



Sleep Disturbances and Behavior Problems in Children With and Without Arthritis

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Received 26 November 2013; revised 5 March 2014; accepted 7 March 2014

Key words:

Sleep disturbances;
Externalizing behavioral problems;
Internalizing behavior problems;
Juvenile idiopathic arthritis

The study compared sleep disturbances and behavior problems in school-age children with and without juvenile idiopathic arthritis (JIA). Children 6-to-11 years of age, with ($n = 70$) and without ($n = 46$) JIA, and their parent participated. Parents completed questionnaires on sleep habits and behavior problems. Compared to control children, JIA children had significantly higher total sleep disturbances and higher scores on six of eight subscales. Sleep disturbances predicted externalizing behavior problems, controlling for age, medications, study group, and pain. Sleep disturbances such as, sleep disordered breathing are often overlooked or unrecognized in JIA and may contribute to behavioral problems.

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ACUTE AND CHRONIC medical conditions increase the risk of sleep disturbances in children. Sleep disturbances are associated with particular sleep disorders (e.g. sleep disordered breathing), are often co-morbid with acute and chronic illness states (e.g. arthritis, asthma), manifest during developmental transitions (e.g. childhood, adolescence), or are sometimes self-imposed because of caregiving demands. Regardless of etiology, sleep disturbances most often manifest as disrupted or fragmented sleep and as an inadequate amount of sleep. There is some evidence that sleep disturbances are more persistent in children with chronic conditions compared with those without chronic conditions (Sivertsen, Hysing, Elgen, Stormark, & Lunder-vold, 2009). Underlying inflammation, disease-related symptoms of pain, shortness of breath, fatigue, and side effects of medications influence sleep. Exacerbation of pain and fatigue, daytime sleepiness, missed days from school, and lower quality of life are often attributed to the underlying

chronic condition, but unrecognized and untreated sleep disturbances such as sleep disordered breathing and poor sleep hygiene may be important etiologies that are often overlooked both by clinicians and parents (Chervin, Archbold, Panahi, & Pituch, 2001; Erichsen et al., 2012; Faruqi, Khubchandani, Price, Bolyard, & Reddy, 2011). Children with chronic conditions such as Juvenile Idiopathic Arthritis [JIA]) are vulnerable to the adverse consequences associated with unrecognized sleep disturbances including behavioral problems, neurocognitive decrements, and poorer quality of life.

Juvenile idiopathic arthritis (JIA) is an inflammatory chronic disease with unknown etiology. It is one of the most common pediatric rheumatologic chronic conditions with an estimated prevalence of 300,000 children in the United States (Sacks, Helmick, Luo, Ilowite, & Bowyer, 2007). JIA is a disease that can persist into adulthood and result in significant long-term morbidity including physical disability (Minden, Niewerth, Listing, & Zink, 2002; Selvaag et al., 2006). Disease severity varies in JIA with unpredictable episodes of inactive disease and active disease, including

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joint inflammation, pain, stiffness, and limited mobility. In conjunction with these symptoms, sleep disturbances including frequent limb movements, snoring, difficulty falling asleep, nighttime awakenings, and daytime sleepiness are found in children with arthritis (Abad, Sarinas, & Guillemineault, 2008; Butbul Aviel et al., 2011; Passarelli et al., 2006; Ward et al., 2008).

Sleep disturbances in children are associated with adverse health outcomes including behavioral problems, e.g., mood swings, hyperactivity, aggression, anxiety, difficulty with social and emotional functioning, poor quality of life, and school absenteeism (Gregory & Wiggs, 2013; Gruber, Cassoff, Frenette, Wiebe, & Carrier, 2012; Hysing, Elgen, Gillberg, & Lundervold, 2009; Simola, Liukkonen, Pitkaranta, Pirinen, & Aronen, 2012; Touchette et al., 2012; Touchette et al., 2009; Witcher et al., 2012). Decreased night time sleep duration, longer sleep onset time, variability in bedtimes, poor sleep hygiene, and more night awakenings have been associated both with internalizing behavior problems (e.g. anxiety and depressed mood), and externalizing behavior problems (e.g. aggression, impulsivity, and hyperactivity) (Alfano, Ginsburg, & Kingery, 2007; Biggs, Lushington, van den Heuvel, Martin, & Kennedy, 2011; Hudson, Gradisar, Gamble, Schniering, & Rebelo, 2009; Simola et al., 2012). In a community sample of 8 year-olds, parent reported bedtime refusal was associated with increased child-reported anxiety (Gregory, Rijdsdijk, Dahl, McGuffin, & Eley, 2006). Recent studies have shown that persistent sleep disturbances in early childhood predict later internalizing and externalizing behavior problems in middle school and adolescence (Forbes et al., 2008; Gregory, Rijdsdijk, Lau, Dahl, & Eley, 2009). Simola et al. (2012) conducted a 4-year follow-up study in 470 Finnish children; those with persistent sleep disturbances in early childhood were 16 times more likely to have aggression, anxiety, depressed mood, and social and attention problems in middle school.

