COVID-somnia: Sleep disturbance among Indian nurses during COVID-19 pandemic

Mahendra Kumar¹, Anita Kumari², Kusum K. Rohilla³, Shelly Dhawan⁴, Anushi Singh⁵, Nivedita Sharma⁶, Namrata Kriplani⁷, Neha Barari⁸, Roop Kishor Soni⁹

¹Master in Nursing, Stroke Team Coordinator, PGIMER, Chandigarh, ²Graduate in Nursing, Captain, MNS Officer, Base Hospital Lucknow, Uttar Pradesh, ³AIIMS, Rishikesh, Uttarakhand, ⁴Master in Nursing, AIIMS, Patna, Bihar, ⁵Master in Nursing, ITM University, Gwalior, ⁶Master in Nursing, Scholar, BFUHS, Faridkot, Punjab, ⁷Graduate in Nursing, Major, MNS Officer, Military Hospital Jodhpur, Jodhpur, Rajasthan, ⁸Master in Nursing, Sharda University, Delhi, ⁹Graduate in Nursing, PGIMER, Chandigarh, Punjab, India

ABSTRACT

Background: Sleep is vital for every aspect of human life. Inadequate sleep has a massive negative impact on health and work. There is very limited information about the impact of COVID-19 on the sleep disturbance of health-care workers. In our current study, we aim to find answers to certain questions about the impact of the COVID-19 pandemic on sleep patterns on nurses working in COVID care area. Methods: A cross-sectional study was conducted on 305 health-care workers who were purposively enrolled for this study. The study was conducted at the Postgraduate Institute of Medical Education and Research, Chandigarh, India, from April to June 2021. An e-survey method was used to collect data. A questionnaire including sociodemographic characteristics, queries about sleep disturbances, and the patient health questionnaire-9 scale to assess anxiety among participants are among the research tools. Results: Mean age of health-care workers was 26.3 years (SD = 6.3). Most of them were women (81%) with a bachelor's degree in nursing (62%), nursing interns (46%), and married (71%). The majority of nurses (85%) were not infected with COVID and were given suitable personal protective equipment (46%) in the hospital. The majority of participants (45%) got 6–8 h of sleep per night did not receive any sleep therapy (90%). The most of participants (42%) reported that they did not enjoy performing activities and were under moderate stress (15.4). Conclusion: Health-care workers are struggling to cope with the COVID-19 pandemic with limited and almost hackneyed resources. Healthy sleep is everyone's right. The current situation of the pandemic has a great impact on the psychological health of frontline health-care workers by affecting their professional performance.

Keywords: COVID-19, COVID-somnia, health-care workers, nurses, pandemic, sleep disturbance, stress
The newly diagnosed coronavirus disease virus, which appeared in Wuhan, China, in December 2019, has created an unprecedented situation globally and has come as a challenge to health-care institutions in most countries. Pandemic fear has caused widespread concern among people and health institutions, socially and disrupting normal daily routines. These concerns growing anxiety and distress among health-care workers.

COVID-somnia is a term used as a purpose of the substitute to ease divulgence. As sleep is vital for the regulation of humoral and cellular immunity of an individual, sleep deprivation reduces their immune response. Healthy sleep can not only enhance physical and mental limitations but can also improve body functions and facilitate better working performance.

Health-care workers are among the most precious assets as well as venerable populations in any country. Sadly they are going through the classic rock-and-a-hard-place scenario, miserably needed during the resilience retaliation to the outbreak and struggling to maintain morale and a healthy mental state.

It is reasonable to believe that health-care workers are more likely at risk than the general public to contract COVID-19 due to the highly contagious environment in which they have direct contact with patients. Previous statistics also reported that health-care workers handled a notable portion of the infected cases during the pandemic. COVID-19 pandemics is aggressively making the news everywhere with cases multiplying, and here something markedly missing is the concern for frontline health-care workers who are sacrificing their lives and facing challenges beyond the risk of infection.

