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Children sleep habits and their knowledge during COVID-19: the impact on quality of life

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Abstract

Background Amid the coronavirus crisis, many aspects of children's lives had been compromised, among which were their sleep habits. The current study aimed to examine children's sleep habits and the children's knowledge of the pandemic and its impact on their quality of life during the COVID-19 pandemic. Using observational cross-sectional analysis based on web-based questionnaires and face-to-face interviews, Parents completed the children's sleep habits questionnaire (CSHQ) and the pediatric quality of life inventory (PedsQL-P), and the questionnaire regarding their children's knowledge about COVID-19.

Results Among the total sample ($n = 259$), Children below the age of 6 ($n = 52$) showed statistically significant higher scores in the bedtime resistance, delayed sleep onset, and sleep anxiety subscales, while those older than the age of 12 ($n = 50$) showed a higher score in the sleep duration problem subscale and lower scores of physical, emotional and psychological functions. Finally, (71.4%) of the study population showed a high level of knowledge about the infectivity of the coronavirus and the fact that it is a pandemic.

Conclusions Sleep problems are common among Egyptian children during the COVID-19 pandemic and have a significant impact on their quality of life.

Keywords Children, Sleep, Quality of life, COVID-19, Coronavirus, Children's sleep habits questionnaire

Background

Sleep is considered as an important component of human biology, and it has been referred to as a "window to the central nervous system", owing to its close associations with many other neurophysiological variables [1]. Sleep has a multifaceted role in maintaining optimal health as well [2]. It was found that problematic sleep in pediatric age groups may be associated with overweight and obesity [3], suboptimal health status [4], as well as depressive, suicidal, and ADHD-related behavior [5]. In addition, despite the finding that sleep problems during infancy and early childhood are common but they are rarely recognized as understanding sleep patterns and disorders associated with sleep is yet challenging in pediatric practices [6]. This motivated us to conduct such a study to explore pediatric sleep patterns especially in the times of the pandemic and how this may affect their QOL.

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Based on the finding that sleep architecture [7] and requirements change with age, and because any sleep disturbance may affect the cognitive, emotional, and physical well-being of the child's health [8]. Therefore, we conducted this study to evaluate if the different age groups included in the study will exhibit significantly different changes sleep wise in response to the Pandemic and quarantine.

The corona virus disease 2019 (COVID-19) has already been recognized as a cause of direct and indirect psychological and social consequences that might influence on mental health not only during the pandemic but also in the future [9]. Among the consequences of quarantine, there are acute stress disorders, anxiety, irritability, poor concentration and indecisiveness, deteriorating work performance, post-traumatic stress disorders, high psychological distress, depressive symptoms and insomnia [10]. Egypt is one of the first countries in the Middle East, which started to control rapid transmission of coronavirus disease from 24 March 2020. Therefore, starting 3/24/2020, the Egyptian government has suspended mass public transport, imposed a night curfew from 7 in the evening to 6 in the morning and locked down all academic schools and universities, health clubs, gardens, café and restaurants. This curfew ended on 6/27/2020. More than 3 months of such precautionary measures had resulted in radical changes in the daily routine with minimization of the outdoor activities and acute decrease in the total period of exposure to the direct sunlight; based on the previous research findings that the natural light is a main modulator of the circadian rhythm and sleep cycles [11]. On the other hand, the reported anxiety and fear of getting infected by the deadly virus worldwide [12], and within the general population in Egypt as well [13], would be expected to have negative reflections on the sleep patterns of the vulnerable age groups of both children and adolescents.

Moreover, sleep disturbances have many implications for adolescents' mental health. In a large study conducted on Chinese adolescents, it was found that mood disorders have been associated with poor sleep quality, which is considered one of the most significant risk factors for these disorders [14].

We conducted this observational cross-sectional study to examine the children's sleep habits during the COVID-19 pandemic and correlate this to their quality of life, knowledge of, and attitudes toward the COVID 19 pandemic. This study was conducted in response to the growing interest around the world in exploring the effects of COVID 19 on the children's sleep habits [15–17], and due to the lack of knowledge. Such evaluation would help to tailor treatment strategies to improve the quality of sleep and to target the anxiety and other identified

factors troubling the sleep and mental well-being of such vulnerable populations.

Methods

This study is an observational, cross-sectional study based on Questionnaires via both online and face-to-face interviews from many governorates and areas of Egypt. The study started during the COVID-19 quarantine and continued for 6 months. Data collection was conducted from February 2021 to August 2021. The protocol of the current study was approved by the ethical committee of Alexandria University (NO: 0305061). Parental or legal guardian permission (informed consent) has been taken before the questionnaire.

