



Sleep problems in children and adolescents with epilepsy: Associations with psychiatric comorbidity



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ABSTRACT

Sleep problems are common in pediatric epilepsy and may influence seizure control, daytime functioning, and overall quality of life. Knowledge of factors contributing to sleep problems is likely to improve treatment. The aim of this study was to investigate associations between psychiatric comorbidity and parent-reported and self-reported sleep problems in a sample of children and adolescents with epilepsy. Participants were children and adolescents (N = 94), aged 10–19 years, with generalized or focal epilepsy who had been referred to a tertiary epilepsy treatment center in Norway. Participants underwent a thorough clinical assessment and 24 h of EEG registration. Information on sleep problems was obtained from parents using the Children's Sleep Habit Questionnaire (CSHQ) and from self-reporting using the Sleep Self-Report (SSR) questionnaire. Psychiatric diagnoses were established using the semistructured psychiatric interview Schedule for Affective Disorders and Schizophrenia – Present and Lifetime Version (Kiddie-SADS-PL).

Both the total and subdomain CSHQ and SSR scores were high in comparison with scores from population-based samples. Having one or more psychiatric disorder(s) was significantly associated with elevated scores on both the CSHQ and the SSR. With the exception of parent-reported parasomnias, associations between sleep problems and psychiatric disorders remained significant after adjusting for relevant epilepsy variables. Psychiatric comorbidity explained about one-third of the variance of the reported sleep problems in children and adolescents with epilepsy.

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1. Introduction

Sleep problems occur frequently in children and adolescents with epilepsy and may influence seizure control, impair daytime functioning, and adversely affect quality of life [1]. Treatment of sleep disturbances is thus important when caring for pediatric patients with epilepsy [2]. However, for treatment to be effective, knowledge of potential contributing factors is important [3]. Efforts have been made to identify potential contributing factors associated with sleep disturbances in pediatric populations with epilepsy (see [1,3,4] for review), but the role of comorbid psychiatric disorders has not been investigated. This is surprising as an association between epilepsy and psychiatric disorders is well-established [5], as is an association between psychiatric disorders and sleep problems [6,7].

Previous studies on relationships between emotional and behavioral problems and sleep in pediatric populations with epilepsy have demonstrated associations between sleep disturbances and symptoms of inattentiveness, hyperactivity/impulsiveness, and emotional problems (assessed by questionnaires) (see [1–3] for review). These associations may be reflections of the daytime consequences of disturbed sleep or may indicate associations due to psychiatric comorbidity. This latter hypothesis has not been tested in pediatric populations with epilepsy [3] and requires comprehensive psychiatric evaluations in order to establish reliable and valid psychiatric diagnoses, along with the sleep assessment [5].

Children and adolescents with epilepsy have higher prevalences of psychiatric disorders than healthy controls [5], and a substantial body of research has reported robust and consistent associations between psychiatric disorders such as attention-deficit hyperactivity disorder (ADHD), anxiety, depression, and autism spectrum disorders and sleep problems in children and adolescents (see [6–9] for review). Sleep disturbances and emotional/behavioral problems are considered to have a bidirectional relationship [6,10]. In addition, the possible role of shared underlying pathophysiological and psychopathological processes has been discussed [10–12]. These processes may contribute to

Abbreviations: Kiddie-SADS-PL, Schedule for Affective Disorders and Schizophrenia – Present and Lifetime Version; SSR, Sleep Self-Report; CSHQ, Children's Sleep Habit Questionnaire; ADHD, attention-deficit hyperactivity disorder.

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poor sleep quality in pediatric populations with epilepsy, in addition to disturbances of sleep caused by epilepsy characteristics, such as seizure frequency, epilepsy syndrome, interictal epileptiform activity, and/or side effects of antiepileptic drugs (AEDs) [1].

Previous studies on sleep and psychiatric problems in pediatric populations with epilepsy have used parents to obtain information on both sleep and behavior (see [1–3] for review). The use of only parents as informants when assessing sleep in children is generally not recommended [13–15], as this approach increases the risk of both false negative or false positive associations due to information bias. Especially in older children, parents may be unaware of important aspects of their child's sleep, such as sleep onset latency, night wakings, and daytime sleepiness [16]. On the other hand, parents may overestimate sleep disturbances in their child with daytime behavioral problems [17]. Using both patients and parents as sources of information may overcome these limitations. Further, correlations between parent report and child report of sleep in general pediatric populations are low [14], but how this applies to pediatric populations with epilepsy has not been investigated. Using both patients and parents as sources of information may thus strengthen previous research findings on the association between behavioral and emotional problems and sleep disturbances in pediatric populations with epilepsy.

The aim of this study was to investigate the prevalence of self-reported and parent-reported sleep problems in a group of children and adolescents with epilepsy and to investigate the independent contribution of having one or more psychiatric diagnoses on sleep problems in the same population, correcting for relevant epilepsy-related characteristics (see [1–3] for review). Improved knowledge on how psychiatric comorbidity influences sleep in pediatric populations with epilepsy may lead to more efficient treatment strategies. These, in turn, may have the potential to improve seizure control, daily functioning, and quality of life.

