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Evaluation of Sleeping Habits in Children with Cognitive Disengagement Syndrome

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ABSTRACT

Symptoms like "lost in thought and sleepy-sluggish" are frequently described in children with symptoms of cognitive disengagement syndrome (CDS). The aim of this study was to evaluate the sleep habits and sleep problems of children diagnosed with CDS; CDS+attention deficit hyperactivity disorder (ADHD) and healthy controls. The study group comprised 32 children (8–12 years old) classified into the high-risk CDS group; 30 children with CDS+ADHD; the control group (87 children) comprised patients of other clinics at the hospital. Children's sleep habits and sleep problems were assessed using the Children's Sleep Habits Questionnaire. The Barkley Child Attention Scale was used to assess CDS symptoms in the study. The CDS and CDS+ADHD groups were compared with healthy controls; a statistically significant intergroup difference was observed for bedtime resistance, sleep onset delay, sleep duration, sleep anxiety, waking frequency, parasomnia, and daytime sleepiness; however, no statistically significant difference was found in the disordered breathing during sleep. When the CDS and CDS+ADHD groups were compared, the sleep anxiety was higher in the CDS+ADHD group. A few studies have evaluated sleep in CDS symptoms. In this study, as in related literature, problems in sleep habits evaluated by parents of the group of children with ADHD were more than the healthy controls. However, further studies with larger sample size and objective measures such as actigraphy and polysomnography may allow us to have more knowledge on this subject.

Keywords: Cognitive disengagement syndrome, attention deficit hyperactivity disorder, sleep, child.

ÖZ

Bilişsel Kopma Sendromu Olan Çocuklarda Uyku Alışkanlıklarının Değerlendirilmesi

Bilişsel kopma sendromu belirtileri olan çocuklarda düşüncelere dalıp gitme ya da uykulu hal belirtileri sıklıkla tariflenmektedir. Bu çalışmada, bilişsel kopma sendromu belirtileri gösteren çocukların uyku sorunları ve alışkanlıkları açısından bilişsel kopma sendromu ve dikkat eksikliği hiperaktivite bozukluğu tanıları birlikte olan çocuklarla ve sağlıklı kontrollerle karşılaştırılması amaçlandı. Çalışmaya 8–12 yaş ara-

sında 32 bilişsel kopma sendromu açısından yüksek riskli grup, 30 bilişsel kopma sendromu ve dikkat eksikliği hiperaktivite bozukluğu tanıları birlikte olan olgu ve hastanelerin diğer kliniklerine başvuran yaş ve cinsiyet olarak benzer 35 çocuk kontrol olarak katıldı. Çocuklarda uyku, Çocuklar İçin Uyku Alışkanlıkları Anketi ile değerlendirildi. Bilişsel kopma sendromu belirtilerine yönelik Barkley'in Çocuk Dikkat Anketi uygulandı. Hem bilişsel kopma sendromu grubu hem de bilişsel kopma sendromu ve dikkat eksikliği hiperaktivite bozukluğu tanıları birlikte olan grup kontrollerle karşılaştırıldığında; yatma zamanı direnci, uykuya dalmanın gecikmesi, uyku süresi, uyku kaygısı, gece uyanmaları, parasomniler, gün içinde uykululuk ve uyku sorunları açısından istatistiksel anlamlılık bulunurken, uykuda solunum bozulması arasında anlamlı bir farklılık saptanmadı. Bilişsel kopma sendromu grubu bilişsel kopma sendromu ve dikkat eksikliği hiperaktivite bozukluğu tanıları birlikte olan grup ile karşılaştırıldığında sadece uyku kaygısı farklı saptandı. Bilişsel kopma sendromu semptomolojisi olan çocuklarda uykuyu değerlendiren çok az çalışma bulunmaktadır. Çalışmamızda, literatüre benzer şekilde, bilişsel kopma sendromu grubundaki çocukların ebeveynleri tarafından değerlendirilen uyku alışkanlıklarındaki sorunlar sağlıklı kontrollere göre fazla bulundu. Ancak, daha geniş örneklemde, aktigrafi ve polisomnografi gibi daha objektif ölçümlerle yapılan çalışmalar, bu konuda daha fazla bilgi sahibi olmamıza olanak sağlayabilir.

