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Effect of the COVID-19 pandemic on the mental health, daily and occupational activities among health professionals in Colombia: a national study

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Abstract

Background: The COVID-19 pandemic has placed an unprecedented physical and mental burden on healthcare workers who are frequently at high risk of infection, particularly in low-income countries. This study aimed to assess the prevalence and associated factors of anxiety, depression, and stress, as well as changes in daily and occupational activities among healthcare professionals due to the COVID-19 pandemic in Colombia.

Methods: An observational, cross-sectional study was conducted between February and June 2021. The survey incorporated validated mental health tools such as the Generalized Anxiety Disorder-7, the Patient Health Questionnaire-9, and the Perceived Stress Scale-10. Multivariable ordinal logistic regression analysis was performed to determine the factors associated with severe mental health outcomes.

Results: Among 1345 healthcare workers the prevalence of anxiety, depression, and stress were 75.61, 59.18, and 53.09%, respectively. Anxiety (OR:1.44; 95%CI:1.16–1.8), depression (OR:1.74; 95%CI:1.27–2.37), and stress (OR:1.51; 95%CI:1.18–1.94) were more frequent in women, and individuals who expressed fear of a negative outcome (death, sequelae) (OR:2.25; 95%CI:1.60–3.25), (OR:1.49; 95%CI:1.03–2.16) and (OR:2.36; 95%CI:1.69–3.29) respectively. Age was negatively associated with anxiety (OR:0.98; 95%CI:0.98–0.99), stress (OR:0.98; 95%CI:0.97–0.99), and depression (OR:0.97; 95% CI:0.96–0.98). Reduction in consultations and surgeries (OR:1.01; 95%CI:1.0–1.01) was positively associated with anxiety. Due to the pandemic, most specialists expected to incorporate drastic long-term (> 1 year) changes in their clinical setting and daily activities.

Conclusions: The prevalence of anxiety, depression, and stress is higher among Colombian healthcare workers compared to previous reports. Further research regarding these psychological outcomes is needed to achieve early mental health intervention strategies.

Trial registration: Hospital Universitario Fundación Santa Fe, Ethical Committee Registration ID: CCEI-12992-2021.

Keywords: Prevalence, Health professionals, COVID-19, Mental health, Pandemic, Associated factors

Background

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) as the causative agent of COVID-19 has rapidly spread worldwide, drastically disrupting healthcare systems and placing an unprecedented burden on healthcare

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professionals. By December 2021, the World Health Organization (WHO) has reported over 240 million confirmed cases and nearly 5 million deaths throughout the different waves of the disease, multiple mutations of the virus, and significant differences in clinical patterns and outcomes [1, 2]. In Colombia, up to 6 million cases of COVID-19 and over 133 thousand deaths have been registered, ranking the country as the 11th hardest hit in terms of mortality rate. Although control measures to contain the spread of the disease have been applied and over 6 billion vaccines have now been administered globally, new strains are emerging. During previous severe acute respiratory syndrome outbreaks, disproportionate infection rates among healthcare workers resulting in long-term adverse psychological and occupational outcomes had been reported [3, 4].

Since the spread of COVID-19, Vizheh et al. stated that healthcare specialists reported higher occupational stress levels and higher rates of psychological symptoms [5]. These outcomes could be related to excessive workload, inadequate support, a critical shortage of personal protective equipment, hospital beds, and ventilators [3, 6]. On a more personal level, the restrictions implemented to contain and reduce the risk of infection impacted the regular daily and leisure activities which may also lead to an increased risk of anxiety, depression, burnout syndrome and stigma in healthcare workers [7]. Several studies conducted during the COVID-19 pandemic have reported a decline in mental wellbeing among health care professionals [3, 5, 6]. From June to September 2020, Mental Health America (MHA) applied a survey to describe their experience and reported that 93% of health care workers were experiencing stress, 86% reported anxiety, and 76% reported exhaustion and burnout [8]. Being worried about exposing their child was reported by 76% of participants, and nearly half of them expressed fear of infecting a partner or older adult family member, while 39% of reported inadequate emotional support [8]. In 2021 a systematic review reported the results of 24 studies predominantly from urban China indicating that COVID-19 had a considerable impact on the psychological wellbeing of front-line hospital staff and suggested that nurses may be at higher risk of adverse mental health outcomes [9]. Likewise, in a meta-analysis performed in 2021 with 38 studies, Saragih et al. reported that anxiety, depression, and distress presented a significant rise in healthcare workers during the 2020 COVID-19 pandemic with a pooled prevalence of 40% (95% CI: 29–52%), 37% (95% CI: 29–45%), and 37% (95% CI: 25–50%), respectively [10].

These studies highlight the importance of mental wellness in physicians during times of crisis, yet further studies are needed to capture a broader picture of the

situation to efficiently manage future sanitary emergencies and thus prevent long-term impact on front-line staff. To date, very few studies have been published in English regarding these psychological outcomes in Latin America. Regarding the Colombian population, one study reported the effects of the pandemic on the mental health, daily and occupational activities of otolaryngologists, and allergists [11]. A cross-sectional study reported figures that range of 50% for any type of altered mental state [12] and approximately 72% of anxiety symptoms in Colombian physicians [13]. Despite some international studies have performed these analyses using internationally validated questionnaires [14], few studies have applied these tools in Latin American countries. This study aimed to describe the prevalence and associated factors of depression, anxiety, stress, and the changes in daily and occupational activities among Colombian healthcare professionals during the second wave of the COVID-19 pandemic.

