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Original Article

Have the sleep habits in children of health workers been more affected during the COVID-19 pandemic?



Ibrahim Hakan Bucak^{a,*}, Habip Almis^a, Songül Okay Tasar^a, Hatice Uygun^b, Mehmet Turgut^b

^a Adiyaman University School of Medicine, Department of Pediatrics, Adiyaman, Turkey

^b Adiyaman University School of Medicine, Department of Pediatric Infectious Disease, Adiyaman, Turkey

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ABSTRACT

Background: Changes have occurred in children's sleep habits during the coronavirus disease 2019 (COVID-19) pandemic. The purpose of this study was to compare the sleep patterns during the COVID-19 pandemic of school age children of health worker parents (Group 1) and non-health worker parents (Group 2).

Method: One hundred twenty-two participants were included in Group 1 and 250 in Group 2. The families' sociodemographic characteristics (education levels and occupations of mothers and fathers, parental shift-working status, monthly family income, number of children in the family, and place of residence), general information for the children taking part (diagnosis of COVID-19 or COVID-19 related isolation, distance education, participation in sporting activities, time spent watching TV, time devoted to reading, time spent on telephones/tablets/computers, and time spent on indoor activities), and the responses given to the Children's Sleep Habits Questionnaire (CSQH)-abbreviated form were all examined. **Results:** Group 1 consisted of 122 individuals, 66 (54.1%) female and 56 (45.9%) male, and Group 2 of 250 individuals, 129 (51.6%) female and 121 (48.4%) male. Statistically significant differences were determined between the groups in terms of parental education levels and occupations, family monthly income, number of children in the family, place of residence, parental shift-working status, and length of time spent on indoor activities. Total CSQH scores were 41.57 ± 7.57 (20–60) in Group 1 and 39.6 ± 8.47 (17–68) in Group 2 (**p:0.03**).

Conclusion: Greater impairment of sleep habits of school age children of health workers compared to those of non-health workers in the COVID-19 pandemic is proved for the first time in this study. Further assessment of the effects of the COVID-19 pandemic on children's sleep habits is now required, and appropriate measures must be taken in the light of the results obtained.

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1. Introduction

The impacts on children's lives since the first day of the COVID-19 pandemic have been unprecedented. One of these effects involves sleep. Although parents do not report many sleep problems to pediatricians, the incidence of such problems in childhood ranges between 25% and 40% [1,2]. Childhood sleep impairment must not be underestimated since it can lead to cognitive and

learning defects [3]. One study performed during the COVID-19 pandemic revealed impaired sleep quality among health workers treating COVID-19 patients [4]. A study of sleep habits among preschoolers (aged 4–6) during the COVID-19 pandemic proved that children tended to fall asleep and to awaken later [5]. Home confinement among children together with lockdown rules has been proved to affect sleep quality as a result of disturbance of daily habits, decreased exposure to daylight, increased use of digital media devices, and decreased physical activity [6,7]. The first case of COVID-19 in Turkey was reported on 11 March, 2020. Individuals aged under 18 were subsequently prohibited from going outdoors. This prohibition led to breakdown of social communication, the closure of schools/restaurants/playgrounds, and thus to children being exposed to completely unfamiliar stress. Studies have

* Corresponding author. Altınşehir Neighborhood 3012 Street Manas Site G Bloc Floor:7 No:32, Adiyaman, Turkey, 02040. Fax: +90416 2250838.

E-mail addresses: ihbucak@hotmail.com, drhbucak@hotmail.com (I.H. Bucak), drhabipalmis@gmail.com (H. Almis), songulokay@hotmail.com (S.O. Tasar), ozhanhatice@hotmail.com (H. Uygun), drmehmetturgut@yahoo.com (M. Turgut).

investigated sleep habits among health workers during the COVID-19 pandemic, and children's sleep quality has generally been shown to be impaired. However, no previous studies have investigated the sleep patterns of children of health workers. We think that health workers' children are exposed to greater stress during the COVID-19 pandemic due to their parents' occupations (extended working hours, a greater risk of contracting the disease, shorter interaction time with their children, etc.), and that changes in sleep patterns may occur in the children of health workers as a result.

