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Depression, Anxiety, and Stress in Health Professionals Working During the COVID-19 Pandemic in Peru: An Analytical Cross-Sectional Study

Alan Quispe-Sancho [1], Katerin Lesly Chambi-Macedo [2], Verónica Laurel-Vargas [1], Edson Huamani-Merma [1], Katherine Vanesa Cuzcano-Gonzales [3], Milagros Alexandra Huaita-Rocha [4], Lesly Mendoza-Guillen [5], Akemi Diana Sanchez-Choquepata [1], Jheampiero Fuentes-Casani [1], António Bandeira [6], Marcos Roberto Tovani-Palone [7*], Christian R. Mejia [8**]

[1] Universidad Nacional de San Antonio Abad del Cusco, Escuela Profesional de Medicina Humana, Asociación científica de estudiantes de medicina humana ASOCIEMH CUSCO, Cusco, PERU
[2] Unidad de Telesalud -Facultad de Medicina, Universidad Nacional Mayor de San Marcos, PERU
[3] Universidad San Martín de Porres-Filial norte, SCIEMVE Sociedad Científica de Estudiantes de Medicina Veritas, Chiclayo, PERU
[4] Facultad de Medicina Humana, Universidad Nacional de San Martín, Tarapoto, Sociedad Científica de Estudiantes de Medicina de San Martín (SOCIEMSA), San Martín, PERU
[5] Facultad de Medicina San Fernando, Universidad Nacional Mayor de San Marcos (UNMSM), Sociedad Científica San Fernando (SCSF), Lima, PERU
[6] Faculdade de Medicina da Universidade do Porto, Porto, PORTUGAL
[7] Ribeirão Preto Medical School, University of São Paulo, Ribeirão Preto, BRAZIL
[8] Universidad Continental, Lima, PERU
*Corresponding Author: marcos_palone@hotmail.com
**Corresponding Author: christian.mejia.md@gmail.com

ARTICLE INFO

ABSTRACT

Objective: To determine the association between depression, anxiety, and stress according to sociodemographic and occupational factors in Peruvian health professionals during the coronavirus disease 2019 (COVID-19) pandemic.

Methods: Cross-sectional analytical and multicentre study, based on a virtual survey sent to Peruvian health personnel (from the 25 Peruvian regions) working during the COVID-19 pandemic. The three dependent variables (depression, anxiety, and stress) were measured with the Depression, Anxiety, and Stress Scale -21 (DASS-21) (Cronbach's Alpha: 0.93) and compared with sociodemographic and occupational variables. P-values were obtained through generalized linear models, adjusted for each location where the survey was sent.

Results: Of the 550 participants, 2%, 13%, and 3% of them had severe or very severe depression, anxiety, and stress, respectively. In the multivariate analysis, we observed that professionals with a greater number of children had a lower frequency of severe depression (adjusted prevalence ratio (aPR): 0.37; 95% confidence interval (CI): 0.17-0.79; p = 0.010). In addition, physicians had a lower frequency of severe anxiety (aPR: 0.37; 95% CI: 0.18-0.75; p = 0.036), and professionals who lived in the Central region (aPR: 0.50; 95% CI: 0.25-0.97; p = 0.042) and in the South of the country (aPR: 0.37; 95% CI: 0.19-0.71; p = 0.003) had lower anxiety levels compared to those in the Northern region. With regard to severe stress, those who lived in the Central (aPR: 0.15; 95% CI: 0.03-0.75; p = 0.021) and South regions (aPR: 0.19; 95% CI: 0.04-0.79; p = 0.011) had lower stress levels.

Conclusion: There were significant percentages of deteriorating mental health in Peruvian health professionals during the pandemic, which may have negative repercussions in the short-, medium-, and long-term. In this sense, additional governmental actions should be necessary to provide specific psychological and psychiatric support programs to these workers.

