## Original Research Article

# Study of sleep disturbances in frontline healthcare workers during COVID-19 epidemic

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**ABSTRACT**

**Background:** Aim of this study was to study sleep disturbances in frontline healthcare workers during COVID-19 epidemic.
**Methods:** This is a case control study was conducted in the Department of Physiology at Pt. B. D. Sharma PGIMS, Rohtak. The study included hundred volunteer subjects of age group 25-35years and were divided into two groups (healthcare workers and and professionals from non-medical background).
**Results:** Subjective sleep quality was significantly altered in FHCW with P value of 0.001. Sleep latency was increased in study group with 50% of study group having score of 3 on Pittsburg sleep quality index. The duration of sleep was reduced in study group with increased sleep disturbances. Forty percent of FHCW reported use of medications for sleep. Almost 100% of FHCW reported Day time dysfunction.
**Conclusions:** COVID-19 resulted in significant sleep deprivation, increased latency, poor sleep quality and increased use of medication in FHCW. The FHCW suffered from poor quality of sleep during the COVID pandemic. FHCW were affected by several stress factors including heavy workload, high night shift frequency and constant use of PPE kit. All these stress factors affected their quality of sleep.

**Keywords:** COVID-19, FHCW, Pittsburg sleep quality index, Sleep disturbance

## INTRODUCTION

Coronavirus disease (COVID-19) being a new infectious disease with a high potential for transmission that leads to morbidity and mortality in some of those affected. This caused a substantial mental stress in everyone especially in the healthcare workers who were working at the frontline and are caring for the sick.[1] Healthcare workers were under huge pressure during COVID pandemic and faced lot of issues like inadequate protection from contamination, high risk of infection, isolation, frustration and exhaustion.[2] These issues lead to development of stress, anger, insomnia, fear, anxiety, depressive symptoms and sleep disorders.[3] This pandemic was a relatively new kind of stress or trauma in physicians during the COVID-19 outbreak which had seriously influenced on overall sleep quality especially who were frontline healthcare workers.[3] This disease also comes with a sense of helplessness because of lack of resources and personal protective equipment's in most of the hospitals[4] which indirectly harasses the mental health of a doctor and this leads to a feeling of anger and loneliness. They may develop adjustment disorder and post-traumatic stress disorder (PTSD).[5]

Previous studies have consistently associated poor sleep in later life with deprived QOL. However, the causal relationships between poor sleep and medical conditions,

such as depression remain poorly defined. In this study we try to evaluate sleep disturbances in frontline healthcare workers during COVID-19 epidemic.

## METHODS

The case control study was conducted over hundred volunteer subjects of age group 25 - 35years at Pt. B. D. Sharma PGIMS, Rohtak between Jan 2020 to Jan 2021. Young adults who were willing to participate voluntarily and age group of 25-35 years were included in the study except those who had any chronic illness, mental disorders like depression, anxiety, insomnia etc. also those who had history of medication affected cognition like anti-anxiety/anti-depressants/anti-hypertensives/ sedatives/antihistaminic/alcoholism were excluded. Fifty frontline health care workers (Group I) were age and sex matched with fifty students and professionals from non-medical background (Group II) to serve as their control. The participants of Group I were provided with the questionnaire before starting their duties in ward/flu clinic/sample collection and were asked to fill the form right after completing their designated number of duty days and before starting quarantine. Group II participants were asked to fill the questionnaire as per their convenience. Ethical Committee approval was taken and written informed consent was obtained from each participant.

### Statistical analysis

Statistical testing was conducted with the statistical package for the social science system version 20.0. For all statistical tests, p value less than 0.05 was taken as statistically significant difference.

## RESULTS

This study included fifty healthcare workers and fifty non healthcare workers. Sixty-four percent were Female and thirty six percent were male in frontline healthcare workers (FHCW) compared to fifty two percent Female and forty eight percent male in non-frontline healthcare workers (NFHCW). In FHCW, majority of subjects 21 (42%) had scored 2 and no one had scored 0 compared to NFHCW, where majority of subjects 25 (50%) had scored 0.

**Table 1: Age and gender wise distribution of the study.**

|  | Frequency | Percent |
|---|---|---|
| **Age** |  |  |
| 25-30 | 74 | 74.0 |
| 30-35 | 26 | 26.0 |
| Mean±SD | 28.77±2.72 | Range (25-35) |
| **Gender** |  |  |
| Male | 58 | 58 |
| Female | 42 | 42 |

The sleep onset latency score from PSQI scale had scored 3 for majority of subjects 25(50%) in FHCW compared to NFHCW, where 32 (64%) subjects had scored 1. Both the results were statistically significant as shown in Table 2.

