Relationship between sleep, fatigue and depression in pediatric multiple sclerosis

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BACKGROUND

• Fatigue and depression common in pediatric multiple sclerosis (MS)
• Decreased quality of sleep known to be associated with fatigue and depression in adults with MS and healthy children1,3
• Prevalence of sleep problems in pediatric MS and their relationship with fatigue and depression is not well studied

OBJECTIVES

(1) To determine the prevalence of sleep problems in pediatric MS.
(2) To examine the relationship between sleep quality, fatigue and depression.

METHODS

Population:
• Participants were recruited from the Neuroinflammatory Clinic at the Hospital for Sick Children (HSC)
• Inclusion criteria: (1) Diagnosis of MS or monophasic acquired demyelinating syndrome (mono-ADS); (2) Age 5 to 17 and 11 months
• Exclusion criteria: (1) Attack within last 30 days; (2) Age <5 or ≥18

Questionnaires:
1. Child Sleep Habits Questionnaire (CSHQ) – subscales: bedtime resistance, sleep onset delay, sleep duration, sleep anxiety, night wakings, parasomnias, sleep disorders breathing, daytime sleepiness
2. Child Behaviour Checklist Sleep Composite (CBCL)
3. Pediatric Multidimensional Fatigue Scale (PedsQL)
4. Center for Epidemiological Studies - Depression Scale for Children (CES-DC)

Thresholds:
• CSHQ: total score ≥11 used to identify potential sleep disorder; subscale score ≥mean+1SD of normative data used to identify type of sleep problem(s)
• CBCL: total score ≥1 indicated at least one self-reported sleep problem

Clinical data:
• Collected using a standardized data collection form (HSC Neuroinflammatory Registry). Data analyzed included: (1) Demographic information; (2) Expanded Disability Status Scale (EDSS); (3) disease duration; (4) annualized relapse rate (ARR)

Analysis:
• Differences between total scores in the two groups were analyzed (t-test or Mann-Whitney U)
• Relationship between sleep, fatigue and depression scores was examined (Spearman’s correlations)
• Ethics approval was obtained from HSC REB (REB #1000005356)

RESULT

Table 1. Demographics and disease characteristics

<table>
<thead>
<tr>
<th></th>
<th>MS (n = 23)</th>
<th>mono-ADS (n = 34)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (# of females)</td>
<td>15</td>
<td>18</td>
<td>0.357</td>
</tr>
<tr>
<td>Age in years (mean ± SD)</td>
<td>16.11 ± 1.38</td>
<td>12.39 ± 3.20</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Range</td>
<td>12.7-17.7</td>
<td>5.4-17.8</td>
<td>—</td>
</tr>
<tr>
<td>Disease duration in years (mean ± SD)</td>
<td>2.92 ± 2.29</td>
<td>4.05 ± 3.17</td>
<td>0.146</td>
</tr>
<tr>
<td>EDSS score (median (IQR))</td>
<td>1.5 (0.5)</td>
<td>1.0 (1.0)</td>
<td>0.001*</td>
</tr>
<tr>
<td>ARR (median (IQR))</td>
<td>0.7 (0.6)</td>
<td>—</td>
<td>—</td>
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</tbody>
</table>

*p<0.05 is considered statistically significant

Figure 1. Prevalence of sleep problems. Proportion of MS vs. mono-ADS who met the threshold for a. CSHQ (p=0.341) and b. CBCL (p=0.423). c. Prevalence of specific types of sleep problems in MS who met threshold for CSHQ. *p<0.05 is considered statistically significant

Figure 2. Differences in sleep problems. Median total scores in MS vs. mono-ADS for a. CSHQ (p=0.070) and b. CBCL (p=0.423). *p<0.05 is considered statistically significant

Table 2. Correlations controlled for age

<table>
<thead>
<tr>
<th></th>
<th>MS</th>
<th>mono-ADS</th>
</tr>
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<tbody>
<tr>
<td>Sleep (CSHQ) &amp; Fatigue (PedsQL)</td>
<td>0.427</td>
<td>0.087</td>
</tr>
<tr>
<td>Sleep (CSHQ) &amp; Depression (CES-DC)</td>
<td>0.112</td>
<td>0.669</td>
</tr>
<tr>
<td>Sleep (CBCL) &amp; Fatigue (PedsQL)</td>
<td>-0.078</td>
<td>0.766</td>
</tr>
<tr>
<td>Sleep (CBCL) &amp; Depression (CES-DC)</td>
<td>0.015</td>
<td>0.955</td>
</tr>
<tr>
<td>Fatigue (PedsQL) &amp; Depression (CES-DC)</td>
<td>0.525</td>
<td>0.030</td>
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*p<0.05 is considered statistically significant

CONCLUSION

• It is clear that MS group reported experiencing sleep problems and was at risk for the development of sleep disorders. The most prevalent types of sleep problems in MS were sleep onset delay, sleep duration and daytime sleepiness.
• However, there were no statistically significant differences in the overall prevalence of sleep problems between the two groups.
• MS group reported higher fatigue and depression scores than mono-ADS, as previously shown.
• Higher sleep problem scores were associated with increased fatigue and depression scores in mono-ADS, but not MS.
• Reasons for this are unclear but reinforce the role that ongoing disease activity may play in fatigue and depression in youth with MS.
• Objective measures of sleep (e.g. actigraphy) may be more sensitive to the identification of sleep problems and could provide further insight into the nature of the relationship between sleep, fatigue and depression in youth with MS.

ACKNOWLEDGEMENTS/DISCLOSURES

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REFERENCE