Frontline health-care workers are under great pressure to participate in pandemic care. Furthermore, they face loneliness and hopelessness while caring COVID-19 patient care for a long time without proper rest. They are also at risk of a potential career infection at home, which turns them into anger, anxiety, and insomnia.

The pandemic has changed the routines of people for food, sleep, and physical activity. These components have led to changes in sleep habits. The workload on health-care workers during pandemic includes exhausting shifts, a long-established shortage of health-care workers, and negative outcomes such as lower job satisfaction, burnout, and intent to leave the job. The infection controls protocols to minimize transmission risk to others require health-care workers to stay in isolation during their COVID-19 posting, furthermore making them feel hopeless and anxious. Additionally to routine schedule, health-care workers spend hours each day donning and doffing protective gear, further increasing stress among health-care workers and making them tired. Sleep is a very important aspect of good mental health and is considerably modifiable. Disrupted sleep patterns and sleep quality have been associated with psychological symptoms such as anxiety, stress, and depression.

According to nurses’ reactions to the current pandemic, the most salient sources of stress were lack of sleep, anxiety, and safety concerns. Shifting our concerns to the evidence reported from many researchers, there is a paucity of research work over the effect of COVID pandemic over nurse’s sleep and stress. Moreover, that is too reported from developed countries.

Nursing is a female-dominant profession. Nurses work at hospitals as well as take care of their families back. Effect of COVID-19 pandemic over nurse’s well-being also partially or fully impacts over their caring of family and family responsibilities. Understanding the extent of the relationship between sleep and stress is important as sleep is a modifiable behavior. The finding of the study may help physicians, authorities to counter the impact of the pandemic on nurses, and prepare preventive strategies.

**Materials and Methods**

A cross-sectional study design was used in this present study. A total of 305 nurses were enrolled in the study using the purposive sampling technique. With the help of an e-survey, we examined the relationship between working in COVID pandemic and sleep disturbance with stress and anxiety in nurses working in COVID care unit during April–June of 2021 when India was facing the peak of second COVID pandemic wave.

This study was conducted at a Postgraduate Institute of Medical Education and Research, Chandigarh, India.

The structured questionnaire was validated by nine experts from different specialties and had excellent reliability ($r = 0.90$). Research tools consist of a questionnaire related to sociodemographic variables, related to sleep disturbance and patient health questionnaire-9 (PHQ-9) scale to assess anxiety among participants. PHQ-9 scale is a 9-items standardized Likert scale used to assess the level of anxiety and stress. For each item, the score ranges from 1 to 4 where 1 means not at all and 4 means nearly every day. The total score ranges from 9 to 36. The higher the score, the higher is the level of stress.

Health-care workers who were nurses and posted for COVID-19 duties belonging to the age group from 20 to 50 years and do not have any chronic comorbidity were included. Health-care workers were nurses who were posted in the COVID area and doing shift duties for 6 h each day for a week continuously and were allowed to take 2 days off after 1-week duty.

After taking consent from the participants, the e-survey was sent to 417 nurses via mail, WhatsApp, and completely filled questionnaire received back from 305 participants.

Ethical approval was obtained from the Institute Ethical Committee. Written informed consent was also obtained from each study participant. Each participant’s confidentiality and anonymity were maintained during the whole study.
Data analysis was done using SPSS version 23.0. Frequency, percentage, and mean were calculated to assess sleep patterns and its disturbance among health-care workers.

**Results**

The mean age of health-care workers was 26.3 years (SD = 6.3). Most of them were female (81%), BSc nursing qualified (62%), nursing interns (46%), and married (71%), out of which only 11% of the spouses belonged to the medical profession and only a few (22%) had children also, whose age was more than 5 years (60%). The majority did not have a previous history of sleep disturbance (85%). Out of them, the majority took a complete vaccine for COVID-19 (56%). Only a few (15%) reported that they preferred hospitals to provide accommodation for quarantine during the COVID-19 posting. The majority of participants (85%) were never infected with COVID, and they were provided with adequate personal protective equipment (PPEs) (46%). Forty-five percent of participant's nurses were getting 6–8 h of sleep at night. The majority (90%) were not taking any therapy for sleep disturbances, and only a few (10%) were taking medicine to help them sleep. Half of the participants said that they faced some difficulties due to their sleep problems [Table 1].