Methods

Study design

An observational, cross-sectional study was conducted to determine the prevalence and associated factors of anxiety, depression, and stress levels in a group of healthcare professionals during the second wave of the COVID-19 pandemic in Colombia. The study was based on a non-probabilistic, consecutive sampling, using self-administered, anonymous online surveys to collect sociodemographic and mental health data from February 05, 2021, to June 30, 2021. Internationally validated questionnaires such as the Generalized Anxiety Disorder-7 (GAD7), the Patient Health Questionnaire-9 (PHQ9), and the Perceived Stress Scale-10 (PSS10) were used to determine the frequency of anxiety, depression, and stress, respectively. A sociodemographic questionnaire was also applied and assessed information about age, marital status, family income, working status, workload, work income before and after the pandemic, personal protective equipment, and geographic location. Data collection was performed online, and participants were invited to fill out the survey at any time. Ethics Committee of the Hospital Universitario Fundación Santa Fe de Bogotá approved this study (CCEI-12992-2021) according to the Helsinki Declaration, and all methods were performed in accordance with the relevant guidelines and ethic regulations. Moreover, this study was approved and involved the participation of the National Academy of Medicine from Colombia in the dissemination plans of this research. Informed Consent was obtained from all participants. No incentives were offered for study participation.

Study population

In terms of the eligibility criteria, healthcare workers registered in the National Unified Registry of Human Resources in Health from Colombia and conducted in-person consultations and/or telemedicine were included. Exclusion criteria were specialists who reported a prior diagnosis of mental health disorders confirmed by a psychiatrist or mental health professional, and those who reported any acute/chronic condition that could limit their ability to answer the questionnaires. The sample size was estimated based on a meta-analysis by Pappa et al. that assessed the prevalence of mental health disorders among 33,062 healthcare workers due to the COVID-19 pandemic [15]. A minimum sample size of 250 participants was calculated considering a pooled prevalence of depression of 22.8%, bearing in mind the following formula [16]:

$$n \geq \frac{Z_{1-\frac{\alpha}{2}}^2 * p * (1 - p)}{d^2}$$

A 5% significance and precision level were applied, as well as a 5% adjustment for probable losses. Regarding the sample selection method, a non-probabilistic, consecutive sampling was conducted. Despite the participants registered to do the survey, only the population who completed all the questionnaires was included in the analysis.

Mental health questionnaires

Symptoms of anxiety, depression, and stress were assessed using validated Spanish versions of the following measurement tools: GAD-7 [17], PHQ-9 [18], and PSS-10 [19]. The GAD-7 scale was used to assess symptoms of anxiety over the past 2 weeks, ranging from 0 to 21 points as follows: normal (0–4), mild (5–9), moderate (10–14), and severe (15–21) anxiety (23). The cutoff point for identifying General Anxiety Disorder was a score of 10 in the GAD-7 questionnaire [17]. The PHQ-9 assesses depression symptoms and includes 9 criteria of the Diagnostic and Statistical Manual of Mental Disorders [18]. Each item is scored from 0 (not at all) to 3 (nearly every day) according to the level of discomfort of the patient [18]. The PHQ-9 ranges between 0 to 27 and can be classified as follows: none (0–4), mild (5–9), moderate (10–14), moderately severe (15–19), severe (20–27). A total score of ≥ 10 in the PHQ-9 has a sensitivity and a specificity of 88% for major depression [18]. The PSS-10 questionnaire contains 10 items that measure the perception of stressful experiences over the past month. Responses range from 0 (never) to 4 (very often), and the total score can be classified as follows: low stress (0–13), moderate

stress (14–26), and high perceived stress (27–40) [20]. For this study, the severity of the symptoms of anxiety, depression, and stress was classified considering the cut-off values of the GAD-7, PHQ-9, and PSS-10 scales.

Variables related to COVID-19 and daily activities questionnaires

A “Fear score of COVID-19” developed by the researchers of this study was applied using a scale of 1 to 5 to assess fear of contagion, fear of the possibility of a negative outcome (death, negative sequelae), and fear of infecting a family member and/or friends. Moreover, a questionnaire regarding the opinion on when (less than 3 months, in 3 to 12 months, more than 1 year, never again) healthcare workers would expect to engage again in regular daily and leisure activities was applied. This questionnaire was developed by “The New York Times” and previously applied to 511 epidemiologists [21]. We highlight that their answers only reflect their opinion and individual life circumstances and should not be used as guidelines for the public.

