Fatigue measured using the Neurological Fatigue Index is associated with poor sleep quality and inattentiveness in people with Multiple Sclerosis

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CMSC Annual Meeting 2016

Introduction

- Variety of signs and symptoms
  - Numbness and tingling
  - Dizziness and vertigo
  - Fatigue
  - Cognitive impairments
  - Depression and Anxiety
  - Sleep disturbances
  - Visual deficits
  - Balance and Walking difficulties

(Wingerchuk et al. 2014, Motl et al. 2009)

Introduction

- Fatigue in MS
  - Affects up to 90% of individuals
  - Described as the worst symptom by 40%
  - Negatively affects performance of daily physical and mental tasks
  - Major cause of unemployment
  - Measured using self-reported scales
  - Multidimensional (associated with other common symptoms)

(Berger et al. 2013, Braley et al. 2010)

Introduction

- Cognitive impairments in MS
  - Affects up to 70% of individuals
  - Most common domains affected are speed of information processing and attention
  - Negatively affects individual quality of life

Sleep Disturbances in MS

- 50% have a diagnosable sleep disorder
- Affects daily function and work load
- Associated with reduced employment rate

(Ruet et al. 2015, Braley et al. 2015)
Introduction

- Recent evidence shows psychometric issues in commonly used fatigue scales in the MS population

**Problem:** Interpretation of previous studies might be difficult! And using the same common scales without proper evaluation affects study results!

*Need a more accurate fatigue scale...??!!*

(Mills et al. 2014, Larson et al. 2013)

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**Purpose of study**

- To examine the relationship between fatigue (NFI-MS) and sleep quality

- To examine the relationship between fatigue (NFI-MS) and cognitive function (attention)

..... In people with MS

(Mills et al. 2010)

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**Materials and methods**

- Participants recruited from MS clinic located at the Landon center on Aging and personal referral from consented subjects

- Cross sectional design

- Data collection took place in Brain Behavior Lab (BBL) at KUMC

- Written informed consent obtained from all study participants
Materials and methods

- **Inclusion criteria**
  - 18-60 years of age
  - Relapsing remitting or secondary progressive MS
  - Able to ambulate with or without an assistive device
  - Score > 24 on the Mini Mental Status Exam (MMSE)

- **Exclusion criteria**
  - History of alcohol/drug abuse or nervous system disorder other than MS
  - Severe physical, neurological, or sensory impairments that would interfere significantly with testing
  - Developmental history of learning disability or attention-deficit/hyperactivity disorder
  - Relapse and/or corticosteroid use within four weeks of assessment
  - Untreated sleep disorder (such as sleep apnea)
  - Uncorrected vision loss that would interfere significantly with testing.

The NFI-MS

- Four sub-scales (physical, cognitive, relief by diurnal sleep or rest, and abnormal nocturnal sleep and sleepiness)
- 23 questions (Likert scale from 0-3) with higher score indicating more fatigue
- Measures fatigue in the past two weeks

The Pittsburgh Sleep Quality Index (PSQI)

- Gold standard self-reported sleep quality measure
- 19 self-rated questions
- Each question is rated on a scale of 0-3 with 0 indicating no sleep difficulty and 3 indicating severe sleep difficulties
- A single global score ranging from 0-21
- A cutoff value of > 5 reflects poor sleep quality

The Continuous Performance Test (CPT)

- A well-known computerized measure of sustained attention
- Participant seated in front of a computer screen and instructed to press the space bar when any letter of the alphabet except the letter X appeared on the monitor
- Takes 14 minutes to complete
- Outcome measure is Hit Reaction Time (HRT)
- Higher HRT score indicates decreased attention/inattentiveness
Results

- Total 52 participants enrolled
  - 44 females
  - 47 relapsing remitting and five with secondary progressive

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<th>Variable</th>
<th>Mean</th>
<th>Std. Deviation</th>
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<tbody>
<tr>
<td>Age</td>
<td>46.8</td>
<td>10.1</td>
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<tr>
<td>Disease Duration</td>
<td>12.4</td>
<td>7.5</td>
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<td>PDDS (Disease severity)</td>
<td>1.8</td>
<td>1.6</td>
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<tr>
<td>MMSE (Global cognitive function)</td>
<td>28.7</td>
<td>1.5</td>
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<tr>
<td>BDI (Depression)</td>
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<table>
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<tr>
<th></th>
<th>NFI-MS</th>
<th>PSQI - Global score</th>
<th>CPT - HRT score</th>
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<tbody>
<tr>
<td>Physical Domain</td>
<td>r</td>
<td>.431</td>
<td>.242</td>
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<td></td>
<td>p</td>
<td>.001*</td>
<td>.087</td>
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<tr>
<td>Cognitive Domain</td>
<td>r</td>
<td>.240</td>
<td>.383*</td>
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<td></td>
<td>p</td>
<td>.087</td>
<td>.006</td>
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<td>Relief by diurnal sleep</td>
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<td>.145</td>
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<td></td>
<td>p</td>
<td>.403</td>
<td>.311</td>
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<tr>
<td>Abnormal nocturnal sleep</td>
<td>r</td>
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<td>-.019</td>
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<tr>
<td></td>
<td>p</td>
<td>≤.001</td>
<td>.895</td>
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Discussion

- Findings emphasize the need for health care providers to consider the assessment of sleep quality and possibly address sleep disturbances as part of the treatment plan.

- Cognitive fatigue affects sustained attention which is necessary for individuals to effectively perform continuous and repetitive activities.

- The NFI-MS can be easily administered and used in research and clinical settings.

Acknowledgments

- My Advisor
  - Dr. Catherine Siensukon

- Dissertation Committee members
  - Dr. Patricia Kluding
  - Dr. Jeff Radel
  - Dr. Jessie Huisinga
  - Dr. Jared Bruce (UMKC)

- Landon Center on Aging (KUMC)
  - Dr. Sharon Lynch

- Research participants

Thank you!