

<https://doi.org/10.23913/ride.v13i26.1474>

Artículos científicos

Depression, anxiety and stress levels among frontline healthcare workers during COVID-19 in Jalisco, México

Depresión, ansiedad y niveles de estrés entre los trabajadores del área de salud de primera línea durante COVID-19 en Jalisco, México

Depressão, ansiedade e níveis de estresse entre profissionais de saúde da linha de frente durante a COVID-19 em Jalisco, México

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Abstract

The SARS-CoV-2, which appeared in China at the end of December 2019, is responsible for an acute respiratory infection called COVID-19; in March 2020, this disease was characterized as a pandemic. In addition to physical symptoms, it causes mental health effects, mainly in workers who care for patients with COVID-19. The purpose of this research was to evaluate the indicators of depression, stress, and anxiety in the personnel who work with COVID-19 patients as well as those who work in other areas. A non-experimental, descriptive, cross-sectional research design was used, with non-probabilistic snowball sampling of 299 health workers (74.2% women and 25.4% men) aged from 20 to 66 years, who responded to an online survey. Through the Mann Whitney U test, we found that those who work with COVID-19 patients presented higher indicators of depression, anxiety, and stress; through the odds ratio, we observed that the personnel working with COVID-19 patients had a higher probability of the risk of anxiety (2.53) and stress (2.59). Female doctors had higher levels of stress and depression. There is a need to design mental health care programs with a sex- and gender-based approach for health workers.

Keywords: Anxiety, COVID-19, depression, healthcare workers, stress.

Resumen

El virus SARS-CoV-2, que apareció en China a finales de diciembre de 2019, es responsable de una infección respiratoria aguda llamada COVID-19; en marzo de 2020, esta enfermedad se caracterizó como pandemia. Además de los síntomas físicos, provoca efectos en la salud mental, principalmente en los trabajadores que atienden a los pacientes con COVID-19. El objetivo de esta investigación fue evaluar los indicadores de depresión, estrés y ansiedad en el personal que trabaja con pacientes de COVID-19, así como en aquellos que trabajan en otras áreas. Se utilizó un diseño de investigación no experimental, descriptivo y transversal, con un muestreo no probabilístico tipo bola de nieve de 299 trabajadores de la salud (74,2% mujeres y 25,4% hombres) con edades comprendidas entre 20 y 66 años, que respondieron a una encuesta en línea. A través de la prueba U de Mann Whitney, se encontró que quienes trabajan con pacientes con COVID-19 presentaban mayores indicadores de depresión, ansiedad y estrés; a través de la odds ratio, se observó que el personal que trabaja con pacientes con COVID-19 tenía una mayor probabilidad de riesgo de ansiedad (2.53) y estrés (2.59). Las mujeres médicas presentaban mayores niveles de estrés y depresión. Es necesario

diseñar programas de atención a la salud mental con un enfoque basado en el sexo y el género para el personal sanitario.

Palabras clave: Ansiedad, COVID-19, depresión, trabajadores de la salud, estrés.

Resumo

O vírus SARS-CoV-2, que surgiu na China no final de dezembro de 2019, é responsável por uma infecção respiratória aguda denominada COVID-19; em março de 2020, essa doença foi caracterizada como uma pandemia. Além dos sintomas físicos, causa efeitos na saúde mental, principalmente em trabalhadores que cuidam de pacientes com COVID-19. O objetivo desta pesquisa foi avaliar os indicadores de depressão, estresse e ansiedade no pessoal que trabalha com pacientes com COVID-19, bem como naqueles que trabalham em outras áreas. Utilizou-se um desenho de pesquisa não experimental, descritivo e transversal, com amostragem não probabilística em bola de neve de 299 profissionais de saúde (74,2% mulheres e 25,4% homens) com idades entre 20 e 66 anos, que responderam a uma pesquisa online. Por meio do teste Mann Whitney U, constatou-se que quem trabalha com pacientes com COVID-19 apresentou maiores indicadores de depressão, ansiedade e estresse; Por meio da razão de chances, observou-se que a equipe que trabalha com pacientes com COVID-19 apresentou maior probabilidade de risco de ansiedade (2,53) e estresse (2,59). As médicas apresentaram níveis mais elevados de estresse e depressão. É necessário desenhar programas de atenção à saúde mental com enfoque em sexo e gênero para o pessoal de saúde.

