



Prevalence and factors associated with sleep problems in children during COVID-19 lockdown

Mona Nasiri¹; Elham Bakhtiari²; Alireza Zibaei³; Ghazaleh Pourali⁴; *Zanireh Salimi⁵

¹Assistant professor of pediatrics, Department of Pediatrics, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran.

²Ph.D. Assistant professor, Clinical Research Development Unit, Mashhad University of Medical Sciences, Mashhad, Iran.

³Resident of psychiatry, Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran.

⁴Medical student, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran.

⁵Assistant professor of psychiatry, Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran.

Abstract

Introduction: Adequate sleep is important to children's overall health, as sleep disturbances can result in both cognitive and mental challenges. The global COVID-19 pandemic, with its significant lifestyle disruptions, potentially altered children's sleep patterns. This study investigates the prevalence of sleep problems in children and the factors associated with these issues during the pandemic.

Materials and Methods: This cross-sectional analysis was conducted between March and April 2020 on 270 children aged 6-11 during the COVID-19 pandemic. Sleep behaviors were assessed using the Children's Sleep Habits Questionnaire (CSHQ), which was distributed online to the participants. The data were analyzed using SPSS 16, Chi-square test, and independent t-test.

Results: Finally 262 were studied (131 boys and 131 girls). The mean age of participants was 8.56 ± 1.97 years. The mean score of CSHQ was 51.99 ± 7.85 , with 95.8% (251 children) demonstrating sleep-related issues. Notably, children with highly educated parents exhibited significantly fewer sleep problems.

Conclusion: The study reveals a high prevalence of sleep disturbances among children aged 6-11, particularly during the COVID-19 lockdown. The findings highlight the significant role of parental education in mitigating these sleep issues, emphasizing the need for further investigation into the effects of familial environments on children's sleep patterns during periods of stress and confinement.

Keywords: Children, COVID-19 pandemic, Education, Sleep disturbances

Please cite this paper as:

Nasiri M, Bakhtiari E, Zibaei A, Pourali Gh, Salimi Z. Prevalence and factors associated with sleep problems in children during COVID-19 lockdown. *Journal of Fundamentals of Mental Health* 2024 Sep-Oct; 26(5): 279-283.

DOI: 10.22038/JFMH.2024.80754.3139

*Corresponding Author:

Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran.
salimizn@mums.ac.ir

Received: Apr. 24, 2024

Accepted: Jul. 29, 2024

©️ Copyright © 2024 Mashhad University of Medical Sciences. This work is licensed under a Creative Commons Attribution-Noncommercial 4.0 International License <https://creativecommons.org/licenses/by-nc/4.0/deed.en>

Introduction

Sleep is important to maintain physical and mental health in children. Sleep disruptions increase risk of chronic illnesses, behavioral changes, memory problems, and impaired executive function (1-3). The onset of the COVID-19 pandemic in December 2019, followed by the first reported case in Iran in February 2020, led to the closure of schools and the transition to virtual learning. This sudden shift confined children to their homes, likely contributing to increased stress due to limited social interactions, reduced physical activity, and changes in daily routines. These factors may have significantly impacted sleep, nutrition, and mood (4). Given the widespread nature of these changes, it is essential to understand their impact on children's sleep and identify factors that may either mitigate or exacerbate these effects. This study addresses a gap in the existing research by examining (a) the prevalence of sleep disturbances among Iranian children aged 6-11 years during the COVID-19 lockdown and (b) the relationships between demographic factors such as age, gender, socioeconomic status, and parental education level, and sleep problems.

Materials and Methods

We conducted this cross-sectional study between March and April 2020 during the COVID-19 lockdown. Stratified sampling was used to select 270 children aged 6-11 from elementary schools in Mashhad, Iran.

The sample size was determined based on an estimated 20% prevalence of sleep disorders, as reported in previous studies (5). The inclusion criteria included aged 6-11 years, attending elementary schools in Mashhad, lack of history of sleep or neurological disorders, including autism and ADHD, and online completed questionnaires by mothers.

The exclusion criteria included children with prior sleep or neurological disorders, incomplete questionnaire, and lack of parental consent.

Research instruments

A) Demographic Checklist: It includes age, gender, and medical history, birth order, school type of children, also history of family member with COVID-19, and parental education.