Keywords: occupational health, mental health, coronavirus, health personnel, pandemics

INTRODUCTION

The Peruvian health system has been constantly changing throughout its history; however, it still has many deficiencies in the different levels of care [1,2], ranking the sixty-first position among 71 countries evaluated [3]. Its main limitations result from several factors, such as lack of personnel, insufficient financial resources, inadequate infrastructure, and corruption [2,4,5]. These factors, in turn, have been identified as a cause of work overload and, physical and mental health problems in

workers in the health sector [6,7], including Burnout Syndrome, stress, and anxiety [8].

The world is currently experiencing a pandemic unprecedented in modern history, which has generated several negative impacts in the fields of politics, economics, and health, with more than 122 million confirmed cases of coronavirus disease 2019 (COVID-19) and approximately 2 million and 700 thousand deaths [9]. In view of this, it is of great importance to preserve the mental health of health professionals in all aspects, since disorders in this field can generate negative influences in the short-, medium-, and long-term, as examples of what has been reported in previous epidemics [10] as well as in recent publications by Chinese authors [11].

Given this scenario, the Peruvian government has taken actions to create support guidelines for health professionals. Recently, a guide on care of mental health of health professionals during the COVID-19 pandemic was elaborated ("Technical guide for care of mental health of health professionals in the context of the COVID-19 pandemic ["Guía técnica para el cuidado de la salud mental del personal de la salud en el contexto del COVID-19"]), whose main purpose is to ensure the care and self-care of the mental health of these professionals [12].

Therefore, it is also of fundamental importance to carry out studies on the state of mental health of professionals in the health sector working during the COVID-19 pandemic [13], in order to provide adequate emotional support for them, grant the required rest period, and mitigate the triggering factors of related mental disorders; which should contribute to the well-being of them, with positive impacts on the provision of services to patients [14,15] and their families [16], in addition to avoiding early retirements and leave.

In this study, we determined the association between depression, anxiety, and stress according to sociodemographic and occupational factors in Peruvian health professionals working during the pandemic.

METHODS

Study Design and Population

This is a cross-sectional analytical and multicentre study carried out in Peru with the participation of several institutions, based on a virtual survey sent to over 500 health professionals in the 25 Peruvian regions (24 departments and 1 constitutional province). A non-randomized snowball sampling method was used for a minimum sample size of 544 professionals. Another 10% was added to the sample size (by calculating the expected rejection rate), obtaining a minimum sample size of 598 health professionals, for a minimum difference of 6% (47% versus 53%; obtained from a previous simulation), with a power of 80% and a 95% confidence level, for a sample unique (according to the study design: cross-sectional analytic), using the statistical program STATA v.14.0 (StataCorp LP, College Station, Texas, United States).

The health professionals answered the survey in the period between the fourth week of March and the first week of April 2020. Professionals who worked in health services at any of the three levels of health care (from the primary care to the specialized services) and who agreed to participate in the survey, with prior consent, were included in the study. A total

of 642 surveys were collected, of which 92 were excluded, corresponding to surveys from health professionals who did not complete the survey completely or who were not in professional practice during the investigation period.

Variables

We used the Depression, Anxiety, and Stress Scale -21 (DASS-21) to obtain the main variables (depression, anxiety, and stress). The original DASS was created by Lovibond and Lovibond (1995) [17] and it aims to assess the negative effects of these disorders. The DASS-21 is the short-form version of the original, which was translated and validated into Spanish by Daza et al. (2002) [18]. It consists of 21 items, which include the subscales of depression, anxiety, and stress. The questions asks about how the participant felt in the last week and each item is scored on a 4-grade Likert scale from 0 to 3, with 0 indicating "did not apply to me at all", and 3 indicating "applied to me all the time".

The DASS-21 has shown a good sensitivity and specificity for these three mental pathologies; for depression (sensitivity: 88.5 and specificity: 86.5), for anxiety (sensitivity: 87.5 and specificity: 83.4), as well as for stress (sensitivity: 81.5 and specificity: 71.4). Moreover, Cronbach's alpha was calculated to be 0.93. The variables were classified according to the score obtained in the survey in five categories: normal, low, moderate, severe, and very severe.