Sleep disturbances in JIA have been associated with disease-related symptoms of pain (Bromberg, Gil, & Schanberg, 2012a; Schanberg, Anthony, Gil, & Maurin, 2003), and fatigue (Butbul Aviel et al., 2011; Passarelli et al., 2006; Ward et al., 2008), but findings between sleep disturbances and behavior problems have been inconsistent (Bromberg et al., 2012a; LeBovidge, Lavigne, Donenberg, & Miller, 2003). Some studies report higher rates of behavioral problems such as anxiety, depression, adjustment difficulties and mood in JIA compared to healthy peers, and others report no significant group differences (Bromberg et al., 2012a; Huygen, Kuis, & Sinnema, 2000; LeBovidge et al., 2003; Noll et al., 2000).

The purpose of this study was to describe and compare parent reported sleep disturbances and behavior problems, and to examine sleep disturbances as a predictor of behavioral problems in 6-to-11 year-old children with JIA compared to typically developing children. Based on previous studies involving children with JIA, we hypothe-

sized parents of children with JIA would report more sleep disturbance compared to parents of typically developing children. We further hypothesized that sleep disturbance would explain a significant portion of the variance in internalizing and externalizing behavior problems, after controlling for age, study group, medications, and joint pain.

Method

Participants

Approval for this study was obtained from the institutional review board. Researchers recruited a convenience sample of 70 JIA children (53 girls, 17 boys) and 46 control children (30 girls, 16 boys), totaling 116 participants, 6-to-11 years of age. In addition, parents of participating children were enrolled in this study. JIA and control parents were included in the study if they were the primary caretaker of the child and able to read and speak English. Inclusion criteria for JIA children were a diagnosis of oligoarticular or polyarticular JIA, 6 to 11 years of age, and able to read and speak English. Control children were included in the study if they were 6 to 11 years of age and able to speak and read English. Both JIA and control children were excluded if they had a psychiatric condition, ADHD, diabetes, asthma, cancer, or a disability that would interfere with neurobehavioral performance testing. Additionally, JIA children diagnosed with active systemic JIA were excluded as these children often require hospitalization. Of the 70 children with JIA, mean disease duration was 3.6 years. Within the group, 37.1% ($n = 26$) had oligoarticular disease, 57.1% ($n = 40$) had polyarticular disease, and 5.7% ($n = 4$) had inactive systemic disease. Fifty-seven percent ($n = 39$) had active arthritis, inflammation of one or more joints with swelling, limited range of motion, or tenderness, and a physician global assessment of >1 on a clinical scale of 0–10, and 45% ($n = 31$) had inactive arthritis, with no joints with inflammation and a physical global assessment of 0 on a scale of 0–10.

Measures

Children's Sleep Habits Questionnaire

Parents completed the Children's Sleep Habits Questionnaire (CSHQ) (Owens, Spirito, & McGuinn, 2000) a 45-item retrospective report that examines their child's sleep habits (bedtimes, wake times, behaviors) and whether or not they were problematic over a typical week. The CSHQ yields a total sleep disturbance score and eight subscale scores: bedtime resistance, sleep onset delay, sleep duration, sleep anxiety, night awakenings, daytime sleepiness, parasomnias, and sleep disordered breathing. Parents rate the frequency of each item on a 3-point scale ranging from "usually" (5–7 times per week) to "rarely" (0–1 times per week). Higher

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