

Sleep Quality during COVID-19 Lockdown among Young Indian Adults: A Cross-sectional Study

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ABSTRACT

Background: COVID-19 disrupted lives globally, and to combat it, various countries including India imposed lockdown and other restrictions. This study was conducted to estimate the prevalence of poor sleep quality among Indian adults in 18–30-year age-group and factors associated with it during lockdown.

Methods: This was an online survey-based cross-sectional study conducted in May 2020 after 6 weeks of lockdown in India. Information regarding sociodemographic profile, screen time, physical activity, substance use, caffeine intake, and sleep habits during lockdown was collected. Pittsburgh sleep quality index was used to assess the sleep quality. Descriptive analysis was performed.

Results: A total of 244 study participants were included in the study, out of which 59% (144) were males and mean age was 24.1 years. Physical activity was decreased among 138 (56.6%) and screen time of more than 4 hours among 152 (62.3%) study participants. Poor sleep quality was reported by 47.1% (115) and sleep duration was decreased among 24.6% (60) study participants. Younger age, living in a containment zone, optimal use of available time, and decreased sleep duration were found to be associated with poor sleep quality.

Conclusion: Lockdown affected sleep quality of the study participants adversely, delaying sleeping and waking times. It is important to ensure minimum disruption of day-to-day schedule of people even during such restrictions. Living in a containment zone was found to be significantly associated with poor sleep quality. Authorities should see to it that people living in such zones should be given priority and counseled appropriately.

Keywords: Containment zone, COVID-19, Lockdown, PSQI, Sleep quality.

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INTRODUCTION

Sleep is an integral component of overall well-being as almost one-third of a human's life is spent in sleeping. It has been found that approximately 30–35% general population reported sleep-related problems.¹ India has a high prevalence of sleep disorders with one of the studies reporting 33% prevalence of insomnia among adults.² However, a country-wide prevalence data are unavailable. Sleep deprivation can cause various physical effects, mental health complications and cognitive impairment including fatigue, hypertension, sleepiness, decrease in performance, attention and motivation, poor concentration, and increased risk of workplace and road accidents. It also affects immunity and increases risk of cardiovascular diseases, depression, obesity, and diabetes.³ Sleep gets altered by lifestyle and environmental factors while various external factors like gender, stress, socioeconomic status, general health, etc., can affect sleep quality.⁴

In 2019, a novel virus was identified and coronavirus disease caused by it was declared a public health emergency of international concern in January 2020. To combat coronavirus disease-2019 (COVID-19), countries across the globe placed many restrictive measures including isolation, quarantine, and nation-wide lockdowns. These restrictions limited the movement of people and confined them to their homes, thereby disrupting the daily routines. India imposed a nationwide lockdown from March 25, 2020, after the first case was detected on January 30, 2020. It was initially introduced for 21 days and later extended up to May 31, 2020.⁵ Lockdown restrictions disrupted the lifestyle of individuals, thereby raising the possibility of affecting sleep quality. This was evident from findings of a study conducted in Spain in which quality of sleep was poor among the study participants during lockdown.⁶

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The confinement was stressful in itself as individuals shared limited space for a prolonged period with few close interactions. A lack of novel stimuli, disruptions of routine activity, increased parenting responsibilities, especially for women, and altered productivity expectations for those engaged in professional duties from home, in addition to the fear of contracting COVID-19, uncertainty about jobs, economic situation, and the health and safety of loved ones were other changes affecting the individuals.⁷ People across the globe faced different mental health problems including elevated levels of stress. Stress usually has an inverse relationship with sleep. The effect of stress on sleep quality, timing, and duration is influenced by sleep reactivity. Persons with high reactivity develop insomnia during stressful situations while those without it do not. Thus, home-confinement resulting from lock-down could increase the chances of stress induced disturbed sleep and insomnia.⁸ The pandemic has also been described as an information epidemic,

with people having constant access to news about negative consequences, along with an increase in “screen time”.

Many studies were conducted to study the mental health of people globally during COVID-19 pandemic. However, there is paucity of literature evaluating sleep quality among general population during the lockdown in India as previous studies have been conducted either among COVID-19 patients in isolation and quarantine or among healthcare workers. Therefore, this study was conducted to estimate the prevalence of poor sleep quality and factors associated with it, if any, among general population during lockdown in India.

