Sleep Quality, Insomnia, and Perceived Stress among Colombian Healthcare Workers during the COVID-19 Pandemic

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Abstract

Objective   The COVID-19 pandemic has imposed a great burden on healthcare workers worldwide. The aim of the present study was to assess sleep quality, insomnia, and perceived stress in healthcare workers of a high complexity hospital located in Bogota, Colombia.

Methods   Cross-sectional study in which 1,155 healthcare workers at the Hospital Universitario San Ignacio in Bogotá, Colombia were included, between September and October 2020. Using an online-based survey, self-reported variables were assessed including demographics, Pittsburgh Sleep Quality Index (PSQI), Insomnia Severity Index (ISI), and 10 item Perceived Stress Scale (PSS-10). Associations between these variables were evaluated.

Results   Fifty percent of the respondents were between 31 and 45 years old, and 76 percent were women. Most of the surveyed were the nursing staff. Poor sleep quality, insomnia, and high perceived stress was found in 74.9, 12.4, and 13.2%, respectively. Poor sleep quality was predominantly found in females, in the 31 to 45 years old group and in married personnel. Also, poor sleep quality was found in relation to a moderate to high perceived risk of COVID-19 infection by the family of the workers surveyed.

Discussion   Poor sleep quality, moderate rates of insomnia, and perceived stress were found among healthcare workers committed to COVID-19 infected patients in Colombia. The identification of workers at greater risk and the implementation of targeted interventions are called upon as the results.

Keywords
► healthcare workers
► sleep quality
► insomnia
► stress
► COVID-19
► Latin America

Introduction

The COVID-19 pandemic has had an immense effect on the mental health and sleep patterns of healthcare workers (HCWs) worldwide. Many studies have demonstrated the effect that a pandemic can have on the anxiety, depression, and stress levels of HCWs.[1,2] A study performed after the 2003 SARS outbreak in China found that 10% of the HCWs surveyed had a high intensity of post-traumatic stress symptoms related to their work in patient care and that the presence of those symptoms was directly proportional to their exposure to the pandemic.[1,2]

It has been recognized that HCWs tend to have poor sleep quantity and quality related to long work schedules and shiftwork.[3,4] This conveys a higher risk of work-related accidents and compromises their general and mental health.[5] From the Hubei province in China to Europe, studies have been performed to assess the mental and sleep-related effects the burden of the pandemic has imposed on HCWs and the function that social support and self-efficacy might have in sleep quality, depression, and anxiety symptoms during these demanding times worldwide.[6–10]

One of the studies was performed in the Hubei province, China during the first wave of the pandemic; in this survey, 34% of the participants (702 doctors and 1,128 nurses) had high rates of insomnia measured with the Insomnia Severity Index (ISI). Half of the participants had depressive symptoms (PHQ9) and 70% reported high-stress levels. The severity related factors were being female, nurses, and frontline COVID-19 HCWs.[11]

It is important to study the impact the COVID-19 pandemic has on healthcare providers. Acknowledging these phenomena could identify intervention scenarios that reduce the emotional burden and promote better patient care. To date, studies in Latin America have focused mainly on the impact on clinical practice by physicians, illustrating issues such as the reduction in the number of procedures, face-to-face visits, and salaries; the implementation of telehealth; or the impact on clinical trials.[12–15] Nonetheless, the effect of the pandemic on the sleep or mental health of healthcare workers in this region remains to be elucidated.

We aimed to describe the sleep quality, the frequency of insomnia symptoms, and the perceived stress during the first wave of the COVID-19 pandemic in healthcare workers in a high complexity hospital located in Bogotá, Colombia.

Material and Methods

Design and Participants

We conducted a descriptive, observational, cross-sectional study between September 4th and October 20th, 2020, during the first wave of the COVID-19 pandemic in healthcare workers, including medical staff and residents, nurses, radiology technicians, professionals in respiratory, physical, and speech therapy, bacteriologists, and patient transport personnel within a high complexity hospital located in Bogotá, Colombia. No sample size was calculated, as the study was developed as a census.