Statistical analysis

Frequencies and percentages were calculated for the quantitative variables. Central tendency, and dispersion measures for the quantitative variables were estimated. The prevalence of symptoms of anxiety, depression, and stress was calculated along with its 95% confidence interval. Bivariate and multivariate analyses were carried out to explore the associations between the levels of anxiety, depression and stress and the sociodemographic and occupational covariates due to the COVID-19 pandemic. These analyses were based on an ordinal logistic regression analysis. The predictors of the model were selected considering the biological plausibility reported by prior studies as primary criteria, and the possible statistical association within the variables. Variables with clinical relevance first, or those with a Fisher or Kruskal Wallis test with a p -value ≤ 0.2 were included in the multivariate analysis. The full, crude, and adjusted models are reported to compare the strength of the associations with depression and to assess the presence of confounding variables in the analysis. Percentage decrease in monthly income was calculated comparing income before the pandemic and during the fieldwork (October–November 2020). Finally, the goodness of fit of the model was assessed and assumptions were verified through a linearity test, proportional odds, and through the estimation of deviance residuals and leverage values. Statistical significance for the multivariate models was established at $p < 0.05$. Statistical analysis was performed using Stata 16MP software. A 5% significance level for the comparisons was established before data collection.

Results

A total of 1345 individuals were included in this study, of which 39.26% were over the age of 50, 66.17% ($n=840$) were women, and 46.10% ($n=620$) were specialist doctors. The baseline demographic characteristics of the study population are described in Table 1. Most of the sample was based in urban Colombia, i.e., Bogotá ($n=663$), Antioquia ($n=118$), 66% of the participants were women, and nearly 40% were over the age of 50. Near half of the study population (49.44%) performed face-to-face consultation, while 25.58% worked as telemedicine practitioners. Overall, 19.03% ($n=256$) of the study population considered that the personal protection elements provided by their employer were not enough to prevent COVID-19 infection. The most frequently used biosafety elements in their practice were surgical masks with 32.94% ($n=443$), and N95 respirators with 27.43% ($n=369$).

Prevalence of psychological disorders

Table 2 shows the prevalence of depression, anxiety, stress, and burnout in the study population. The frequency of symptoms was established as follows: anxiety (75.61%), depression (59.18%), and stress (53.09%). Overall, the prevalence of anxiety was higher than the frequency of depression or stress. A total of 587 (43.64%) healthcare professionals presented these 3 psychological disorders simultaneously. When considering burnout, the frequency of high-level emotional exhaustion, depersonalization, and low-level personal accomplishment were 34.28, 16.13, and 23.49% respectively.

Factors associated with severity of anxiety, depression, and stress

Bivariate and multivariate analysis via ordinal logistic regression of the demographic and clinical variables associated to anxiety, depression, and stress levels are shown in Table 3. Anxiety (OR: 1.44; 95% CI: 1.16–1.8.), depression (1.74; 1.27–2.37), and stress (1.51; 1.18–1.94) were more severe in women. Age was negatively associated with anxiety (0.98; 0.98–0.99), stress (0.98; 0.97–0.99), and depression severity (0.97; 0.96–0.98). Higher depression levels were found in single/divorced/widowed participants (2.3; 1.48–3.59). Higher levels of anxiety and depression were found in participants who reported that their workload increased during the pandemic due to COVID-19 (2.18; 1.67–2.84); (2.07; 1.58–2.71), while higher levels of stress were found in the participants who reported that their workload “remained the same”. Likewise, higher levels of anxiety, depression, and stress were found in participants that expressed fear of the possibility of a negative outcome

(death, negative sequelae) due to COVID-19 (2.25; 1.60–3.25), (1.49; 1.03–2.16), and (2.36; 1.69–3.29) respectively. The reduction in the number of consultations and surgery (1.01; 1.001–1.01) was also associated positively with anxiety severity, while the reduction in income during the pandemic was positively associated with higher levels of stress (1.01; 1.001–1.02) and depression (1.01; 1.001–1.02). Moreover, active healthcare workers presented higher levels of anxiety, depression, and stress (1.51; 1.21–1.89), (1.43; 1.14–1.79), and (1.31; 1.02–1.69) respectively. An interaction between diabetes and Covid-19 vaccination had statistically significant effects (0.084; 0.017–0.40) on anxiety levels, while an interaction between female gender and marital status (single/divorced/widowed) had statistically significant effects on depression levels (0.54; 0.32–0.89).

No collinearity problems were found through the linearity and the goodness-of-fit tests, both tests showed good models ‘specification. In addition, the proportional odds assumption was not rejected for all models (p values > 0.10). Likewise, no extreme or influential values were found for the residuals and leverage values.

Variables related to COVID-19

At the time of the study, 20.89% ($n=281$) of the participants tested positive for SARS-Cov-2 and 41.93% ($n=564$) had been isolated on suspicion of infection, in contrast, 84.76% ($n=1140$) had been vaccinated for Covid-19. Around 87.96% ($n=1183$) reported fear of contagion by SARS-CoV-2, and 85.50% ($n=1150$) were afraid of the possibility of a negative outcome as death or negative sequelae due to Covid-19 infection. Finally, up to 92.71% ($n=1247$) reported being afraid of the possibility of infecting their family and friends with Covid-19. These results are shown in Table 2.