B) Children's Sleep Habits Questionnaire (CSHQ): The CSHQ includes 35 items related to various aspects of children's sleep, organized into eight subdomains: bedtime resistance, sleep onset delay, sleep duration, sleep anxiety, frequent night waking, parasomnias, respiratory problems, and daytime sleepiness. A total score of 41 or higher indicates the presence of sleep disturbances. This instrument is used frequently in different countries and various populations (6-9). The internal consistency of the total CSHQ was reported equal to 0.72 (10). The Persian version of this questionnaire has satisfactory psychometric properties (11).

Statistical analysis was performed using SPSS version 16. Results were reported as means \pm standard deviation (SD) or percentages. Relationships between categorical variables were assessed using the Chi-square test, and independent t-tests were used for comparisons of quantitative data.

Results

Out of 270 children, eight were excluded due to ADHD or autism, resulting in a final sample of 262 children (131 boys and 131 girls). The mean age was 8.56 ± 1.97 years. Most children (59.9%) were the first child in their family, and 40.5% attended state schools.

A small percentage (1.9%) had a family member with COVID-19. Most children's parents (69.8% of fathers and 75.2% of mothers) had higher education (Table 1).

Table 1. Comparison of demographic variables in children with and without sleep disorders

Characteristic	Sleep disorders present (N=251)	No sleep disorders (N=11)	P
Age (Years)	8.54 \pm 1.96	9.09 \pm 2.34	0.55
Gender			
Male	50.2% (126)	45.5% (5)	
Female	49.8% (125)	54.5% (6)	
School type			0.76
Public	40.2% (101)	45.5% (5)	
Private	59.8% (150)	54.5% (6)	
Birth order			0.79
First child	59.8% (150)	63.6% (7)	
Second child or more	40.2% (101)	36.4% (4)	
Family member with COVID-19			0.07
Yes	1.6% (4)	9.1% (1)	
No	98.4% (247)	90.9% (10)	
Father's education			0.004
High school diploma or lower	31.5% (79)	0% (0)	
Academic education	68.5% (183)	100% (11)	
Mother's education			0.008
High school diploma or lower	25.5% (64)	9.1% (1)	
Academic education	74.5% (187)	90.9% (10)	

The total score on the CSHQ was 51.99 ± 7.85 . The scores for bedtime resistance, sleep onset delay, sleep duration, and sleep anxiety were 11.70 ± 3.36 , 1.74 ± 0.80 , 4.20 ± 1.33 , and 7.43 ± 2.45 , respectively. Scores for frequent night waking, parasomnia, respiratory issues, and daytime dizziness were 3.98 ± 1.24 , 8.59 ± 1.51 , 3.49 ± 1.03 , and 10.82 ± 2.31 , respectively. According to the questionnaire results, 251 students (95.8%) experienced sleep problems.

We did not find a significant difference in demographic characteristics between children

with and without sleep problems ($P > 0.05$). Additionally, no significant relationship was seen between sleep problems and type of school ($P = 0.76$), presence of a COVID-19 patient in the family ($P = 0.07$), or being the first child in the family ($P = 0.79$). However, a significant association was observed between lower sleep problems and higher parental education levels ($P = 0.004$ for fathers and $P = 0.008$ for mothers). A comparison of questionnaire subsections between children with and without sleep problems is presented (in Table 2).

Table 2. Comparison of in children with and without sleep problems

Subscale	Sleep problems present (N=251)	No sleep problems (N=11)	P
Bedtime resistance	11.84 ± 6.23	6.27 ± 0.64	0.001
Sleep onset delay	1.78 ± 0.80	1.00 ± 0.00	0.001
Sleep duration	4.24 ± 1.34	3.18 ± 0.60	0.001
Sleep anxiety	7.56 ± 2.42	4.54 ± 0.68	0.001
Night waking	4.03 ± 1.25	3.00 ± 0.00	0.001
Parasomnias	8.64 ± 1.51	7.45 ± 0.68	0.01
Sleep disordered breathing	3.51 ± 1.04	3.00 ± 0.00	0.001
Daytime sleepiness	10.91 ± 2.31	8.81 ± 1.07	0.003

Discussion

This study investigated sleep disturbances in 262 children aged 6-11 during the COVID-19 lockdown. To our knowledge, this is the first study to specifically examine sleep issues among Iranian children in the context of the pandemic. Remarkably, a very high proportion—95.8%—of the children exhibited sleep problems, which were notably influenced by parental education levels. Children whose parents had higher levels of education were less likely to experience sleep disturbances.