Forty-two percent of participants stated that there was no change in sleeping hours during the COVID-19 pandemic. Where 28% were unable to sleep at night, one-third (30%) of participants said that they never wake up often during the night. Where 31% agree that their sleep pattern interferes with working in the COVID pandemic and that they get up only once (43%) at night to urinate, they were taking rest (51%) on an average working day also, and they were satisfied (35%) with their current sleep pattern [Table 2].

The majority of participants were not at all feeling any pleasure (42%) in doing things, not feeling down or hopeless (46%), not having trouble falling or staying asleep (45%), not having a poor appetite (47%), not feeling bad about yourself (61%), not having any trouble concentrating on things (55%), not speaking slowly (65%), and not thinking that you would be better off dead, or that you (68%). Forty percent of participants agreed that for several days they had been feeling tired or had little energy. So the overall stress scores of participants were 15.4 [Table 3]. Overall, the majority of participants’ nurses feel stressed due to the risk of transferring COVID-19 infection to their family [Figure 1].

**Discussion**

In the present study, web-based surveys were used, which are convenient and powerful tools to collect information in the pandemic era.[14] Although so far several research papers have been published to check the effect of the COVID-19 pandemic on health-care workers’ sleep patterns, no study has firmly reported that COVID-19 crisis on sleep disturbance and stress among nurses in India.[15] There is a higher possibility of sleep disturbances seen among health-care workers during COVID-19, possibly related to asymptomatic infection by the virus, alternatively credited to social and emotional elements including stress and anxiety.[16]

In the present study, nurses who were doing shift duties in COVID-19-positive areas were included. Previously reported evidence showed that nurses are bound to work long shifts of hours to ensure an uninterrupted flow of patients.[19] However, circadian misalignment occurs in health-care workers, which recover within after few days after returning to the normal schedule.[19] Moreover, during the COVID-19 pandemic, frequent policy changes by hospital authorities and absence of clear-cut guidelines for case management protocols have resulted in adding anxiety and stress among health-care workers.[17] This disturbance in circadian causes hormonal disturbance which further leads to an increased risk of metabolic syndromes, that is, obesity, a cardiovascular, and metabolic disease which finally result in accelerated cellular senescence and aging too.[19]

| Variables | Options | Frequency | Percentage |
|-----------|---------|-----------|------------|
| Duration of quality sleep at night | <4 h | 21 | 07 |
| | 4-6 h | 118 | 38 |
| | 6-8 h | 138 | 45 |
| | Over 8 h | 28 | 10 |
| Since the pandemic began, have you visited therapist related to sleep disturbance? | Yes | 29 | 10 |
| | No | 276 | 90 |
| If yes, how often you took medicine (n=29) | Not on medication | 276 | 90 |
| | Once per week | 19 | 66 |
| | Once or twice per week | 07 | 24 |
| | Three or more times per week | 03 | 10 |
| How difficult is for you to do your work due to your sleep problems? | Not difficult | 122 | 40 |
| | Somewhat difficult | 147 | 50 |
| | Very difficult | 29 | 08 |
| | Extremely difficult | 7 | 02 |
Kumar, et al.: Sleep disturbance among nurses