METHODS

This was a cross-sectional study conducted during May 2020, after almost 6 weeks of lockdown over a period of one week from May 7, 2020, till May 13, 2020. The study population included individuals above the age of 18 years across the country. Study participants included adults age more than 18 years who had an access to smartphone and Internet connection. Online survey-based semi-structured questionnaire was used to collect information regarding sociodemographic profile, caffeine consumption, physical activity, smoking, alcohol intake, screen time, and sleep timing during lockdown along with any preexisting comorbidity and history of any drug intake. Socioeconomic status was assessed using BG Prasad scale updated for the year 2020.⁹ Sleep quality was assessed using Pittsburgh sleep quality index, which contains 19 self-rated questions to form seven component scores and a global score between 0 and 21. A global PSQI score greater than five showed a sensitivity of 89.6% and specificity of 86.5% (kappa = 0.75, $p < 0.001$) in identifying poor sleepers.¹⁰ Cut-off score of < 5 was used to categorize participants having poor sleep quality and ≥ 5 as having good sleep quality. The questionnaire was pretested on a sample of 20 individuals and required modifications were done based on its results. Pretesting data are not included in the final analysis. The questionnaire link was then circulated through WhatsApp social media platform. The authors sent the link to their contacts who were asked to circulate it further. Single response from each participant was allowed. The link was open for responses from May 7, 2020, to May 13, 2020.

Google Excel sheet containing the responses from study participants was downloaded cleaned for errors and missing information. The data were then analyzed using SPSS version 21.0. Descriptive statistics was used. Frequency and percentages were used for categorical data and mean and standard deviation for continuous variables. Chi-square/Fischer-exact test was applied to study the factors associated with sleep quality among study participants. A p -value of < 0.05 was considered significant. The study was conducted within the boundaries of Declaration of Helsinki. The survey questionnaire contained a section on information for the study participant and consent form. Privacy and confidentiality of data was ensured. Contact detail of one of the authors was provided to the study participants in case they had any query.

RESULTS

A total of 275 responses were received, out of which 31 were incomplete, so they were excluded and 244 responses were included in the analysis. Mean age of the study participants was 24.1 ± 3.0 years (Range 18–30 years). More than half (58.2%, 142) of the study participants were in 21–25 year age-group. Fifty-nine

percent (144) were males and 166 (68%) said they are in a relationship. As per B.G. Prasad scale revised for the year 2020, 170 (69.7%) were classified as social class I (2020) (Table 1).

Table 1: Distribution of study participants according to sociodemographic profile ($n = 244$)

Variable	Frequency	Percentage
Age-groups (in completed years)		
18–20	32	13.1
21–25	142	58.2
26–30	70	28.7
Gender		
Male	144	59.0
Female	100	41.0
Relationship status		
Single	58	23.8
Married	20	8.2
In relationship	166	68.0
Number of family members		
Upto 4	163	66.8
5–8	74	30.3
9 or more	7	2.9
Profession		
Student	128	52.5
Government service	62	25.4
Private service	29	11.9
Others	7	2.9
Unemployed	18	7.4
Socioeconomic status		
1	170	69.7
2	74	30.3
State of residence		
Delhi	97	39.8
Haryana	42	17.2
Uttar Pradesh	25	10.2
Punjab	17	7.0
Rajasthan	12	4.9
Others	51	20.9
Living in a containment zone		
Yes	51	20.9
No	161	66.0
Do not know/not sure	32	13.1
Effect of lockdown on job		
Studying/working from home	141	57.8
No change	72	29.5
Unable to continue my profession	31	12.7
Faced loss of job/income due to lockdown ($n = 116$)		
Yes	17	14.7
No	99	85.3
Time spent on screen		
<2 hours	21	8.6

(Contd...)

Table 1: (Contd...)

Variable	Frequency	Percentage
2-4	71	29.1
>4-6	69	28.3
>6	83	34.0
Physical activity during lockdown		
Increased	61	25.0
Decreased	138	56.6
No change	45	18.4
Tea/coffee intake during lockdown (n = 187)		
Increased	58	31.0
Decreased	19	10.2
No change	110	58.8
Alcohol intake during lockdown (n = 85)		
Increased	2	2.4
Decreased	55	64.7
No change	28	32.9
Tobacco use during lockdown (n = 34)		
Increased	10	29.4
Decreased	11	32.4
No change	13	38.2
Any existing comorbidity		
Yes	19	7.8
No	225	92.2
Lockdown has given ample time		
Yes	210	86.1
No	34	13.9
Utilized time effectively (n = 210)		
Yes	79	37.6
No	131	62.4

Of 85 alcohol users, 55 (64.7%) reported a decrease in alcohol intake during lockdown as compared to prelockdown period. Of the 34 tobacco users, 10 (29.4%) reported an increase in tobacco use during the lockdown. One hundred and eighty-seven study participants reported taking tea or coffee and out of them 58 (31.0%) had increased caffeine intake during the lockdown. Only 7.8% (19) study participants had preexisting comorbidities which included hypertension, diabetes mellitus, hypothyroidism, asthma, etc.