The study sample included 259 Healthy Egyptian children and adolescents aged [6–18] years; mean age \pm SD (8.89 ± 3.3), 130 boys (50.2) and 129 girls (49.8) who completed the online-based survey or the individual interviews either with them or with their parents according to their ages.

The children were excluded from the study if there is a history of chronic/significant medical or neurological condition, a history or current prescribed use of any psychotropic or sleep medications, a history or current substance abuse or dependence, major cognitive or developmental disorder, including autism spectrum disorder and Sleep disordered breathing, as demonstrated by a score on the children's sleep habits questionnaire (CSHQ) [18] of at least 5.

The data were collected through individual contact with friends and relatives via face-to-face individual interviews or sending a link of the online designed google form survey submitted by one or both parents or children's caregivers or by the adolescents themselves.

Children sleep habits questionnaire (CSHQ) [18] is a validated 33-item measure of disorders of initiating and maintaining sleep. It measures eight sleep problem domains (bedtime resistance, sleep onset delay, sleep duration, sleep anxiety, night waking, parasomnias, sleep disordered breathing, and daytime sleepiness) and is summed to provide a total sleep problem score. It was applied by one or both parents (or caregiver) of the child to describe the nature of the child's sleep or by the adolescence themselves. Arabic version of this scale was used [19]. The Cronbach's alpha coefficient and test-retest reliability coefficient of the subscales were, respectively, 0.78 and 0.81. Higher scores indicate a sleep problem.

Pediatric quality of life inventory 4.0 generic version (PedsQL) [20] Arabic version [21] is designed to measure health-related quality of life (HRQOL) in children and adolescents ages 2–18 years. It includes the physical health summary score (eight items; same as the physical functioning scale) and the psychological health summary

score (15 items; the mean of the sum of items included in the Emotional, Social, and School functioning scales). This scale could be completed by Parents. The PedsQL-P is a quick, simple measurement tool, takes 5 min, that is scored on a five points Likert type scale. Higher scores indicate better quality of life.

Questionnaire about COVID-19: it was designed by authors regarding how parents evaluate their child's knowledge about COVID including (general knowledge, the protective measures used, and their beliefs and emotions toward the COVID-19 pandemic). A pilot study was conducted on 60 participants to check the reliability and validity of the questionnaire. It involves 5 points Likert-type scale (strongly agree, agree, maybe, disagree, and strongly disagree)

Statistical analysis

We analyzed all data using SPSS (Statistical Package for Social Sciences) software package version 19, 2010 (SPSS Inc., Chicago, Illinois, USA). First, the normality of data was assessed by the Shapiro–Wilk test and visual inspection of histograms. Most of the subjective sleep and PedsQL variables showed a lack of normality ($p < 0.05$), and thus non-parametric tests were conducted. We used the Kruskal–Willis test to compare subjective sleep habits with PedsQL domains between three different age groups of Egyptian children. The Spearman rank test was used to detect the correlation between the different children's sleep habits problems with the quality of life domains. Finally, we used the Fisher Exact Test to compare the percentage of attitude and expression of feelings of Egyptian children toward the coronavirus based on the age groups. Statistical significance is determined at a p value < 0.05 .

Results

The current study includes a total of (259) Egyptian child's parents (or the adolescents themselves) who responded to the questionnaires either online or via face-to-face interviews. The participants ($n = 259$) were divided into three groups based on age as follows: group A (< 6 years), group B (6–12 years), and group C (> 12 years). Their sociodemographic and clinical characteristics are described in Table 1. Most of the study population above 6 years were females, while most of the population below 6 years were males. Most of the population regardless of age, was the first child in order in his family.

Concerning the sleep habits of Egyptian children during COVID-19 lockdown there was a statistically significant difference in Children's sleep habits questionnaire subscales (CSHQs) and total scores among the three studied age groups. Group A (< 6 years) showed significantly higher scores of bedtime resistance, delayed sleep onset, and sleep anxiety subscales than other groups (p

