

Sleep Habits in Students with Special Needs in Elementary School: A Cross-Sectional Study

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Original Article

Abstract

Introduction: Sleep is one of the most vital needs and a factor influencing the academic performance of students. Sleep habits are formed before adolescence and are maintained throughout life. This study aims to investigate the sleep habits of students with special needs in the elementary schools of Hamadan, Iran, from the parents' point of view.

Materials and Methods: In this cross-sectional descriptive-analytical study, 102 students with special needs aged 7-13 years old were selected through the convenience sampling method in Hamadan City, 2021. Data were collected by demographic information questionnaire and the Children's Sleep Habits Questionnaire (CSHQ) with the self-report method (by the mother). Data were analyzed with descriptive statistics methods, t-tests, Mann-Whitney U, and Kruskal-Wallis test in SPSS software. Level of significance was considered less than 0.05.

Results: The mean score of the students' sleep habits was 76.87 ± 17.24 in girls and 73.90 ± 17.99 in boys. Sleep duration in girls was 9.42 ± 1.40 hours and in boys 9.53 ± 1.22 hours. Disturbance in sleep habits was reported more in students with cerebral palsy (CP) than other groups.

Conclusion: The findings of this study showed that sleep habit disorders were prevalent in students with CP, autism, Down syndrome, low vision, hearing impairment, and motor sensory disabilities.

Keywords: Sleep habits; Students with special needs; Sleep

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Introduction

Sleep is a fundamental biological need directly affecting human performance (1). It has a unique role in rehabilitation and is considered one of the occupational therapy's seven areas of occupation (2). Adequate sleep promotes health, improves quality of life, and affects daily physical and mental performance, both in terms of sleep quality and duration (3). Moreover, sleep plays a crucial role in brain development, memory consolidation, and cognitive function (4). Children with special needs may experience sleep disorders due to the complex etiology of their neurological, medical, and psychiatric disorders, which can exacerbate learning and behavioral problems (5, 6). Similarly, sleep disorders

in typical and special needs students can lead to complications such as depression, anxiety, cognitive dysfunction, and hindered learning and development (7, 8).

Sleep disorders are prevalent in both normal preschool children and those with special needs. Studies show that the prevalence of sleep disorders in normal preschool children is 25%, while in children with special needs, the percentage is significantly higher at 86% (9). These sleep disorders persist until adolescence and adulthood. The prevalence of sleep disorders in different groups of children with special needs is also significant. Children with Down syndrome report sleep disorders at a rate of 83% (10), while children with autism report sleep disorders at a

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rate of 78% (11). For children with cerebral palsy (CP), the rate is 46% (12). These children say the most common sleep disorders include resistance before sleep, waking up from sleep, parasomnias, irregularity, breathing problems during sleep, difficulty waking up in the morning, and sleepiness during the day (10, 13).

Sleep patterns are established in children between 6 and 11 years old (14). If sleep disorders are left untreated, they can become chronic in children with neurodevelopmental disorders (6). As a person reaches adolescence, the adverse effects of sleep deprivation gradually become more apparent (15). Despite the significance of sleep habits in students with special needs, there has been limited research in this area. It is crucial to identify and prevent inappropriate sleep habits at this age. Therefore, the present study investigated the duration and sleep habits of elementary school students with special needs.

Materials and Methods

This was a descriptive-analytical cross-sectional study conducted in public schools related to exceptional education in Hamadan City, Iran. The research was conducted in elementary schools for children with special needs, including students with physical-motor impairment, autism, hearing impairment, visual impairment, and mental disability aged 7 to 13 years, who were selected by convenience sampling. The data collection tool was a demographic information questionnaire that included age, weight, height, gender, school class, sleeping and waking hours, and type of student disorder. Additionally, the Children's Sleep Habits Questionnaire (CSHQ) was used, which comprises 44 statements in the form of a 3-choice Likert scale. If the behavior is repeated zero to 1 time a week, the option is considered rarely (score 1), if the behavior is repeated 2-to 4 times a week, the choice is sometimes (score 2), and if the behavior is repeated 5-7 times a week, option three is