**Table 2: Subjective sleep quality (score) and sleep onset latency (score) from PSQI scale.**

| Score | Subjective sleep quality | | | | Total (%) | P value |
|---|---|---|---|---|---|---|
|  | **0 (%)** | **1.0 (%)** | **2.0 (%)** | **3.0 (%)** |  |  |
| **FHCW (N=50)** | 0 | 19 (38) | 21 (42) | 10 (20) | 50 (100) | 0.001 |
| **NFHCW (N=50)** | 25 (50) | 24 (48) | 0 | 1 (2) | 50 (100) | 0.001 |
| **Sleep onset latency** |  |  |  |  |  |  |
| **FHCW (N=50)** | 1 (2) | 7 (14) | 17 (34) | 25 (50) | 50 (100) | 0.001 |
| **NFHCW (N=50)** | 13 (26) | 32 (64) | 5 (10) | 0 | 50 (100) | 0.001 |

**Table 3: Subjective sleep duration (score) and Sleep efficiency (score) from PSQI scale.**

| Score | Sleep duration | | | | Total (%) | P value |
|---|---|---|---|---|---|---|
|  | **0 (%)** | **1.0 (%)** | **2.0 (%)** | **3.0 (%)** |  |  |
| **FHCW (N=50)** | 3 (6) | 9 (18) | 24 (48) | 14 (28) | 50 (100) | 0.001 |
| **NFHCW (N=50)** | 41 (82) | 8 (16) | 0 | 1 (2) | 50 (100) | 0.001 |
| **Sleep efficiency** |  |  |  |  |  |  |
| **FHCW (N=50)** | 22 (44) | 15 (30) | 8 (16) | 5 (10) | 50 (100) | 0.001 |
| **NFHCW (N=50)** | 48 (96) | 2 (4) | 0 | 0 | 50 (100) | 0.001 |

Table 3 depict the sleep duration score from PSQI scale in frontline healthcare workers and non-frontline healthcare workers. In FHCW, majority of subjects 24 (48%) had scored 2 in NFHCW, majority of subjects 41 (82%) had scored 0.

The sleep efficiency score from PSQI scale in majority of subjects 22 (44%) was 0 in frontline healthcare workers, compared to non-frontline healthcare workers, where majority of subjects 48 (96%) had scored 0 (Table 2).

Table 4 depict the sleep disturbances score from PSQI scale in frontline healthcare workers and non-frontline healthcare workers. In FHCW, majority of subjects 31 (62%) had scored 2. In NFHCW, 41 (82%) subjects had scored 1. The result was statistically significant.

When we compare the medication score from PSQI scale in FHCW, 30 (60%) subjects had scored 0 whereas in NFHCW, majority of subjects 50 (100%) had scored 0. This was also statistically significant (Table 4). The daytime dysfunction score from PSQI scale in frontline healthcare workers was 1, in majority of subjects 26 (52%) compared to zero in NFHCW, in majority of subjects 28 (56%).

**Table 4: Sleep disturbances (score), day time dysfunction (score) and medication (score) from PSQI scale.**

| Score | Sleep disturbances | | | | Total (%) | P value |
|---|---|---|---|---|---|---|
| | 0 (%) | 1.0 (%) | 2.0 (%) | 3.0 (%) | | |
| FHCW (N=50) | 2 (4) | 11 (22) | 31 (62) | 2 (12) | 50 (100) | 0.001 |
| NFHCW (N=50) | 1 (2) | 41 (82) | 8 (16) | 0 | 50 (100) | 0.001 |
| Medication | | | | | | |
| FHCW (N=50) | 30 (60) | 16 (32) | 2 (4) | 2 (4) | 50 (100) | 0.001 |
| NFHCW (N=50) | 50 (100) | 0 | 0 | 0 | 50 (100) | 0.001 |
| Day time dysfunction (score) | | | | | | |
| FHCW (N=50) | 0 | 26 (52) | 13 (26) | 11 (22) | 50 (100) | 0.001 |
| NFHCW (N=50) | 28 (56) | 20 (40) | 2 (4) | 0 | 50 (100) | 0.001 |

**Table 5: Global score of FHCW (frontline healthcare workers) and NFHCW (non-frontline healthcare workers) from PSQI scale.**

| Groups | Mean ± SD Range | P value |
|---|---|---|
| FHCW (N=50) | 10.88±3.44 4-17 | 0.001 |
| NFHCW (N=50) | 3.26±1.92 1-13 | 0.001 |

Table 5 depict the global score of frontline healthcare workers and non-frontline healthcare workers. Mean global score was higher in frontline healthcare workers 10.88±3.44 than non-frontline healthcare workers 3.26±1.92 which showed statistically significant results.