Table 1 Sociodemographic and clinical characteristics of study sample

Variable	6 years or more ($n = 207$)	< 6 years ($n = 52$)
	No. (%)	No. (%)
<i>Sex</i>		
Male	112 (54.1%)	18 (36.6%)
Female	95 (45.9%)	34 (65.4%)
<i>Age (years)</i>		
Mean \pm SD (Min–Max)	10.11 \pm 3.27 (6–18)	3.78 \pm 1.18 (1–5.5)
<i>Order of birth</i>		
1st	100(48.3)	42(80.8)
2nd	64 (30.9)	7 (13.5)
3rd	29 (14.0)	3 (5.8)
4th	7 (3.4)	0 (0)
5th	5 (2.4)	0 (0)
6th	2 (1.0)	0 (0)
<i>School grade</i>		
Preschool	–	52 (100.0)
Primary	147 (71.0)	
Preparatory	42 (20.3)	
Secondary	18 (8.7)	
<i>Governorate</i>		
Cairo	54	20.8
Giza	8	3.1
Alexandria	64	24.7
Assiut	68	28.3
Ismailia	22	8.5
Delta	24	9.3
Other upper Egypt Governorates	12	4.6
Other	7	2.7
<i>Father age (years)</i>		
Mean \pm SD (Min–Max)	43.10 \pm 6.58 (31–66)	34.23 \pm 4.03 (28–50)
<i>Mother age (years)</i>		
Mean \pm SD (Min–Max)	38.44 \pm 5.79 (25–56)	30.63 \pm 3.51 (24–41)
<i>Socioeconomic class</i>		
High level	13(6.2%)	5(9.6%)
Middle level	161(77.8%)	35(67.3%)
Low level	33(16.0%)	12(23.1%)
<i>Parents educational level</i>		
Primary/preparatory school	65(31.4%)	21(40.3%)
Secondary school	102(49.2%)	23(44.3%)
High school	40(19.3%)	8(15.4%)

All data are represented as number and percentage n (%), mean \pm Standard deviation or (Min–Max). n ; number

value = 0.000). While Group C (> 12 years) displayed a significantly higher score of sleep duration problem subscale than other groups (p value = 0.001); Table 2.

Table 2 Comparison of the mean scores of Children’s sleep habits questionnaire subscales and total scores among different age groups

CSHQ	< 6 years vs 6–12 years		6–12 years vs > 12 years		< 6 years vs > 12 years	
	Mean difference	<i>p</i>	Mean difference	<i>p</i>	Mean difference	<i>P</i>
Bedtime resistance	0.41	0.31	1.88	0.00	2.30	0.00
Sleep onset delayed	0.02	0.85	0.44	0.00	0.46	0.00
Sleep duration	− 0.83	0.00	− 0.23	0.38	− 1.06	0.00
Sleep anxiety	0.51	0.02	1.08	0.00	1.59	0.00
Night waking	− 0.03	0.90	0.12	0.66	0.09	0.79
Parasomnia	− 0.38	0.34	0.72	0.07	0.35	0.48
Sleep disorder breathing	− 0.02	0.93	0.04	0.84	0.02	0.93
Daytime sleepiness	− 0.47	0.34	− 0.71	0.16	− 1.18	0.05
Total score	− 0.79	0.57	3.34	0.02	2.55	0.14

All data are represented as mean ± Standard deviation. CSHQ: children sleep habits questionnaire. *n*: number. Kruskal–Willis test

Comparison of mean score of children’s sleep habits questionnaire subscales and total score among preschool (< 6 years) and school-age children [6–17] showed that school-aged children have a significantly higher score of parasomnia subscale compared to preschool children (*p* value=0.03).

The quality of life (QOL) among Egyptian children during COVID-19 lockdown, showed a statistically significant difference among different age groups. Group C (> 12 years) showed significantly lower scores of physical and emotional functions, and overall psychosocial function compared to other groups (*p* value=0.02, 0.01, 0.03), respectively. While group B (6–12 years) revealed a significantly lower score of social function compared to other groups (*p* value=0.03) (Table 3).

In the current study, we assessed the correlation regarding the different sleep habits or problems and different domains of QOL among school-aged under the study. We found that there is a significant negative correlation between bedtime resistance, impaired school function, and overall QOL function (*r*= − 0.19, *p*=0.01). Moreover, there was a significant negative correlation

between sleep anxiety, impaired physical function, impaired emotional function, and overall QOL function (*r*= − 0.15, *p*=0.03), (*r*= − 0.17, *p*=0.01), and (*r*= − 0.16, *p*=0.02), respectively (Table 4).

The assessment questionnaire regarding the general knowledge of the children about the pandemic revealed that most of the study population, regardless of age, have a high level of knowledge about the infectivity of the corona virus and the fact that it is a pandemic. In addition, and according to the answer of the parents, about half of the children knew that COVID-19 infected the respiratory system and could lead to death and the elderly are more liable to the infection. However, a large percentage of the parents were not sure or disagreed regarding the knowledge of their children about the possibility of virus transmission from an asymptomatic person and that the virus can present with non-respiratory symptoms. Most of the parents were not sure or disagreed that their children have abnormal beliefs regarding the coronavirus (Table 5).