Anahtar Kelimeler: Bilişsel kopma sendromu, dikkat eksikliği ve hiperaktivite bozukluğu, uyku, çocuk.

INTRODUCTION

Reversible perceptual disengagement and unresponsiveness are behavioral states that occur during sleep. While we sleep, many observable and behavioral things happen (Carno et al, 2003). Over one-third of our lives are spent in sleep. Sleep is the main brain activity, particularly during childhood (Pıçak et al, 2010; Kılıçarslan Törüner & Büyükgönenç, 2017); it is as necessary for healthy growth and physical development as it is for emotional development. It has a significant impact on brain plasticity (Davis et al, 2004), and it is well known that getting enough sleep aids in the permanent development of neurological alterations brought on by learning. Emotional memory encoding and consolidation are made possible by sleep sağlar (Walker & van Der Helm, 2009). A child's everyday life, relationships with others, and behavior are all altered when they do not get enough sleep, which also has a severe impact on their psychosocial and physical development (Beebe, 2011). Stressors in children and youth are recognized to predominantly impact sleep patterns, even though they do not cause serious mental health disorders (Beebe, 2011). A thorough assessment of the child's overall sleep and wakefulness patterns is necessary.

During childhood, sleep issues can be common. According to studies, between 25% and 45% of school-age youngsters struggle with sleep (Van Litsenburg et al, 2010; DelRosso et al, 2021). Children with childhood psychiatric disorders are more likely to develop sleep issues (Alfano & Gamble, 2009). Numerous sleep-related issues have been noted, particularly sleep resistance, trouble falling or remaining asleep, parasomnia, and daytime tiredness. Previously known as "sluggish cognitive tempo," the term "cognitive disengagement syndrome (CDS)" has been proposed as a replacement in recent years owing to the consensus of experts that this term does not adequately describe current symptoms. A review of the literature in recent years reveals that scientific studies have been published under a new name (Fredrick & Becker, 2023; Mayes et al, 2023). The clinical signs of CDS, a disease of cognitive arousal and alertness, include daydreaming, trouble staying awake, low energy, appearing disoriented, and living in one's own world (Becker et al, 2014b). Although some experts believe that the Turkish translation of CDS should be "cognitive disengagement syndrome," no Turkish literature has been found that uses this name as there are so few Turkish scientific publications about its new name in recent years. Here, it is shortened to "CDS" throughout the text. Although the attention deficit predominant type has been considered a subtype of attention deficit hyperactivity disorder (ADHD), new research does not support this theory. According to recent research, CDS can be diagnosed independently and in conjunction with ADHD (Marshall et al, 2014; Leopold et al, 2015). There are characteristics that set CDS apart from ADHD. CDS is linked to the arousal process, and its cognitive processes differ from those of ADHD. While individuals with CDS are more likely to have concomitant internalizing disorders, including depression and anxiety disorders, children with ADHD are more likely to have conduct disorder (CD) and oppositional defiant disorder (ODD) (Becker, 2014). It has not been demonstrated whether CD and ODD are related to CDS (Barkley, 2013). Additionally, it has been demonstrated that CDS has a negative correlation with substance addiction disorder and antisocial personality disorder (Barkley 2013); 40% of the CDS group consists only of individuals with CDS symptoms and no comorbidities (Barkley, 2013, Becker, 2014). Additionally, CDS is primarily influenced by

environmental variables, whereas ADHD is primarily affected by genetic factors (Becker et al, 2014b).

Sleep problems are another prevalent concern among children diagnosed with ADHD. According to previous studies, families complain about sleep issues 25%–55% of the time; moreover, children with ADHD experience difficulties falling asleep and maintaining sleep (Arias-Mera et al, 2023). According to some studies, children with ADHD have difficulty waking up, especially in the morning, and are more active while sleeping (Díaz-Román et al, 2016; Spruyt & Gozal, 2011; Tsai et al, 2016).