Based on previous research in adults [1,3], we hypothesized that sleep problems occurred more frequently in children and adolescents with epilepsy with a comorbid psychiatric disorder than in those without such comorbidity. Furthermore, we hypothesized that psychiatric comorbidity, independently adjusted for relevant covariates, could be used to predict the magnitude of the sleep problems.

2. Methods

2.1. Participants

Participants were 94 children and adolescents, aged between 10 years and 19 years, who were consecutive referrals to a tertiary epilepsy treatment center in Norway between January 2012 and June 2014. They were participants in a study on psychiatric comorbidity and executive functions, and details on the inclusion procedure for that study have been reported previously [18]. Patients invited for inclusion in the present study had confirmed genetic generalized epilepsies or confirmed focal epilepsies, including patients with parietal or occipital epilepsies. Because of administrative reasons, the sleep questionnaires were added to the study protocol only after 19 participants had already been included. All assessments took place during the participants' stay at the treatment center, within a maximum period of three weeks.

Reasons for exclusion from the study were intellectual disability and/or a progressive neurological brain disorder. Informed written consent was obtained from parents or participants of legal age; children gave their assent. The study was approved by the Regional Ethics Committee (2011/1636/REK sør-øst B).

2.2. Epilepsy-related information

Data on type of epilepsy, seizure frequency, and AED treatment were collected from interviews of participants/parents and examination

of patient records. All patients except four had a 24-hour EEG study interpreted by a neurologist who had been board-certified in neurophysiology. Epilepsy syndromes were classified according to the current ILAE classification [19] by two experienced neurologists and further grouped into genetic generalized epilepsies or focal epilepsy. For nonconsensus or difficult cases, a child neurologist reviewed the cases.

Seizure frequency was dichotomized into having experienced a seizure in the last six months or not. Interictal epileptiform activity was dichotomized into present or not present during the 24-hour EEG. Sleep structure was classified as normal or disturbed, based on visual inspection of the spectrogram – a Fourier analysis with calculation of a frequency-based spectral computation using electrodes F4 and CP1. In our clinical experience, the spectrogram is very easy to obtain and gives a reasonable result but is less accurate than a hypnogram. It is used as a standard procedure at our center. Slow-wave activity, rapid eye movement (REM) sleep, spindle activity, and the absence of muscle artifacts can easily be assessed. The spectrogram of each patient who had a long-term EEG was shown to three board-certified neurophysiologists, blinded for all clinical and personal information. They rated the quality of sleep between values of 0 and 3, according to the spectrogram, as follows: 0 (no sleep at all), 1 (detectable changes in the spectrogram, such as an increase in slow-wave activity or reduction of muscle tone but no sleep cycles or spindle activity), 2 (detectable sleep cycles but a disturbed sleep pattern), and 3 (normal sleep pattern with regular sleep cycles, spindle activity, slow-wave activity, and the absence of muscle activity equivalent to muscle atonia). For our analyses, the data were dichotomized into normal sleep structure (value 3) or disturbed (values 0, 1, or 2). In cases of disparity, the majority decision was used. There were no cases in which each neurophysiologist gave a different result.

2.3. Sleep assessment

2.3.1. The Children's Sleep Habit Questionnaire (CSHQ)

The CSHQ is a 1-week recall parental screening questionnaire for children [20]. The questionnaire has been used extensively in research, both in clinical and nonclinical populations, including adolescents and populations with epilepsy [21–24]. Acceptable test–retest reliability and validity have been reported [20]. Parents rate the occurrence of 33 sleep habits or sleep problems as occurring 'usually' (5–7 times/week), 'sometimes' (2–4 times/week), or 'rarely' (0–1 times/week) in the most recent typical week. The questionnaire provides a Total Score and eight subscale scores: Bedtime Resistance, Sleep Onset Delay, Sleep Duration, Sleep Anxiety, Night Wakings, Parasomnias, Sleep Disordered Breathing, and Daytime Sleepiness. A higher score indicates more sleep problems. A total score above 41 is of adequate sensitivity (0.80) and specificity (0.72) for differentiating between children with and without clinical sleep disturbances [20].

2.3.2. The Sleep Self-Report (SSR)

The SSR is a 1-week recall sleep self-report questionnaire for children aged 7–12 years and is designed to assess similar domains of sleep as the CSHQ [25]. The questionnaire has been used in both nonclinical and clinical populations [14,25,26], including adolescents [27,28]. Good values of convergent validity and acceptable values of divergent validity have been reported [26]. The questionnaire consists of 23 items with the same response options as the CSHQ, in addition to three general questions regarding sleep answered in a 'yes/no' fashion. Items are allocated to three subscales to describe Bedtime Issues, Sleep Behavior, and Daytime Sleepiness. For each subscale, sum scores are formulated, and a total score may be calculated based on 13 items. A higher score indicates more sleep problems. Comparison of the CSHQ and the SSR is possible for specific items [14].

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