Palavras-chave: Ansiedade, COVID-19, depressão, profissionais de saúde, estresse.

Fecha Recepción: Septiembre 2022

Fecha Aceptación: Mayo 2023

Introduction

At the end of December 2019, in Wuhan, within the Hubei province of China, a group of individuals began experiencing symptoms associated with an acute respiratory infection, which the World Health Organization (WHO) called COVID-19, given that it was identified as a new strain of coronavirus caused by the SARS-CoV-2 virus. The ease with which it spread, along with the alarming mortality figures being observed, in addition to the lack of knowledge of effective treatments and vaccines at the time, led to its being considered a global health emergency from the very beginning (Perez-Anaya et al., 2021; Ramos, 2020).

The transmission of COVID-19 occurs from contact with people who carry the virus, through liquid particles that are expelled when coughing, sneezing, or speaking. The symptoms that have been observed are high temperature or chills, cough, shortness of breath, muscle pain, headache, throat and chest pain, runny nose, loss or change of sense of smell or taste, diarrhoea, vomiting; in some people, it progresses to acute respiratory failure, pneumonia, or kidney failure, which can lead to death (Abuabara-Franco et al., 2020; Palacios Cruz et al., 2021).

The spread of COVID-19 occurred rapidly throughout Asia and then to the rest of the world. The first case in Latin America was registered in Brazil on 25 February 2020, while in Mexico the first infection was reported on 27 February 2020. By 11 March 2020, COVID-19 was subsequently declared a pandemic by the WHO given that, by then, 125,000 cases had been recorded in 118 countries around the world with 4,613 deaths (Vega-Vega et al., 2020).

Preventive measures, such as the use of face masks, frequent hand washing, avoiding spaces with poor ventilation, as well as cleaning and disinfecting surfaces, were proposed; mitigation measures, such as the isolation of suspected cases and social distancing were also suggested, while suppressive measures, such as generalized quarantines and the closure of public spaces including schools, universities, commercial premises, restaurants and other entertainment centers were also established (Candia et al., 2021; Patiño et al., 2020).

These measures, denominated “non-pharmacological interventions”, were instrumental in reducing the spread of the virus. Flaxman et al., (2020) who evaluated non-pharmacological interventions such as school closures and lockdowns in eleven European countries; concluded that the implementation of these measures made it possible to reduce the doubling times of cases per day. In addition, they estimated that if these measures had been established from the beginning of the pandemic, around three million deaths would have been avoided.

Although various countries around the world supported these measures some of them were found to have negative repercussions on people's wellbeing; in this sense, it is believed that COVID-19 not only caused respiratory effects and physical sequelae in those who suffered from it, but also that the uncertainty, worry, and fear experienced also generated negative consequences in the mental health of the population (Dávila-Torres et al., 2020; Perez-Anaya et al., 2021).

In this sense, the United Nations (UN) (2020) pointed out that widespread misinformation about the virus, preventive measures, and uncertainty about the future were identified as sources of anguish that would ultimately be associated with increased levels of depression and anxiety than those normally seen among the general population. One of the populations who suffered the greatest impact on their mental health due to COVID-19 were frontline healthcare personnel. A study conducted with 1 257 healthcare personnel during the first two months of the pandemic by COVID-19 found that the principal mental health disorders observed were depression with 50.4%, anxiety with 44.6%, insomnia with 34% and anguish with 71.5% (Lai et al., 2020).