Regarding the independent variables, we consider sex, marital status, work area, employment status, health sector, work hours, type of health professional, and levels of care as categorical variables, while age, number of children, and years of service as quantitative variables.

Procedures

The DASS-21 survey was adapted to a virtual format and sent to health professionals. Once the investigation protocol was approved by the Ethics Committee of the Facultad de Medicina Humana of the Universidad de San Martín de Porres, the survey was shared through social networks from the fourth week of March until the first week of April 2020, given that a state of emergency was decreed in Peru for a period of 90 days since March 11, 2020. We prioritized the send of more surveys to Lima and the departments of the North region, which were the areas most affected by COVID-19.

Subsequently, the researchers of this study contacted the representatives of each of the hospitals, medical school, Regional Health Directorate (DIRESA) as well as with some health professionals (individually), to request collaboration for the dissemination of the survey, being this anonymous and ensuring the confidentiality of the information. Confidentiality of information was assured and information was recorded anonymously.

Data Analysis

Results of the surveys were tabulated in Microsoft Excel 2013 spreadsheets (Microsoft Corp, Redmond, Washington), and a quality control was performed by reviewing the complete and correct filling of each received survey. Finally, the data were transferred to the statistical program STATA v.14.0 (StataCorp LP, College Station, Texas, United States).

Moreover, we review the normality of the quantitative variables of the study and they were described using measures of central tendency and dispersion. Categorical variables were described as frequencies and percentages. A figure was drawn

Table 1. Characteristics of the health professionals interviewed, in all regions of Peru

Variable	Frequency	Percentage
Female sex	298	54.3%
Age (years)*	37	31-47
Single	226	41.1%
Married	195	35.5%
With children	332	60.4%
Number of children*	2	1-3
Physician	336	61.2%
Nurse	115	21.0%
Care level		
First level	178	32.4%
Second level	144	26.2%
Third level	228	41.4%
Works in emergency	184	44.5%
Works in intensive care unit	22	4.0%
Work region		
North	181	32.9%
Central	188	34.2%
South	181	32.9%
Ministry of Health	349	63.5%
Social Security	148	26.9%
Work hours		
Less than 6 hours	48	8.7%
6-12 hours	305	44.5%
More than 12 hours	197	35.8%
Worked years		
Less than 1 year	63	11.4%
Up to 5 years	168	30.6%
Up to 10 years	103	18.7%
More than 10 years	216	39.3%

*The median value and the quartiles were described for these variables

to show the percentages of each of the categories of the three dependent variables.

We also performed a bivariate analysis, in which each of the three dependent variables was crossed with each of the independent variables, thus obtaining the p-values in each case. For multivariate analysis, we crossed (in each case) the variables considered statistically significant in the bivariate model, using generalized linear models (from the Poisson family, with a logarithmic link function, and models for robust variance; adjusted for each location where the survey was sent). Adjusted prevalence ratios (aPR), 95% confidence intervals (CI), and p-values were obtained. In each of the crossings, p-values <0.05 were considered statistically significant.

Ethics

During the entire investigation period the ethical concerns were taken into account, since the survey was answered anonymously (in order for participants to feel comfortable and without risk of identification). In addition, participation in the study was completely voluntary (in the initial part of the survey, both the objective of the investigation and the voluntary nature of participation were explained).

RESULTS

Of the 550 participants nationwide, 54.3% were women. The median age was 37 years (quartiles: 31-47 years), with 61.2% of the participants being physicians, 41.4% working in units at the third level of care (large hospitals in Peru), 44.5% working in services emergency, 63.5% belonged to an institution regulated by the Peruvian Ministry of Health, 44.5% worked between 6 to 12 hours a day, and 39.3% had been working for more than 10 years (**Table 1**).