The connection between CDS and sleep has not received much attention. The majority of the participants were young adults. Even after controlling for ADHD, depression, anxiety, and anxiety symptoms, Langberg et al. (2014) discovered that daytime sleepiness was a significant predictor of CDS in college students with ADHD diagnoses (Langberg et al., 2014). Furthermore, the daytime sleepiness of people with CDS and ADHD was worse than that of those without CDS who only had ADHD (Langberg et al., 2014).

According to a different study, college students who had CDS symptoms had lower-quality sleep and more night-time sleep disturbances (Becker et al, 2014a). Insomnia was more common in adults with ADHD and CDS symptoms than in healthy controls, according to a study on the relationship between sleep disorders, circadian rhythm, and ADHD and CDS symptoms. More than half of the group with severe ADHD symptoms experienced insomnia (Voinescu et al, 2012). According to the literature review, few studies have examined sleep, ADHD, and CDS symptoms in school-age children. This study is the first to investigate sleep patterns and CDS in a school-age sample in Türkiye.

The purpose of this study was to compare the sleep issues and habits of children with CDS, comorbid CDS and ADHD, and healthy controls.

METHODS

This study included a sample of children who applied to the Child and Adolescent Mental Health and Diseases Clinic of Izmir Katip Çelebi University Training and Research Hospital between January 2023 and December 2023, and children with ADHD and CDS who applied to different polyclinics of the same hospital, and who did not have any psychiatric disorders or chronic illnesses. Healthy children and their mothers, who were similar in age and gender to the case group, were included in the study.

In the evaluation, children with clinically normal intelligence, who learned to read and write in the first grade and did not fail the grade, were included in the study. The psychiatric conditions of the control group were evaluated using the Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Life-Time Turkish Version (K-SADS-PL), and children without any psychiatric disorders were included in the study.

Mothers of the cases and controls were included in the study; mothers who were not diagnosed with bipolar disorder, psychotic disorder, or mental retardation and who had not received any psychiatric treatment in the last year were included in the study. Mothers and children were evaluated by the same child psychiatrist. Ethics committee approval for the study was received from the non-invasive ethics committee of the hospital where the study was conducted (Date: 11.01.2023; Decision no: 2022/12-21). Verbal and written consent was obtained from the mothers who participated in the study. The study was conducted in accordance with the ethical standards of the Declaration of Helsinki (October 2013).

After the first evaluation of the children in the case group, the Child and Adolescent Behavior Assessment Scale was administered to the families. Considering that the cases with three points and above from four questions in the CBRS (questions 8, 17, 80, and 102) may be significant in terms of CDS clinic, their parents were asked to fill out the Barkley Child Attention Scale, and a clinical interview was conducted with the children with 23 points and above risk group has been determined.

The K-SADS-PL was used to assess the children's comorbidities. Clinical interviews were performed, and patients with ADHD that co-occurred with CDS were included in the study; cases with CDS that co-occurred with other disorders were excluded.

Measurements

Sociodemographic Data Form

This form was prepared by the researchers to collect information on the sociodemographic characteristics of the children and their parents. Participant children's ages, genders, socioeconomic levels (compared according to mean income per year calculated by the Turkish Statistical Institute for the year 2022; https://data.tuik.gov.tr/Bulten/Index?p=Gelir-Dagilimi-Istatistikleri-2022-49745), academic achievement (poor/mediocre/superior), peer relationships (poor/mediocre/good), parental education levels, and family status (nuclear/separated/divorced/widower) were entered in the form by the clinicians.

Schedule for Affective Disorders and Schizophrenia for School-Age Children: Present and lifetime Turkish version (K-SADS-PL)

The K-SADS-PL is a semistructured interview developed to evaluate current and lifetime psychopathology among

Table 1. Comparison of sociodemographic data between the CDS, ADHD–CDS, and control groups