A systematic review carried out to study the psychological impact of the COVID-19 pandemic among frontline healthcare personnel in the USA and European countries, found moderate and high levels of stress, anxiety, depression, alteration of sleep, and burnout syndrome. In addition, it was observed that frontline healthcare personnel were more impacted compared to other healthcare professionals, even at a level greater than that found in the Asian context (Danet, 2021).

In Mexico, a study was conducted with a sample of 5 938 health workers to assess mental health problems resulting from COVID-19, comparing frontline staff with other healthcare workers. The main mental health problems identified among frontline staff were insomnia (52.1%), depression (37.7%), and post-traumatic stress disorder (37.5%) (Robles et al., 2021).

The UN (2020) points out that frontline personnel in the struggle against COVID-19 are subjected to high stress levels derived from the workload. In addition to witnessing the death of patients, they are also involved in complex decision making and face the risk of spreading the infection among their families and community; thus, their mental health begins to deteriorate. Due to these circumstances, in Pakistan, 42% of healthcare workers had moderate psychological distress and 26% mentioned that it was severe; in Canada, 47% of healthcare workers requested psychological support, while in China, 50% of healthcare workers had high rates of depression, 45% anxiety, and 34% insomnia.

In short, although various mental health disorders that have been described among frontline workers in the face of COVID-19, the most frequent manifestations are depression, stress, and anxiety. Depression is characterized by the presence of low levels of positive affect, loss of interest and pleasure, feelings of guilt, low self-esteem, low energy, and poor concentration. Anxiety is characterized by physiological hyperarousal, while stress is

characterized by a state of irritability, nervous tension, difficulty relaxing, and agitation (Lee, 2019; Vindegaard & Benros, 2020; Zanon et al., 2021).

Therefore, this study aims to evaluate the indicators of depression, stress, and anxiety in healthcare personnel working in frontline COVID-19 areas in the last two weeks, compared to those who work in other areas of healthcare. In regard to the practical implications, this study seeks to generate evidence on the impact on mental health in frontline healthcare workers in the face of COVID-19, in order to design strategies to promote the mental health, wellbeing, and to improve quality of life among healthcare workers, both for health contingency situations and for coping with daily work demands. Therefore, the following research question arises: what are the indicators of depression, stress, and anxiety in a sample of frontline health workforce workers in the struggle against COVID-19 compared to those working in other healthcare? This study is based on the hypothesis that healthcare personnel who worked in areas related to COVID-19 during the past two weeks could have higher indicators of depression, stress, and anxiety, as well as a greater probability of developing these, compared to those who do not work in areas related to COVID-19.

Method and materials

For the present investigation, a non-experimental, descriptive, cross-sectional study was used, with a non-probabilistic snowball sampling (Ato et al., 2013; Field, 2018). It is stated in this way, since the variables of interest (depression, anxiety, and stress) are described and analyzed as they occur among healthcare personnel, without constructing any experimental situation for their evaluation (Creswell, 2012).

For the selection of participants, a non-probabilistic snowball test was carried out among medical personnel from public and private hospitals in the state of Jalisco. A total of 299 healthcare workers participated ($\beta=.95$); 164 (55.8%) were nurses and 135 (43%) were physicians. Regarding the gender ratio, 222 (74.2%) were women and 76 (25.4%) men. The average age was from 20 to 66 years. Of all the people who participated in the study, 199 (66.5%) stated having worked in the COVID-19 area in the previous two weeks, while 100 people (33.5%) reported not having worked in the COVID-19 area in the last two weeks.

A sociodemographic questionnaire was applied for age, gender, and work area. The instrument used to measure depression, stress, and anxiety was the Depression, Anxiety, and Stress Scale (DASS-21) in its abbreviated version and validated in a Spanish-speaking adult

population; it consisted of three 4-point Likert-type self-response subscales. Each subscale was composed of 7 items, which evaluated the emotional states of depression, anxiety, and stress; to evaluate each subscale, the scores of each of the items were added; the higher the score obtained, the greater the presence of the variable, which allowed the results to be studied from a scalar perspective (Román et al., 2016). Regarding its psychometric properties, it had an alpha coefficient of 0.96 and 0.93, 0.86, and 0.91 for the depression, anxiety, and stress subscales, respectively. The Spanish version of the DASS-21 was translated and validated in a sample of the Hispanic population reporting solid psychometric indicators (Mellor et al., 2015; Valencia, 2019).