The purpose of this study was to compare the sleep patterns during the COVID-19 pandemic of children of health worker and non-health worker parents by evaluating these in school age children during the COVID-19 pandemic.

2. Material and methods

2.1. Design and participants

The study was performed on 25–29 May, 2020, during the COVID-19 pandemic at a time when individuals aged under 18 were prohibited from going outdoors. It was conducted in Adiyaman, a Turkish province with a population of 632,000. Health workers in a tertiary education and research hospital with school age children (7–18 years) were enrolled as Group 1, and non-health worker parents with school age children (7–18 years) as Group 2. Due to the risks inherent in applying face-to-face questionnaires during the COVID-19 pandemic, the questionnaire was sent to the cell phone numbers of health workers (Group 1) recorded on the hospital's data management system. An online questionnaire was administered to parents of children who had undergone routine child health examination in our hospital within the previous year and whose cell phone numbers were recorded on the hospital data management system (Group 2). Children with any condition capable of causing sleep problems, who had received treatment for any disease, using medications, or with previously identified sleep disorder, and children with chronic diseases such as obesity, diabetes, epilepsy, asthma, attention deficit hyperactivity disorder, intellectual disability, and autism, and similar conditions were excluded. Children whose mothers or fathers were made unemployed during or immediately before the COVID-19 pandemic were also excluded. Consent was received from all participants in the study. Approval was granted by the local ethical committee (no. 2020/5–13).

2.2. Self-reported variables

A three-section questionnaire was applied to all cases included in the study:

1. The first part of the questionnaire was intended to elicit information about the parent taking part in the study and the family. The questions in this section investigated the identity of the participant (mother or father), the mother/father's education level (elementary, high school, university), occupations of mothers and fathers, at least one parent working shifts, the family's monthly income (below the minimum wage, minimum wage, or above the minimum wage), the number of children in the family, place of residence (village, district, or provincial center), whether the parent completing the form had been diagnosed with COVID-19, if not, whether the parent had remained in isolation, whether any relatives had been diagnosed with COVID-19, whether any friends had been diagnosed with COVID-19, and in the case of health worker parents whether or not they worked in a COVID-related hospital department (emergency department, intensive care, or COVID-19 in-patient ward), and in case of parents working in a

COVID-related hospital department, whether they had continuing living in their own homes during the pandemic.

2. The second part of the questionnaire elicited information concerning the parent's child administered the Children's Sleep Habits Questionnaire (CSHQ). The second part contained questions regarding age (months), sex (female, male), whether the child had been diagnosed with COVID-19, if not, whether the child had remained in isolation, the type of school attended (public or private), whether the child received distance-learning during the pandemic, whether the child was interested in any branch of sport prior to the pandemic, and time spent per day watching television/reading/on cell phones, tablets or computers or engaging in activities (such as drawing, playing a musical instrument, or playing with a parent or sibling).
3. The final part of the questionnaire consisted of the questions in the CSHQ-abbreviated form [8]. The CSHQ-abbreviated form had previously been adapted into Turkish and validated [9]. The form consists of 33 questions investigating the child's sleep habits and sleep-related problems. Eight subscales have been listed – bedtime resistance, sleep onset delay, sleep duration, sleep anxiety, night wakings, parasomnias, sleep disordered breathing, and daytime somnolence. The scale is completed retrospectively by the mother or father, who is asked to consider the child's sleep habits for the preceding week. The items on the scale are coded three 'generally' (if the specified behavior occurs 5–7 times a week, two 'sometimes' (if it occurs 2–4 times a week), or one 'rarely' (if it occurs 0–1 times a week). However, some items are reverse coded (generally one, sometimes two, and rarely three). A total score of 41 is regarded as the cut-off, and values above this are evaluated as 'clinically significant.' The questionnaire also contained three open-ended questions concerning the child's sleep habits (bedtime, length of time spent sleeping during the entire day, and time spent awake following waking in the night).

