Knowledge, attitudes, practices, fear and stress before COVID-19 in nursing students and recent graduates in Colombia

Conocimientos, actitudes, prácticas, temor y estrés ante el Covid-19 en estudiantes y recién egresados de Enfermería en Colombia

Conhecimento, atitudes, práticas, medo e estresse diante da Covid-19 entre estudantes e recém-formados de enfermagem na Colômbia.

Sonia Patricia Carreño-Moreno[1]
Lorena Chaparro-Díaz[2]
Cristian David Cifuentes-Tinjaca[3]
Freddy Elías Perilla-Portilla[4]
Erika Ximena Viancha Patiño[5]

1 Universidad Nacional de Colombia, Bogotá, Colombia. spcarrenom@unal.edu.co Autora de correspondencia.
2 Universidad Nacional de Colombia, Bogotá, Colombia. olchaparrod@unal.edu.co
3 Universidad de Los Llanos, Villavicencio, Colombia, cristian.cifuentes@unillanos.edu.co
4 Universidad Francisco de Paula Santander, Chinacota, Colombia, fperilla1@gmail.com
5 Universidad Pedagógica y Tecnológica de Colombia,UPTC. Sogamoso, Colombia. erika.viancha24@gmail.com

Abstract

Introduction: the COVID-19 pandemic has affected the emotional health of human resources in health care, despite having knowledge about the virus and its management, health care personnel, including nurses, have shown stress and fear of COVID-19. **Objective:** to describe and correlate the level of fear, stress, knowledge, attitudes and practices regarding Covid-19 in nursing students and recent graduates in Colombia. **Materials and Methods:** a cross-sectional and analytical observational study was conducted in Colombia between October and November 2020. The instruments of fear, stress and knowledge, attitudes and practices regarding COVID-19 were answered online by 1621 nursing students and recent graduates. **Results:** a mean fear score of 20.69 ± 6.1 points, a mean stress score of 89.15 ± 29.5 points and relative frequencies above 80% for knowledge, attitudes and practices to COVID-19 were observed. Direct correlations were observed between knowledge and attitudes and, in turn, attitudes with the practice. Fear was inversely correlated with knowledge and directly correlated with COVID-19 stress. **Conclusion:** an adequate cognitive level is observed in nursing students and recent graduates, but an emotional deficiency in the COVID-19, in terms of stress and fear. It is necessary to establish mental health support strategies for this key population in the current and future control of health crisis situations.

Keywords: coronavirus infection; fear; psychological stress; health knowledge, attitudes, and practice.

Conocimientos, actitudes, prácticas, temor y estrés ante el Covid-19 en estudiantes y recién egresados de Enfermería en Colombia

Resumen

Introducción: La pandemia por Covid-19 ha tenido una afectación de la salud emocional del recurso humano en salud, a pesar de contar con conocimientos sobre el virus y su manejo, el personal sanitario entre el que está Enfermería, presenta estrés y temor ante el Covid-19. **Objetivo.** Describir y correlacionar el nivel de temor, estrés, conocimientos, actitudes y prácticas frente al Covid-19 en estudiantes y recién egresados de Enfermería en Colombia. **Método.** Se realizó un estudio observacional de carácter transversal y analítico en Colombia entre octubre y noviembre de 2020. Los instrumentos de temor, estrés y conocimientos, actitudes y prácticas ante el Covid-19 fueron respondidos en línea por 1621 estudiantes y recién egresados de Enfermería. **Resultados.** Se observó una media de temor de 20.69 ± 6.1 puntos, una media de estrés de 89.15 ± 29.5 puntos y frecuencias relativas superiores al 80% para los conocimientos actitudes y prácticas ante el Covid-19. Correlaciones directas fueron observadas entre los conocimientos y actitudes y a su vez, las actitudes con las prácticas. El temor se correlacionó de forma inversa con los conocimientos y de forma directa con el estrés ante el Covid-19. **Conclusión.** Se observa un adecuado nivel cognitivo en los estudiantes y recién egresados de enfermería, pero una deficiencia emocional frente al Covid-19, en términos de estrés y temor. Es necesario establecer estrategias de soporte en salud mental para esta población clave en el control actual y futuro de situaciones de crisis en salud.

Palabras clave: Infecciones por Coronavirus; Miedo; Estrés Psicológico; Conocimientos; Actitudes y Práctica en Salud.