All the participants responded to a self-applied digital questionnaire that included general sociodemographic and professional questions related to their work in the COVID-19 area together with the DASS-21. The DASS-21 scale is made up of 21 items, with answers ranging from 0 to 3, where 0 means "not at all applicable to me", 1 "applies to me in a small part of the time", 2 "applies to me many times" and 3 "applies to me most of the time". The items that indicate depression are 3, 5, 10, 13, 16, 17 and 21; the items that indicate anxiety are 2, 4, 7, 9, 15 and 20; and the items that indicate stress are 1, 6, 8, 11, 12, 14 and 18. The cut-off points for depression are: 5-6 mild, 7-10 moderate, 11 or more, severe. For anxiety, the cut-off points are: 4 mild, 5-7 moderate, 8 or more, severe. For stress, cut-off points are: 8-9 mild, 10-12 moderate, and 13 or more, severe.

The survey was administered through the Google Forms platform with a total of 34 items; Google Forms is an online tool that allows creating, sending, managing, and analyzing questionnaires that are addressed to the population dispersed in various latitudes (Raju & Harinarayana, 2016). The questionnaire was available from December 2020 to February 2021 and was distributed through a link that allowed linking to the hosting of the instruments, by email and through the instant messaging application WhatsApp. Before answering the questions, the platform allowed participants to be informed about the objectives of the research and included an informed consent form; to guarantee anonymity, participants used an alias. The data collection was carried out during the second wave of COVID-19 infections, with 1 532 266 accumulated cases in Mexico. Ten entities concentrate 63.4% of the functions accumulated in the country: CDMX, State of Mexico, Jalisco, Puebla, Veracruz, Nuevo León, Guanajuato, Baja California, Sonora and Chihuahua. During this rebound, Jalisco reported 13 592 cases, with saturation of health services.

Statistical analysis

The Statistical Package for the Social Sciences (SPSS) version 21 was used for data analysis. For the description of the variables, measures of central tendency and dispersion were used, as well as frequencies, depending on the type of variables. The Kolmogorov-Smirnov test was used to test the normality of the results. The chi-square test was used for hypothesis testing, considering it significant at a $p \leq 0.05$, 95% CI. To establish the risk, the odds ratio was used. The difference tests were performed from the Mann Whitney U test (Coolican, 2005; Field, 2018; Kerlinger & Lee, 2002).

Ethical considerations

For this study, the ethical guidelines established in the General Health Law on Health Research and in accordance with the guidelines of the Helsinki Declaration were followed in order to guarantee the dignity, wellbeing, protection of rights, and confidentiality of the data of the study participants. The people who participated in this research were informed about the purpose of the study; their informed consent was subsequently requested. Once the data was collected, it was stored in a password-protected electronic storage device under the supervision of the principal investigator to protect the confidentiality and security of the data. Since the present study is an observational design, it was classified as risk-free research, since no modifications were made to the study variables (Ley General de Salud en Materia de Investigación para la Salud, 2014). The research project was evaluated and approved by the Institutional Research Committee of the University Center of South of the University of Guadalajara (Mexico), with folio number CIP/T/05/20.

Results

Levels of depression, anxiety and stress in healthcare workers

The scores obtained from the sample corresponding to the subscales that evaluated the emotional states of anxiety, depression and stress did not meet the requirements of normality and homoscedasticity (Kolmogorov- Smirnov test), so non-parametric tests were used.

Table 1. Comparison between personnel who worked in the COVID-19 area in the last two weeks and those who worked in other areas.