The one-third (36%) of participants' nurses from current study expressed no interest in doing things and feel stressed since pandemic. This is likely due to the adverse environment of negative news abound, stress of future, and possible impact of fear of getting infected with COVID virus. Present study participants' nurses stress level recorded as mean ± SD 15.4 ± 5.2 moderate stress level. Stress is the primary cause of insomnia.[14] It mainly triggers internal or external burdens that may be a perceived threat for an individual. In response to these burdens, the body counteracts complex physiological and behavioral responses to maintain optimal equilibrium in the body. Extra ordinary situation of COVID-19 required close monitoring for patient, extra safety precautions, and protective gears to be wear by health-care providers and stressful environment due to impactable mortalities in intensive care units affected negatively who are already facing challenging tasks of working with a handful of resources.[10] Many researchers have found stress a major cause of sleep disturbances in health-care workers.[7]

Another study from China also reported that over one-third (36%) of total study participants experienced insomnia since COVID pandemic. The authors also mentioned that female nurses were more to report anxiety and depression.[1] Stress is infamous for being difficult to define. Many researchers explain stress as a physical and emotional reaction to life's challenges. Serious stressful events affect sleep of affected people.[21] Another study from western China on health-care workers during the COVID-19 pandemic observes that there was a high prevalence of negative emotions and stress including poor sleep quality.[22] Where a study conducted at Oman by Badahdah et al.[23] who examine sleep quality among physicians and nurses posted in COVID-19-positive patient units reportedly, one-third of them (36%) experienced insomnia since COVID-19 pandemic.

Figure 1: Factor responsible for stress among health-care workers

Table 2: Sleep quality of participants

| Variables                              | Sleeping hours decreased very much | Sleeping hours decreased | No change | Sleeping hours increased | Sleeping hours increased very much |
|----------------------------------------|-----------------------------------|--------------------------|-----------|--------------------------|-----------------------------------|
|                                       | Strongly agree                     | Agree                    | Neutral   | Disagree                 | Strongly disagree                 |
| Not able to sleep at night             | 49 (18)                           | 80 (26)                  | 88 (28)   | 88 (28)                  | 0                                 |
| Not able to sleep due to fear of COVID infection | 55 (18)                           | 74 (24)                  | 103 (34)  | 73 (24)                  | 0                                 |
| Since COVID pandemic, I wake up often during night | 36 (12)                           | 30 (10)                  | 70 (23)   | 79 (25)                  | 90 (30)                           |
| My sleep pattern has interfered my daily functioning | 20 (06)                           | 34 (12)                  | 64 (21)   | 94 (31)                  | 93 (30)                           |
| I get up at night to urinate           | 10 (04)                           | 18 (06)                  | 65 (21)   | 130 (43)                 | 82 (26)                           |
| I take rest periods in an average working day | 11 (03)                           | 14 (05)                  | 50 (16)   | 156 (51)                 | 74 (25)                           |
| Satisfaction level with your current sleep pattern | 8 (03)                            | 55 (18)                  | 93 (30)   | 107 (35)                 | 42 (14)                           |

Table 3: Level of stress among participants

| Stress                                      | Not at all | Several days | More than half of days | Nearly every day |
|----------------------------------------------|------------|--------------|------------------------|------------------|
| Little pleasure in doing thing               | 127 (42)   | 112 (36)     | 50 (17)                | 16 (05)          |
| Feeling down or depressed                    | 140 (46)   | 108 (35)     | 43 (14)                | 14 (05)          |
| Trouble falling asleep                       | 136 (45)   | 108 (35)     | 43 (14)                | 18 (06)          |
| Feeling tired                                | 98 (33)    | 123 (40)     | 63 (20)                | 21 (07)          |
| Poor appetite                                | 145 (47)   | 102 (34)     | 39 (12)                | 19 (07)          |
| Feeling bad about yourself or your family    | 184 (61)   | 79 (26)      | 30 (09)                | 12 (04)          |
| Trouble concentrating on things             | 165 (55)   | 88 (28)      | 35 (12)                | 17 (05)          |
| Moving or speaking so slowly                | 198 (65)   | 75 (25)      | 22 (07)                | 10 (03)          |
| Thoughts of you would be better off dead    | 210 (68)   | 67 (22)      | 21 (07)                | 7 (03)           |
| Stress level (9-36)                          | Mean±SD    | 15.4±5.2     |                        |                  |