Approximately half of the study participants (128, 52.5%) reported an increase in sleep duration during lockdown. Less than one-third participants (73, 29.9%) used to sleep at night by 12 am and about two-thirds (164, 67.2%) used to wake up after 8 am in morning. Mean global PSQI score for the study population was found to be 5.84 ± 3.32 (0-18). Taking cut-off as <5, 47.1% (115) study participants were found to have poor sleep quality. As seen in Figure 1, the frequency distribution peaked at a global PSQI of 4, with a gradual decline with increasing scores. The scores ranged from a minimum of 0 to a maximum of 18 (Table 2).

Age more than 20 years, currently living in a containment zone, participant's perception of not optimally using available

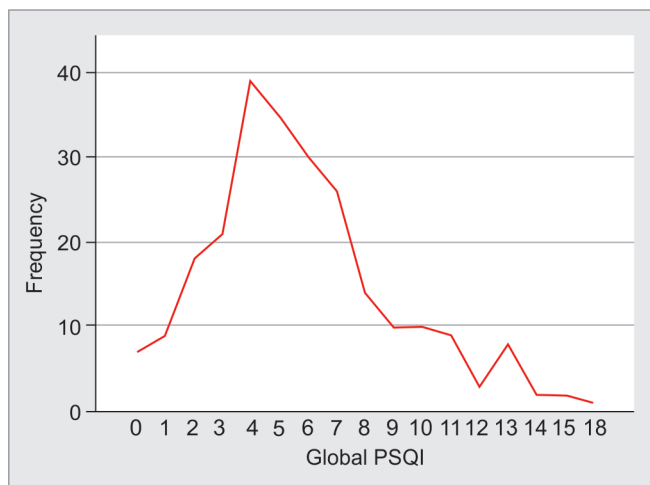


Fig. 1: Frequency distribution of global PSQI score

Table 2: Sleep-related characteristics of study participants (N = 244)

Variable	Frequency	Percentage
Sleep during lockdown		
Increased	128	52.5
Decreased	60	24.6
No change	56	23.0
Sleeps at night by		
12 am	73	29.9
2 am	62	25.4
4 am	55	22.5
>4 am	54	22.2
Wakes up by		
8 am	80	32.8
10 am	68	27.9
12 pm	42	17.2
>12 pm	54	22.2
Sleep quality as per Pittsburgh Sleep quality Index		
Poor	115	47.1
Good	129	52.9

Table 3: Distribution of study participants according to factors associated with sleep quality (N = 244)

Variable	Sleep quality, n (%)		p value
	Good	Poor	
Age-groups (in completed years)			
18-20	10 (31.3)	22 (68.7)	0.030*
21-25	81 (57.0)	61 (43.0)	
26-30	38 (54.3)	32 (45.7)	
Gender			
Male	82 (56.9)	62 (43.1)	0.152
Female	47 (47.0)	53 (53.0)	
Relationship status			
Married	11 (55.0)	9 (45.0)	0.874
Single	89 (53.6)	77 (44.4)	
In relationship	29 (50.0)	29 (50.0)	