	Personnel worked in the COVID-19 area?		Z	Significance level (p)
	No (n=100)	Yes (n=199)		
	Median (Range)	Median (Range)		
Depression	4 (28)	8 (42)	-4.230	.000
Anxiety	6 (42)	12 (42)	-4.691	.000
Strees	6 (40)	12 (42)	-4.703	.000

Source: own elaboration

Differences in depression, anxiety, and stress were evaluated between medical personnel who did not work in a COVID-19 related area and personnel who worked with COVID-19 patients within the previous two weeks using the Mann Whitney U test (Table 1). Those who reported not working in a COVID-19 area scored significantly lower in terms of depression, anxiety, and stress compared to those who reported working in areas related to COVID-19 over the previous two weeks.

Risk to mental health from working in the COVID-19 area

The risk of suffering from depression, anxiety and stress was calculated for the study sample; to achieve this, dichotomous variables were used considering normal and mild levels as the absence of the variable, while taking moderate, severe, and extremely severe levels as the presence of the variable. Using the calculation of the odds ratio, it was obtained that the personnel who worked with patients with COVID-19 presented statistically significant probabilities for anxiety (2.53) and stress (2.59 compared to medical personnel who did not work in a COVID-19 area. According to results (Table 2) it seems that working with COVID-19 patients is the risk factor for anxiety and stress.

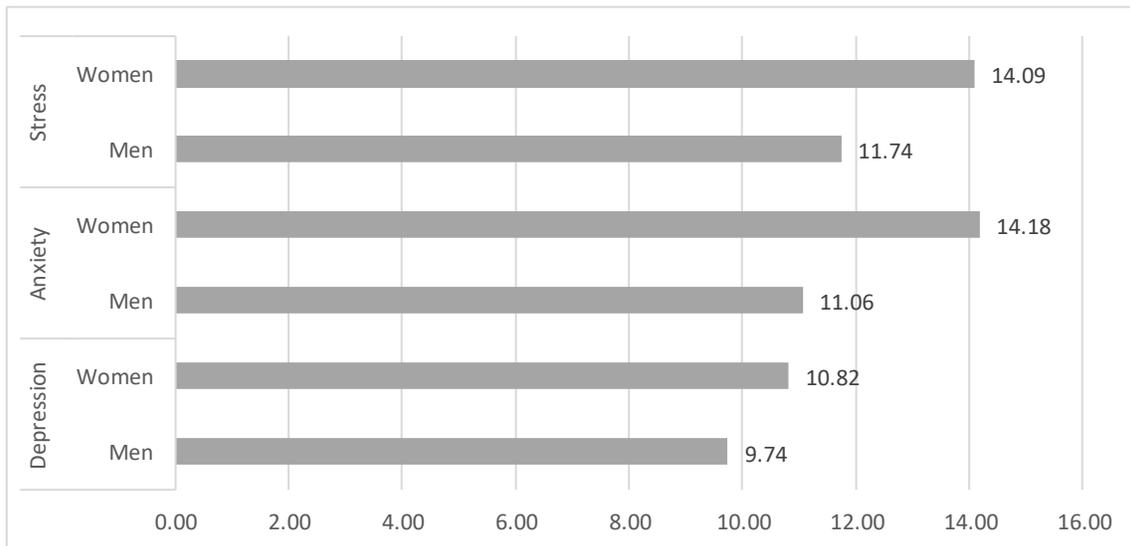
Table 2. Risk of presenting indicators of depression, anxiety or stress in health personnel who worked in the COVID-19 area in the last two weeks and those who did not.

