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# INSOMNIA DURING THE COVID-19 PANDEMIC AND ITS RELATIONSHIP WITH PSYCHOLOGICAL DISTRESS IN HEALTHWORKERS : A LITERATURE REVIEW

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## ABSTRACT

**Background:** The global COVID-19 pandemic has had a significant impact on all aspects of daily life. One area it has impacted on is psychological stress experienced by health workers, particularly sleep disorders. Insomnia is frequently related to stressful situations, such as the current COVID-19 pandemic crisis and other mental health related work. The development of sleep disorders such as insomnia may affect the wellbeing of health care workers. This literature review aims to summarize the evidence concerning insomnia during the COVID-19 pandemic and its relationship to psychological distress in healthcare workers and to detect associates stress symptoms with sleep quality in health workers.

**Methods:** This study is a literature review constructed by searching articles through the Pubmed and Science Direct electronic databases using a combination of keywords, including articles published from 2020-2022, analyzing the effect of insomnia during the COVID-19 pandemic and its relationship with psychological stress. The review process used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) as a guide.

**Results:** A total of five articles were analyzed. Three studies indicated that insomnia was associated with stress symptoms even with low exposure to COVID-19 patient care. Two other articles showed that psychological distress has a negative impact on sleep quality to such a level that it interferes with daily activities.

**Conclusion:** Sleep disorders, including insomnia, are related to psychological distress in health workers in the COVID-19 pandemic era. Providing social and psychological support to health workers is crucial because the emotional well-being of health workers affects the quality of patient care, and subsequently the effective functioning of health services.

**Keywords:** COVID-19, Health Workers, Insomnia, Psychological Stress/Distress.

## Introduction

The COVID-19 outbreak began with case reports of a novel coronavirus (SARS-Cov-2) in December 2019 in Wuhan China. A global pandemic was declared months later on 11th March 2020 by the World Health Organisation (WHO).(1) The effects of the rapid spread of the COVID-19 virus had the greatest impact on health care workers across the globe.(1) The pandemic had significant potential to influence the mental health of health care workers on the front line of this crisis.(2)

Insomnia is often related to stressful situations, such as the current healthcare crisis, mental health, physical health and workplace issues.(3) The psychological impact is not only on doctors and nurses, but includes all the health-care workforce from porters to management.(4) Various factors contributed to the devastating impact of COVID-19. These include the nature of the illness with a rapid development, concerning

symptoms, the rapid increase in cases and the large number of fatalities.(5)

The lack of knowledge about this illness has led to a need for reformed health system protocols due to the high level of infection in health care workers. Issues contributing to psychological problems in the health care workforce include excessive workloads, long shifts and an unsafe work environment with insufficient personal protective equipment. (5) (6)

Stress causes long- and short-term disability in the various human systems, and activates the defense system of the central nervous system.(7) The stress responses differ depending on the type of stress and the individual's physiological responses. (8) These latter responses consist of neuro-endocrine and behavioral responses,and include the

changes in the activity and immune function of the hypothalamo-pituitary-adrenal (HPA) axis.[9]

The immune system is also influential in the relationship between stress and sleep.[10] The most important link between the immune system and sleep is established by the cytokines which act as signaling molecules of the immune system such as interleukin-1 beta (IL-1β), tumor necrosis factor (TNF), and interferon. IL-1β, TNF, and interferon are known to participate in the regulation of sleep. If IL-1β or TNF are injected, non-REM (NREM) sleep will increase.[8] But, in the absence of these substances, sleep is interrupted.[11] IL-1β is also involved with the immune regulating feedback chain, which activates the HPA axis, and may be one pathway involved in the relationship between stress and sleep.[12]

According to The International Classification of Sleep Disorders (ICSD-3), insomnia is defined as a repeated experience of either difficulty initiating sleep, maintaining sleep or waking up earlier than desired despite adequate opportunity, leading to impaired daytime function due to fatigue and occurring 3 or more times per week.[13] The prevalence of insomnia is frequently estimated at around 10-20% of the general population.[14] Recorded risk factors include depression, female sex, low socioeconomic status, physical suffering, psychological disorders and being single.[15] The development of a sleep disorder, especially insomnia, is related closely with stressful situations such as the conditions experience by health care workers during the COVID-19 pandemic.[2]