	CDS	ADHD–CDS	Control	p
Age	10.2±1.9	10.3±2	10.2±1.8	0.97
Gender (female/%)	16 (50%)	17 (56.7%)	17 (48.6%)	0.79
Maternal education (%)				0.99
Primary school or lower	10 (31.3%)	12 (40%)	13 (37.1%)	
Secondary school	9 (28.1%)	8 (26.7%)	9 (25.7%)	
High school	10 (31.3%)	7 (23.3%)	10 (28.6%)	
University or higher	3 (9.4%)	3 (10%)	3 (8.6%)	
Paternal education (%)				0.99
Primary school or lower	10 (31.3%)	11 (36.7%)	12 (34.3%)	
Secondary school	10 (31.3%)	9 (30%)	11 (31.4%)	
High school	11 (34.4%)	10 (33.3%)	11 (31.4%)	
High school	1 (3.1%)	0 (0%)	1 (2.9%)	
Peer relations (%)				**0.02**
Good	14 (43.8%)	14 (46.7%)	27 (72.1%)	
Mediocre	15 (46.9%)	14 (46.7%)	8 (22.9%)	
Poor	3 (9.4%)	2 (6.7%)	0 (0%)	
Academic achievement (%)				**0.001**
Superior	14 (43.8%)	12 (40%)	29 (82.9%)	
Mediocre	15 (46.9%)	16 (53.3%)	6 (17.1%)	
Poor	3 (9.4%)	2 (6.7%)	0 (0%)	

CDS: Cognitive disengagement syndrome; ADHD: Attention deficit hyperactivity disorder. The chi-square test and Fisher's exact test were used.

children aged 6–18 years old (Kaufman et al, 1997). It was later revised to reflect the DSM-5 criteria; the Turkish version was found to be valid and reliable in both the first and revised versions (Unal et al, 2019). The clinicians who participated in the study received training in its application and certification from the Turkish Association of Child and Adolescent Mental Health.

Barkley Child Attention Scale (BCAS)

This 14-item, four-point Likert-type scale was developed by Russell Barkley to screen for CDS symptoms within the past 6 months (Barkley, 2013). It has two subdimensions: sluggishness and daydreaming. The sluggishness subscale consists of symptoms of decreased activity, lethargy, and slow behavior, and the daydreaming subscale consists of symptoms of daydreaming, absentmindedness, and mental confusion. Each item was scored between 1 and 4, where (1) means "never or rarely" and (4) means "very often." The reliability and validity of the Turkish version were established by (Firat et al, 2018). The Cronbach's alpha value of the scale was 0.735.

Childhood Sleep Habits Questionnaire (CSHQ)

CSHQ, which is one of the questionnaires whose psychometric properties have been determined and whose validity and reliability have been determined in preschool and school-age children, was designed to investigate the sleep habits and sleep-related difficulties of children aged 4–12 years and was published by Owens et al. in 2000. The study was developed to review general sleep problems and determine the need for further examination, rather than making a specific diagnosis; its adaptation to Turkish, validity, and reliability were studied by Fis et al. (2010). The scale is completed by the parent. Parents were asked to evaluate their child's sleep habits over the previous week (Fis et al, 2010).

Statistical Analysis

Statistical analyses were conducted using SPSS (version 25.0 (IBM Corporation, Armonk, NY, USA) for Windows TM and JASP (JASP Team (2023). JASP (Version 0.16.4). (Computer software) (Retrieved from https://jasp-stats.org), as well as JAMOVI (The jamovi Project (2023). Jamovi (version 2.3) (Computer

Table 2. Intergroup comparison of the Child Sleep Habits Questionnaire and BCAS scores (median–interquartile range)

	CDS	CDS+ADHD	Control	p
Barkley	24.5 (19–30.75)	25 (21–32)	12 (12–13)	<**0.001**
Bedtime resistance	9 (7–10)	10 (7.75–12)	6 (6–6)	<**0.001**
Sleep delay	2 (1–3)	2 (1–3)	1 (1–1)	<**0.001**
Sleep duration	5.5 (3–7)	4.5 (3–7)	3 (3–4)	<**0.001**
Sleep anxiety	4 (4–6.5)	6.5 (4–10)	4 (4–4)	<**0.001**
Night wakings	3 (3–4)	4 (3–5)	3 (3–3)	**0.004**
Parasomnia	9 (7–9.75)	9 (7–10)	7 (7–7)	<**0.001**
Disordered breathing during sleep	3 (3–4)	3 (3–4)	3 (3–4)	**0.209**
Daytime sleepiness	11 (10–15)	11 (9.75–13)	8 (8–8)	<**0.001**

CDS: Cognitive disengagement syndrome; ADHD: Attention deficit hyperactivity disorder. Applying the Kruskal–Wallis test provided the p values.