Sleep is a critical physiological need for recovery, growth, energy storage, brain function, neurological development, and the acquisition of learning and memory skills (12). Sleep-related processes in the brain can influence physical, emotional, and cognitive functions. Sleep hygiene, which encompasses guidelines regarding sleep duration, sleep environment, and pre-sleep activities, plays a crucial role in maintaining good sleep health (13). Poor sleep hygiene, potentially arising from physical, mental, environmental, or genetic factors, can reduce sleep quality and duration, thus jeopardizing a child's overall health (14). Reduced sleep quality and duration can lead to physical issues (such as headaches and cardiovascular problems) as well as behavioral and psychological issues (including irritability and aggression) (15,16).

The COVID-19 pandemic and the resulting home confinement have been a source of stress for many, disrupting various aspects of life such as sleep, work, education, and physical activity. The pandemic is still a relatively new phenomenon, and much remains unknown, including its impact on sleep patterns in children. Liu et al. studied preschoolers aged 4-6 during the COVID-19 pandemic, using the CSHQ questionnaire. They revealed that the CSHQ total and subscale scores were lower compared to a similar study conducted before the pandemic in 2018 (17). Conversely, our study found that the CSHQ scores and the prevalence of sleep disturbances were higher than before the pandemic. This discrepancy could be due to differences in study populations, confinement conditions, or other contextual factors.

Studies by Altena et al. (18) and Becker et al. (19) found that the majority of mothers did not perceive significant changes in their children's sleep quality, duration, or structure during the pandemic, although reported changes varied from 19.3% to 35% across different variables. Additionally, some mothers reported positive changes in their children's sleep quality (12%) and increased sleep duration (25%). A systematic review by Jahrami et al. found that the prevalence of sleep disorders during COVID-19 among the general population was

35.7% (20), while Franceschini et al. reported that 55.31% of participants had poor sleep quality (21). These findings suggest that the frequency of sleep disorders is quite high globally, which aligns with our results, which show an unexpectedly high prevalence of sleep disturbances in children. Given the nature of diseases that spread through human-to-human transmission, stringent epidemic prevention and control measures are necessary, which can drastically reduce outdoor and social activities. These restrictions can affect exercise, eating habits, and sleep routines. Many people may have taken to napping during the day or watching television, leading to irregular exposure to sunlight and disrupting biological rhythms and sleep patterns (22). One limitation of this study is that it relied on subjective assessments of sleep quality using the CSHQ. Future research should consider incorporating objective measures, such as actigraphy, to understand sleep quality in children better.

Conclusion

The prevalence of sleep disturbances among children aged 6-11 during the COVID-19 lockdown was unexpectedly high. Sleep disturbances were significantly lower in children with highly educated parents. Our results highlight the importance of monitoring changes in sleep within the family context during the COVID-19 confinement.

References

1. Gomes S, Ramalheite C, Ferreira I, Bicho M, Valente A. Sleep patterns, eating behavior and the risk of noncommunicable diseases. *Nutrients* 2023; 15(11): 2462.
2. Li Y-F, Niu L-Y, Fan J-F, Yao Z-C, Shen L-Y, Wang Y-K, et al. The effect and underlying mechanism of sleep deprivation on several gastrointestinal physiology and diseases. *Medicine research* 2024; 8(1): 230006.
3. Pan Y, Zhou Y, Shi X, He S, Lai W. The association between sleep deprivation and the risk of cardiovascular diseases: A systematic meta-analysis. *Biomed Rep* 2023; 19(5): 78.
4. Diaz A, Berger R, Valiente C, Eisenberg N, VanSchyndel S, Tao C, et al. Children's sleep and academic achievement: The moderating role of effortful control. *Int J Behav Dev* 2017; 41(2): 275-84.
5. Bruni O, Novelli L. Sleep disorders in children. *BMJ Clin Evid* 2010; 2010: 2304.
6. Owens JA, Spirito A, McGuinn M. The Children's Sleep Habits Questionnaire (CSHQ): Psychometric properties of a survey instrument for school-aged children. *Sleep* 2000; 23: 1043-51.
7. Lionetti F, Dellagiulia A, Verderame C, Sperati A, Bodale G, Spinelli M, et al. The Children's Sleep Habits Questionnaire: Identification of sleep dimensions, normative values, and associations with behavioral problems in Italian preschoolers. *Sleep Health* 2021; 7(3): 390-96.
8. Zaidman-Zait A, Zwaigenbaum L, Duku E, Bennett T, Szatmari P, Mirenda P, et al. Factor analysis of the children's sleep habits questionnaire among preschool children with autism spectrum disorder. *Res Dev Disabil* 2020; 97: 103548.
9. Perpétuo C, Fernandes M, Veríssimo M. Comparison between actigraphy records and parental reports of child's sleep. *Front Pediatr* 2020; 8: 567390.
10. Silva FG, Silva CR, Braga LB, Neto AS. Portuguese children's sleep habits questionnaire – validation and cross-cultural comparison. *J Pediatr* 2013; 90: 78-84.