**DISCUSSION**

Sleep is a cyclically occurring, transient, and functional state that is controlled primarily by neurobiological processes. Sleep disorders and insomnia are increasingly being diagnosed at all ages. These are risk factors for depression, mental disorders, coronary heart disease, metabolic syndrome, and/or high blood pressure. A number of factors can negatively affect sleep quality, including the use of stimulants, stress, anxiety, and the use of electronic devices before sleep. A growing body of evidence suggests that nutrition, physical activity, and sleep hygiene can significantly affect the quality of sleep.[18]

COVID 19 was a new disease with lots of uncertainty, no definitive clinical features in the beginning with only supportive treatment and trail and errors.[6,7] The disease stopped the world for one full year in first wave. Luckily, the mortality was very low.[8] The second wave of covid and subsequent waves were different from first wave. COVID 19 caused tremendous stress to everyone especially frontline health care workers who dint had any escape.[9] In this study, we have assessed the direct impact of working environment on the sleep quality of FHCW during COVID-19 pandemic by evaluating scores of Pittsburg sleep quality index and compared it with the sleep quality of NFHCW.[8]

*PSQI scale*

The PSQI was developed in 1989 by researchers at the University of Pittsburgh.[10] It is a self-administered questionnaire that includes 19 questions that patient would answer about and five additional optional questions that can be answered by someone who sleeps in the same room or bed with the patient.[11] The questions are all intended to be answered based on sleeping pattern for the past month.[11,12] It provides information about seven aspects of sleep namely subjective sleep quality, sleep onset latency, sleep duration, sleep efficiency, sleep disturbances, medication, and daytime dysfunction.[13]

In this study the results of the sleep parameters were as followed:

Subjective sleep quality: It was observed that majority of HCW 21(42%) had scored 2 indicating fairly bad sleep

quality as compared to NHCW in which majority (50%) scored one indicating fairly good sleep quality.

Sleep onset latency: It had been observed that HCW had longer sleep latency as 50% of HCW scored highest indicating very bad sleep latency as compared to NHCW in which majority of them scored 1 indicating good sleep latency.

Sleep duration: FHCW had a less sleep duration than NFHCW resulting in poor sleep efficiency.

Sleep efficiency: It was observed that majority of FHCW had less sleep efficiency as compared to NFHCW.

Sleep disturbances: In this study, it was observed that majority of HCW (62%) had scored 2 which indicating high sleep disturbances as compared to the NFHCW in which majority of them (82%) scored 1, which indicate good sleep.

Medication: it was also observed that 40% HCW took medications in order to have a proper sleep as compared to NFHCW (table 7and figure 7).

Daytime dysfunction: In this study, daytime dysfunctions were found once or twice during the past month in half of the FHCW (52%). Once or twice each week in 26% and in NFHCW, 56% had never experienced daytime dysfunction.

Global PSQI Score: It is the sum of total seven components of PSQI scores.

PSQI scale was validated in multiple studies like in study by Zhang et at. In Chinese population and Al Maqbali in aabic patients.[19,20]

In this study, the mean global PSQI score of FHCW was 10.88±3.44 and NFHCW scored 3.26±1.92 (Table 9 and Figure 9). This poor sleep quality of medical workers during the COVID-19 pandemic might be due to the work overload and intense psychological pressure. This was in line with study conducted by Diomidous et al found that the overall sleep quality was extremely worse in frontline nurses during COVID-19 pandemic with sleep problem proportion being 64.15%.[14] Another study by Stojanov et al found poor sleep quality in health care professionals.[12] A study conducted by Zeng et al found 31% prevalence of poor sleep quality in nursing staff.[16] Similarly a study in Saudi Arabia reported prevalence of poor sleep quality was 51% in primary care physician.[17]

## CONCLUSION

This study indicated that the FHCW suffered from poor quality of sleep during the COVID pandemic. FHCW were affected by several stress factors including heavy workload, high night shift frequency, constant use of PPE kit, isolation, fear of being infected and transmitting the infection to their family. All these stress factors affected their quality of sleep.

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