Changes in daily and leisure activities due to COVID-19

Table 4 reports the daily and leisure activities that participants considered they would soon engage in. The activities that this population expected to engage in within the next 3 months included: eating at a restaurant (56.80%), getting a haircut at a salon or barbershop (49.96%), seeing a doctor for a non-urgent appointment (46.32%), and hiking, or picnicking outdoors with friends (40.52%). Conversely, many healthcare professionals expressed that they would never go out again with someone they do not know well (28.62%), workout at a gym or fitness studio (20.52%), ride a subway/bus (15.17%), attend a church or other religious service (11.52%), work in a shared office (8.62%), or attend a wedding or a funeral (8.25%).

Table 1 Baseline demographic and occupational characteristics of the study population

Variables	Total n = 1345	
	n	%
Sex. Female/Male	890/455	66.17/33.83
Age in years ^(a)	47.12 (12.82)	43.01 (36.97–56.07)
Age group		261
30 years-old or less	143	10.63
> 30 to 40 years-old	324	24.09
> 40 to 50 years-old	350	26.02
> 50 to 60 years-old	337	25.06
> 60 to 70 years-old	161	11.97
70 years-old or more	30	2.23
Number of people in the household		
1	109	8.10
2	309	22.97
3	373	27.73
4	385	28.62
5 or more	169	12.57
Marital status		
Married	646	48.03
Divorced/widowed	127	9.44
Single	372	27.66
Free union	200	14.87
Occupation		
Nurse	102	7.58
Specialist	620	46.10
General physician	199	14.80
Dentist/Specialty resident/Therapist	196	14.57
Other type of occupation	228	16.95
Years of work experience ^(a)	19.1 (11.3)	20 (10–28)
Regarding the workload compared to PRE-PANDEMIC months this		
has increased	576	42.83
has decreased	390	29.00
still the same	379	28.18
Work mode		
Face-to-face consultation	665	49.44
Telemedicine	344	25.58
Emergency care for no covid-19 patients	146	10.86
Emergency care for covid-19 patients	145	10.78
ICU	122	9.07
Surgical assistant	62	4.61
Considers the security elements sufficient		
No	256	19.03
Provider of biosafety elements		
Occupational Risk Manager	240	17.84
Company/Institution/Hospital where you work	612	45.50
Yourself	321	23.87
Biosecurity item delivered		
Mask	443	32.94
Face mask N95	369	27.43
Coat	452	33.61

Table 1 (continued)

Variables	Total <i>n</i> = 1345	
	<i>n</i>	%
Surgical cap	286	21.26
Antifluid elements	72	5.35
Surgical gloves	284	21.12
Glasses	322	23.94
Alcohol or antibacterial gel	117	8.70
Percentage reduction in consultation during the pandemic ^(a)	26.23 (25.9)	20 (0–50)
Reduction percentage of your income ^(a)	23.5 (27.78)	20 (0–40)

^(a) Values are reported as mean (standard deviation) and median (p25–p75)

Discussion

Healthcare professionals and front-line workers are especially vulnerable in times of public health crisis and may be at risk for developing adverse psychological outcomes, particularly in low/middle-income Latin American countries [22]. As previously mentioned, a study conducted in Colombian otolaryngologists and allergists during the COVID-19 pandemic reported high rates of psychological outcomes [11, 23]. Our study describes the prevalence of mental health outcomes and associated factors of anxiety, depression, and stress in the general Colombian health care population during the COVID-19 pandemic. A total of 1345 health care professionals participated in this study including nurses, physicians, therapists, and dentists, among others, although nearly half of them were specialist doctors. Adverse psychological outcomes such as anxiety, depression, and stress were reported in 75.61%, 59.18%, and 53.09% of the study population, respectively, echoing the findings of previous studies conducted during the pandemic [23, 24]; as mentioned previously.

A systematic review published in 2020 by Vizheh et al., reported a prevalence of anxiety, depression, and stress among health care professionals of 67.55, 55.89, and 62.99%, respectively [5]. Similarly, a prior study in a Spanish healthcare population that reported a prevalence of psychological distress of up to 80.6% [25], which to date is the highest rate of this mental outcome in healthcare workers. However, we stand out that our results remain among the highest rates of these psychological outcomes compared to prior reports worldwide, which underscores the importance of urgent mental health strategies for healthcare workers. Up to 43.64% of our study population presented these 3 psychological disorders simultaneously, highlighting the importance of prevention and early interventions. However, anxiety, depression, and stress symptoms require psychiatric evaluation and confirmation since the questionnaires applied to the population

cannot rule out that these symptoms could be related to adjustment disorders. Our data was collected 1 year after the pandemic started and despite there is a significant amount of scientific information about the mental health in healthcare workers in the beginning of the pandemic, prior authors state that depending on the trajectory of the pandemic the mental health symptoms on healthcare workers could intensify or reduce over time [26].