We found also that 0%, 7%, and 1% of the health professionals had, respectively, very severe depression, anxiety, and stress; while 3%, 7%, and 2% of them had severe depression, anxiety, and stress. Furthermore, 76%, 51%, and 72% of the workers had depression, anxiety, and stress, respectively, within the values considered normal (**Figure 1**).

In the bivariate analysis, severe depression was inversely associated with the number of children (p = 0.032), life and work in the Southern region of the country (p = 0.005), and the number of hours worked per day (both p <0.001). Regarding anxiety, we found associations with the medical profession (p <0.001) and with life and work in the Central (p = 0.010) and South regions of Peru (p = 0.001).

With respect to stress, associations were observed with work at the second level of care (p = 0.023) and the region, when compared those who lived and worked in the North of the
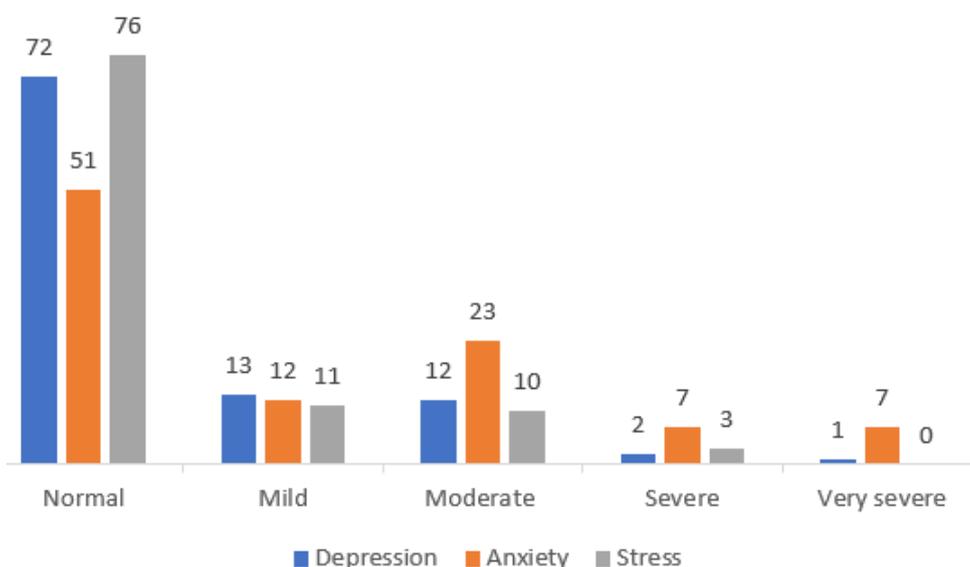
Figure 1. Percentages of depression, anxiety, and stress among health professionals during the COVID-19 pandemic in Peru

Table 2. Bivariate analysis of sociodemographic and occupational factors associated with severe and very severe depression, anxiety, and stress in health professionals during the COVID-19 pandemic in Peru

Variable	Depression	Anxiety	Stress
Sex	0.201	0.580	0.063
Age (years)*	0.482	0.369	0.204
Single	0.372	0.772	0.233
Married	0.184	0.591	0.061
With children	0.176	0.927	0.064
Number of children*	0.032	0.547	1.000
Physician	0.661	<0.001	0.643
Nurse	0.122	0.141	0.800
Care level			
First level	Reference	Reference	Reference
Second level	0.470	0.168	0.023
Third level	0.333	0.677	0.088
Works in emergency	0.352	0.683	0.805
Works in intensive care unit	0.253	0.431	0.479
Work region			
North	Reference	Reference	Reference
Central	0.240	0.010	0.009
South	0.005	0.001	0.011
Ministry of Health	0.706	0.417	0.941
Social Security	0.537	0.894	0.207
Work hours			
Less than 6 hours	Reference	Reference	Reference
6-12 hours	<0.001	0.360	0.927
More than 12 hours	<0.001	0.222	0.546
Worked years			
Less than 1 year	Reference	Reference	Reference
Up to 5 years	0.674	0.835	0.940
Up to 10 years	0.611	0.080	0.787
More than 10 years	0.904	0.458	0.611

*These variables were described quantitatively. P- values were obtained with generalized linear models (from the Poisson family, with a logarithmic link function, and models for robust variance; adjusted for each location where the survey was sent). Depression, anxiety, and stress were measured with the DASS-21 test.