Figure 1: Factor responsible for stress among health-care workers

has reported various effects of stress on sleep, such as difficulty in falling asleep, altered sleep pattern, nighttime awakening, and stressful dreams.[38] The one-third (36%) of participants' nurses from current study expressed no interest in doing things and feel stressed since pandemic. This is likely due to the adverse environment of negative news abound, stress of future, and possible impact of fear of getting infected with COVID virus. Present study participants' nurses stress level recorded as mean ± SD 15.4 ± 5.2 moderate stress level. Stress is the primary cause of insomnia.[14] It mainly triggers internal or external burdens that may be a perceived threat for an individual. In response to
India is quite a densely populated state, with a known shortage of health-care infrastructure and health-care workers too. Furthermore, fewer COVID-19 testing and treatment facilities contribute to the widespread infection and create a crisis. Consequently, the result of this pressure has to be carried out by health-care workers and their families, who also suffer along with them. In India, health-care workers also face stigmatization and criticism from the public and are mistaken for having a career in infection in the locality where they live. Such a hopeless situation already exists among health-care workers and pushes them toward psychological impacts like anxiety, depression, and sleep disturbance.

A contemporary survey study on 1119 health-care workers in the USA examines sleep disturbance during the COVID pandemic which reported 70% of health-care workers had difficulty in sleeping during the COVID-19 pandemic. The swiftly growing COVID-19 pandemic is inducing stress. The sudden and unanticipated disconnection of social interactions and the upset to daily routines have significantly impacted people's sense of security and comfort. The study reported increase in sleeping medicine utilization, from 8.2% to 10% during post-COVID-19 pandemic emergent.

In the present study, the finding suggested that health-care workers were stressed about COVID-19 infection and they shared their personal experiences of stress with COVID-19 pandemics. The study reported that the prevalence of mental and psychological symptoms among health-care workers during the COVID-19 pandemic was more severe compared to previous pandemics. Evidences from previous pandemic and infectious disease outbreaks also indicate negative impact over sleep and mental health of caregivers. In a study from one of the most fatal breakouts of SARS, with more than 8000 cases around the world, also a significant number of health-care workers reported a higher prevalence of stress among health-care workers working with SARS patients directly as compared to those who were not working with these patients, who were also suffering from sleep disturbance, fatigue, and anxiety. Another research study also reported that the SARS outbreak has a psychological impact on health-care workers and found sleep disturbances among (28.4%) health-care workers.

Nurses are around one-third of the total health-care workers in any country. As a front-runner health-care worker, nurses are playing crucial role and at higher risk of getting infected while providing care and other direct patient care activities.

In the present study, findings suggest that health-care workers were moderately stressed during this COVID-19 pandemic. The current situation of the COVID-19 pandemic, where nurses feel powerless, consequently results in frustration. The increased incidence of anxiety, depression, aggression, and burnout can affect their sleep quality too.

Nurses can use some common strategies to minimize the effect of the COVID pandemic on their well-being such as discussion with colleagues and expressing feelings and emotions who are going through similar experiences can lower stress and nurses can feel light-hearted. Being positive is sometimes the only choice than intervention like tele-motivation workshops and group sessions by a psychologist can help nurses to find support. Promote physical activities like regular exercise, yoga, and meditation. Encourage recreational activities like watching online movies and reading books. Should avoid overconsumption of coffee, smoking, or alcoholic drinks and stay well hydrated to mitigate stress.

**Institutional strategies**

The institution can work on bringing the equal distribution of night duties to minimize repetition and overburden. Short duration night shifts can provide rest in between long shifts. Institution authorities should ensure uninterrupted supplies of PPEs, hand sanitizers, and other protective equipment. Intensive screening is required for all staff during and after COVID-19 posting.

