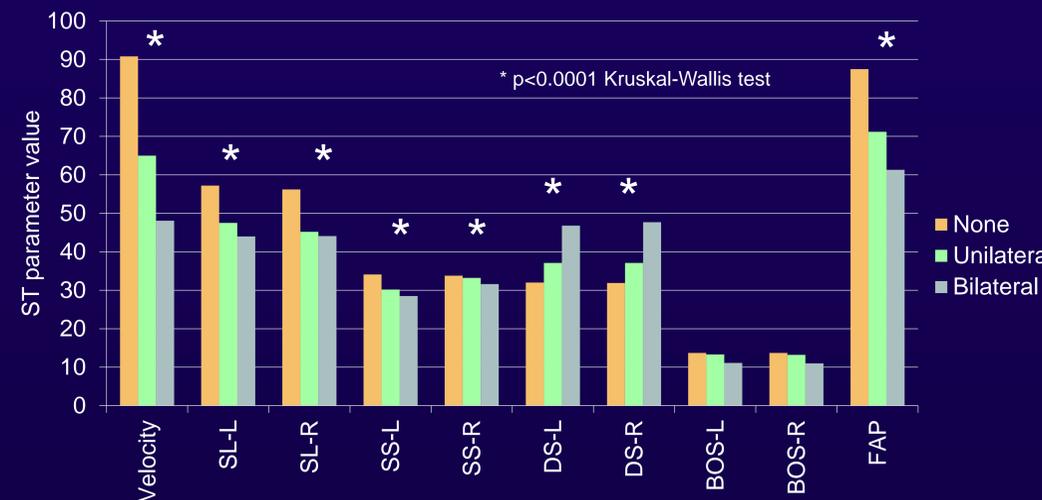


Figure 2 – Change slow to fast pace unilateral vs. no device



## RESULTS (Cont'd)

- A comparison of subgroups based on the level of support needed (none, unilateral, bilateral) showed significant differences in most gait parameters (with the exception of step width) at slow or fast pace, reflecting changes in ST gait parameters by level of walking disability. (Figure 1) The change in gait parameters between slow and fast pace was not significantly different between subgroups.
- Although some immediate improvements in gait parameters were noted when testing patients with and without walking aide (particularly with the HFAD on the affected LE), the changes did not reach statistical significance, and the change in walking aide did not significantly affect the difference between slow and fast pace. (example of cane versus no device in Figure 2)

## CONCLUSIONS

- Despite significant differences in ST gait parameters according to the habitual level of support needed, the changes observed between slow and fast pace were similar between subgroups, as were the changes between slow and fast pace within patients when comparing unilateral to no support.
- The lack of statistically significant difference in gait parameters when patients were tested with or without walking aide may be due to small sample sizes, and to the need for training to the use of the device.
- Further research is needed to determine how to optimize the impact of walking aides on gait pattern.

## References

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