The assessment of the children’s attitude and expression toward the COVID-19 pandemic revealed that, as

Table 3 Comparison of the mean scores of Pediatric quality of life inventory subscales and total scores among different age groups

PedsQL	< 6 years	6–12 years	> 12 years	Test statistics	<i>p</i> value
	N(52)	N(157)	N(50)		
	Mean ± SD	Mean ± SD	Mean ± SD		
Physical score	64.72 ± 17.57	68.65 ± 17.10	60.62 ± 20.89	4.03	0.02
Emotional score	62.98 ± 18.98	55.76 ± 19.05	52.20 ± 20.56	4.27	0.01
Social score	77.50 ± 14.87	69.80 ± 19.28	72.80 ± 19.30	3.45	0.03
School score	63.36 ± 29.32	60.44 ± 18.35	58.10 ± 21.26	0.77	0.46
Psychosocial score	67.94 ± 14.75	62.01 ± 15.46	61.03 ± 15.90	3.41	0.03
Total score	132.67 ± 26.98	130.65 ± 26.26	121.65 ± 31.33	2.52	0.08

PedsQL Pediatric quality of life inventory, *n* number, Kruskal–Willis test

Table 4 Correlation between Children's sleep habits questionnaire and Pediatric quality of life inventory subscales

CSHQ	Physical	Emotional	Social	School	Psychosocial
Bedtime resistance					
<i>r</i>	0	-0.27	-0.26	-0.19	-0.3
<i>p</i>	0.98	0	0	0.01*	0
Sleep onset delay					
<i>r</i>	0.27	0.11	0.01	-0.04	0.04
<i>p</i>	0	0.11	0.9	0.61	0.55
Sleep duration					
<i>r</i>	-0.3	-0.5	-0.4	-0.32	-0.5
<i>p</i>	0	0	0	0	0
Sleep anxiety					
<i>r</i>	-0.15	-0.17	-0.06	0.02*	-0.07
<i>p</i>	0.03	0.01	0.42	0.77	0.31
Night waking					
<i>r</i>	-0.1	-0.36	-0.36	-0.33	-0.43
<i>p</i>	0.15	0	0	0	0
Parasomnia					
<i>r</i>	-0.11	-0.4	-0.45	-0.43	-0.51
<i>p</i>	0.12	0	0	0	0
Sleep disorder breathing					
<i>r</i>	-0.25	-0.06	-0.06	0	-0.03
<i>p</i>	0	0.39	0.42	0.99	0.69
Daytime sleepiness					
<i>r</i>	-0.33	-0.49	-0.44	-0.42	-0.54
<i>p</i>	0	0	0	0	0

R spearman rho correlation, **p* value < 0.05

the parents reported, most of the children, regardless of their ages, did not suffer from dreams or nightmares related to coronavirus. In addition, half of the parents indicated that their children expressed their feelings toward the virus (Table 6). We compared the three studied age groups regarding the occurrence of nightmares. There was a statistically significant difference among the age groups: there was no report of nightmares below the age of 6 years, while there was only a small percentage that reported the presence of nightmares in the other two groups (6–12, and > 12). There was a statistically significant difference among the 3 study age groups regarding the expression of their feeling ($p=0.001$), the group below 6 years was the least to express their feeling, while more than half of the other two groups expressed their feeling regarding the pandemic.

Concerning the correlation between the socioeconomic status level and the general knowledge of Egyptian children about the coronavirus, we found a significant positive relation between socioeconomic level and children's knowledge about COVID-19 ($r=0.33$, $p=0.04$).

Furthermore, the study showed a significant positive correlation between socioeconomic level and children's

attitude and expression of their feelings toward COVID-19 ($r=0.32$, $p=0.03$).

Also, the current study revealed a significant correlation between the parent's educational level and the general knowledge of their children about the coronavirus ($r=0.34$, $p=0.01$). However, we did not find a significant relationship between the parent's educational level and the children's attitude and expression of their feelings toward COVID-19 ($r=0.17$, $p=0.07$).