considered. The CSHQ consists of five areas: sleep time (12 items), sleep behavior (18 items), waking up at night (3 items), waking up in the morning (7 items), and sleepiness (4 items). The descriptions of sleep habits are given in table 1 (definition of concepts). In each section, a high average indicates a disturbance in sleeping habits, and a low standard indicates a lesser disturbance. In generally, obtaining a score of more than 41 means disrupting the child's sleeping patterns. This tool was designed by Owens et al. in 2000 to evaluate the sleep habits of preschool and school-age children. It is a standard scale whose validity was determined using the content method, and reliability was determined as 0.97 using the retest method. Previous studies reported the tool's reliability as 0.78 and 0.83. Additionally, the reliability of the questionnaire in the present study was obtained using Cronbach's alpha coefficient, which was 0.94.

One hundred twenty students with special needs who met the entry requirements were identified for the study. To determine the sample size based on the study's primary purpose, the prevalence estimation formula with a confidence level of 0.95 was used. Similar research indicates a 0.02 prevalence of sleep disorders among students with special needs. The estimation error rate was 0.01, and the sample size was determined to be 100 people.

Students with special needs had to meet specific entry criteria to be included in the study. These criteria included being Iranian, being enrolled in school (visual impairment, hearing impairment, mental retardation, physical-motor impairment, and autism), having parents who did not use drugs (according to the mother's statement), having parents with minimum reading and writing literacy, having no significant stress during the last year (such as the death of first-degree relatives and migration), no significant emotional and academic problems that led to hospitalization of the child and student, and approval of the consent form by the mother and verbal approval of the student.

Table 1. Description of areas of sleep habits

Sleep habit	
Sleep duration	They check whether the children fall asleep at a particular time. Do they sleep late after falling asleep, or do they get the same sleep daily?
Sleep behavior	Behaviors related to resistance to falling asleep, the need for parents to be present in the bedroom, anxiety during sleep, and parasomnia behaviors. Parasomnia is one of the periodic behaviors that involve a person's cognition and consciousness and causes disturbances in the person's muscle function and autonomic system.
Night waking	Most healthy children wake up during the night but often fall asleep without intervention. This section asks questions about the child's night waking and the need for parental intervention to go back to sleep or change the child's sleeping place.
Waking up in the morning	They check whether the children wake up in the morning by themselves or by the sound of the bell. And do they have difficulty getting out of bed?
Daytime sleepiness	This category of questions is related to waking up in the morning with the help of others, the children's alertness after waking up, a negative mood and fatigue, and a strong desire to sleep during the day.

The students were excluded from the study if these conditions were not met. Additionally, students were excluded from the study if they had suffered from a certain disease during the past six months that affected their sleep or if they were using sleeping pills or central nervous system (CNS) stimulating drugs that cause sleep disturbances.

After the approval of the proposal by the research council of the faculty and university ethics committee, and with the coordination of Education Department and the introduction of relevant schools, the study received consent from the principal. Informed consent was obtained from the parents of the students. Necessary explanations about the purpose of the research and the method of completing the questionnaires were provided to the parents, who were requested to answer the questions on behalf of their child. All ethical standards were observed, including obtaining necessary permissions, written consent, statement of objectives, confidentiality of information, and use of information for research purposes.

The normal distribution of variables was assessed using the Kolmogorov-Smirnov test. The data were analyzed using SPSS software (version 21, IBM Corporation, Armonk, NY, USA), employing descriptive statistics, t-test, Mann-Whitney U-test, and Kruskal-Wallis test. A significance level of $P < 0.05$ was considered.

Results

The present study involved 102 students with special needs, with an average age of 10.07 ± 1.34 years. On average, they weighed 30.44 ± 5.39 kg and had a height of 129.22 ± 6.00 cm. Of the 102 participants, 50 were girls (49%) and the remaining 52 were boys (51%). Additionally, 30.4% of the students were in the third grade.

The score for sleeping habits was 76.87 ± 17.24 in girls and 73.90 ± 17.99 in boys. The average sleep duration was 9.42 ± 1.40 hours in girls and

9.53 ± 1.22 hours in boys. According to the Mann-Whitney U test, there was no significant difference in the duration of sleep between boys and girls ($P > 0.05$) (Table 2).