Table 3. Multivariate analysis of sociodemographic and occupational factors associated with severe or very severe depression, anxiety, and stress in health professionals during the COVID-19 pandemic in Peru

Variable	Depression	Anxiety	Stress
Number of children*	0.37 (0.17-0.79) 0.010	Did not enter the model	Did not enter the model
Physician	Did not enter the model	0.37 (0.18-0.75) 0.036	Did not enter the model
Care level			
First level	Did not enter the model	Did not enter the model	Reference
Second level	Did not enter the model	Did not enter the model	5.94 (0.88-40.2) 0.068
Third level	Did not enter the model	Did not enter the model	6.80 (0.81-57.5) 0.088
Work region			
North	Reference	Reference	Reference
Central	0.35 (0.02-6.42) 0.481	0.50 (0.25-0.97) 0.042	0.15 (0.03-0.75) 0.021
South	Does not converge	0.37 (0.19-0.71) 0.003	0.19 (0.04-0.79) 0.011
Work hours			
Less than 6 hours	Reference	Did not enter the model	Did not enter the model
6-12 hours	Does not converge	Did not enter the model	Did not enter the model
More than 12 hours	Does not converge	Did not enter the model	Did not enter the model

** This variable was described quantitatively. The prevalence ratios (95% confidence intervals) and p-values were obtained with generalized linear models (from the Poisson family, with a logarithmic link function, and models for robust variance; adjusted for each location where the survey was sent). Depression, anxiety, and stress were measured with the DASS-21 test.

country with those who lived and worked in the Central region (p = 0.009) and in the South (p = 0.011) (**Table 2**).

In the multivariate analysis, we observed that the greater the number of children, the lower the frequency of severe depression (aPR: 0.37; 95% CI: 0.17-0.79; p = 0.010), adjusted by the region of work and the amount of hours worked per day. In addition, physicians had a lower frequency of severe anxiety (aPR: 0.37; 95% CI: 0.18-0.75; p = 0.036). When compared, professionals who lived and worked in the Central region (aPR: 0.50; 95% CI: 0.25-0.97; p = 0.042) and in the South of the country (aPR: 0.37; 95% CI: 0.19-0.71; p = 0.003) had lower anxiety levels than those who lived and worked in the North. With regard to severe stress, health workers who lived and worked in the Central (aPR: 0.15; 95% CI: 0.03-0.75; p = 0.021) and in the South regions (aPR: 0.19; 95% CI: 0, 04-0.79; p = 0.011) had lower stress levels (adjusted according to the level of care of each hospital) in comparison with those who lived in the North of the country (**Table 3**).

DISCUSSION

The initial hypothesis of our study was the existence of an association between depression, anxiety, and severe stress according to sociodemographic and occupational factors in Peruvian health personnel working during the COVID-19 pandemic. This hypothesis was confirmed by the findings that the number of hours of work per day in hospitals, number of children, medical professional category, level of care, and work region showed a significant association with stress, anxiety, and severe depression during the pandemic, which suggests a high risk for mental health problems in these professionals.