Discussion

In the current study, we observed higher scores of bedtime resistance, delayed sleep onset, and sleep anxiety subscales in preschool children. Meanwhile, the adolescent group showed a higher score of sleep duration problems than other groups. Both school children and adolescents revealed a higher score of parasomnia in the CSHQ in comparison with preschool children. In addition, a negative correlation was found between the disturbed sleep (bedtime resistance, delayed sleep onset, night waking and sleep anxiety) and impaired QOL. The youngest group was the least likely to express feelings toward COVID-19 pandemic and no nightmares were

Table 5 General knowledge of Egyptian children about the coronavirus

Questions	Strongly agree	Agree	May be	Disagree	Strongly disagree	Mean	SD
<i>Does your child know that the corona virus is an infectious disease?</i>							
Total sample (259)							
<i>n</i>	136	49	45	19	10	4.09	1.16
%	52.5	18.9	17.4	7.3	3.9		
<i>Does your child know that the corona virus may cause death?</i>							
Total sample (259)							
<i>n</i>	101	50	44	51	13	3.68	1.30
%	39.0	19.3	17.0	19.7	5.0		
<i>Does your child know that the elderly are more liable for corona virus infection?</i>							
Total sample (259)							
<i>n</i>	88	44	42	67	18	3.45	1.37
%	34.0	17.0	16.2	25.9	6.9		
<i>Does your child know that the corona virus infects the respiratory system?</i>							
Total sample (259)							
<i>n</i>	88	44	52	56	19	3.49	1.34
%	34.0	17.0	20.1	21.6	7.3		
<i>Does your child know that the corona virus may be transmitted from asymptomatic person?</i>							
Total sample (259)							
<i>n</i>	66	44	57	67	25	3.23	1.34
%	25.5	17.0	22.0	25.9	9.7		
<i>Does your child know that the corona virus may present with symptoms other than respiratory?</i>							
Total sample (259)							
<i>n</i>	56	27	67	79	30	3.00	1.32
%	21.6	10.4	25.9	30.5	11.6		
<i>Does your child know that the corona virus is a pandemic disease?</i>							
Total sample (259)							
<i>n</i>	108	45	34	55	17	3.66	1.37
%	41.7	17.4	13.1	21.2	6.6		
<i>Does your child have abnormal beliefs about the corona virus?</i>							
Total sample (259)							
<i>n</i>	26	61	69	54	49	2.85	1.26
%	10.0	23.6	26.6	20.8	18.9		
Weighted mean						3.43	1.04

Likert score interpretation:

Low level {1–2.59}, Strongly disagree and disagree

Moderate {2.60–3.39}, may be

High level {3.40–5}, strongly agree and agree. *n*; number

detected. On the other side, more than half or the elder groups expressed their feelings and only a small percentage of them reported nightmares.

Staying at home and avoiding outside activities became the recommended lifestyle for kids as social separation

was advocated as the greatest approach to limit spread of COVID-19 [22]. Recent studies warned of the potential deleterious impact of the lockdown on the general population’s mental health in the context of the COVID-19 pandemic. Quarantine procedures would produce

Table 6 Comparing general knowledge, Attitude, and expression of feelings of Egyptian children toward the coronavirus based on the age groups

Questions	Strongly agree	Agree	May be	Disagree	Strongly disagree	p value
<i>Does your child know that the corona virus is an infectious disease?</i>						
<i>< 6 years</i>						
<i>N(52)</i>						
<i>n</i>	17	15	8	4	8	
<i>%</i>	32.7%	28.8%	15.4%	7.7%	15.4%	
<i>6–12 years</i>						
<i>N(157)</i>						
<i>n</i>	81	25	35	15	1	0.000
<i>%</i>	51.6%	15.9%	22.3%	9.6%	.6%	
<i>> 12 years</i>						
<i>N(50)</i>						
<i>n</i>	38	9	2	0	1	
<i>%</i>	76.0%	18.0%	4.0%	.0%	2.0%	
<i>Does your child know that the corona virus may cause death?</i>						
<i>< 6 years</i>						
<i>N(52)</i>						
<i>n</i>	4	8	17	13	10	0.000
<i>%</i>	7.4%	15.4%	32.7%	25.0%	19.2%	
<i>6–12 years</i>						
<i>N(157)</i>						
<i>n</i>	60	35	23	37	2	
<i>%</i>	38.2%	22.3%	14.6%	23.6%	1.3%	
<i>> 12 years</i>						
<i>N(50)</i>						
<i>n</i>	37	7	4	1	1	
<i>%</i>	74.0%	14.0%	8.0%	2.0%	2.0%	
<i>Does your child know that the elderly are more liable for corona virus infection?</i>						
<i>< 6 years</i>						
<i>N(52)</i>						
<i>n</i>	1	4	18	17	12	0.000
<i>%</i>	1.9%	7.7%	34.6%	32.7%	23.1%	
<i>6–12 years</i>						
<i>N(157)</i>						
<i>n</i>	49	33	23	47	5	
<i>%</i>	31.2%	21.0%	14.6%	29.9%	3.2%	
<i>> 12 years</i>						
<i>N(50)</i>						
<i>n</i>	38	7	1	3	1	
<i>%</i>	76.0%	14.0%	2.0%	6.0%	2.0%	
<i>Does your child know that the corona virus infects the respiratory system?</i>						
<i>< 6 years</i>						
<i>N(52)</i>						
<i>n</i>	5	8	14	13	12	0.000
<i>%</i>	9.6%	15.4%	26.9%	25.0%	23.1%	
<i>6–12 years</i>						
<i>N(157)</i>						
<i>n</i>	44	30	36	40	7	
<i>%</i>	28.0%	19.1%	22.9%	25.5%	4.5%	
<i>> 12 years</i>						
<i>N(50)</i>						
<i>n</i>	39	6	2	3	0	
<i>%</i>	78.0%	12.0%	4.0%	6.0%	.0%	