# Methods

This study is a Literature Review. The writers completed a search of the international databases Pubmed and Science Direct, using the following key words: *(Insomnia OR Sleep disorder) AND (Psychological Distress OR Stress) AND (Health Worker OR Health care workers) AND (COVID-19 OR Coronavirus OR SARS-CoV-2).*

The retrieved articles were screened by 2 independent investigators (Y.F and S.H.) who also independently studied full texts of records considered eligible for inclusion, resolving any discrepancies by discussion and consensus. An overall risk of bias was independently assigned to each eligible study by 2 researchers (Y.F. and S.H.), and a third reviewer (R.G.) was consulted for any disagreement.

### Inclusion Criteria

Articles fulfilling the inclusion criteria had to discuss insomnia influencing psychological stress in health care workers during the COVID-19 pandemic. Articles were in English, published between 2020 until 2022 and respondents within each research project had to be health care workers that were actively working during the COVID-19 pandemic. Furthermore articles needed to use a quantitative research design.

### Exclusion criteria

Articles that were not published in English and research designs that were not original research were excluded. Systematic reviews, review articles and articles that did not provided complete access were also excluded.

### Data extraction and analysis

The selection method of this review adhered to the protocol of Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). After searching each database, relevant articles are put through a selection process. The articles acquired are then organised using the bibliographic software Zotero. The analysis or articles was completed using critical appraisal tools from the JBI Critical Appraisal Checklist for analytical cross sectional studies.

**Figure 1. PRISMA Diagram**
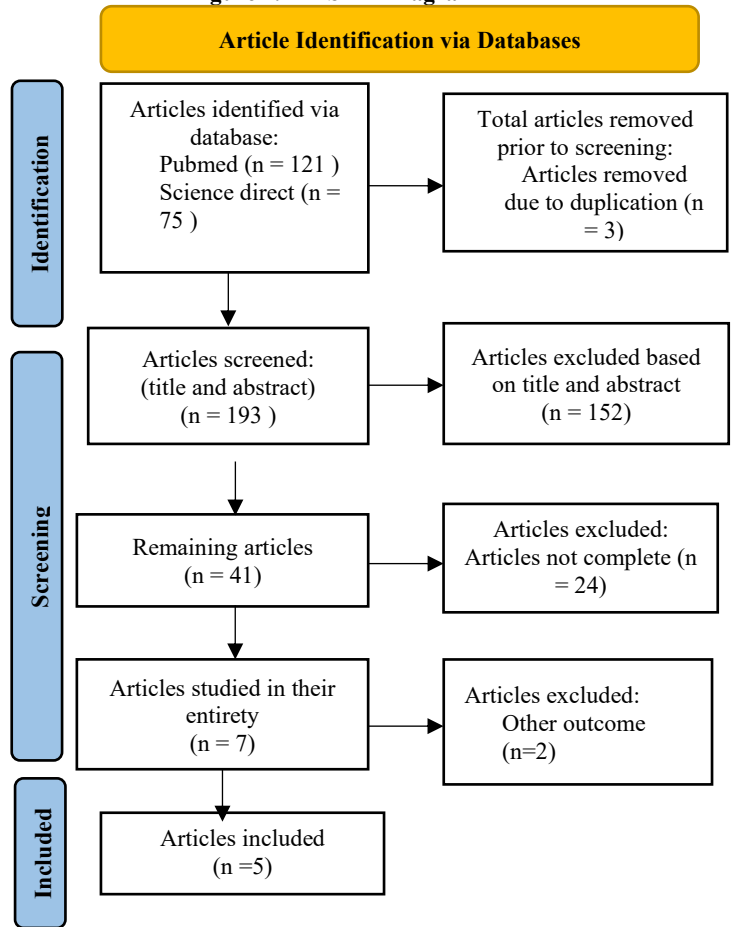


# Results

The initial database search yielded 196 articles. After removing 3 duplicate articles, 188 were excluded for the following reasons: articles that were not relevant based on title and abstract (n=152), articles without full text availability (n=24), systematic reviews and meta-analyses (n=10). Seven articles were studied and five fulfilled the inclusion criteria for review.