Workplace	Depression, anxiety and stress levels			Odds ratio	Significance level (<i>p</i>)
	% normal to mild	% moderate to severe	% total		
Depression					
COVID-19 area	149	50	199	1.76; 0.94 - 3.28	0.07
	48.8%	16.7%	66.6%		
Non-COVID-19 area	84	16	100		
	28.1%	5.4%	33.4%		
Total	233	66	299		
	77.9%	22.1%	100%		
Anxiety					
COVID-19 area	76	123	199	2.53; 1.54 - 4.14	0.001
	25.4%	41.1%	66.6%		
Non-COVID-19 area	61	39	100		
	20.4%	13%	33.4%		
Total	162	162	299		
	45.8%	52.4%	100%		
Stress					
COVID-19 area	147	52	199	2.59; 1.31 - 5.12	0.006
	49.2%	17.4%	66.6%		
Non-COVID-19 area	88	12	100		
	29.4%	4%	33.4%		
Total	235	64	299		
	78.6%	21.4%	100%		

Source: own elaboration

Moreover, differences in trends were observed between the personnel who worked in with COVID-19 patients during the previous two weeks, with higher mean scores among the female population in relation to stress, anxiety, and depression (Figure 1).

Figure 1. Comparison of means in relation to gender, among health personnel who worked in the COVID-19 area in the last two weeks



Source: own elaboration

Finally, an analysis was conducted based on the different healthcare-related activities among those who had worked with COVID-19 patients during the previous two weeks; observations showed that women physicians presented higher indicators of stress and depression compared to their male counterparts, though these observations were not statistically significant, as shown in Table 3.

Table 3. Comparison of means according to the health activity performed by the personnel who worked in the COVID-19 area in the last two weeks.

Healthcare Activity	Gender	Mental Health Indicator	Mean	Typical Dev.
Porter/ Stretcher bearer	Men	Depression	4.50	0.01
		Anxiety	2.20	0.11
		Stress	2.10	0.90
Nursing	Women	Depression	10.34	9.22
		Anxiety	14.12	9.64
		Stress	13.21	9.88
	Men	Depression	9.71	7.88
		Anxiety	12.67	10.76
		Stress	13.07	10.05
Medical	Woman	Depression	11.76	8.68
		Anxiety	14.08	7.62
		Stress	15.84	9.37
	Men	Depression	9.94	10.28
		Anxiety	10.58	10.34
		Stress	11.42	10.59

Source: own elaboration

Discussion

This study was conducted with the purpose of analyzing the indicators of depression, stress, and anxiety among healthcare personnel working with COVID-19 patients over the previous two weeks, compared to those who worked in other areas of healthcare. The results obtained will be discussed over these following paragraphs, and possible study opportunities for future research will also be elucidated.

The results of this study indicated that medical personnel who worked with COVID-19 patients over the previous two weeks had significantly higher scores for depression, anxiety, and stress compared to those who did not work in this area. This is consistent with what was reported by García-Iglesias et al., (2020) who, in the first systematic review carried out at the beginning of the COVID-19 pandemic (January to May 2020), found 13 studies which, reported that more than half of frontline healthcare professionals presented severe depressive symptoms; while 35.6% reported high levels of anxiety, and 68% reported high levels of stress.

Another systematic review, covering studies from the start of the pandemic to August 2020, found that in Italy around 25% to 31% of people working as health workers had symptoms of depression, in Türkiye the percentage was 65%, while in the UK 64% of people surveyed felt down, sad or depressed. On the other hand, 20% of healthcare personnel in Italy were found to suffer from anxiety, 37% among the Vasco-Navarra population, 52% in Türkiye, and 72% in Italy. For stress, the percentage reported was from 37% to 78% with a more frequent interval between 40% and 50%. Indicators of depression, anxiety, and stress were observed mainly in frontline health personnel (Danet, 2021).

This research also made it possible to observe that health personnel who worked with people diagnosed with COVID-19 were more likely to have elevated indicators related to depression, anxiety and stress, compared to health workers who did not work in areas related to patients with COVID-19. In addition, during the analysis of the means of the personnel who care for COVID-19 patients, we found that women tended to present the highest number of indicators for these conditions; while in terms of the analysis conducted by the type of healthcare activity, female physicians were observed to have higher levels of stress and depression.