Table 6 (continued)

Questions	Strongly agree	Agree	May be	Disagree	Strongly disagree	p value
<i>Does your child know that the corona virus may be transmitted from asymptomatic person?</i>						
<i>< 6 years</i>						
N(52)						
n	3	3	12	19	15	0.000
%	5.8%	5.8%	23.1%	36.5%	28.8%	
<i>6–12 years</i>						
N(157)						
N	32	27	43	45	10	
%	20.4%	17.2%	27.4%	28.7%	6.4%	
<i>> 12 years</i>						
N(50)						
n	31	14	2	3	0	
%	62.0%	28.0%	4.0%	6.0%	.0%	
<i>Does your child know that the corona virus may present with symptoms other than respiratory?</i>						
<i>< 6 years</i>						
N(52)						
n	2	2	12	20	16	0.000
%	3.8%	3.8%	23.1%	38.5%	30.8%	
<i>6–12 years</i>						
N(157)						
n	24	17	47	56	13	
%	15.3%	10.8%	29.9%	35.7%	8.3%	
<i>> 12 years</i>						
N(50)						
n	30	8	8	3	1	
%	60.0%	16.0%	16.0%	6.0%	2.0%	
<i>Does your child know that the corona virus is a pandemic disease?</i>						
<i>< 6 years</i>						
N(52)						
n	3	15	9	15	10	0.000
%	5.8%	28.8%	17.3%	28.8%	19.2%	
<i>6–12 years</i>						
N(157)						
n	68	23	22	39	5	
%	43.3%	14.6%	14.0%	24.8%	3.2%	
<i>> 12 years</i>						
N(50)						
n	37	7	3	1	2	
%	74.0%	14.0%	6.0%	2.0%	4.0%	
<i>Does your child have abnormal beliefs about the corona virus?</i>						
<i>< 6 years</i>						
N(52)						
n	2	11	12	13	14	0.03
%	3.8%	21.2%	23.1%	25.0%	26.9%	
<i>6–12 years</i>						
N(157)						
n	17	43	48	28	21	
%	10.8%	27.4%	30.6%	17.8%	13.4%	
<i>> 12 years</i>						
N(50)						
n	7	7	9	13	14	
%	14.0%	14.0%	18.0%	26.0%	28.0%	

Table 6 (continued)

Questions	Strongly agree	Agree	May be	Disagree	Strongly disagree	p value
<i>Does your child talk about dreams or nightmares regarding the coronavirus ?</i>						
< 6 years						
N(52)						
n	0	2	7	18	25	0.000
%	.0%	3.8%	13.5%	34.6%	48.1%	
6–12 years						
N(157)						
n	6	28	49	33	41	
%	3.8%	17.8%	31.2%	21.0%	26.1%	
> 12 years						
N(50)						
N	4	7	3	13	23	
%	8.0%	14.0%	6.0%	26.0%	46.0%	
<i>Does your child express his/her feelings toward the coronavirus ?</i>						
< 6 years						
N(52)						
n	2	14	11	13	12	0.001
%	3.8%	26.9%	21.2%	25.0%	23.1%	
6–12 years						
N(157)						
n	41	45	40	13	18	
%	26.1%	28.7%	25.5%	8.3%	11.5%	
> 12 years						
N(50)						
N	10	16	12	3	9	
%	20.0%	32.0%	24.0%	6.0%	18.0%	

All data are represented as n (%). n; number

Fisher Exact Test

sleep difficulties and anxiety symptoms [23]. Bonding and social connection are critical components of a child's appropriate psychological development and well-being. When children are separated from their caretakers, they are more likely to develop psychological illnesses. More crucially, the age of the first detachment has been linked to psychological development [24, 25].