About the factors associated with the severity of anxiety, depression, and stress; a higher severity of these outcomes was found in women. Similarly, Gómez-Salgado et al reported that among 3801 adults living in Spain during COVID-19 confinement, women had higher levels of psychological discomfort [27]. Previous studies have reported that women can be twice as more prone to depression than men probably due to individual factors such as genetic, environmental, and cultural influences [28, 29]. Furthermore, prior authors describe that woman in healthcare are often victims of additional external factors for mental health outcomes such as bias and discrimination, disparaging or disrespectful comments, lack of career promotion, disparities in resources (including financial and administrative support), rewards, and reimbursement [30, 31]. Additionally, due to school closures during the pandemic, family caregivers may have had a greater burden of responsibilities. This scenario could explain the interaction found between being women and being single/widowed/divorced, since this population was less prone to depression. However, we also stand out that the variable “single/widowed/divorced” was associated with the presence of depression. Prior authors have described this relationship between marital status and depression: a higher prevalence of depression in separated or divorced individuals may be due to both an increased risk of marital disruption, and to the higher risk of this disorder in those with divorced or separated marital status [32]. Organizational support strategies are needed in these populations to increase wellbeing,

Table 2 Prevalence and severity of depression, anxiety, stress, and conditions relating to Covid-19 pandemic in the study population

Variable	Total		
	(n = 1345)		
	n	%	95% CI
Anxiety	1017	75,61	(73,24 - 77,83)
Depression	796	59,18	(56,53- 61,77)
Stress	714	53,09	(50,41 - 55,73)
High level Emotional Exhaustion	461	34,28	(31,79 - 36,85)
High level Depersonalization	217	16,13	(-, 14, 18, 19, 26)
Low level Personal Accomplishment	316	23,49	(21,30 - 25,83)
Presence of Depression in combination with			
Anxiety	756	56,21	(53,54 - 58,83)
Stress	598	44,46	(41,82 - 47,12)
Presence of Anxiety in combination with			
Stress	674	50,11	(47,44 - 52,77)
Presence of Depression in combination with			
Anxiety and stress	587	43,64	(41,01 - 46,30)
Emotional Exhaustion		261	
Low	616	45,80	-
Moderate	268	19,93	-
High	461	34,28	-
Depersonalization		261	
Low	911	67,73	-
Moderate	217	16,13	-
High	217	16,13	-
Personal Accomplishment		261	
Low	316	23,49	-
Moderate	543	40,37	-
High	486	36,13	-
Factors associated with contagion		261	
Travel to areas of virus circulation	309	22,97	-
Close contact with a case	381	28,33	-
None	628	46,69	-
Have you been diagnosed with Covid-19?			
Yes	281	20,89	-
Have you been isolated on suspicion of contagion with Covid-19?			
Yes	564	41,93	-
Have you been vaccinated to Covid-19?			
Yes	1140	84,76	-
Any of the following family members has been diagnosed with Covid-19			
Father	102	7,58	-
Mother	115	8,55	-
Brother/sister	296	22,01	-
Son	178	13,23	-
Spouse	191	14,20	-
Comorbidities			
hypothyroidism	842	62,60	-
arterial hypertension	199	14,80	-
autoimmune disease	61	4,54	-
diabetes	46	3,42	-
heart disease	42	3,12	-

Table 2 (continued)

Variable	Total		
	(n = 1345)		
	n	%	95% CI
COPD	18	1,34	–
Have you been afraid of contagion by Covid-19			
Yes	1183	87,96	–
Have you been afraid of the possibility of a negative outcome (death, sequelae) due to Covid-19			
Yes	1150	85,50	–
Have you been afraid of the possibility of infecting your family and / or friends with Covid-19?			
Yes	1247	92,71	–
Fear score against (On a scale of 1 to 5):			
Fear of contagion ^(a)	4 (3–5)		
Negative outcome (death, sequelae) ^(a)	4 (3–5)		–
Infect a family member ^(a)	5 (4–5)		–

^(a) Values are reported as median (p25-p75)

improve resilience, provide protected time to participate in self-care activities, and convenient access to physical and mental health services should be prioritized.

Age was also negatively associated with psychological outcomes; older age could lead to a lower probability of severe forms of these conditions. Similarly, a prior study in healthcare workers in Iran during the pandemic reported a higher frequency of depression and anxiety in younger participants aged 30–39 years old compared to those aged 40 or older [33]. However, the presentation of depression in older adults may be significantly different to that in younger adults, since it can be present with the absence of an affective component [34, 35]. Therefore, despite depression is the most common mental disorder in older adults, it can be often under-diagnosed probably due to age-related biological and psychological factors, and comorbidities [34, 36]. Moreover, a higher incidence of chronic disease and using regular medication has been associated with higher levels of anxiety and an increased risk of negative mental outcomes [37]. Even though the mental health symptoms may show variations among older populations, higher rates of morbidity and mortality have been described, as well as increased healthcare utilization and economic costs. Further studies assessing these findings should be performed in older populations.

Furthermore, higher levels of anxiety were found in participants that expressed fear of a negative outcome such as death or negative sequelae which is similar to a prior study that included Otolaryngologists and allergists in Colombia [11]. Almost 88% reported fear of contagion, and over 92% were afraid of the possibility of infecting their family and/or friends, highlighting the sense of fear as key in developing adverse emotional symptoms.