The total scores obtained from the questionnaire were compared between Group 1 and Group 2, and between individuals in Group 1 working in COVID-19-related hospital departments and those not working in such departments, and individuals in Group 1 working in COVID-19-related hospital departments and living in or outside their own during the COVID-19 pandemic.

2.3. Statistical analysis

The data obtained in the study were analyzed on SPSS (IBM, version 21.0, Chicago, IL, USA) software. Categorical data were expressed as numbers (%) and were compared using the chi-square and Fisher's Exact test. Compatibility with normal distribution was assessed using the Kolmogorov–Smirnov test. Normally distributed continuous variables were expressed as mean \pm standard deviation (minimum–maximum) and were compared using the independent samples t test. Non-normally distributed variables were expressed as median values (minimum–maximum) and were compared using the Mann Whitney U test. *p* values < 0.05 were regarded as statistically significant.

3. Results

Three hundred seventy two individuals were included in the study. Sixty eight (55.7%) mothers and 54 (44.3%) fathers completed the study form in Group 1, while 129 (51.6%) mothers and 121 (48.4%) fathers completed the form in Group 2 (*p*:0.506). The mean age of the mothers in Group 1 was 39.04 ± 4.42 (26–50) while the mean age of the fathers was 42.47 ± 5.56 (29–63). The mean age of the mothers in Group 2 was 38.97 ± 5.32 (26–53) and

the mean age of the fathers was 42.58 ± 5.96 (29–64). There was no significant difference between the groups in terms of maternal ($p:0.896$) or paternal ($p:0.861$) ages. However, significant differences were observed between the groups in terms of maternal and paternal education levels, whether at least one of the parents worked shifts, monthly family income, number of children in the family, and the parent completing the study form having been quarantined due to COVID-19 (Table 1). Distributions by parental occupation group are shown in Table 2.

Data for the children included in the CSHQ questionnaire are shown in Table 2. Sixty-six (54.1%) of the children in Group 1 were girls and 56 (45.9%) were boys, with a mean age of 10.84 ± 2.97 (7–18) years. In Group 2, 129 (51.6%) children were girls and 121 (48.4%) were boys, with a mean age of 10.71 ± 3.14 (7–18). There was no significant between the groups in terms of the sex ($p:0.66$) or age ($p:0.707$) of the children included. However, significant differences were detected in terms of length of time spent on activities in the home ($p:0.029$) and children's COVID-19 diagnoses ($p:0.002$). Information concerning the children evaluated in the study is shown in Table 3.

Total CSHQ scores were 41.57 ± 7.57 (20–60) in Group 1 and 39.6 ± 8.47 (17–68) in Group 2. The mean total CSHQ score in Group 1 was significantly higher than that in Group 2 ($p:0.03$). Information concerning the bedtimes of the children in the study, amount of daily sleep, time spent awake following night-time waking, and time of waking in the morning is shown in Table 4.

Twenty-two (5.9%) of the 372 in the children had been diagnosed with COVID-19. The mean CSHQ score of the 22 COVID-19 cases was 42.91 ± 11.15 (18–66). This was higher than the mean total CSHQ scores of the children in groups 1 and 2 [Group 1, 41.57 ± 7.57 (20–60), Group 2, 39.6 ± 8.47 (17–68)]. The health workers in Group 1 were also evaluated in terms of whether or not they worked in COVID-19-related hospital departments and of

whether or not they had stayed outside their own homes during the pandemic. Thirty-five (28.7%) of the 122 health workers in Group 1 worked in some form of COVID-19-related department (emergency department, intensive care, or a COVID 19 inpatient ward) [mean total ÇSQH score 41.71 ± 7.45 (24–60)], and 87 (71.3%) worked in units not involving direct contact with COVID-19 patients [mean total ÇSQH score 41.51 ± 7.66 (20–59)] ($p:0.891$). Twenty-six (74.3%) of the 35 health workers in COVID-19-related hospital departments reported continuing to live in their own homes during the pandemic [mean total ÇSQH score 41.85 ± 8.14 (24–6)], while nine (25.7%) did not live in their own homes [mean total ÇSQH score 41.33 ± 5.39 (32–47)] ($p:0.862$).