Occupation				No change	35 (57.4)	26 (42.6)	
Student	66 (51.6)	62 (48.4)	0.108 [#]	Any existing comorbidity			
Government service	34 (54.8)	28 (45.2)		Yes	8 (42.1)	11 (57.9)	0.327
Private service	14 (48.3)	15 (51.7)		No	121 (53.7)	104 (46.3)	
Others	7 (100)	0 (0)		Lockdown provided ample time			
Unemployed	8 (44.4)	10 (55.6)		Yes	112 (53.3)	98 (46.7)	0.853
Number of family members				No	17 (50.0)	17 (50.0)	
Up to 4	86 (52.8)	77 (47.2)	1.000 [#]	Made use of ample time (n = 210)			
5–8	39 (52.7)	35 (47.3)		Yes	55 (69.6)	24 (30.4)	0.000 [*]
9 or more	4 (57.1)	3 (42.9)		No	57 (43.5)	74 (56.5)	
State				Sleeping time			
Delhi	51 (52.6)	46 (47.4)	0.240	Upto 12 am	50 (68.5)	23 (31.5)	0.001 [*]
Haryana	17 (40.5)	25 (59.5)		Later than 12 am	62 (45.9)	73 (54.1)	
Uttar Pradesh	16 (64)	9 (36)		Waking time			
Others	45 (56.3)	35 (43.7)		Upto 8 am	41	39	0.723
Socioeconomic status**				After 8 am	88	76	
1	88 (51.8)	82 (48.2)	0.600	Sleep duration			
2	41 (55.4)	33 (44.6)		Increased	68 (53.1)	60 (46.9)	0.002 [*]
Residing in a containment zone				Decreased	22 (36.7)	38 (63.3)	
Yes	18 (35.3)	33 (64.7)	0.004 [*]	No change	39 (69.6)	17 (30.4)	
No	97 (60.2)	64 (39.8)		*significant association; [#] Fischer-exact test; **as per BG Prasad scale updated for the year 2020			
Don't know/not sure	14 (43.8)	18 (56.2)					
Effect of lockdown on job							
No effect	40 (55.6)	32 (44.4)	0.899				
Work from home	73 (51.8)	68 (48.2)					
Unable to continue	16 (51.6)	15 (48.4)					
Faced loss of job/income due to lockdown (n = 116)							
Yes	11 (64.7)	6 (35.3)					
No	52 (52.5)	47 (47.5)	0.352				
Time spent on screen (in hours)							
<2	9 (42.9)	12 (57.1)	0.256				
2–4	37 (52.1)	34 (47.9)					
>4–6	43 (62.3)	26 (37.7)					
>6	40 (48.2)	43 (51.8)					
Alcohol intake during lockdown (n = 85)							
Increased	2 (100)	0	0.072 [#]				
Decreased	23 (41.8)	32 (58.2)					
No change	17 (60.7)	11 (39.3)					
Tobacco use during lockdown (n = 34)							
Increased	3 (30.0)	7 (70.0)	0.504				
Decreased	6 (54.5)	5 (45.5)					
No change	5 (38.5)	8 (61.5)					
Caffeine intake during lockdown (n = 187)							
Increased	28 (48.3)	30 (51.7)	0.460				
Decreased	9 (47.4)	10 (52.6)					
No change	63 (57.3)	47 (42.8)					
Physical activity during lockdown							
Increased	35 (57.4)	26 (42.6)	0.691				
Decreased	70 (50.7)	68 (49.3)					

free time during lockdown, sleeping after 12 am, and decreased duration of sleep were found to be associated with poor sleep quality ($p < 0.05$). There was no association of gender, relationship status, socioeconomic status, loss of job or income, and caffeine, alcohol, and tobacco intake during lockdown with sleep quality (Table 3).

DISCUSSION

Lockdown disrupted day-to-day life schedule for entire world and has affected people in multiple ways. The uncertainty about future, fear of contracting the infection, and myths circulating about the disease disturbed the mental health status of individuals. The possibility of such pandemics in future cannot be ruled out; therefore it is important to identify the problems and concerns faced by individuals during such testing times. It will enable the policymakers to decide the future course of action to minimize the suffering among people across the globe. Thus, this study was conducted to assess the sleep quality among adult population during lockdown in India.

Almost half of the study population (115, 47.1%) suffered from poor sleep quality during lockdown. This was similar to the findings of another study conducted by Gupta et al. who found 44.1% study participants having poor sleep quality during lockdown out of which 23.4% reported worsening post lockdown and rest had it even before lockdown. Studies conducted in other countries also showed similar result.^{11–14} The lockdown restrictions forced people to stay indoors, confined to limited space, especially in LMICs, which could have aggravated stress and anxiety among them. As evident from studies conducted in Jordan and Italy, many study participants had anxiety and depressive symptoms during lockdown and both of these were found to be significantly associated with poor sleep quality among study participants.^{14,15} Poor sleep for prolonged duration poses an individual at risk of obesity, diabetes, and heart disease.¹⁶ Sleep disruption, an important component of sleep

quality, for a short duration can cause somatic pain, emotional distress, mood disorders, reduced quality of life, enhanced stress responsivity, and deficits in cognition, memory, and performance among healthy adults.¹⁷

This proportion was higher as compared to other studies. The reason for this contrast could be due to different timing of the interviews, nonidentical study tool, and different age structures of the study participants.^{15,18,19} Another study conducted in Italy showed that self-perceived sleep quality did not change during lockdown compared to prelockdown.²⁰ This could be due to lockdown also provided more time for self-care and taking adequate rest.