Although prior authors state that the increase in workload may generally be associated with increased stress [38], in this study the increase in workload may be also associated with anxiety and depression which has been previously described as global public health priority [39]. Moreover, in this study the decrease in consultations was associated with anxiety. This scenario may be related to a decrease in monthly income since an association was also found between a reduction in income during the pandemic and the presence of depression and stress. Prior studies have shown that a significant decrease in household income is associated with an increased risk of incident mood, or anxiety disorders [23, 40]. This highlights the importance of providing not only emotional support but preventive financial measures to healthcare workers who may experience monetary drawbacks due to lockdown policies. On a more personal level, endeavors such as engaging with family and friends or taking part in outdoor activities have been compromised by the sanitary situation, consequently shaping behavioral standards, and altering traditional support systems, and emotional outlets.

More than 28% of healthcare professionals surveyed, expressed that they would never go out again with someone they do not know well. More than 20% expressed that they will never exercise in a gym again, and most participants reported delaying non-urgent medical appointments to up to a year, highlighting the risks in terms of physical as well as emotional health. These changes in work patterns and daily life were also described in a prior study by Colombian otolaryngologists and allergists [9]. Radical changes in the daily life of healthcare workers may predispose them to the accelerated development

Table 3 Factors associated with severity of Anxiety, Depression, and Stress via ordinal logistic model

Variable	Anxiety (GAD7)			Depression (PHQ9)			Stress (PSS 10)								
	Multivariate model ^a		Reduced model ^{b,g}	Multivariate model ^c		Reduced model ^{d,g}	Multivariate model ^e		Reduced model ^{f,g}						
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI					
Sex ^h															
Female	1.45	1.16 1.82	1.44ⁱ	1.16	1.80	1.47	1.17 1.86	1.74	1.27	2.37	1.40	1.08 1.80	1.51	1.18	1.94
Age in years	0.98	0.97 0.99	0.98	0.98	0.99	0.98	0.97 0.99	0.98	0.97	0.99	0.97	0.96 0.98	0.97	0.96	0.98
Marital status (reference category: married)															
Single/divorced/widowed	0.89	0.70 1.12	-	-	-	1.43	1.13 1.82	2.30	1.48	3.59	1.48	1.14 1.93	-	-	-
Free union	1.00	0.74 1.35	-	-	-	1.38	1.01 1.88	1.20	0.68	2.14	1.13	0.80 1.59	-	-	-
Are you currently working?															
Yes	0.84	0.51 1.40	-	-	-	0.64	0.39 1.06	-	-	-	0.70	0.40 1.22	0.64	0.37	1.12
Type of contract															
Provision of services	0.83	0.67 1.03	-	-	-	0.88	0.71 1.10	0.90	0.72	1.12	0.85	0.67 1.09	0.88	0.69	1.11
Do you work in a face-to-face external consultation?															
Yes	0.92	0.75 1.14	-	-	-	1.00	0.80 1.24	-	-	-	1.12	0.88 1.43	-	-	-
Do you work at ICU?															
Yes	1.45	1.02 2.06	-	-	-	1.27	0.89 1.80	1.28	0.90	1.81	0.87	0.58 1.29	0.81	0.55	1.20
Do you work in telehealth?															
Yes	0.93	0.73 1.17	-	-	-	1.01	0.79 1.28	1.28	0.90	1.81	0.88	0.68 1.15	-	-	-
The workload during the pandemic (reference category "has decreased")															
remains the same	1.14	0.85 1.52	1.08	0.82	1.43	1.09	0.81 1.47	1.12	0.84	1.50	1.36	0.98 1.89	1.99	1.48	2.69
has increased	2.26	1.70 2.99	2.18	1.67	2.84	1.94	1.46 2.58	2.07	1.58	2.71	2.06	1.50 2.83	1.32	0.96	1.82
Are you an active healthcare worker?															
Yes	1.44	1.15 1.81	1.51	1.21	1.89	1.42	1.13 1.78	1.43	1.14	1.79	1.38	1.07 1.78	1.31	1.02	1.69
Have you been diagnosed with SARS-CoV-2?															
Yes	1.21	0.95 1.56	-	-	-	1.34	1.05 1.72	-	-	-	1.29	0.98 1.71	-	-	-
Do you have a diagnosis of diabetes?															
Yes	0.56	0.31 1.01	4.47	1.08	18.54	1.08	0.60 1.95	2.21	1.45	3.35	0.71	0.37 1.38	0.70	0.36	1.34
Do you have a diagnosis of arterial hypertension?															
Yes	1.21	0.89 1.63	-	-	-	1.47	1.09 1.99	-	-	-	0.88	0.62 1.24	-	-	-
Have you been afraid of contagion by Covid-19?															
Yes	2.24	1.50 3.34	2.13	1.43	3.16	2.25	1.48 3.43	-	-	-	2.17	1.38 3.40	-	-	-
Have you been afraid of the possibility of a negative outcome (death/sequelae) due to Covid-19															
Yes	2.15	1.48 3.11	2.25	1.6	3.25	1.44	0.99 2.09	1.49	1.03	2.16	1.62	1.08 2.43	2.36	1.69	3.29