Applied Instruments

Initially, we asked participants their age, sex, marital status, school level, profession, medical specialty (for residents and specialists), work area, years of professional experience, and whether they participated in clinical activities regarding the diagnosis, treatment, or care of patients with suspicion or diagnosis of COVID-19. This last question was made to determine whether the HCWs were at the front line of the pandemic. This approach is like the one used by Zhang et al.[11] In addition, based on previous reports,[15,16] we included a Likert-scale question on the perceived risk of the respondents and their family members of becoming infected with SARS-CoV-2; we stratified the answers into low, moderate, and high.

Sleep quality was determined using the Colombian-validated version of the Pittsburgh Sleep Quality Index (PSQI)[17] which indicated the participants with good or poor sleep quality. Participants with a PSQI score > 5 points were included in the poor sleep quality group. Participants with a PSQI score < 5 points were included in the good sleep quality group.

Insomnia was assessed using the Spanish-validated version of the Insomnia Severity Index (ISI).[18] The ISI is composed of seven items that evaluate the difficulties for falling or maintaining sleep, early awakenings, degree of satisfaction with current sleep, and the interferences of poor sleep with normal daytime functioning. For the interpretation of the ISI, we used a score > 14 to determine the presence of insomnia, which is consistent with other studies developed during the COVID-19 pandemic.[11,19] Additionally, the ISI has been deemed as sensitive to change after cognitive-behavioral or pharmacological therapies have been instated.[18]

Regarding perceived stress, the 10-item Perceived Stress Scale (PSS-10) Colombian validated version[20] was used to evaluate the general psychological response to stressors.[21] It evaluates two dimensions: general stress and coping capacities. We considered > 24 points as high perceived stress. This cutoff point has been used previously in studies performed in Colombia, and it has demonstrated an adequate psychometric performance to evaluate stress during the COVID-19 pandemic.[22]

The described tools were condensed in a questionnaire using RedCap version 10.7.1, Vanderbilt University, Nashville, United States of America, and a survey link was obtained and disseminated with the support of the Hospitaĺs Human Resources office. Additionally, the link was sent via WhatsApp groups of which potential participants could be part. The survey's answers were anonymous.

Data Analysis

The software yielded spreadsheets, which were analyzed using R studio, Posit, Massachusetts, United States of America. Absolute and relative frequencies were calculated for qualitative variables and central tendency and dispersion measures were determined for quantitative variables.

Ethical Considerations

The study protocol was reviewed and approved by the Research and Ethics Committee of the Hospital and University (FM-CIE-0663–20). The study was classified as minimal

risk research and was conducted in agreement with the Helsinki Declaration and Resolution 008430 of 1993 issued by the Colombian Ministry of Health, thus a waiver for informed consent was obtained.

Results

From the 3,283 workers affiliated with the Hospital, we obtained data from 1,155 healthcare personnel (35.18% participation) between September 4th through October 20th, 2020. ►**Table 1** shows the demographic characteristics of the surveyed population and ►**Table 2** the participation rates by profession. Remarkably, around half of the medical and nursing staff participated in the study. Fifty percent of the respondents were between the 31 and 45 years old, and 76 percent were women. Of the HCWs surveyed, 44% were nursing staff and 30% were medical personnel. Also, 66.4% of the participants were directly committed to COVID-19 patients, hence considered frontline COVID-19 HCWs.

►**Table 3** shows the descriptive analysis performed for each of the described conditions, only full responses of each questionnaire were described. Poor sleep quality, insomnia, and high perceived stress were found in 74.9, 12.4, and 13.2% of the HCWs surveyed, respectively. Categories were grouped to facilitate analysis and visualization. Additional information regarding the sociodemographic characteristics and descriptive analysis of the 319 (27.9%) medical specialists and residents can be found in the ►**Supplementary Tables 1** and **2.**

Regarding sleep quality, a higher frequency of poor sleep was observed in females and young (< 30 years old) workers; also, the HCWs who were single, widowed, or divorced at the time of the study had poorer sleep quality in comparison with married HCWs. The prevalence of insomnia evaluated using the ISI with a 14-point cutoff was 12.41%, the frequency of insomnia was relatively similar in all participant groups except for the workers who referred a personal or family high-risk perception of COVID-19 contagion.