**Table 1. Characteristics of Included Studies**

| Author/Year | Location | Research Design / Sample | Research Instrument | Data Analysis | Results |
|---|---|---|---|---|---|
| (Olagunju et al., 2021) | Kebbi state located in North-Western Nigeria | Cross sectional/ 303 health care workers in Kebbi state | - The 12-item general health questionnaire (GHQ-12) was used to assess psychological distress (Goldberg et al., 1997)<br>- The Pittsburgh Sleep Quality Index (PSQI) was administered to participants to characterize their sleep problems (Buysee et al. 1989) | Pearson correlation | Psychological stress is associated with poor quality sleep (p=0.001) |
| (Qi et al., 2020) | China | Cross-sectional study/1396 health care workers in the Hubei province, China | - Pittsburgh Sleep Quality Index (PSQI), Athens Insomnia Scale (AIS) and Visual Analogue Scale (VAS). | ANCOVA | Frontline healthcare workers have the highest prevalence of sleep disorders and issues with sleep quality (p<0.001); frontline health care workers have the highest depression score (p=0.001) |
| (Diaz et al., 2022) | New York city | Cross-sectional / 1247 health care workers, working in a medical centre in New York City | - Patient Health Questionnaire-2 (Kroenke et al., 2003)<br>- Insomnia Severity Index (ISI) (Morin et al., 2011). | Regression model | Insomnia symptoms are related to psychological stress experienced by health care workers in New York city during the COVID-19 pandemic, with a total sleep time of less than 6 hours per night associated with signs/symptoms of depression and anxiety (p<0.001) |
| (Chan et al., 2021) | Oman | Cross-sectional/Cluster A (n = 416) was from HCW in non-frontline roles, and constituted "low-risk and least-impacted". Cluster B (n = 412) and Cluster C (n = 304) were from frontline HCW and constituted 'high-risk and moderate-impacted' and 'high-risk and high-impacted' groups, respectively | - Part 1 comprised demographic data included nationality, gender, age, job position, marital status, years of working in the health-care setting and type of working areas (primary, secondary, tertiary or polyclinic)Part 2 consisted of two sections (mental health measures). Section A is the Depression, Anxiety and Stress Scale (DASS-21), a validated self-report checklist for general populations. | Chi-square test and t-test test/ANOVA | Health care workers in Cluster C reported higher levels of depression (p<0.001), anxiety (p<0.001), stress (p < 0.001) and clinical insomnia (p < 0.001) when compared to Cluster A and B. Cluster C had the highest risk of mental health issues during the pandemic. |

| (Wang et al., 2022) | Guangdong, China | Cross-sectional/1049 health care workers in fever clinic, Emergency department, ICU or Infectious Diseases department at four hospitals in Guangdong province, China | - | Hospital Anxiety and Depression Scale (HADS), Perceived Stress Scale (PSS-14), and Insomnia Severity Index (ISI) | Pearson $X^2$ test. | The level of stress and insomnia is highest amongst health care workers in the high risk group related to COVID-19 exposure, with a 1.60 times risk (95% CI 1.07–2.40, p = 0.023) of being assessed with higher degree of insomnia compared to the low-risk group. The proportion of staff suffering anxiety (55.4% v. 43.0%, p < 0.001) or depression (43.6% v. 36.8%, p = 0.028) was significantly higher in the high-risk group compared with the low-risk group. |

## Discussion

According to (Olagunju et al., 2021) psychological distress and sleep issues are closely related with up to 23.4% of health care workers experiencing psychological distress, 17.4% of which being doctors. It is important to for health care workers to maintain their mental wellbeing so that psychological stress does not influence their mental health during the COVID-19 pandemic.

The socioeconomic characteristics of this population included a male predominance of 60.4% with an average age of 38 years. The majority of the population were aged 41-50 years (41.3%). A total of 70.3% were married and had work experience of 10 years or less and the majority had no comorbid illness (92.1%). The prevalence of psychological distress was 23.4% based on GHQ-12 score, while 60.4% reported sleep issues/disorder based on their PSQI score. Psychological distress and poor sleep were inter-related (r=0.2; p=0.001).