Table 3 (continued)

Variable	Anxiety (GAD 7)			Depression (PHQ 9)			Stress (PSS 10)					
	Multivariate model ^a		Reduced model ^{b,g}	Multivariate model ^c		Reduced model ^{d,g}	Multivariate model ^e		Reduced model ^{f,g}			
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI		
Have you been vaccinated against SARS-CoV-2												
Yes	0.93	0.70 1.24	1.01	0.76 1.35	0.92	0.69 1.24	-	-	0.73	0.52 1.01	1.26	0.96 1.66
Percentage reduction in consultation/surgeries during the pandemic	1.00	1.00 1.01	1.01	1.00	1.00	0.99 1.00	0.99	0.98 1.01	1.00	0.99 1.01	-	-
Percentage reduction in income during the pandemic	1.01	1.01 1.02	-	-	1.01	1.01 1.02	1.01	1.01	1.01	1.01 1.02	1.01	1.01

^a Log-likelihood Intercept only: - 1811.062; Log-likelihood Model: -1690.539; AIC: 3427.079; BIC: 3546.774; ^b Log-likelihood Model: -1702.342; AIC: 3432.684; BIC: 3505.542; ^c Log-likelihood Intercept only: - 1800.648; Log-likelihood Model: -1697.505; AIC: 3443.010; BIC: 3567.909; ^d Log-likelihood Model: -1702.266; AIC: 3440.533; BIC: 3534.207; ^e Log-likelihood Intercept only: - 1113.446; Log-likelihood Model: -1009.307; AIC: 2062.614; BIC: 2177.105; ^f Log-likelihood Model: -1021.314; AIC: 2070.629; BIC: 2143.487; ^g The reduced model was based on the Furnival-Wilson leaps-and-bounds algorithm, Brant test $p > 0.05$, link test $p < 0.05$; ^h For dichotomic variables reference category is "no"; ⁱ Bolded numbers highlight the significant associations between the variables

Table 4 Daily and leisure activities the health workers might start doing soon

Question	n = 1345		Question	n = 1345	
	n	%		n	%
Attend a sporting event, concert or play		261	Ride a subway or a bus		
< 3 months	73	5.43	< 3 months	301	22.38
3 to 6 months	110	8.18	3 to 6 months	78	5.80
6 to 12 months	265	19.70	6 to 12 months	151	11.23
> 1 year	703	52.27	> 1 year	372	27.66
Never again	121	9.00	Never again	204	15.17
Does not apply	73	5.43	Does not apply	239	17.77
Attend a wedding or a funeral			Travel by airplane		
< 3 months	136	10.11	< 3 months	422	31.38
3 to 6 months	128	9.52	3 to 6 months	205	15.24
6 to 12 months	316	23.49	6 to 12 months	264	19.63
> 1 year	565	42.01	> 1 year	341	25.35
Never again	111	8.25	Never again	64	4.76
Does not apply	89	6.62	Does not apply	49	3.64
Attend a small social event or dinner with a small group of people			Vacation overnight within driving distance		
< 3 months	483	35.91	< 3 months	385	28.62
3 to 6 months	254	18.88	3 to 6 months	223	16.58
6 to 12 months	301	22.38	6 to 12 months	258	19.18
> 1 year	237	17.62	> 1 year	354	26.32
Never again	47	3.49	Never again	79	5.87
Does not apply	23	1.71	Does not apply	46	3.42
See a doctor for a nonurgent appointment			Hike or picnic outdoors with friends		
< 3 months	623	46.32	< 3 months	545	40.52
3 to 6 months	238	17.70	3 to 6 months	210	15.61
6 to 12 months	183	13.61	6 to 12 months	210	15.61
> 1 year	189	14.05	> 1 year	242	17.99
Never again	70	5.20	Never again	92	6.84
Does not apply	42	3.12	Does not apply	46	3.42
Exercise at a gym or fitness studio			Visit elderly relatives or friends in their home		
< 3 months	245	18.22	< 3 months	446	33.16
3 to 6 months	103	7.66	3 to 6 months	215	15.99
6 to 12 months	186	13.83	6 to 12 months	265	19.70
> 1 year	388	28.85	> 1 year	296	22.01
Never again	276	20.52	Never again	67	4.98
Does not apply	147	10.93	Does not apply	56	4.16
Get a haircut at a salon or barbershop			Send children on play dates		
< 3 months	672	49.96	< 3 months	341	25.35
3 to 6 months	187	13.90	3 to 6 months	123	9.14
6 to 12 months	152	11.30	6 to 12 months	135	10.04
> 1 year	194	14.42	> 1 year	131	9.74
Never again	76	5.65	Never again	46	3.42
Does not apply	64	4.76	Does not apply	569	42.30
Eat at a dine-in restaurant			Hug or shake hands when greeting a friend		
< 3 months	764	56.80	< 3 months	339	25.20
3 to 6 months	200	14.87	3 to 6 months	148	11.00
6 to 12 months	172	12.79	6 to 12 months	229	17.03
> 1 year	149	11.08	> 1 year	485	36.06