Acknowledgments

We thank all participants. Also, this study was funded by Mashhad University of Medical Sciences, Mashhad, Iran (grant number: 990256).

Conflict of Interests

There was no conflict of interest.

Funding

Mashhad University of Medical Sciences

Ethical Considerations

The study was approved by the Ethics Committee of Mashhad University of Medical Sciences. Participants were fully informed about the study, and their personal information was kept confidential throughout the research.

Code of Ethics

IR.MUMS.REC.1399.152

Authors' Contribution

Mona Nasiri: Conceptualization, methodology, supervision, and writing original draft.

Elham Bakhtiari: Data curation, formal analysis, writing, review and editing the manuscript.

Alireza Zibaei: Investigation, review and editing the manuscript.

Ghazaleh Pourali: Data collection, project administration, review and editing the manuscript.

Zanireh Salimi: Conceptualization, supervision, review and editing the manuscript, and funding acquisition.

11. Shoghi M, Khanjari S, Farmani F, Hosseini F. [Sleep habits in children aged 6-11]. *The quarterly journal of Iranian nursing* 2005; 18: 131-7. (Persian)
12. Baranwal N, Phoebe KY, Siegel NS. Sleep physiology, pathophysiology, and sleep hygiene. *Prog Cardiovasc Dis* 2023; 77: 59-69.
13. Fernandez TM. An educational sleep hygiene module for UNLV students to promote occupational performance: University of Nevada, Las Vegas; 2023.
14. Ali RM, Zolezzi M, Awaisu A, Eltorki Y. Sleep quality and sleep hygiene behaviours among university students in Qatar. *Int J Gen Med* 2023; 16: 2427-39.
15. Lueke NA, Assar A. Poor sleep quality and reduced immune function among college students: Perceived stress and depression as mediators. *J Am Coll Health* 2024; 72(4): 1112-9.
16. Zhao H, Lu C, Yi C. Physical activity and sleep quality association in different populations: A meta-analysis. *Int J Environ Res Public Health* 2023; 20(3): 1864.
17. Liu Z, Tang H, Jin Q, Wang G, Yang Z, Chen H, et al. Sleep of preschoolers during the coronavirus disease 2019 (COVID-19) outbreak. *J Sleep Res* 2021; 30(1): e13142.
18. Altena E, Baglioni C, Espie CA, Ellis J, Gavrilloff D, Holzinger B, et al. Dealing with sleep problems during home confinement due to the COVID-19 outbreak: Practical recommendations from a task force of the European CBT-I Academy. *J Sleep Res* 2020; 29(4): e13052.
19. Becker SP, Gregory AM. Editorial perspective: Perils and promise for child and adolescent sleep and associated psychopathology during the COVID-19 pandemic. *J Child Psychol Psychiatry* 2020; 61(7): 757-9.
20. Jahrami H, Bahammam AS, Bragazzi NL, Saif Z, Faris M, Vitiello MV. Sleep problems during the COVID-19 pandemic by population: A systematic review and meta-analysis. *J Clin Sleep Med* 2021; 17(2): 299-313.
21. Franceschini C, Musetti A, Zenesini C, Palagini L, Scarpelli S, Quattropiani MC, et al. Poor sleep quality and its consequences on mental health during the COVID-19 lockdown in Italy. *Front Psychol* 2020; 11: 574475.
22. Alldredge CT, Snyder M, Stork SR, Elkins GR. Exploring variables associated with the effects of a self-administered hypnosis intervention for improving sleep quality. *Int J Clin Exp Hypn* 2024; 72(2): 94-108.