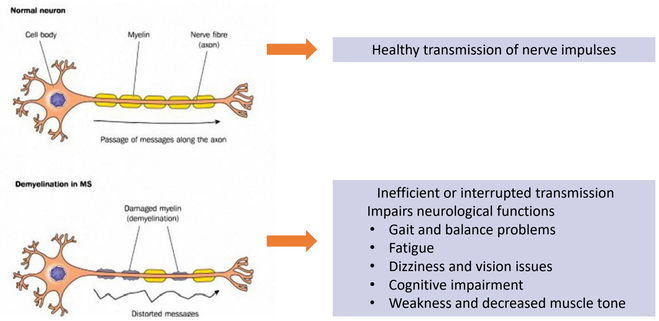
The Impact of Multiple Sclerosis Related Fatigue on Pre-existing Gait and Balance Impairments

Sarah Chesley

Overview



Fatigue and balance impairments are common symptoms of MS, which may overlap to exacerbate each other. In order to improve understanding of symptom pathology for PwMS, we tracked balance and gait before and after a fatiguing task.

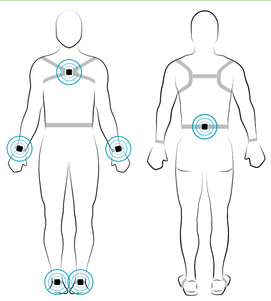
Within sensitive measures, our data revealed significant decline in standing balance. The gait data showed consistency from initial to final testing, which may suggest recovery by subjects or weaker correlation of fatigue and gait.

Goals

We aimed to observe if standing balance would change in PwMS after a fatiguing task. We also wanted to observe any gait changes in people with MS after a full day of testing. We predicted that both standing balance and gait would worsen in PwMS after fatigue.

Methods

As of August 2019, 15 healthy controls and 17 PwMS were tested. We asked all subjects to abstain from use of relevant medications, caffeine, etc. which might alter their performance. We fastened APDM Opal sensors to subject's sternum, lumbar, the dorsal surfaces of the feet, and posterior surfaces of the wrists.



Initial Sway and Gait Tests
- 30 seconds firm surface eyes open
- 6-minute walk

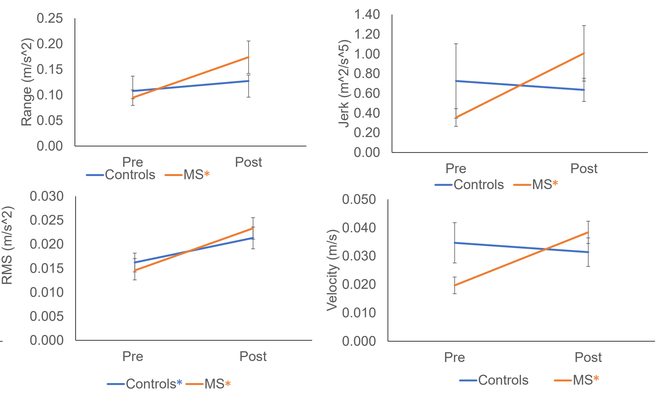
Fatiguing Task
- Biodex - 60 second sustained contraction of right lower limb

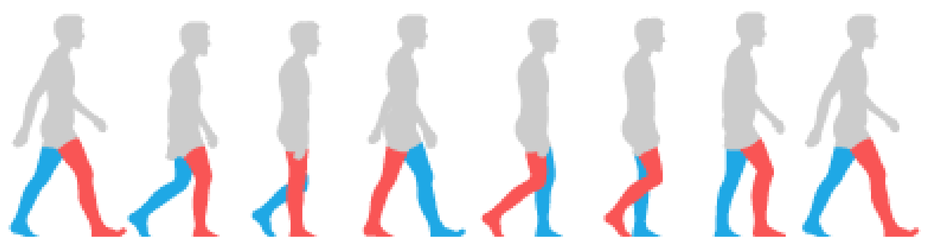
Post Sway and Gait Tests
- 30 seconds firm surface eyes open
- 6-minute walk

The APDM Opal sensors compiled data into Mobility Lab datasheets, from which we analyzed several measures. We focused on measures known to be sensitive in PwMS pre-fatigue.

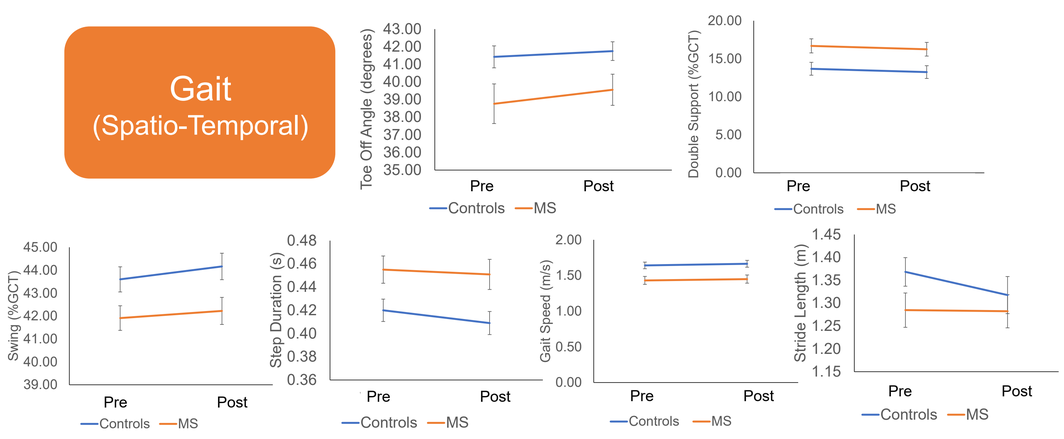
Results

Standing Balance (Medio-Lateral)

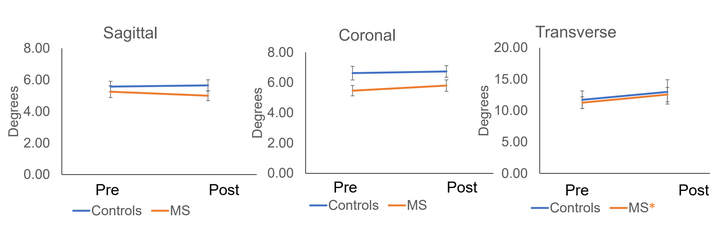




Gait (Spatio-Temporal)

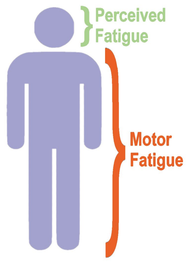


Gait (Trunk ROM)



Discussion

- Greater population sizes
- Analyze other sensitive measures
  - Ex: Turning Radius
- Increase duration, difficulty, and scope of fatiguing task
  - Create long-lasting fatigue to impact gait after several minutes
- Data only measures motor fatigue
  - Says nothing of perceived fatigue, also taxing
  - Analyze fatigue survey results
- Activity level of subjects may influence performance
- Fatigue perception variable based on symptom severity and disease activity
- All subjects tested well after periods of relapse
  - Many are asymptomatic during remission



Conclusion

Postural Sway
- As expected, all standing balance measures worsened in PwMS after fatiguing task
- PwMS experience greater motor fatigue from fatiguing task, causing distinct impairment on postural sway.

Walking Gait
- In contrast to our hypothesis, we did not observe change in spatio-temporal features of gait in PwMS after a long day of testing
- Upper body control (Trunk Transverse ROM) did increase

Acknowledgements

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