4. Discussion

Many children's activities, such as their social lives, peer relations, eating and drinking routines, studying, attending school, going outside, and playing have all changed during the COVID-19 pandemic. Sleep is of vital importance to children's healthy development and complete well-being [7,10]. The assessment of children's sleep habits in this new living arrangement is essential for early precautionary measures to be taken. The children of health worker parents in this study had significantly higher total mean CSHQ scores than the children of non-health worker parents ($p:0.03$). This finding, reported for the first time in the literature, shows that the sleep habits of school age children (7–18 years) of health worker parents have been adversely affected during the COVID-19 pandemic. Individuals feel confined as a result of the restrictions imposed to prevent the spread of the disease [7,11]. Sleep disorder can thus develop together with other potential psychological effects (burnout, detachment from others, anxiety, concentration disturbance, etc.) [12,13]. A study investigating the adult population in Canada identified female gender, presence of

Table 1
General information about the families in the study.

		Group 1 n (%)	Group 2 n (%)	p
Mother's education level	Elementary	1 (0.8)	48 (19.2)	<0.001
	High school	11 (9)	47 (18.8)	
	University	110 (90.2)	155 (62)	
Father's education level	Elementary	1 (0.8)	24 (9.6)	<0.001
	High school	13 (10.7)	40 (16)	
	University	108 (88.5)	186 (74.4)	
Does at least one parent work shifts?	Yes	28 (23)	12 (4.8)	<0.001
	No	94 (77)	238 (95.2)	
Monthly family income	Below minimum wage	–	13 (5.2)	<0.001
	Minimum wage (343.2 dollars)*	–	31 (12.4)	
	Above minimum wage	122 (100)	206 (82.4)	
Number of children in the family	1	8 (6.7)	33 (13.4)	0.011
	2	70 (58.8)	113 (45.9)	
	3	33 (27.7)	56 (22.8)	
	4	8 (6.7)	35 (14.2)	
	5	–	6 (2.4)	
	6	–	3 (1.2)	
Place of residence	Village	–	4 (1.6)	<0.001
	District	7 (5.7)	62 (24.8)	
	Provincial center	115 (94.3)	184 (73.6)	
Have you been diagnosed with COVID-19?	Yes	3 (2.5)	14 (5.6)	0.199
	No	119 (97.5)	236 (94.4)	
If so, were you isolated?	Yes	6 (4.9)	30 (12.7)	0.025
	No	116 (95.1)	206 (87.3)	
Have any of your relatives/friends been diagnosed with COVID-19?	Yes	12 (9.8)	31 (12.4)	0.605
	No	110 (90.2)	219 (87.6)	
For parents in Group 1; Do you work in a COVID-19-related department?	Yes	35 (28.7)	–	–
	No	87 (71.3)	–	
If so, have you continued living at home during the pandemic?	Yes	10 (28.6)	–	–
	No	25 (71.4)	–	

Minimum wage 2324 Turkish Lira (= \$343.2), Turkish Republic Central Bank Exchange Rate on 27.05.2020: 6.81 Lira to \$1 [26].

Statistical significance: $p < 0.05$.

Table 2
Occupations of the mothers and fathers of the cases included in the study.

