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ORIGINAL ARTICLE

Delayed sleep phase disorder and Attention deficit and hyperactivity symptoms in a teenager

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Abstract JR is an 18-year-old male with five-year history of going to bed late and waking up late. He gives history of poor frustration tolerance, inattention and fidgetiness in school for which he has been unsuccessfully been treated with stimulant medications for last 3 years. There is history of similar sleep problems in his father who works nights as a mechanic. JR's sleep log shows him going to bed early morning and waking up late morning/afternoon. He shows no sleep maintenance problems and sleeps an average of 8 h per night. He shows no symptoms of depression, anxiety, inattention or hyperactivity during his hospital stay. He does not show any learning, cognitive, attention or intellectual deficits. He is currently not taking any medications. He is discharged home after 3-day hospital stay and is reportedly doing well working in a video rental store at night.

Keywords Attention deficit and hyperactivity disorder · Delayed sleep phase disorder

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Introduction and background

Sleep disorders affect 25–40% of children and adolescents (Owens 2005). These sleep disorders include delayed sleep phase disorder (DSPD), poor sleep hygiene, insomnia, narcolepsy and restless leg syndrome/periodic limb movements in sleep (Meltzer and Mindell 2006). Sleep disorders can have a profound impact on learning, growth, and behavior and emotion regulation. The relationship between sleep and attention deficit/hyperactivity disorder (ADHD) is complex (Owens 2005). Sleep onset problems are seen in up to 28% medication free ADHD children (Stein 1999). Gau and Chiang in 2009 showed that adolescents with a childhood diagnosis of ADHD were more likely to have current and lifetime sleep problems and sleep disorders (Gau and Chiang 2009). Sleep onset insomnia in children with ADHD is suggested to be a circadian rhythm sleep disorder identical to DSPD (Van der Heijden et al 2005). It is not clear if sleep deprivation resulting from presence of DSPD can manifest as ADHD symptoms. Walters et al in 2008 hypothesized that sleep disruption caused by delayed sleep onset in DSPD is not enough to cause daytime inattention and hyperactivity (Walters et al 2008). The following case illustrates the importance of understanding the relationship between DSPD and ADHD symptoms.

Case report

JR is an 18-year-old Caucasian male who is admitted to acute care psychiatric hospital after he had an argument with his mother, made suicidal statements and cut his wrist. He reports having poor frustration tolerance.

For the last 5 years, he has been going to bed late at night and waking up late in the morning/afternoon. It has gotten

progressively worse. He has trouble getting up in the morning. He gets an average of 5 h sleep on weekdays and 9 h on weekends. He is inattentive and fidgety in school more so in the morning classes. His grades dropped. He would be irritable and easily frustrated more so in school than at home and more on weekdays than weekends. He would sleep in until the afternoon on weekends and reported feeling better on weekends. Three years ago, he was diagnosed with ADHD by his primary care physician and treated with stimulant, amphetamine-dextroamphetamine (Adderall), without much improvement in his inattention. He was referred to a psychiatrist who increased dosage of Adderall. He continued to have problems with inattention in school and poor sleep at night. He quit school in his senior year and since then for last 5 months has been staying at home with his parents. He plays video games all night, goes to bed around 7 a.m. and wakes up at 2 p.m. He feels rested and reports having no problems with attention and concentration. He also smokes marijuana about once a month. He has no medical problems and is not taking any medications for last 1 year. There is history of his father having similar sleep pattern more so when he was an adolescent. His grandmother described his father as a "night owl". He subsequently took a night job as a mechanic.

JR does not report or show any symptoms suggestive of depression, anxiety, inattention, hyperactivity, mania or psychosis. His physical examination is unremarkable. He does not show any deficits in attention, learning, intellect or cognition on clinical and neuropsychological evaluation. During his brief hospital stay, his sleep log showed him going to bed late at night/early morning and waking up late in the afternoon. He shows no sleep maintenance problems and gets an average of 8 h sleep per night. He feels rested. This delayed but stable sleep pattern called in for diagnosis of DSPD and raised questions about diagnosis of ADHD. His sleep complaints preceded symptoms of inattention and fidgetiness, while as the latter symptoms resolved with more sleep. Differential diagnosis of a primary mood disorder, comorbid ADHD and DSPD was not supported by clinical and ancillary reports. He was educated about DSPD, the importance of proper sleep and sleep hygiene. He was reluctant to use any strategies aimed at correcting his DSPD as he has made up his mind about taking a nighttime job in a video store. JR was discharged after 3 days of hospital stay and is reportedly doing well, working the night shift at a video rental store 6 months after his discharge.

Discussion

DSPD is characterized by habitual sleep-wake times that are delayed, usually more than 2 h, relative to conventional or socially acceptable times. Affected individuals complain of difficulty falling asleep at socially acceptable times, but once asleep, sleep is reported to be normal (AASM 2005).

Diagnostic criteria for DSPD per international classification of sleep disorders (ICSD)

1. There is a delay in the phase of major sleep phase period in relation to the desired sleep time and wake-up time, as evidenced by a chronic or recurrent complaint of inability to fall asleep at a desired conventional clock time together with the inability to awaken at a desired and socially acceptable time.
2. When allowed to choose their preferred schedule, patients will exhibit normal sleep quality and duration for age and maintain a delayed, but stable, phase of entrainment to the 24-h sleep-wake pattern.
3. Sleep log or actigraphy monitoring (including sleep diary) for at least 7 days demonstrates a stable delay in the timing of the habitual sleep period.
4. The disturbance is not better explained by another sleep disorder, medical or neurological disorder, mental disorder, medication use, or substance use disorder (AASM 2005).

Therapeutic interventions for DSPD consist of behavioral and pharmacological interventions. Phototherapy involving timed light exposure at wake times resulting in advancing sleep-wake cycle is used to treat DSPD. In chronotherapy, bed times and wake times are progressively delayed until sleep-wake cycle has rotated around the clock and neared the desired schedule. Timed melatonin administration is also helpful in treatment of DSPD (Morganthlaer et al. 2007). Pharmacological interventions including use of benzodiazepine receptor agonists, stimulants and melatonin agonists have not been studied in the treatment of children with DSPD and are not recommended by AASM practice parameters (Wyatt 2007).

Sleep disorders are common in children and adolescents and varied in their presentation. Owens in 2008 describes the complex bidirectional relationship between primary sleep disorders and ADHD in children. Primary sleep disorders can present with symptoms of inattention and can have a significant impact on mood, behavior, development and functioning (Owens 2008; Meltzer and Mindell 2006). Many sleep disorders are likely to be misinterpreted as other clinical conditions of a physical or psychological nature, especially neurological or psychiatric disorders (Stores 2007). Dahl et al. (1991) described a case of a 10-year-old girl in whom chronotherapy of delayed sleep phase insomnia resulted in significant reduction in ADD symptoms (Dahl et al. 1991). This is a first case report that underscores the need for evaluating the presence of delayed sleep phase disorder in children and adolescents with

ADHD symptoms. It calls for studies to understand the relationship between ADHD and DSPD. It also stresses the need for educating clinicians about the complex interaction between sleep and psychiatric disorders. Owens in 2008 provides guidelines to evaluate and manage children with ADHD and sleep problems (Owens 2008).

Conflict of interest statement This was not an industry-supported study. All authors have reported no financial conflicts of interest.

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