Sleep duration was found to be increased among half of the study participants, similar to the findings of Trakada et al.¹⁸ Approximately 70% reported sleeping after 12 am in night and waking up after 8 am in morning. Delayed waking times were also observed during the lockdown as compared to before the lockdown in another study conducted in Indian population.²¹ Physical activity decreased among more than half of the study participants (138, 56.6%) while 62.3% (152) reported screen time of more than 4 hours. All these factors affect sleep and its quality adversely by disrupting circadian rhythm.²²

Significantly higher proportion of younger age-group study participants were found to have poor sleep quality compared to older age-groups, similar to the findings of Trakada et al. Sleep quality deteriorates with age among adults, especially among women.²³ This was in contrast to findings of Christian et al. in which age was not found to be associated with sleep quality. The reason for difference could be different study tool used to assess the sleep quality and different age distribution.

Gender was not found to be significantly associated with sleep quality during lockdown. This was similar to another study in Jordan. The gender differences in sleep disorders with more women suffering from sleep related problems are more pronounced during puberty, pregnancy, and menopause due to distinct hormonal and physical changes.²⁴ However, the study population in our study was not in pubertal or menopausal age-group. This could be the reason we failed to find out any gender difference in sleep quality. Another explanation could be fewer women are gainfully employed in comparison to males; therefore most of them remain confined to their homes. Hence, the pandemic and the resulting lockdown could have lower effect on women compared to their counterparts. The finding of our study was different from findings of other studies in which more females were found to have poor sleep quality compared to males.^{12,14,18} Marital status and occupation were not found to be significantly associated with sleep quality during lockdown. This was in tune with the findings of other studies.^{11,14}

Poor sleep quality was also reported by a significantly higher proportion of individuals living in containment zone for COVID-19. Heightened fear of contracting the infection and stricter restrictions in containment zones due to higher number of cases in defined geographical vicinity could be the possible reason for poor sleep quality among these study participants. Additionally, the study participants who thought that they have used the ample time available during lockdown efficiently had good sleep quality. This again reinforces the hypothesis that lockdown also had positive influences by providing more time for recreation and self-care to some individuals, thereby improving the sleep quality. Decreased

sleep duration was found to be significantly associated with poor sleep quality.

Strengths

To the best of our knowledge, this study is among the few conducted in general Indian population to study the effect of lockdown due to COVID-19 on sleep quality. Pretested questionnaire was used. Validated tool (Pittsburgh sleep quality index) was used for assessment of sleep quality.

Limitations

This study has certain limitations. As it was an online survey-based study, inherent selection bias could not be ruled out as only those literate individuals with access to smartphone and Internet could participate in the study. Therefore, generalizability of the study results is limited. All the information is based on self-reporting by the study participants. Cross-sectional nature of study has a recall bias, especially for patterns of sleep and activity and temporality cannot be established.

CONCLUSION

We can conclude from our study that the lockdown affected the sleep quality of the study participants adversely, delaying sleeping and waking times. There was increased screen time and decreased physical activity. It is therefore important to ensure that there is minimum disruption of day-to-day schedule of people even when such restrictions are imposed. The harms of increased screen time and reduced physical activity should be communicated to people. Living in a containment zone was found to be significantly associated with poor sleep quality. Authorities should ensure that people living in such zones should be given priority and counseled appropriately. Transparency in information and timely communication should be the key to tackle fears and myths among these populations.

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REFERENCES

1. WHO technical meeting on sleep and health. World Health Organization regional office for Europe. European Centre for Environment and Health Bonn Office. 2004.
2. Bhaskar S, Hemavathy D, Prasad S. Prevalence of chronic insomnia in adult patients and its correlation with medical comorbidities. *J Family Med Prim Care* 2016;5(4):780–784. DOI: 10.4103/2249-4863.201153.
3. Basics B. Understanding sleep. National Institute of Neurological Disorders and Stroke, Bethesda. 2006.
4. Yilmaz D, Tanrikulu F, Dikmen Y. Research on sleep quality and the factors affecting the sleep quality of the nursing students. *Curr Health Sci J* 2017;43(1):20–24. DOI: 10.12865/CHSJ.43.01.03.
5. Coronavirus India timeline: tracking crucial moments of Covid-19 pandemic in the country. Available from: <https://indianexpress.com/article/india/coronavirus-covid-19-pandemic-india-timeline-6596832/>.
6. Maestro-Gonzalez A, Sánchez-Zaballos M, Mosteiro-Díaz MP, et al. Quality of sleep among social media users during the lockdown period due to COVID-19 in Spain. *Sleep Med* 2021;80:210–215. DOI: 10.1016/j.sleep.2021.01.050.