According to the results of the Kruskal-Wallis test, there was a significant difference in the average score of sleep habits and its areas among different groups of students with special needs ($P < 0.050$). The autism group had a higher mean sleep time disorder variable than the other groups. The CP group had a higher prevalence of sleepiness and morning awakening disorders. Night-awakening disorder was most commonly reported in the group of hearing impaired and visually impaired students. The highest overall disorder of sleep habits was observed in students with CP. There was also a significant difference in the duration of sleep between different groups of students ($P < 0.050$). Students with CP slept for about 11 hours per night and were considered the sleepest group, while students with Down syndrome, low vision, and hearing loss slept for about 9 hours per night and were considered the least sleepy group (Table 3).

Discussion

A recent study indicates that sleep habits of students with special needs are not regular, and there is a disorder in their sleep habits. However, the length of sleep in the day and night is typical. The study found a significant difference in average sleep duration among students with special needs. Students with CP tend to sleep the most, while those with hearing impairments sleep the least in a 24-hour period. According to the American Academy of Sleep Medicine (AASM), children aged 6 to 12 require 9 to 12 hours of sleep daily (19, 20). The study confirmed that for students with special needs, sleep duration fell within the normal range for all groups. Interestingly, other studies have also reported that children with neurodevelopmental disorders often suffer from sleep disorders (8).

Table 2. Average sleep variables according to gender of students with special needs

Variable	Boys (52 persons) (mean \pm SD)	Girls (50 persons) (mean \pm SD)	P
Student sleep time	10.48 \pm 0.91	10.67 \pm 0.98	0.37
Student wake-up time	8.26 \pm 1.02	8.21 \pm 1.05	0.81
Sleep duration (hour)	9.42 \pm 1.40	9.53 \pm 1.22	0.65
Sleep habits			
Bedtime	20.40 \pm 5.80	19.19 \pm 5.94	0.30
Sleep behavior	33.06 \pm 9.68	31.25 \pm 9.94	0.30
Night awakening	5.87 \pm 1.76	5.92 \pm 1.87	0.90
Waking up in the morning	12.18 \pm 3.72	12.48 \pm 3.82	0.69
Drowsiness	5.47 \pm 1.51	5.05 \pm 1.10	0.11
Total sleep habits score	76.87 \pm 17.24	73.90 \pm 17.99	0.40

SD: Standard deviation
Significance at $P > 0.05$ level

Table 3. Sleep duration and sleep habits of students with special needs in different groups

	Groups of students with special needs	Number	Mean \pm SD	P (Kruskal-Wallis test)
Sleep duration of groups of students with special needs (based on hours per day)	Sensory-motor	22	9.50 \pm 1.37	20.16, P < 0.001
	CP	24	10.45 \pm 0.97	
	Autism	24	9.12 \pm 1.03	
	Hearing and visually impaired	21	8.53 \pm 1.45	
	Down syndrome	9	8.47 \pm 1.39	
Sleep habits in student groups with special needs	Sensory-motor	22	57.50 \pm 9.18	51.68, P < 0.001
	CP	24	87.70 \pm 12.94	
	Autism	24	85.04 \pm 13.96	
	Hearing and visually impaired	21	62.43 \pm 12.94	
	Down syndrome	9	83.44 \pm 11.46	

SD: Standard deviation; CP: Cerebral palsy

Sleep disorder is a common problem among students in special schools, with 41% reporting it. This rate is significantly higher than the 27% reported among children in regular schools (21).

In a group of students with autism, sleep disorders were found in all areas of sleep habits. The autism group had a higher mean of sleep time disorder than other students with special needs. A study conducted by Aathira et al. on the sleep habits of 3-10-year-old children with autism disorder, using the Indian version of the CSHQ questionnaire, highlighted the prevalence of sleep habits disorder. The most prevalent sleep problems among these children were sleep behavior disorders and daytime sleepiness (22), which is consistent with the present study's findings. Other studies have also reported sleep conditions such as reduced sleep time, frequent awakenings during sleep, and interrupted sleep (23, 24). In this group of children, external factors often control the circadian rhythm and sleep physiology, as most children sleep with their nurse (22). However, in Iranian culture, children with autism usually sleep in the same room with their parents or siblings, and the necessary points in these children's management and sleep hygiene are not considered. Additionally, children with autism have a pattern of reduced nocturnal melatonin secretion or delayed nocturnal secretion. Low melatonin or urinary metabolic derivatives are associated with sleep problems and autism behaviors (25). Therefore, patients with autism may have trouble falling asleep late at night or exhibit an irregular sleep-wake rhythm with several irregular naps during the day and night (26).