Conhecimento, atitudes, práticas, medo e estresse diante da Covid-19 entre estudantes e recém-formados de enfermagem na Colômbia

Resumo

Introdução: A pandemia de Covid-19 teve um impacto sobre a saúde emocional dos trabalhadores da saúde, apesar de terem conhecimento do vírus e seu manejo, os trabalhadores da saúde, incluindo os da Enfermagem, estão estressados e com medo da Covid-19. **Objetivo**: Descrever e correlacionar o nível de medo, estresse, conhecimento, atitudes e práticas em relação à Covid-19 em estudantes de enfermagem e recém-formados na Colômbia. **Método:** Um estudo observacional, transversal e analítico foi realizado na Colômbia entre outubro e novembro de 2020. Os instrumentos de medo, estresse e conhecimento, atitudes e práticas em relação ao Covid-19 foram respondidos online por 1621 estudantes e recém-formados de enfermagem. **Resultados:** Foi observada uma pontuação média de medo de 20,69 ± 6,1 pontos, uma pontuação média de estresse de 89,15 ± 29,5 pontos e frequências relativas acima de 80% para conhecimentos, atitudes e práticas sobre a Covid-19. Foram observadas correlações diretas entre conhecimento e atitudes e, por sua vez, atitudes com práticas. O medo estava inversamente correlacionado com o conhecimento e diretamente correlacionado com o estresse da Covid-19. **Conclusão:** Um nível cognitivo adequado foi observado em estudantes de enfermagem e recém-formados, mas com deficiência emocional em termos de estresse e medo quando confrontados com a Covid-19. É necessário estabelecer estratégias de apoio à saúde mental para esta população-chave na gestão atual e futura de situações de crise sanitária.

Palavras chave: Infecções por Coronavirus; Medo; Estresse Psicológico; Conhecimentos; Atitudes e Prática em Saúde.

Introduction

The worldwide spread of SARS-CoV-2 and the mortality associated with COVID-19 have shown the dimensions of a pandemic that, in the case of Colombia, has left 1,399,911 cases, 38,484 deaths, and the entire national territory affected as of December 11, 2020[1]. The Colombian epidemiological history of COVID-19 recorded the identification of the first case on March 6, 2020. This event opened the containment phase, followed by the dissemination of cases to different departments and the difficulty of epidemiological follow-up and identification of the source of infection, which led to the general circulation of the virus in the country.

In response to this contingency, the national government has developed a series of measures, including issuing decrees mandating lockdowns, contagion prevention, events cancellation, health system preparation, and the organization of the economy for times of pandemic. One of the lines of action of the government, which has been the object of criticism and protest, is the one related to the organization of human talent in health. This line of action has been described as a violation of workers' rights as it forces them to deal with the pandemic on the front line without adequate labor guarantees in terms of wages, social benefits, incentives, and personal protective equipment[2-3]. As of December 12, 2020, 21,101 health care workers had gotten infected, and 103 of them died; medical and nursing staff were the most affected[4].

One of the aspects highlighted among health professionals, including nurses, is fear. There are common fears among nurses, including getting infected, carrying the virus on their body or clothing and infecting their loved ones at home, the collapse of the health system, and finally, fear of discrimination. Apart from fear, other feelings such as frustration, helplessness, anxiety, and anger are common; as they face a situation that is still unknown in many aspects, they do not feel sufficiently trained; they feel undervalued and vulnerable[5-6]. In the case of nursing students and recent graduates, fear is normal, and besides the common concerns they feel in their training process and particularly when they are close to graduation, there is the possibility of the health system overflow in Colombia and the need to go to work amid the pandemic, as the Government forewarned in the face of the contingency[7-8].

> **There are common fears among nurses, including getting infected, carrying the virus on their body or clothing and infecting their loved ones at home, the collapse of the health system, and finally, fear of discrimination. Apart from fear, other feelings such as frustration, helplessness, anxiety, and anger are common; as they face a situation that is still unknown in many aspects, they do not feel sufficiently trained; they feel undervalued and vulnerable[5-6]**

Parkpour and Griffiths (2020) describe fear as an unpleasant emotional state triggered by the perception of danger. Due to fear, some individuals have had attempted suicides because they thought they had COVID-19 even though the autopsies showed that they did not[9]. Fear has been studied from different psychological perspectives and stressful situations such as breast cancer, dementia, Alzheimer's disease, pain, surgery, dental procedures, public speaking, and phobias[9]. Therefore, assessing fear is important because it allows us to address and prevent it. The result of this study is the design of the FCV-19S, a scale to assess the fear of COVID-19. The authors also point out that the fear of COVID-19 is also a tool for increasing preventive behaviors.