In the present study most of the study population above 6 years were females, while most of the population below 6 years were males. In addition, those who are younger than 6 years reported no nightmares, while some of those exceeding 6 years reported nightmares. These findings can be explained by many factors like the ability to recall dreams and the desire to socialize the dreams as well as the contribution of gender disparity [26]. The mechanism by which youngsters form attitudes toward dreams, a key aspect in identifying the gender gap in dream recall frequency, remains unclear. It has been documented that the gender disparity in dream recollection of kids aged than 10 years is substantially smaller than the gender differences in dream recall of adolescents and young adults [27]. The majority of the Egyptian population

lives along the Nile (especially Cairo and Alexandria), in the Delta, and along the Suez Canal [28]. The present study involved children from a wide variety of Egyptian regions from the east, west, delta, Upper Egypt and Cairo. In an earlier Egyptian study, in the Giza governorate, whether in urban, suburban, or rural settings, sleep issues were widespread among primary school students [29]. Another Egyptian study where the majority of the involved population (children and adolescence) were from Greater Cairo, particularly (Giza–Cairo–Qalyubia). The later study has documented that disturbed child's usual lifestyle (including Low income, excessive screen time, and restrictive quarantine measures) is a predisposing factor for the development of anxiety symptoms and sleep problems [30]. Therefore, it is obvious that the sociodemographic background has an important effect on sleep habits and related disorders.

The quarantine imposed by the COVID-19 epidemic and the closure of schools had a negative impact on families, particularly children and teenagers. When students are not in school, such as during holiday vacations or summer vacations, they are physically less energetic,

invest extra time on screens, have an inconsistent sleep schedule, and consume less healthy options. In the current study, we observed a significantly higher scores of bedtime resistance, delayed sleep onset, and sleep anxiety subscales in preschool children (<6 years) when compared to the other groups. While the adolescent groups (>12 years) displayed a significantly higher score of sleep duration problem than other groups. These results are in accord with a study on Italian children and adolescence during the COVID-19 pandemic. It has reported a considerable delay in bedtime and rise time in all age groups. The duration of sleep has expanded in all groups except for the younger ones. The likelihood of difficulty falling asleep, anxiety at night-time, nocturnal awakenings, nightmares, and sleep terrors was higher in the younger groups. The CSHQ in the current study revealed a significant higher score of parasomnia in the school children and adolescents (6–17 years) when compared to preschool children (<6 years). A retrospective French study has shown similar results regarding the increased scores of parasomnias. However, the study reported parasomnias in preschool children only (4–6 years of age) [31]. The later study used the sleep disorder scale for assessment of the sleep disorders. On the other hand, a Chinese study on a population of preschool children (4–6 years) has reported that the sleep habits of the young children changed during quarantine, with later bedtimes and waking times, longer night-time and reduced nap sleep periods, however, a similar 24-h sleep length. They also had less sleep disorders indicated by caregivers. It has been reported by the same study that adjustable lifestyle measures (arranged sleep, reduced screen use, proper diet) and specific parenting techniques were linked to fewer sleep difficulties [16].

In the present study a negative correlation between bedtime resistance, night waking, sleep anxiety and overall QOL function has been observed. These findings seem logical and in accord with the previous research and literature. In a study on Egyptian children and adolescents, the researchers have reported that the sleep problems most prevalent among participants were difficulties of initiating and sustaining sleep, which affected 33.4% of them, whereas increased somnolence affected 15.7% of the population. The same study has reported, upon applying logistic regression, the positive correlation between SDSC and extra screen usage, recognizing safety and hygiene procedures, anxiety indicators, and changes in child habits [30].

Regarding the relation between the level of socioeconomic status, general knowledge of Egyptian children about the coronavirus, and children's attitude and expression of their feelings toward COVID-19, the current study reported a significant relationship between the

socioeconomic status level and children's knowledge, attitude, and expression of their feelings toward COVID-19.

This finding was consistent with Tang and his colleagues, who reported that families with higher socioeconomic status are more knowledgeable about COVID-19 issues [32].

Furthermore, a significant correlation was found between the parent's educational level and the general knowledge of their children about the coronavirus.

This could be explained by the fact that parents with higher socioeconomic status and educational level are more involved in their children's learning and support them with a lot of information about COVID-19, as well as having more effective communication skills with their children [33].