		Group 1 n (%)	Group 2 n (%)	p
Mother's occupation	Doctor	15 (12.3)	–	<0.001
	Health worker	95 (77.9)	–	
	Housewife	2 (1.6)	110 (44.9)	
	Engineer	3 (2.5)	2 (0.8)	
	Academic	2 (1.6)	4 (1.6)	
	Teacher	3 (2.5)	92 (36.8)	
	Lawyer	–	3 (1.2)	
	Private sector worker	1 (0.8)	8 (3.2)	
	Retired	–	2 (0.8)	
	Clerical worker	1 (0.8)	29 (11.6)	
	Father's occupation	Doctor	23 (18.9)	
Health worker	5 (4.1)	–		
Military personnel	–	2 (0.8)		
Engineer	12 (9.8)	19 (7.6)		
Academic	1 (0.8)	5 (2)		
Teacher	30 (24.6)	92 (36.8)		
Judicial worker	1 (0.8)	4 (1.6)		
Private sector worker	20 (16.4)	73 (29.2)		
Retired	–	5 (2)		
Clerical worker	30 (24.6)	47 (18.8)		
Deceased	–	3 (1.2)		

Statistical significance: p <0.05.

Table 3
General information about the children in the study.

		Group 1	Group 2	p
Sex	Female	66 (54.1)	129 (51.6)	0.660
	Male	56 (45.9)	121 (48.4)	
Has your child been diagnosed with COVID 19?	Yes	1 (0.8)	21 (8.4)	0.002
	No	121 (99.2)	229 (91.6)	
Was your child placed under isolation?	Yes	7 (5.8)	22 (9.6)	0.308
	No	114 (94.2)	207 (90.4)	
What type of school does the child attend?	Public	78 (63.9)	193 (77.2)	0.009
	Private	44 (36.1)	57 (22.8)	
Did the child receive distance education during the COVID-19 pandemic?	Yes	104 (85.2)	212 (84.8)	0.91
	No	18 (14.8)	38 (15.2)	
Does your child engage in any particular sporting activity?	Yes	53 (43.4)	104 (41.6)	0.739
	No	69 (56.6)	146 (58.4)	
Length of time spent watching TV	Less than 2 h	45 (36.9)	83 (33.2)	0.405
	2–4 h	48 (39.3)	105 (42)	
	4–6 h	24 (19.7)	46 (18.4)	
	6–8 h	5 (4.1)	9 (3.6)	
	Longer than 8 h	–	7 (2.8)	
Length of time spent reading	Less than 30 min	45 (36.9)	81 (32.4)	0.617
	30–60 min	49 (40.2)	110 (44)	
	1–2 h	11 (9)	30 (12)	
	More than 2 h	17 (13.9)	29 (11.6)	
	Less than 2 h	54 (44.3)	117 (46.8)	
Length of time spent on cell phone/tablet/computer	2–4 h	37 (30.3)	79 (31.6)	0.886
	4–6 h	19 (15.6)	34 (13.6)	
	6–8 h	8 (6.6)	11 (4.4)	
	More than 8 h	4 (3.3)	9 (3.6)	
	Less than 30 min	22 (18)	40 (16)	
Length of time spent on indoor activities (drawing, playing games etc.)	30–60 min	36 (29.5)	106 (42.4)	0.029
	1–2 h	26 (21.4)	29 (11.6)	
	More than 2 h	38 (31.1)	75 (30)	
	Less than 30 min	22 (18)	40 (16)	

Statistical significance: p <0.05.

chronic disease, family responsibility, and time spent in front of the TV as causes of sleep problems during the COVID-19 pandemic [11]. Pre-school and school-age children have been reported to fear family members contracting COVID-19, with attention deficit developing in school age children [14]. Extended periods spent in the home reduce exposure to sunlight, and time spent in front of screens due to distance education causes a restriction in children's physical activity [7]. Melatonin production is compromised as a result, and the body's circadian rhythm is affected. This then results in sleep disturbance. Liu et al. reported that the sleep habit of bedtime was delayed in preschoolers during the COVID-19

pandemic, that waking up times were later, and that total sleep duration during the day was extended [5]. Although these effects are known, there have been no sleep-related studies focusing on school age children and children of health workers during the COVID-19 pandemic. In the present study, there was no statistically significant difference between the groups in terms of bedtimes, waking up times, or mean sleep duration.