**Conclusion**

Undoubtedly, sleep is a key indicator of health. Good sleep quality helps them to give better work output. These study findings highlight the importance of easing the working environment and conditions in health-care institutions for COVID-19 warriors, specifically toward nurses, who are prime victims of suffering from anxiety and sleep disorders.

The study results are indicating the impact of working in the COVID pandemic on nurses’ sleep and their mental health. The current pandemic has exposed nurses’ working conditions that alarm their compromised physical and mental health. Accepting that the pandemic war is going to be long, nurses are using the coping mechanism to avoid stress and living in the reality of new normal likely behind non-significance between sleep disturbance, stress, and pandemic.

**Limitation of the study**

The study was limited to a single center and a limited number of participants. The effect of the COVID-19 pandemic on health-care workers is deep and required more studies on a large sample size.

**Acknowledgments**

We offer a sincere thanks to all COVID-19 warriors, especially my fellow nurses for working hard during this difficult time and sharing their experience with us.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and
due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

References
1. Zhang C, Yang L, Liu S, Ma S, Wang Y, Cai Z, et al. Survey of insomnia and related social psychological factors among medical staff involved in the 2019 novel coronavirus disease outbreak. Front Psychiatry 2020;11:306.
2. Mukherjee A, Bandopadhyay G, Chatterjee SS. COVID-19 pandemic: Mental health and beyond-the Indian perspective. Ir J Psychol Med 2021;38:140-4.
3. Kumar M, Dwivedi S. Impact of coronavirus imposed lockdown on Indian population and their habits. Int J Sci Healthcare 2020;5:88-97.
4. Gupta R, Grover S, Basu A, Krishnan V, Tripathi A, Subramanyam A, et al. Changes in sleep pattern and sleep quality during COVID-19 lockdown. Indian J Psychiatry 2020;62:370-8.
5. Ibarra-Coronado EG, Pantaleón-Martínez AM, Velázquez-Moctezuma J, Prospero-García O, Méndez-Díaz M, Perea-Tapia M, et al. The bidirectional relationship between sleep and immunity against infections. J Immunol Res 2015;2015:678164.
6. Salari N, Khazaie H, Hosseinian-Far A, Ghasemi H, Mohammadi M, Shoiaimi S, et al. The prevalence of sleep disturbances among physicians and nurses facing the COVID-19 patients: A systematic review and meta-analysis. Glob Health 2020;16:92.
7. Kalyani CV, Malhotra P, Rohilla KK. Immunity boosting measures: A gateway toward preventive measure for coronavirus disease 2019. Natl J Physiol Pharm Pharmacol 2021;11:1-6.
8. Vizheh M, Qorbani M, Arzaghi SM, Mahdian S, Javanmard Z, Esmaeili M. The mental health of healthcare workers in the COVID-19 pandemic: A systematic review. J Diabetes Metab Disord 2020;19:1-12.
9. Chatterjee SS, Chakrabarty M, Banerjee D, Grover S, Chatterjee SS, Dan U. Stress, sleep and psychological impact in healthcare workers during the early phase of COVID-19 in India. A factor analysis 2021;12. doi: 10.3389/fpsyg.2021.611314.
10. Nagesh S, Chakraborty S. Saving the frontline health workforce amidst the COVID-19 crisis: Challenges and recommendations. J Glob Health 2020;10:010345.
11. Kumar M, Mohindra R, Sharma K, Soni RK, Rana K, Singh SM. The impact of working in a COVID hospital on sexual functioning in male nurses: A study from North India. Ind Psychiatry J 2021;30:187-90.