According to (Qi et al., 2020) comparison of 801 frontline medical workers (FMW) and 505 non-frontline medical workers (non-FMW) was completed. It was found that FMW had significantly higher scores on PSQI and AIS with concomitant higher rates of anxiety and depression. FMW were also found to have a higher prevalence of sleep disturbances than non-FMW with PSQI >6 points (78.4% vs 61.0%; relative risk [RR] = 1.29; p < 0.001) and AIS >6 pts (51.7% vs 35.6%; RR = 1.45; p < 0.001). A significant finding in subgroup analysis was that women working as FMW during the COVID-19 pandemic had a higher prevalence of sleep disturbances than men according to PSQI >6 pts (80.6% vs 69.6%; P = 0.002).

According to (Diaz et al., 2022) in a study of 813 health care workers in New York during the COVID-19 pandemic, mean sleep duration was 5.8 ± 1.2h per night. There was a high prevalence of insomnia (72.8%) and acute stress (57.9%). Insomnia symptoms were associated with acute stress (adjusted prevalence ratio [PR]: 1.51, 95% CI: 1.35, 1.69), as well as depressive symptoms (PR: 2.04, 95% CI: 1.78, 2.33 ) and anxiety symptoms (PR: 1.74, 95% CI: 1.55, 1.94). Short sleep (defined as <6 hours sleep per night) was also associated with acute stress(PR: 1.17, 95% CI: 1.07, 1.29), depressive symptoms (PR: 1.36, 95% CI: 1.233, 1.51) and anxiety symptoms (PR: 1.38, 95% CI: 1.26, 1.50). Working during the COVID-19 pandemic was associated with a higher prevalence of disordered sleep and increased risk of acute stress with anxiety/depressive symptoms.

(Chan et al., 202) completed a cluster analysis of health care workers (HCW) in Oman with three groupings: Cluster A (n=416) were HCW in non-frontline roles classified as *'low-risk and least-impacted'*, Cluster B (n=412) and Cluster C (n=304) were frontline HCW classified as *'high-risk and moderate-impacted'* and *'high-risk and high-impacted'* respectively. HCWs in Cluster C reported higher rates of depression (P < 0.001), anxiety (P < 0.001), stress (P < 0.001) and clinical insomnia (P < 0.001) compared to Cluster A or B. Hence high-risk frontline health care workers like those in Cluster C were at the highest risk for mental health problems during the COVID-19 pandemic. Early psychological intervention represents a target for preventing deterioration in health care worker's mental wellbeing.

(Wang et al., 2022) utilised the Hospital Anxiety and Depression Scale (HADS), Perceived Stress Scale (PSS-14) and Insomnia Severity Index (ISI) to survey 1048 health care workers across four hospitals in Guangdong, China. Staff were divided into high-risk and low-risk groups. The proportion of staff suffering anxiety (55.4% v. 43.0%, p < 0.001) or depression (43.6% v. 36.8%, p = 0.028) was higher in the high-risk group compared to the low-risk group. The high-risk group had greater levels of clinical insomnia(13.5% v. 8.5%, p = 0.011) and stress symptoms at the upper quartile (24.7% v. 19.3%, p = 0.037) than the low risk group. Doctors were more likely to report moderate to severe depressive symptoms, while longer work experience was negatively correlated with insomnia symptoms.

## Conclusion

In conclusion based on 5 articles are sleep problems appear to have been common during the COVID-19 pandemic. One in every three individuals reported the sleep problems. Nearly half of the healthcare professionals (43%) encountered sleep problems during the pandemic period. Healthcare providers may want to design appropriate programs to help individuals overcome their sleep problems. Moreover, sleep problems were found to be associated with

higher levels of psychological distress (including depression and anxiety).

The effects of the COVID-19 pandemic include a significant influence on psychological distress experienced by health care workers. One manifestation of this stress is in the form of disordered sleep and insomnia. Other related mental health complaints include high reported rates of symptoms of depression and anxiety. This highlights the importance of mental wellbeing for health care workers during the COVID-19 pandemic. Preventative action targeting the contributing risk factors can reduce the negative impact caused by psychological distress in health care workers during this time.

# Acknowledgement

# References

1. Pappa S, Sakkas N, Sakka E. A year in review: sleep dysfunction and psychological distress in healthcare workers during the COVID-19 pandemic. Sleep Med [Internet]. 2021 Jul 14 [cited 2022 Apr 13]; Available from: https://www.sciencedirect.com/science/article/pii/S1389945721003919

2. Olagunju AT, Bioku AA, Olagunju TO, Sarimiye FO, Onwuameze OE, Halbreich U. Psychological distress and sleep problems in healthcare workers in a developing context during COVID-19 pandemic: Implications for workplace wellbeing. Prog Neuropsychopharmacol Biol Psychiatry. 2021 Aug 30;110:110292.