The increased risk of anxiety and stress among healthcare personnel who care for patients with COVID-19 was consistent with the findings reported by Huang et al., (2020), Lai et al., (2020), Danet (2021) y Robles et al., (2021). In this regard, Lu et al., (2020) stated that the increase in hours worked per day, the increase in concentration, and the state of permanent vigilance demanded by the activities related to the pandemic caused by a breathing problems, as well as being in close contact with the suffering and deaths of patients were all variables associated with the negative psychological impact of this global emergency upon frontline healthcare professionals.

On the other hand, García-Iglesias et al. (2020) pointed out that increased work time, fear of contagion and transmission of the virus between the family and the community, as well as concern for the control of the pandemic were factors that precipitated alterations in mental health among healthcare professionals who provided their services in COVID-19-related areas. These alterations in mental health represent an important personal problem that could ultimately increase the risk of both contagion and professional malpractice.

This study coincided with Lai et al., (2020), Pappa et al. (2020) and Shaukat et al. (2020) in regard to the prevalence of psychological symptoms associated with healthcare in COVID-19 areas, who found that women healthcare providers working in COVID-19 areas

suffered from higher levels of depression, anxiety, and stress; this was most likely due to the social perception of vulnerability that has been constructed around the female population (Shultz et al., 2016; United Nations, 2020).

Research limitations

This research had limitations, which should be pointed out. In the first place, the lack of randomization in the sampling may have caused the results obtained to have less external validity, without compromising the scientific relevance of the findings presented. On the other hand, the cross-sectional design of this study did not allow for the determination of a causal relationship between the variables. In addition, it was not possible to make generalizations regarding these findings being presented in the same way over time, mainly in the face of a phenomenon such as COVID-19, which has shifted from the lack of effective medical intervention at the beginning of the pandemic to the application of vaccines and the development of certain treatments in less than 24 months.

On the other hand, it is important to point out that although adequate psychometric properties were reported for the DASS-21, it was not possible to carry out a validation processes for the population in which it was applied, as well as for the environment in which this instrument was administered, since social distancing measures limited access to a larger population.

Conclusions

This study provided evidence that healthcare personnel who worked in a COVID-19-related setting over the previous two weeks had higher indicators of depression, anxiety, and stress, compared to healthcare personnel who did not work in this area. In addition, it was found that working with COVID-19 patients represented a higher probability of risk for developing anxiety and stress. Furthermore, the population of female healthcare personnel who worked in pandemic-related areas were found to have the highest indicators of mental health disorders, particularly female physicians.

This shows the need for the creation of a plan and for psychological intervention programs aimed at reducing the presence of depression, anxiety, and stress among healthcare personnel who work with COVID-19 patients, as well as including strategies in these interventions to reduce the risks on mental health in the medium and long term.

It should be noted that programs for physical health, mental health, overall wellbeing, and quality of life for healthcare personnel should be available even in conditions without COVID-19, as they are constantly exposed to demanding work hours, which involve the taking of decisions that not only affect their professional future but also the health and life of their patients; therefore, they require psychological resources that allow them to provide optimal care. Optimally, intervention programs should be carried out with a sex and gender based perspective, in order to incorporate a differential view of reality, which would allow for the specific needs of each healthcare worker to be met.

Contributions to future lines of research

In terms of future possibilities for further research, we recommend conducting longitudinal studies that allow for the evaluation and behavior of the variables over time. On the other hand, it would also be recommended to carry out studies with these variables in a randomized sample, in order to have more evidence to guarantee an optimal generalization of the results.

Optimally, the DASS-21 should also be adapted for the population in which the study was carried out, as well as the means by which it is administered, in order to describe its psychometric properties and have a culturally relevant version to better support the consistency of the findings presented in this research.

Finally, with this research, we propose the need to deepen through qualitative methodologies on the life experiences of professionals who work with patients with COVID-19, in order to have elements that allow for the design of interventions to reduce the presence of depression, anxiety, and stress and reduce, as much as possible, the consequences on physical and mental health in the medium and long term.

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