Studies have largely concentrated on the psychological impacts on health workers during the pandemic [15]. A study from China revealed that health workers (doctors, nurses, and other individuals providing health services) experienced a higher rate of

Table 4
Data obtained from the CSHQ.

		Group 1 n (%)	Group 2 n (%)	p
Bedtime	Before 21:00	–	4 (1.6)	0.235 ^a
	21:00–22:00	6 (4.9)	24 (9.6)	
	22:00–23:00	32 (26.2)	51 (20.4)	
	23:00–24:00	32 (26.2)	69 (27.6)	
	After 24:00	52 (42.6)	102 (40.8)	
Waking time	Before 07:00	2 (1.8)	3 (1.3)	0.253 ^a
	07:00–08:00	6 (5.3)	23 (9.6)	
	08:00–09:00	33 (28.9)	64 (26.7)	
	09:00–10:00	36 (31.6)	54 (22.5)	
	10:00–11:00	17 (14.9)	56 (23.3)	
	11:00–12:00	13 (11.4)	22 (9.2)	
	After 12:00	7 (6.1)	18 (7.5)	
	Median length of sleep (hours)		9 (7–9)	
How long does the child remain awake in the event of waking in the night (min–max)?		10 (2–60)	5 (1–62)	0.117 ^b

Statistical significance: $p < 0.05$.

^a Chi-square test.

^b Mann-Whitney U test.

sleep disturbance than other occupational groups during the COVID-19 pandemic [16]. High depression and anxiety findings and low sleep quality have been reported in individuals isolated for 14 days due to COVID-19 [17]. Several studies have emphasized that sleep disorders are directly linked to suicide, and that suicide rates can be reduced through early diagnosis/treatment of such disorders [18,19]. Further studies investigating sleep disturbances in all children during the COVID-19 pandemic are now needed.

Previous publications have shown a link between families' socioeconomic status (income and well-being) and children's and adolescents' sleep durations [20]. Access to cell phones, computers, televisions, and videogames becomes easier as socioeconomic status rises, the academic performance that families expect of their children rises, children who attend private schools are under greater pressure to study before, during and after school than their peers in state schools, and children's sleep durations decrease [20–24]. In the present study socioeconomic status (maternal and paternal education level and occupation, family income, place of residence, and attendance at private schools) differed significantly between groups 1 and 2. It should be remembered that this socioeconomic status also affected the higher CSHQ score in Group 1 compared to Group 2. Shift work, and particularly nightshifts, creates sleep problems among health workers, and their interactions with their children are also compromised as a result [25]. The data from the present study showed a statistically significant difference between the groups in terms of shift working. We conclude that working shifts among parents contributes to the impairment of sleep habits in the children of health workers during the COVID-19 pandemic.

5. Conclusions

This study demonstrates greater impairment in sleep habits among school age children of health workers compared to children of non-health workers during the COVID-19 pandemic. The impacts on children's sleep habits during the COVID-19 pandemic must be evaluated, and precautions must be adopted in the light of the resulting findings.

Credit author statement

Ibrahim Hakan Bucak, Conceptualization, Methodology, Investigation, Writing – original draft. Habip Almis, Methodology, Formal analysis, investigation, Writing – original draft. Songul Okay Tasar, Resources, Data curation. Hatice Uygun, Investigation, Visualization. Mehmet Turgut, Supervision.

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Conflict of interest

None to declare.

The ICMJE Uniform Disclosure Form for Potential Conflicts of Interest associated with this article can be viewed by clicking on the following link: <https://doi.org/10.1016/j.sleep.2021.05.003>.

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