3. Zhao Y, Guo J, Liu S, Aizezi M, Zeng Q, Sidike A, et al. Prevalence and Related Factors of Depression, Anxiety, Acute Stress, and Insomnia Symptoms Among Medical Staffs Experiencing the Second Wave of COVID-19 Pandemic in Xinjiang, China. Front Public Health. 2021;9:671400.

4. Qi J, Xu J, Li BZ, Huang JS, Yang Y, Zhang ZT, et al. The evaluation of sleep disturbances for Chinese frontline medical workers under the outbreak of COVID-19. Sleep Med. 2020 Aug;72:1–4.

5. Diaz F, Cornelius T, Bramley S, Venner H, Shaw K, Dong M, et al. The association between sleep and psychological distress among New York City healthcare workers during the COVID-19 pandemic. J Affect Disord. 2022 Feb;298:618–24.

6. Wang H, Huang D, Huang H, Zhang J, Guo L, Liu Y, et al. The psychological impact of COVID-19 pandemic on medical staff in Guangdong, China: a cross-sectional study. Psychol Med. 2022 Apr;52(5):884–92.

7. Carpi M, Cianfarani C, Vestri A. Sleep Quality and Its Associations with Physical and Mental Health-Related Quality of Life among University Students: A Cross-Sectional Study. Int J Environ Res Public Health. 2022 Mar 1;19(5):2874.

8. Alimoradi Z, Broström A, Tsang HWH, Griffiths MD, Haghayegh S, Ohayon MM, et al. Sleep problems during COVID-19 pandemic and its' association to psychological distress: A systematic review and meta-analysis. EClinicalMedicine. 2021 Jun 1;36:100916.

9. Bhat S, Chokroverty S. Sleep disorders and COVID-19. Sleep Med [Internet]. 2021 Jul 18 [cited 2022 Apr 12]; Available from: https://www.sciencedirect.com/science/article/pii/S1389945721004032

10. Salehinejad MA, Azarkolah A, Ghanavati E, Nitsche MA. Circadian disturbances, sleep difficulties and the COVID-19 pandemic. Sleep Med [Internet]. 2021 Jul 14 [cited 2022 Apr 12]; Available from: https://www.sciencedirect.com/science/article/pii/S1389945721003932

11. Zhou SJ, Wang LL, Yang R, Yang XJ, Zhang LG, Guo ZC, et al. Sleep problems among Chinese adolescents and young adults during the coronavirus-2019 pandemic. Sleep Med. 2020 Oct 1;74:39–47.

12. Grossman ES, Hoffman YSG, Palgi Y, Shrira A. COVID-19 related loneliness and sleep problems in older adults: Worries and resilience as potential moderators. Personal Individ Differ. 2021 Jan 1;168:110371.

13. Di Filippo P, Attanasi M, Dodi G, Porreca A, Raso M, Di Pillo S, et al. Evaluation of sleep quality and anxiety in Italian pediatric healthcare workers during the first wave of COVID-19 pandemic. BMC Res Notes. 2021 Jun 2;14(1):219.

14. He J, Yang L, Pang J, Dai L, Zhu J, Deng Y, et al. Efficacy of simplified-cognitive behavioral therapy for insomnia(S-CBTI) among female COVID-19 patients with insomnia symptom in Wuhan mobile cabin hospital. Sleep Breath Schlaf Atm. 2021 Dec;25(4):2213–9.

15. Hyun S, Hahm HC, Wong GTF, Zhang E, Liu CH. Psychological correlates of poor sleep quality among U.S. young adults during the COVID-19 pandemic. Sleep Med. 2021 Feb 1;78:51–6.

16. Chan MF, Al-Shekaili M, Al-Adawi S, Hassan W, Al-Said N, Al-Sulaimani F, et al. Mental health outcomes among health-care workers in Oman during COVID-19: A cluster analysis. Int J Nurs Pract. 2021 Dec;27(6):e12998.