7. Gupta R, Grover S, Basu A, et al. Changes in sleep pattern and sleep quality during COVID-19 lockdown. *Indian J Psychiatry* 2020;62(4): 370–378. DOI: 10.4103/psychiatry.IndianJPsychiatry_523_20.
8. Kalmbach DA, Cuamatzi-Castelan AS, Tonnu CV, et al. Hyperarousal and sleep reactivity in insomnia: current insights. *Nat Sci Sleep* 2018;17(10):193–201. DOI: 10.2147/NSS.S138823.
9. Dalvi TM, Khairnar MR, Kalghatgi SR. An update of BG Prasad and Kuppuswamy socio-economic status classification scale for Indian population. *Indian J Pediatr* 2020;87(7):567–568. DOI: 10.1007/s12098-020-03200-7.
10. Buysse DJ, Reynolds III CF, Monk TH, et al. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Res* 1989;28(2):193–213. DOI: 10.1016/0165-1781(89)90047-4.
11. Alharbi AS, Alshahrani SM, Alsaadi MM, et al. Sleep quality and insomnia during the COVID-19 lockdown among the Saudi public. *Saudi Med J* 2021;42(4):384–390. DOI: 10.15537/smj.2021.42.4.20200735.
12. Costi S, Paltrinieri S, Bressi B, et al. Poor sleep during the first peak of the SARS-CoV-2 pandemic: a cross-sectional study. *Int J Environ Res Public Health* 2021;18(1):306. DOI: 10.3390/ijerph18010306.
13. Micheletti Cremasco M, Mulasso A, Moroni A, et al. Relation among perceived weight change, sedentary activities and sleep quality during covid-19 lockdown: a study in an academic community in Northern Italy. *Int J Environ Res Public Health* 2021;18(6):2943. DOI: 10.3390/ijerph18062943.
14. Franceschini C, Musetti A, Zenesini C, et al. Poor sleep quality and its consequences on mental health during the COVID-19 lockdown in Italy. *Front Psychol* 2020;11:3072. DOI: 10.3389/fpsyg.2020.574475.
15. Al-Ajlouni YA, Park SH, Alawa J, et al. Anxiety and depressive symptoms are associated with poor sleep health during a period of COVID-19-induced nationwide lockdown: a cross-sectional analysis of adults in Jordan. *BMJ Open* 2020;10(12):e041995. DOI: 10.1136/bmjopen-2020-041995.
16. Choices NH. Why lack of sleep is bad for your health. *Men's Health* 2017;18:39.
17. Medic G, Wille M, Hemels ME. Short-and long-term health consequences of sleep disruption. *Nature and science of sleep* 2017;9:151–161. DOI: 10.2147/NSS.S134864.
18. Trakada A, Nikolaidis PT, Andrade MD, et al. Sleep during “lockdown” in the COVID-19 pandemic. *Int J Environ Res Public Health* 2020;17(23):9094. DOI: 10.3390/ijerph17239094.
19. Okely JA, Corley J, Welstead M, et al. Change in physical activity, sleep quality, and psychosocial variables during COVID-19 lockdown: evidence from the Lothian birth cohort 1936. *Int J Environ Res Public Health* 2021;18(1):210. DOI: 10.3390/ijerph18010210.
20. Sella E, Carbone E, Toffalini E, et al. Self-reported sleep quality and dysfunctional sleep-related beliefs in young and older adults: changes in times of COVID-19 lockdown. *Sleep Med* 2021;81:127–135. DOI: 10.1016/j.sleep.2021.02.017.
21. Kumar M, Dwivedi S. Impact of coronavirus imposed lockdown on Indian population and their habits. *Int J Sci Healthcare Res* 2020;5(2): 88–97.
22. Altena E, Baglioni C, Espie CA, 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. DOI: 10.1111/jsr.13052.
23. Madrid-Valero JJ, Martinez-Selva JM, Couto BR, et al. Age and gender effects on the prevalence of poor sleep quality in the adult population. *Gac Sanit* 2017;31(1):18–22. DOI: 10.1016/j.gaceta.2016.05.013.
24. Mallampalli MP, Carter CL. Exploring sex and gender differences in sleep health: a Society for Women's Health Research Report. *J Women's Health* 2014;23(7):553–562. DOI: 10.1089/jwh.2014.4816.