The number of children, work region, and number of hours of work per day in hospitals demonstrated an association with severe depression during the COVID-19 pandemic. The increase in the number of hours of work per day was due to a significant increase in severe COVID-19 patients in the different regions of the country, thus subjecting health personnel to increased exposure to the disease. Furthermore, this may also result in reduction of the time normally spent with their families, generating feelings of sadness, frustration, and anger, which in the long term could cause depression. Studies conducted in China and Pakistan during the COVID-19 pandemic demonstrated that health personnel had a prevalence of 1.9% and 0.9% for severe depression and anxiety, respectively. According to these and other studies, the risk factors for depression were having a higher workload (Odds ratio (OR): 1.319; 95% CI: 1.167–1.492), having children at home (OR: 1.58; 95% CI: 1.00–2.50) [19,20], increased work hours [21], and working in a COVID-19 hospital (OR: 1.124; 95% CI: 0.723–1.748). The results of Zheng et al. (2021) indicate a prevalence of severe depression of 1% among health professionals [22].

In our study, severe anxiety was associated with the health professional category and work region. The different health categories have different roles in the treatment and monitoring

of patients, and nurses are frequently in direct contact with them due to continuous care and observation. This, in turn, can generate feelings of fear and uncertainty related to the possibility of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection and spread the disease to their families, with increased fear according to the work region, since the number of positive cases and severe patients may be varied in different regions. A study performed in China showed that the prevalence associated with the fear of SARS-CoV-2 infection among health professionals and spread of the disease to their families was 54.7% and 86.9%, respectively, which contributed to the development of anxiety [23] and corroborates our findings. Another study found that being a doctor, nurse, midwife, or health technician was associated with different levels of anxiety [19]. Moreover, in a study conducted in Spain was evidenced a percentage of 58.6% of health professionals that worked during the pandemic with a possible anxiety disorder, with 20.7% of them with a serious disorder [24]. In complement to these evidences, Zheng et al. (2021) observed that health professionals working in a COVID-19 hospital as a paediatric nurse had a significant association with anxiety (OR: 1.083; 95% CI: 0.771–1.520), with a prevalence of probable severe anxiety of 4.9% [22].

Based on our results, severe stress was shown to be associated with the level of care and work region. The increase in COVID-19 positive cases and severe patients at the beginning of the pandemic, especially in Northern Peru, led to the collapse of hospitals and later the health system. The insufficient number of health personnel caused an overload of work, which generated negative impacts to these professionals, including fatigue, exhaustion, demotivation, and irritation. This may predispose health personnel to suffer from stress, due mainly to the concern to spread the disease to their families. A study performed in Taiwan showed a prevalence of severe stress of 17.2% in hospital staff with increased symptoms of exhaustion and psychological strain [25,26]. In Serbia, 70.4% of first-line doctors and 70.2% of first-line nurses reported anxiety-producing thoughts related to the possibility of SARS-CoV-2 infection in their families and loved ones. In contrast, this type of thought was present in only 35.2% of second-line doctors and 49.8% of second-line nurses [27]. In addition, a study conducted in Singapore and India with the participation of their main hospitals showed that of the 142 patients who tested positive for anxiety, 55.6% of them had moderate to very severe anxiety [28].

Therefore, it is recommended that every hospital centers implement mental health programs with a focus on the constant monitoring of their workers in order to mitigate the short-, medium-, and long-term consequences of mental health disorders.

LIMITATIONS

The limitation of the study is that no random sampling was done to obtain a nationally representative population, which restricts the generalization of our findings. In this sense, further studies are recommended to be done with multi-stage randomization and even with a larger sample size. Moreover, a longitudinal follow-up of health professionals to measure causality is also lacking. We suggest considering the assessment by specialty and subspecialty of the health staff, as well as the follow-up of mental health symptoms. Despite these limitations, this is the first study in Peru that assesses the mental health status of health professionals in the face of the COVID-19 pandemic, thus our findings can be used to formulate new study hypotheses.

CONCLUSIONS

We concluded that a small percentage of health professionals had severe or very severe depression and stress, while a regular percentage of the professionals had severe or very severe anxiety. Depression was associated with the number of children, while anxiety was associated with being a physician and work region, and stress with the work region.

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