Concerning perceived stress, the cumulative prevalence was 13.2%. Females were more stressed than men, and younger workers (< 30 years old) were less stressed than their elder colleagues. No major differences were found in perceived stress levels between those who cared for SARS-CoV-2 infected patients and those who did not, as found with insomnia, those who referred a personal or family high-risk perception of COVID-19 contagion had high perceived stress.

Discussion

Elevated levels of stress, depression, and anxiety have been described in healthcare workers in association with the COVID-19 pandemic.[11,23–26] The experience with previous pandemics has shown high rates of posttraumatic stress in relation to patient care. We performed a descriptive, cross-sectional study in 1,155 workers in a high complexity hospital in Latin America during the first wave of SARS-CoV-2 contagion when the Colombian healthcare system was on the brink of collapse. To the best of our knowledge, this is the first study published evaluating these three outcomes in

Table 1 Demographic characteristics. HCW: Healthcare workers.

Demographics	n (%)
Gender	
Male	269 (23.3)
Female	883 (76.5)
Prefer not to answer	3 (0.3)
Age group (years old)	
< 30	379 (32.8)
31–45	585 (50.6)
> 45	191 (16.5)
Marital status	
Single	512 (44.3)
Married/Consensual union	577 (50.0)
Widowed/Divorced	66 (5.7)
Education	
Bachelor / Technician / Technologist	426 (36.9)
Undergraduate	255 (22.1)
Postgraduate	345 (29.9)
Master's degree or PhD	129 (11.2)
Profession	
Medical specialist	217 (18.8)
Resident	102 (8.8)
General practitioner	28 (2.4)
Nurse	211 (18.3)
Nursing assistant	308 (26.7)
Radiology technician	10 (0.9)
Physical therapist	16 (1.4)
Respiratory therapist	22 (1.9)
Speech therapist	4 (0.3)
Bacteriologist	42 (3.6)
Stretcher-bearer	5 (0.4)
Laboratory assistant	23 (2.0)
Others	167 (14.5)
Predominant work area	
Intensive care unit	106 (9.2)
COVID emergency room	138 (11.9)
Non-COVID emergency room	53 (4.6)
COVID inpatient	105 (9.1)
Non-COVID inpatient	120 (10.4)
Telehealth	40 (3.5)
Radiology	32 (2.8)
Surgical theater	131 (11.3)
Others	430 (37.2)
Years in current profession	
Mean (SD)	11.2 (10.6)
Care of COVID-19 patients	
Yes	769 (66.6)
No	386 (33.4)

Abbreviation: SD, standard deviation.

Table 2 Participation rates by profession.

Profession	Total HCWs (n)	HCWs surveyed (n)	Participation rate (%)
Medical specialist	426	217	50.9
Resident	430	102	23.7
General practitioner	54	28	51.9
Nurse	385	211	54.8
Nursing assistant	778	308	39.6
Radiology technician	33	10	30.3
Physical therapist	58	16	27.6
Respiratory therapist	22	22	100
Speech therapist	5	4	80.0
Bacteriologist	46	42	91.3
Stretcher-bearer	36	5	13.88
Laboratory assistant	43	23	53.5
Others	973	167	17.3

Abbreviation: HCW, healthcare worker.

a Latin American HCWs population during the current pandemic. It is also one of the few studies that include health professionals other than medical and nursing staff by including therapists and technicians.