Table 3. Correlation of the BCAS and Child Sleep Habits Questionnaire subscale scores

	Bedtime resistance	Sleep delay	Sleep duration	Sleep anxiety	Night wakings	Parasomnia	Disordered breathing during sleep	Daytime sleepiness
Barkley								
r	0.526	0.378	0.452	0.273	0.184	0.406	0.056	0.658
p	<0.001*	<0.001*	<0.001*	0.007	0.071	<0.001*	0.589	<0.001*

The Spearman correlation test was used. *: Patients with ADHD have significance in partial correlations.

software) (Retrieved from https://www. jamovi.org). The sociodemographic and clinical categorical characteristics of the case and control groups were assessed using numerical and percentage values. The classified categorical variables were compared using the cross-chi-square test. Initially, the Kolmogorov–Smirnov approach was initially used to assess the data distribution. Triple group analyses were conducted using the Kruskal–Wallis test because the data distribution did not fit the normal distribution; the Man–Whitney U test between pairs was used to assess it. The association between continuous variables was determined using partial-correlation analysis and Spearman's correlation analysis.

RESULTS

In total, 97 children—32 in the CDS group, 30 in the CDS–ADHD group, and 35 in the control group—were assessed. The CDS group's mean age was 10.2±1.9, whereas the mean age of the CDS–ADHD group was 10.3±2.0 and that of the control group was 10.2±1.8. The CDS group (n=16) had 50% female members, the CDS–ADHD group had 56.7% female members (n=17), and the control group had 48.6% female members (n=17). Age, gender, and educational levels of the mother and father did not significantly differ across the groups (Table 1). In relation to friendship relationships and academic achievement, the control group significantly outperformed the other two groups by a significant amount (p=0.002 [CDS group], p=0.001 [CDS–ADHD]) (Table 1).

There were significant differences between the groups in terms of the Barkley Child Attention Questionnaire scores as well as scores for bedtime resistance, latency to fall asleep, duration of sleep, anxiety related to sleep, night awakenings, parasomnia, and daytime sleepiness (Table 2). In this scale and its subscales, where the groups differed significantly, the control group's scores were significantly lower than those of the CDS and CDS–ADHD groups (p<0.001). The CDS–ADHD group's sleep anxiety score was significantly higher than that of the CDS group's (p<0.001).

Bedtime resistance, sleep delay, sleep duration, sleep anxiety, parasomnia, and daytime sleepiness were positively correlated with the Barkley Attention Questionnaire score (Table 3). The positive correlation between bedtime resistance, sleep delay, sleep duration, parasomnia, and daytime sleepiness remained significant (p<0.05) when partial correlations adjusted for ADHD were included.

DISCUSSION

In this study, children with CDS and healthy controls had their sleep patterns and issues assessed. When comparing the CDS+ADHD and CDS only groups to the control group, we found statistically significant increases in scores on the subscales of bedtime resistance, sleep delay, sleep duration, sleep anxiety, night awakenings, parasomnia, and daytime sleepiness.

In a study investigating the relationship between sleep and CDS, sleeping more than usual was found to be a strong predictor of CDS. Daytime sleepiness, in particular, is associated with CDS. These results are remarkable and indicate that there is a physiological foundation (e.g., arousal issues) for the association between CDS and excessive sleep (For instance, throughout the 24-hour circadian cycle, children may be biologically sleepier at night and during the day.) (Mayes et al, 2021). According to our study, both patients with CDS alone and those with ADHD+CDS had higher daytime sleepiness levels. Children with CDS may experience chronic hypoarousal, which could be linked to this.