Table 4 (continued)

Question	n = 1345		Question	n = 1345	
	n	%		n	%
Never again	28	2.08	Never again	113	8.40
Does not apply	32	2.38	Does not apply	31	2.30
Attend a church or other religious service			Go out with someone you don't know well		
< 3 months	369	27.43	< 3 months	94	6.99
3 to 6 months	160	11.90	3 to 6 months	86	6.39
6 to 12 months	187	13.90	6 to 12 months	172	12.79
> 1 year	308	22.90	> 1 year	450	33.46
Never again	155	11.52	Never again	385	28.62
Does not apply	166	12.34	Does not apply	158	11.75
Send kids to school. Camp or daycare			Stop routinely wearing a face covering		
< 3 months	308	22.90	< 3 months	42	3.12
3 to 6 months	95	7.06	3 to 6 months	25	1.86
6 to 12 months	118	8.77	6 to 12 months	146	10.86
> 1 year	174	12.94	> 1 year	743	55.24
Never again	63	4.68	Never again	355	26.39
Does not apply	587	43.64	Does not apply	34	2.53
Work in a shared office			Bring in the mail without precautions		
< 3 months	459	34.13	< 3 months	252	18.74
3 to 6 months	115	8.55	3 to 6 months	104	7.73
6 to 12 months	131	9.74	6 to 12 months	160	11.90
> 1 year	185	13.75	> 1 year	442	32.86
Never again	116	8.62	Never again	339	25.20
Does not apply	339	25.20	Does not apply	48	3.57

of mental disorders. Prior authors have described the role of negative future-oriented cognitions in depression prone individuals [41]. However, this scenario could also be related to the timepoint when the questionnaires were applied, since this survey was performed during the highest rates of infection of the pandemic in Colombia. During this period the vaccination programs were still on the first phase and preliminary studies reported the challenges and limited access to vaccination in low- to middle-income countries [42]. Nevertheless, the long-term impact is still to be defined and may change as studies are conducted at different time points of the COVID-19 pandemic.

Among the strengths of this study, we stand out that the study sample included health workers from different professions, since epidemiologic research highlights the critical constructs of “representativeness” and its relationship with the “generalizability” of study results [43]. The current study may encounter limitations regarding the cross-sectional design of the study can display associations between the variables, but no causal relationships. The survey was completed only by 1360 out of 3512 people who registered to the questionnaire (38.72%), which could lead to a selection bias. We highlight that

this study was performed prior to the vaccination campaigns in Colombia, therefore these symptoms could have significant differences compared to the results after vaccination.

Shining light upon the importance of mental health in healthcare workers is essential considering the high prevalence of adverse psychological outcomes raised by the COVID-19 pandemic. Preventive strategies include adequate occupational environments, financial support, and incentives to mitigate stresses from financial uncertainty for frontline and independent healthcare workers. Previous studies state that key strategies to reduce anxiety among healthcare workers include limitation of shift hours, clear communication, ensuring adequate rest areas, providing timely and appropriately tailored mental health support through hotline teams, media or multidisciplinary teams, and involving mental health professionals in follow-up, diagnose and provide early therapeutic interventions [44, 45]. A current systematic review stated that clear communication and support from the healthcare institutions, social support, and personal sense of control are protective factors for mental disorders on healthcare workers during pandemic outbreaks [46]. Further studies are essential to support preventive and

therapeutic public health strategies to achieve early mental health prevention approaches, as well as therapeutic interventions in this population.

Conclusions

During this COVID-19 pandemic, the frequency of anxiety, depression, and stress is high among this healthcare population compared to prior reports worldwide and the Colombian healthcare population. Anxiety, depression, and stress were more severe in women. Higher levels of anxiety, depression, and stress were found in participants that expressed fear of the possibility of a negative outcome (death, negative sequelae) due to COVID-19. The reduction in the number of consultations and surgery was also associated positively with anxiety severity, while the reduction in income during the pandemic was positively associated with higher levels of stress. Research on these psychological outcomes is needed in Latin America to achieve early mental health prevention approaches, as well as therapeutic interventions in this population. Psychological and/or psychiatric support without occupational stigmatization should be granted by the institutions.

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Authors' contributions

Conceptualization: AP EG. Data evidence collection: AP EG DP SML LCPH. Supervision: AP. Statistical analysis and methodology: SML. Analyzed the data: SML AT JM LCPH. Funding acquisition and resources providing: AP. Writing – Original Draft Preparation: AP DP JM SML AT LCPH. Writing – Review & Editing: AP DP JM LCPH SML EG AT. The author(s) read and approved the final manuscript.

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Availability of data and materials

All data generated or analysed during this study are included in this published article [and its supplementary information files].

Declarations

Ethics approval and consent to participate

The Ethical Committee of the Hospital Universitario Fundación Santa Fe (Protocol Number: CCEI-12992-2021) approved this study. All patients provided informed consent.

Consent for publication

Not applicable.

Competing interests

The authors report no conflicts of interest.

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