The finding that 74.9% of the surveyed healthcare workers had poor sleep quality is alarming. This is like the findings during SARS in 2003.[2,27] As found by other studies, women had worse sleep quality than men.[11,19] No statistically significant differences were found between the HCW that were directly involved in the care of COVID-19 patients (frontline healthcare workers) and those who did not, which is consistent with studies such as the one performed by Jahrami in Bahrain.[23]

Our study found a 12.4% frequency of insomnia. This percentage is lower than the one found by Zhang et al[11] in Wuhan, China (36.1%) and is also lower than the ones found during the SARS outbreak in 2003 in Hong Kong and Taiwan.[27,28] These variations in frequency could be due to the variability of the definition of insomnia between studies. While others have contemplated a score > 8 in the ISI as positive for insomnia, our study considered a score > 14; this cutoff point has been found to have greater clinical

Table 3 Descriptive analysis.

	Sleep quality		Insomnia		Perceived stress	
	Good [0–4] (n = 289)	Poor[5–20] (n = 863)	No [≤ 15] (n = 981)	Yes [> 15] (n = 143)	No [≤ 25] (n = 913)	Yes [> 25] (n = 152)
Gender						
Male	91 (33.8%)	178 (66.2%)	235 (88.0%)	32 (12.0%)	235 (90.4%)	25 (9.6%)
Female	198 (22.4%)	685 (77.6%)	746 (87.0%)	111 (13.0%)	678 (84.2%)	127 (15.8%)
Age (years old)						
< 30	73 (19.4%)	304 (80.6%)	311 (85.2%)	54 (14.8%)	303 (89.1%)	37 (10.9%)
31–45	157 (26.9%)	427 (73.1%)	503 (88.1%)	68 (11.9%)	462 (84.2%)	87 (15.8%)
> 45	59 (30.9%)	132 (69.1%)	167 (88.8%)	21 (11.2%)	148 (84.1%)	28 (15.9%)
Marital status						
Single	106 (20.8%)	404 (79.2%)	425 (85.9%)	70 (14.1%)	408 (88.1%)	55 (11.9%)
Married/ consensual union	170 (29.5%)	406 (70.5%)	497 (88.1%)	67 (11.9%)	451 (83.4%)	90 (16.6%)
Widowed/divorced	13 (19.7%)	53 (80.3%)	59 (90.8%)	6 (9.2%)	54 (88.5%)	7 (11.5%)
Care of COVID-19 patients						
Yes	192 (25.1%)	574 (74.9%)	652 (87.0%)	97 (13.0%)	610 (85.7%)	102 (14.3%)
No	97 (25.1%)	289 (74.9%)	329 (87.7%)	46 (12.3%)	303 (85.8%)	50 (14.2%)
Education						
Bachelor / Technician / Technologist	99 (23.3%)	326 (76.7%)	358 (86.7%)	55 (13.3%)	334 (86.8%)	51 (13.2%)
Undergraduate	50 (19.7%)	204 (80.3%)	207 (83.1%)	42 (16.9%)	205 (87.2%)	30 (12.8%)
Postgraduate	92 (26.7%)	252 (73.3%)	296 (88.6%)	38 (11.4%)	270 (84.4%)	50 (15.6%)
Master's degree or PhD	48 (37.2%)	81 (62.8%)	120 (93.8%)	8 (6.2%)	104 (83.2%)	21 (16.8%)
Profession						
Medical staff	115 (33.3%)	230 (66.7%)	302 (88.6%)	39 (11.4%)	280 (85.4%)	48 (14.6%)

(Continued)

Table 3 (*Continued*).