12. Ben Simon E, Rossi A, Harvey AG, Walker MP. Overanxious and underslept. Nat Hum Behav 2020;4:100-10.
13. Molebatsi K, Motlhatlhedi K, Wambua GN. The validity and reliability of the Patient Health Questionnaire-9 for screening depression in primary health care patients in Botswana. BMC Psychiatry 2020;20:295.
14. Kumar M, Talati S, Arora P, Gill M. Challenges faced by corona warriors during covid-19 pandemic: A review. JMJBS 2021;5:9-23.
15. Rohilla KKV. COVID-19 emergency in India. Natl J Comm Med 2021;12:120-21.
16. Zhang M, Zhang C, Sun Q, Cai Q, Yang H, Zhang Y. Questionnaire survey about use of an online appointment booking system in one large tertiary public hospital outpatient service center in China. BMC Med Inform Decis Mak 2014;14:49.
17. Wong EL, Wong SY, Lee N, Cheung A, Griffiths S. Healthcare workers’ duty concerns of working in the isolation ward during the novel H1N1 pandemic. J Clin Nurs 2012;21:1466-75.
18. Institute of Medicine Committee on Sleep Medicine and Research. The National Academies Collection: Reports funded by National Institutes of Health. In: Colten HR, Altevogt BM, editors. Sleep Disorders and Sleep Deprivation: An Unmet Public Health Problem. Washington (DC): National Academies Press (US) Copyright © 2006, National Academy of Sciences; 2006.
19. Cheng P, Tallent G, Bender TJ, Tran KM, Drake CL. Shift work and cognitive flexibility: Decomposing task performance. J Biol Rhythms 2017;32:143-53.
20. Suchecki D, Tiba PA, Machado RB. REM sleep rebound as an adaptive response to stressful situations. Front Neurol 2012;3:41.
21. Hall M, Buyssse DJ, Nowell PD, Nofzinger EA, Houck P, Reynolds CF 3rd, et al. Symptoms of stress and depression as correlates of sleep in primary insomnia. Psychosom Med 2000;62:227-30.
22. Yue L, Zhao R, Xiao Q, Zhuo Y, Yu J, Meng X. The effect of mental health on sleep quality of front-line medical staff during the COVID-19 outbreak in China: A cross-sectional study. PLoS One 2021;16:e0253753.
23. Badahdah AM, Khamis F, Mahiyari NA. Sleep quality among health care workers during the COVID-19 pandemic. J Clin Sleep Med 2020;16:1635.
24. Gupta R, Pandi-Perumal SR. COVID-Somnia: How the pandemic affects sleep/wake regulation and how to deal with it?. Sleep Vigil 2020;4:51-3.
25. America MH. The mental health of healthcare workers in COVID-19 2021 [2/5/2021]. Available from: https://mhanational.org/mental-health-healthcare-workers-covid-19. [Last accessed on 2022 Jan 09].
26. Johnson KG, Sullivan SS, Nita A, Rastegar V, Gurubhagavatula I. The impact of the COVID-19 pandemic on sleep medicine practices. J Clin Sleep Med 2021;17:79-87.
27. De Kock JH, Latham HA, Leslie SJ, Grindle M, Munoz SA, Ellis L, et al. A rapid review of the impact of COVID-19 on the mental health of healthcare workers: Implications for supporting psychological well-being. BMC Public Health 2021;21:104.
28. LeDuc JW, Barry MA. SARS, the first pandemic of the 21st century: Emerg Infect Dis 2004;10:e26.
29. Preti E, Di Mattei V, Perego G, Ferrari F, Mazzetti M, Taranto P, et al. The psychological impact of epidemic and pandemic outbreaks on healthcare workers: Rapid review of the evidence. Curr Psychiatry Rep 2020;22:43.
30. Simonetti V, Durante A, Ambrosio R, Arcadi P, Graziano G, Pucciarelli G, et al. Anxiety, sleep disorders and self-efficacy among nurses during COVID-19 pandemic: A large
cross-sectional study. J Clin Nurs 2021;30:1360-71.

31. Pappa S, Ntella V, Giannakas T, Giannakoulis VG, Papoutsi E, Katsaounou P. Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. Brain Behav Immun 2020;88:901-7.