In the group of hearing and visually impaired students, sleep habits disorder was reported mainly in the area of night waking disorder, which indicates that this group needs parental intervention to sleep again or change the place of sleep.

A study found that children aged 6 to 16 with auditory processing disorder had a high prevalence of

sleep disorder (27). While research in this field has produced varying results, some studies suggest that people with hearing disorders do not have significantly different sleep patterns from those without hearing disorders. However, other research indicates that sleep disorders are prevalent in this group (28-30). There is limited research on the sleep patterns of visually impaired individuals. Still, evidence suggests that engaging in various sports activities can help improve sleep quality for people with visual impairments (30, 31). Additionally, sleep disorders have been reported in internet-dependent students with different levels of visual impairment (32). Disturbance in sleep habits has also been confirmed in the group of students with Down syndrome, consistent with previous research (33-35). Sleep disorders, including difficulty initiating and maintaining sleep and early waking, were reported in 56 to 69 percent of these children (33-35). The present study found that the students with CP had the most disturbed sleep habits. Morning sleepiness and wakefulness disorders were more common among these students, indicating that they have difficulty getting out of bed, experience negative moods after waking up, feel tired during the day, and have a strong desire to sleep.

Research on sleep disorders in children with CP aged 4-10 using the Indonesian CSHQ questionnaire revealed that 85% of the group suffered from sleep disorders (36). A study that reviewed people with CP below 18 years old reported a common disorder associated with the condition (37). The prevalence of sleep problems and their characteristics in preschool and primary school children with CP were studied, and it was shown that the most common sleep problem was sleep onset and continuation disorder, which accounted for 26% of cases (18.2% for preschool children and 32.1% for primary school children). Researchers identified pain as the most

significant predictor of sleep disorder (38). It should be noted that children with CP face several complications, such as abnormality problems, growth delay, muscle shortening, abnormal tone, joint dislocation and instability, contracture, involuntary movements, soft tissue rigidity, and muscle pain (39). These complications and spasticity make it challenging for people with CP to change positions during sleep, leading to an uncomfortable sleeping position and increasing pain, ultimately resulting in sleep disorders (40, 41). Pain signals are transmitted from the peripheral to the central systems in various ways. The pain signal is modulated by endogenous excitatory and inhibitory factors from the CNS, including reticular formation. These processes activate the ascending reticular activating system (ARAS), which controls the sleep-wake cycle (42). Motor defects and disturbances in sensory processing and integration in patients with CP are among the causes of sleep disorders in these people (43).

The present study found that boys' and girls' average sleep duration and sleep habits were similar and consistent with some previous research (44). However, Asgarian et al.'s research indicated that boys woke up more frequently at night than girls (7). Other factors such as maturity (45), the level of parental control over sleep habits (46), the student's morning or evening shift (47), and the time of attendance at school (48) can also influence the student's sleep habits. As all the schools in the study conducted classes in the morning shift and for the same duration, and the students' average age was before puberty, no significant difference was observed based on gender.

Limitations

In this study, participants completed the questionnaires as self-reports, and individual differences in their responses could not be controlled. The limitations of the study include the small sample size in each group, despite careful planning and coordination with the Hamadan General Directorate of Education to ensure adherence to research criteria. Additionally, the research was conducted in a specific geographic area, and the results should be generalized cautiously to reflect only the two races, Persians and Turks, in the city of Hamadan.

Recommendations

It is essential to conduct studies on the effectiveness of rehabilitation interventions in sleep management and health, as sleep plays a crucial role in development, educational performance, and quality of life.

Conclusion

The results of the present research showed that the sleeping habits of students with special needs were not typical, and there was a disorder in sleeping habits, but the length of sleep during the day and night was standard. Besides, compared to other groups, students with CP showed the most disturbances in sleep habits, but no significant difference in sleep disturbances was reported by gender.

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Authors' Contribution

Study design and ideation: Saideh Sadat Mortazavi, Zahra Mortazavi
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Conflict of Interest

The authors did not have a conflict of interest.

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