	Sleep quality		Insomnia		Perceived stress	
	Good [0–4] (n = 289)	Poor[5–20] (n = 863)	No [≤ 15] (n = 981)	Yes [> 15] (n = 143)	No [≤ 25] (n = 913)	Yes [> 25] (n = 152)
Nursing staff	117 (22.6%)	401 (77.4%)	437 (87.1%)	65 (12.9%)	417 (87.8%)	58 (12.2%)
Others	36 (19.8%)	146 (80.2%)	154 (86.5%)	24 (13.5%)	135 (81.8%)	30 (18.2%)
Therapists	9 (21.4%)	33 (78.6%)	35 (87.5%)	5 (12.5%)	31 (83.8%)	6 (16.2%)
Laboratory	12 (18.5%)	53 (81.5%)	53 (84.1%)	10 (15.9%)	50 (83.3%)	10 (16.7%)
Predominant work area						
COVID-19 area	77 (22.2%)	270 (77.8%)	287 (84.9%)	51 (15.1%)	273 (85.6%)	46 (14.4%)
Non-COVID-19 area	106 (31.6%)	229 (68.4%)	295 (89.4%)	35 (10.6%)	275 (87.0%)	41 (13.0%)
Other	106 (22.6%)	364 (77.4%)	399 (87.5%)	57 (12.5%)	365 (84.9%)	65 (15.1%)
Years in current profession						
Mean (SD)	12.2 (12.5)	10.9 (9.9)	11.3 (10.3)	10.9 (13.3)	11.1 (11.0)	11.7 (9.2)
Perceived personal risk of COVID-19 contagion						
Low	60 (33.7%)	118 (66.3%)	158 (91.3%)	15 (8.7%)	136 (82.4%)	29 (17.6%)
Moderate	129 (26.8%)	353 (73.2%)	426 (91.0%)	42 (9.0%)	395 (87.8%)	55 (12.2%)
High	100 (20.3%)	392 (79.7%)	397 (82.2%)	86 (17.8%)	382 (84.9%)	68 (15.1%)
Perceived family risk of COVID-19 contagion						
Low	102 (33.4%)	203 (66.6%)	278 (92.7%)	22 (7.3%)	253 (88.2%)	34 (11.8%)
Moderate	124 (25.2%)	369 (74.8%)	431 (90.2%)	47 (9.8%)	402 (87.8%)	56 (12.2%)
High	63 (17.8%)	291 (82.2%)	272 (78.6%)	74 (21.4%)	258 (80.6%)	62 (19.4%)

Abbreviation: SD, standard deviation.

significance.[18,19] The frequency of insomnia was found to be similar among the sociodemographic variables analyzed, suggesting that, regardless of the characteristics or profile of the HCW, insomnia was present in a similar degree. Interestingly, based on the reported self-perceived risk of personal or the respondent's family members becoming infected with SARS-CoV-2, those with a low self-perceived risk had a lower prevalence of insomnia.

Regarding perceived stress, resembling what occurred with insomnia, there was a similar frequency regardless of the contrasted sociodemographic characteristics. There were only differences between males and females, the latter being the ones with the highest frequency of perceived stress.

As in other mental health and sleep quality-related studies,[29–33] females were at a higher risk of being poor sleepers. Also, family ties (that is, being married or in a consensual union) implied an association with poor sleep quality. This concurs with the finding that poor sleep quality was highly present in the moderate to high perceived risk of COVID-19 contagion by the family members of the workers surveyed.

Despite the alarming results, our study has some limitations. First, being a cross-sectional study, the baseline status of the main three phenomena analyzed (sleep quality, insomnia, and perceived stress) is unknown, as well as the progression with the epidemiological evolution of infections in the country. Studies performed after the 2003 SARS outbreak showed a progressive clearing of insomnia symptoms in the two weeks after the end of the crisis. Neverthe-

less, the situation with COVID-19 has been different, as subsequent contagion peaks have appeared over a prolonged period. Two brief follow-up longitudinal studies have been performed evaluating the evolution of these symptoms over time in relation to the COVID-19 pandemic, suggesting the need for long-term psychological and sleep-related support for HCWs.[34,35] Second, we did not inquire about shift work nor quantified changes in the workload of the workers, which could be related to higher frequencies of poor sleep quality, insomnia, and perceived stress.[36–38]

Conclusion

Our findings call for the development of precise strategies prioritizing those at greater risk of having poor sleep quality, such as females and married workers. Additionally, they convey the importance of generating cross-sectional strategies for the management of insomnia and stress in healthcare workers, regardless of their sociodemographic profile. Longitudinal studies should be performed in the future to assess the evolution of these three conditions over time.

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