According to Mayes et al., a significant predictor of CDS is the prevalence of sleep problems (Mayes et al, 2021). Similarly, in our study, both patients with CDS alone and those with ADHD+CDS had excellent scores in every category, except for sleep-disordered breathing. The positive significant correlations between sleep problems and the Barkley Attention Scale also suggest that CDS symptoms increase as sleep problems increase.

Children who applied to the clinic with an assessment of CDS alone or ADHD+CDS had higher sleep problems than children in a healthy state (Rondon et al, 2020). Another study with 2,056 participants found that children with CDS experienced greater sleep problems than ordinary children (Burns & Becker, 2021). Another study conducted on children aged 6–10 years found the highest correlation between daytime sleepiness and CDS symptoms. This study found that CDS was more associated with sleep problems, even after controlling for other comorbid diagnoses and sociodemographic characteristics (Becker et al, 2016). In the present study, CDS was found to be most associated with daytime sleepiness. However, one of the limitations of our study was that the Pediatric Daytime Sleepiness Scale was not used to distinguish between daytime sleepiness and CDS symptoms, such as difficulty in staying awake, daydreaming, and appearing confused or sleepy.

In our study, when controlled for the presence of ADHD diagnosis, CDS symptoms were found to be associated with bedtime resistance, sleep delay, sleep duration, parasomnia, and daytime sleepiness. Additionally, our study showed that patients with CDS, whether or not they also have ADHD, are more likely to experience sleep problems. The relationship between CDS symptoms and sleep problems was examined in a study by Koriakin et al.; it showed that sleep problems had a significant impact on CDS symptoms even after controlling for ADHD symptoms (Koriakin et al, 2015). Our conclusion that CDS and sleep problems are related seems to be in line with previous research. Children with CDS may benefit from treatment if their sleep problems are evaluated.

Numerous studies involving children with ADHD diagnoses have been reported in the literature. These investigations employed a wide range of scales and methodologies. In a study comparing the sleep habits and sleep problems of ADHD and healthy controls aged 6–12 years with the Child Sleep Habits Questionnaire used in our study, a statistically significant increase was detected in bedtime resistance, sleep anxiety, parasomnia, and daytime sleepiness scores in the ADHD group. Our findings are consistent with those of other research projects in this area (Abou-Khadra et al, 2013; Chiraphaddanakul et al, 2016; Yürümez & Kılıç, 2016).

Only the sleep anxiety subscale of the Child Sleep Habits Questionnaire showed higher ratings in the CDS+ADHD comorbid group than in the CDS group, in contrast to the other subscales. This may be because sleeping problems are linked to the coexistence of two conditions, such as CDS and ADHD. Other subscale scores (sleep delay, parasomnia, daytime sleepiness, bedtime resistance, and sleep duration) were found to be considerably higher in both groups; this shows that CDS may have a greater association with sleep than ADHD. Although one of our study's limitations may be the absence of a pure ADHD group, these findings nevertheless suggest that CDS may have a greater influence on sleep. Similar findings to ours have been reported in other studies (Mayes et al, 2021; O'Hare et al, 2021). Sleep is significantly impacted by CDS.

Our study's independence might have been affected by the fact that we only used data from parents and children. Furthermore, assessing children using neuropsychological tests could support the study's findings. Moreover, scientific methods such as actigraphy or polysomnography can provide more objective results when examining sleep.

In summary, children who are at a higher risk of CDS develop more problems with sleep than healthy controls. These results imply that managing CDS symptoms in children should take into account their sleep patterns and adjust treatment options accordingly. To clarify the pathophysiological causes of children's sleep and cognitive impairments, larger-scale follow-up studies that utilize neurophysiological and neuroimaging methods may be helpful.

Ethics Committee Approval: The University of Health Sciences İzmir Tepecik Training and Research Hospital Ethics Committee granted approval for this study (date: 11.01.2023, number: 2022/12-21).

Author Contributions: Concept – GÖ, EKT; Design – GÖ, YÖ; Supervision – AET, AA; Resource – GÖ, EKT; Data Collection and/or Processing – GÖ, EKT; Analysis and/or Interpretation – BŞB, AET; Literature Review – BŞB, EKT; Writing – BŞB, EKT; Critical Review – GÖ, YÖ.

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