

Effect of Fatigue on Spasticity in Multiple Sclerosis

H. Karpatkin, PT, DSc, NCS, MSCS; M. Mcdarby, SPT; M. Narovlianski, SPT; B. Perez, SPT; I. Rimawi, SPT



Introduction:

Disturbance in gait is known to occur in approximately 80% of persons with multiple sclerosis (MS) [1]. Fatigue and spasticity are among the most common and debilitating symptoms in this population and both have been shown to affect gait quality, speed and endurance. Fatigue is known to worsen with physical performance in MS [2], and there are anecdotal reports that spasticity is associated with worsening fatigue. However, the current literature provides little information regarding the relationship between spasticity and fatigue in persons with MS.

Purpose:

The purpose of this study is to determine whether increases in fatigue in persons with MS result in increases in lower extremity spasticity. We hypothesized that an increase in fatigue will result in an increase in lower extremity spasticity. If correct, our hypothesis would suggest that physical therapists who perform gait-training activities in persons with MS will need to take the interaction between fatigue and spasticity into account as a factor that may impact outcomes and help determine an appropriate course of treatment.

Subjects

A convenience sample (n=16) of ambulatory subjects with MS was recruited from New York City physical therapy practices which specialized in MS. Demographic and subject characteristics including MS type, years since diagnosis, age, gender, Expanded Disability Status Scale (EDSS) level, medications, and use of assistive devices were recorded and analyzed. The Fatigue Severity Scale (FSS), Multiple Sclerosis Impact Scale-29 (MSIS-29) and the Multiple Sclerosis Severity Scale 88 (MSSS-88) were completed for baseline analysis. (Table 1)

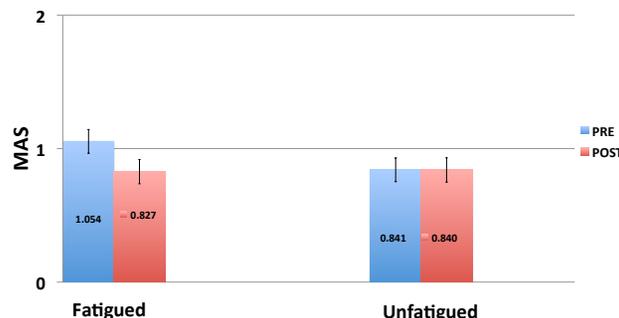
Methods

This study utilized a randomized crossover design. After obtaining informed consent, subject characteristics and demographics, subjects were randomized into walking (W) and resting (R) groups. All subjects received spasticity testing using the Modified Ashworth Scale (MAS). Subjects in the W group then underwent a 6-minute walk (6MW) to induce fatigue, while subjects in the R group laid supine for 6 minutes to minimize fatigue. Immediately following either 6-minute condition, MAS testing was repeated. This was performed on three separate trials over the course of a 5-day period, followed by a 2-week detraining period. Subjects then crossed over, so that those originally in the W group underwent the R protocol, and the subjects in the R group underwent the W protocol. Fatigue was measured using the Visual Analog Scale of Fatigue (VAS-F) before and after each 6 minute walk or rest.

Table 1. Demographic and Clinical Characteristics of Participants (n=16)

Age, Mean, (SD)	\bar{x} 55.88, (\pm 11.68)
Gender	
Male	5
Female	11
EDSS Score, Mean, Range	\bar{x} 3.59, range 2.0- 6.5
Type of MS	
PP	5
RR	7
SP	4
Spasticity Medication	5
Anti-fatigue Medication	5
FSS, Mean, Range, (SD)	\bar{x} 4.51, 1.22-7, (\pm 1.81)
MSIS-29, Mean, Range, (SD)	\bar{x} 68.21, 32-106, (\pm 21.13)
MSSS-88, Mean, Range, (SD)	\bar{x} 158.16, 96-252, (\pm 42.47)

FIG 1: MAS SCORES- FATIGUED VS UNFATIGUED



Results:

16 subjects (EDSS 3.59) completed the study (See table 1). Mean MAS scores decreased significantly following the 6-minute walk from 1.054 to .827 (p=.015, SD= .089). MAS scores also decreased non-significantly in the non fatigued condition from .841 to.839 (p=.996, SD=.091). (See Fig 1) Mean VAS-F scores increased 29.5mm (p<.001) following the 6-minute walk indicating that MAS testing was performed in a fatigued condition.

Discussion:

Contrary to our hypothesis, fatigue did not result in worsening of spasticity, resulting instead in significant increase. Clinically this suggests that the worsening of gait seen over time in persons with MS may be due to reasons other than spasticity. It is possible that the MAS was not sufficiently sensitive a measurement to accurately assess changes in spasticity, or that a fatigue inducing task other than walking may have resulted in different findings

References

- Bethoux, Francois. "Gait disorders in multiple sclerosis." CONTINUUM: Lifelong Learning in Neurology 19.4, Multiple Sclerosis (2013): 1007-1022.
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