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Excessive daytime sleepiness and sleep complaints among children with epilepsy

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Abstract

Objective. Excessive daytime sleepiness (EDS) and sleep complaints are common among adults with epilepsy. We hypothesized that children with epilepsy have worse daytime sleepiness compared with controls.

Methods. Children with and without epilepsy between ages 8 and 18 were recruited for the study. Parents and children were asked to fill out the Pediatric Sleep Questionnaire (PSQ) and Pediatric Daytime Sleepiness Scale (PDSS), respectively. The Mann–Whitney *U* test was used for group comparisons, with the Fischer exact or χ^2 test for categorical variables. Regression analysis was used to identify predictors of EDS.

Results. Twenty-six patients and matched controls were recruited for the study. Parents of children with epilepsy more often reported EDS ($P < 0.001$), symptoms of sleep-disordered breathing ($P < 0.001$), and parasomnias ($P < 0.001$) compared with controls. On the PDSS, children with epilepsy reported worse daytime sleepiness scores compared with controls (15.48 ± 6.4 vs 11.88 ± 5.25, $P = 0.037$). In the conditional logistic regression model, presence of symptoms of sleep-disordered breathing (OR = 15.3, 95% CI = 1.4–166.6) and parasomnias (OR = 12.4, 95% CI = 1.01–151.6) were independent predictors of EDS among patients when adjusted for duration of sleep. Epilepsy syndrome, anticonvulsants used, and presence or absence of seizure freedom, however, were not significant predictors of EDS among patients.

Conclusions. Daytime sleepiness appears to be common in children with epilepsy, and may be due to underlying sleep disorders. Further confirmatory studies are needed using screening questionnaires and formal sleep studies to systematically study the prevalence of sleep complaints and role of sleep disorders in these patients.

Keywords: Epilepsy; Sleep; Daytime sleepiness; Sleep disorders; Children

1. Introduction

Sleep complaints and excessive daytime sleepiness (EDS) have been reported to be common among adults with epilepsy [1,2]. A number of factors underlie these complaints, and may include frequent seizures, antiepileptic drugs (AEDs), and changes in sleep architecture or associated sleep disorders [3–5]. The relatively few studies that have examined sleep complaints among children with epilepsy primarily used parental questionnaires. Using non-standardized questionnaires, some researchers have shown that children with epilepsy have poor-quality sleep and anxieties about their sleep [6,7], whereas others have found that parents of children with idiopathic generalized epilepsy report significantly worse sleep complaints and daytime sleepiness than parents of healthy controls [8]. Although these questionnaires comprise a broad range of questions relating to overall nighttime sleep quality and

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daytime sleepiness, they were less specific in assessing individual sleep disorders such as sleep-disordered breathing.

In this pilot study we prospectively evaluated sleep complaints and EDS using parental and pediatric questionnaires, respectively. A validated parental questionnaire (Pediatric Sleep Questionnaire) evaluated for symptoms of various sleep disorders such as sleep-disordered breathing/sleep apnea, parasomnias, narcolepsy, and insomnia. The pediatric questionnaire (Pediatric Daytime Sleepiness Scale) used in this study is similar to the Epworth Sleepiness Scale, which is a tool commonly used with adults, and essentially determines degree of daytime sleepiness as perceived by the children. We hypothesized that children with epilepsy have worse daytime sleepiness compared with controls.

2. Methods

Children with epilepsy aged 8 to 18 were recruited for the study from the neurology clinics at the Marshfield Clinic. Age- and gender-matched normal controls comprised either siblings of children with epilepsy or children of employees of Marshfield Clinic. All recruited controls had an existing medical record at the Marshfield Clinic. Children with known mental retardation (IQ < 60) or psychiatric comorbidities such as mood disorders, psychotic conditions, and attention deficit/hyperactivity disorder, those on any psychoactive medications such as stimulants, antidepressants, and antipsychotics, and those with known/preexisting sleep disorders were excluded from the study. Additionally, among children with epilepsy, those taking more than two anticonvulsants or those on phenobarbital or benzodiazepines were also excluded from enrollment. After the appropriate consents were obtained, charts were reviewed to ascertain epilepsy history and medication history. Epilepsy was classified into idiopathic generalized and localization-related based on clinical history and electrodiagnostic and radiological details. After appropriate patients were identified, parents of children with epilepsy were asked to complete the Pediatric Sleep Questionnaire (PSQ) and children were asked to complete the Pediatric Daytime Sleepiness Scale (PDSS). Similar methods were employed for controls as well. The Marshfield Clinic institutional review board approved the study.

2.1. Pediatric Sleep Questionnaire

This 49-item parental questionnaire includes subscales for snoring, sleep-disordered breathing/sleep apnea, restless leg syndrome/limb movements of sleep, parasomnias, narcolepsy, insomnia, daytime inattention and hyperactivity, as well as daytime sleepiness. The questions are simple and concise, and a yes/no/don't know answer format is used. The questionnaire was shown to have good internal consistency and reliability [9]. The answers are scored as 1 = yes and 0 = no or don't know per the instrument. A mean score of 0.33 or greater is considered positive for each subscale (falling in the clinical range) per the instrument design [9]. Per the instrument, parents were also asked to estimate the average amount of time spent sleeping daily (in hours) by their children in the preceding month.

Although the sleep-disordered breathing, snoring, daytime sleepiness, and behavioral subscales have been shown to correlate strongly with polysomnographically documented sleep-disordered breathing [9], the remaining subscales have not been fully validated for their respective sleep disorders. For the purpose of the current study, we extracted 31 items from the PSQ that pertain to various sleep disorders. Eleven questions pertain to sleep-disordered breathing, six items pertain to excessive daytime sleepiness, five questions pertain to restless leg syndrome/periodic limb movements, five items pertain to parasomnias, and four items pertain to narcolepsy. The questionnaire also contains items relating to the subject's diagnoses, medications, and prior history of sleep disorders or psychiatric diagnoses.

2.2. Pediatric Daytime Sleepiness Scale

Originally a 32-item scale, the Pediatric Daytime Sleepiness Scale evaluates daily sleep patterns, mood, sleepiness, quality of life, extracurricular activities, and school achievement [10]. Eight of the items assess daytime sleepiness in children, and are self-reported by children. The scale has been shown to be linearly associated with poor school performance. Based on Likert scale ratings, items are scored from 0 to 4 (never = 0, seldom = 1, sometimes = 2, frequently = 3, always = 4). To reduce the possibility of response bias, scoring for item 3 was reversed. In the original study, scores above 15 were associated with poorer academic achievement. Therefore, for the purposes of the current study, eight of the questions that assess daytime sleepiness were included, and scores above 15 were considered indicative of excessive daytime sleepiness [10].

2.3. Statistical analysis

Descriptive data are presented as means and SD or percentages. The Mann–Whitney U test was used to test the group comparison for all subscale scores, and the χ^2 or Fischer exact test was used for categorical variables. A conditional logistic regression model was used to test the association of symptoms of sleep-disordered breathing and parasomnias per parental report on the PSQ and daytime sleepiness measured by the PDSS, between cases and controls, adjusting for age, gender, epilepsy type, medication type, and average duration of nighttime sleep (as reported by the parents). Odds ratios (ORs)and 95% confidence intervals (CIs) were calculated. A linear regression model was used to determine the correlation between excessive daytime sleepiness as measured by the PDSS and duration of nighttime sleep. Cronbach's α was used to measure internal consistency for each of the subscales sleep-disordered breathing (0.791), parasomnias (0.743), and daytime sleep-