On the other hand, we did not find a significant correlation between the parent's educational level and the children's attitude and expression of their feelings toward COVID-19. This was in line with Lee's (2020), which reported that parental educational level did not significantly affect the attitude and expression toward COVID-19 [34].

We explained this issue as a pandemic that affects the whole world at all levels of society, regardless of their educational level. Therefore, COVID-19 affects the children's well-being, their attitude, and their feelings toward it, regardless of their parental education level.

Although it is apparent based on previous studies and the current one that the quarantine during COVID-19 has impacted sleep and life quality, there are some factors that should be taken in consideration. These factors include the prevalence of obstructive sleep disorders in children and young adolescence due to increased obesity and the rapid growth rate of the tonsils and pharynx, which may lead to obstructive sleep disorders and hence affect sleeping quality [35]. Therefore, studies that take in consideration the basal condition of the study population prior to the study should be elucidated to avoid this confounding factor.

On the other hand, a previous study reported that many psychological factors have adverse outcomes for the student's mental health, including reopening of schools, quarantine of classmates, and self-quarantine. These factors increase the risk of depression and anxiety among those students [36].

Dreams mirror everyday experiences, as per the continuity hypothesis of dreaming and present psychodynamic perspectives. According to a study that included many countries (Italy, Romania and Croatia), it has been reported that subjective emotional responses to confinement showed a substantially stronger link with dreaming than actual distress, according to the findings (illness or death of a relative due to COVID-19) [37]. The inability to

meet with friends and family outside the home appear as the most significant difficulty for children [38]. In the current study, we found that the youngest group (<6 years) showed no nightmares and they were the least group who expressed their feelings. However, the more than half or the elder groups expressed their feelings and a small percent of them suffered from nightmares. These findings can be explained, as previously mentioned, by the ability to recall and socialize the dreams [26]. In a previous study, it has been reported that toddlers (3–6 years) had greater emotional symptoms, less conduct issues, and less hyperactivity than older children (7–10 years). Being a single child and being a single parent were both linked to greater levels of child difficulties [38]. These aforementioned factors can explain the impacts of the lockdown on the child's attitude and quality of life.

Recently, many digital psychological interventions as part of the new era of digital psychiatry could be implicated in the treatment of different sleep disorders, especially insomnia. A previous meta-analysis demonstrated that digital cognitive behavioural therapy shows strong support for the treatment of insomnia, specifically during periods of pandemics or limited availability and accessibility of cognitive behavioural therapy [39].

The current study casts light on the impact of the COVID-19 pandemic on the sleep habits and QOL in Egyptian children and adolescents. Yet, there are still some limitations of the study which include the application of subjective sleep assessment for children's sleep habits. In addition, as per many previous studies the collected data, mostly, is based on the parents' information about their children's sleep habits and different quality of life domains. Another limitation is that there is no baseline data regarding the sleep habits and quality of life of children and adolescents to compare the results during COVID-19. Therefore, a large-scale study of the Egyptian children's sleep habits and QOL is needed to help comparison in future studies based on the cultural and psychological beliefs and attitudes of the Egyptian parents and children.

Conclusion

The results of the current study may provide evidence for the significant and grave impact of the Coronavirus crisis upon Children's sleep habits and quality of life. Younger children showed more bedtime resistance, delayed sleep onset, and sleep anxiety subscales, while those older than the age of 12 showed significant difference in sleep duration.

More attention to sleep habits of children and adolescent is pivotal to improve the quality of life and the general health state, especially during the current global COVID-19 pandemic.

Abbreviations

COVID-19	Corona virus disease 2019
CSHQ	Children sleep habits questionnaire
PedsQL	Pediatric quality of life inventory
HRQOL	Health-related quality of life
QOL	Quality of life
SDSC	Sleep disturbance scale for children score

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Author contributions

MH. Idea elaboration, literature search, methodology, coding of the data and statistical analysis, data presentation and commenting on results, and writing the manuscript. ShY. Idea elaboration, literature search, data presentation and commenting on results, discussing the data, writing the manuscript and follow-up of the research process. HS. Building the google form and coding of the data. AG. Ethical approval procedures, data presentation. FF. Idea elaboration, building the google form. RS. and MH. Writing the manuscript. JM. Ethical approval procedures, writing and revising the manuscript, consultation and follow-up of the research steps. All authors shared in idea formulation and data collection. All authors revised and approved the final draft of the manuscript.

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Availability of data and materials

The data sets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

The protocol of the current study was approved by the ethical committee of Faculty of Medicine, Alexandria University (NO: 0305061) at 18/2/2021. Parental or legal guardian permission (informed consent) has been taken before the questionnaire.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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