In addition to being a harmful perception, fear can also be a predictor of positive behaviors. Harper et al. (2020) reported that fear of COVID-19 was the only predictor of positive behavior

change, i.e., social distancing and handwashing. In this sense, fear was presented as an important implication in understanding not only human behavioral responses to a pandemic, but the usefulness of negative emotions for prevention, given that negative emotions can serve to develop better adaptive and protective ways and, in certain contexts, keep people safe. However, pure fear can evolve into pathological forms, so it is necessary to assess it and intervene[10].

As for stress caused by COVID-19, high levels of stress and anxiety were observed mainly in doctors and nurses and severe mental symptoms in up to 14.5% of cases. Factors associated with mental symptoms were age, gender, specialization, and proximity to patients[11]. Petzold et al. (2020) point out the importance of considering the high incidence of stress and psychological distress in health professionals, by supporting the management of strong emotions, ensuring the satisfaction of basic needs, clear communication, distribution of tasks, flexible working hours and provision of psychosocial support services[12]. Health care workers develop psychological stress related to the thought of being in danger, the possibility of self-illness, worrying about family infection, and poor sleep quality[13].

Studies on knowledge, attitudes, and practices (KAPs) are required for health professionals in the current situation. In Italy, Moro et al. (2020) reported an average of 71.6% correct answers about the epidemic among health care workers and 61.2% among non-healthcare workers. Regarding patient management, 57.8% of workers were correct about treatments; however, it is necessary to strengthen preventive measures and behaviors[14]. In Henan, China, a study found that 89% of workers had sufficient knowledge, more than 80% feared self-infection with the virus, and 89% adequately followed practices to contain the virus. Workers with more experience, better job category, and fewer risk factors for COVID-19 presented better attitudes towards it[15]. On the other hand, a study conducted in Iran with medicine students found that they had a good knowledge of COVID-19, as evidenced by the fact that more than 85% gave correct answers to questions on the subject. In addition, preventive behaviors occurred in more than 94% of the cases and a moderate risk perception of 4.08 out of 8 was observed[16].

According to the panorama presented, fear, stress, knowledge, attitudes, and practices in relation to COVID-19 are areas of interest for study in the general population and even more in health personnel. In the literature reviewed, the importance of conducting studies on issues related to emotions, perceptions and behaviors is evident. Although research focused on the biology of the virus itself is urgent and fundamental, behavioral research is a priority to achieve a comprehensive control of the spread of the virus and understand the pandemic consequences[9,10,14]. In addition, given that these studies have been conducted internationally, conducting studies in Colombian settings is necessary. The hypothesis of this study is that there are inadequate levels of KAP, fear, and stress related to COVID-19, as well as correlations between these variables in nursing students and recent nursing graduates. Thus, the objective of this study is to describe and correlate the level of fear, stress, knowledge, attitudes, and practices regarding COVID-19 in nursing students and recent graduates in Colombia.

> **In the literature reviewed, the importance of conducting studies on issues related to emotions, perceptions and behaviors is evident. Although research focused on the biology of the virus itself is urgent and fundamental, behavioral research is a priority to achieve a comprehensive control of the spread of the virus and understand the pandemic consequences[9,10,14]**

Materials and Methods

Study design

A cross-sectional analytical study was conducted between October and November 2020. This study design is appropriate to describe research problems for which little prior information is available. It allows us to describe variables of interest, account for the magnitude of the problem and identify its associated factors[17-18].

Participants

The sample comprised 1621 students and recent graduates of nursing in Colombia who have contact with the Colombian Association of Nursing Students (ACOEEN, for its acronym in Spanish). Participants were recruited from all over Colombia using convenience sampling. Inclusion criteria were being a final year nursing student or having graduated no more than one year ago at the time of the study, being 18 years of age or older, being studying and residing in Colombia. Exclusion criteria was students or recent graduates working as a nurse technician in a health center treating people with COVID-19.

Measuring instruments

The instruments used were the following:

a) *The Fear of COVID-19 Scale*. It is a 10-item unidimensional scale developed by Ahorsu et al. in 2020. The construct validity of this scale reported unidimensionality with factor loadings above 0.66 and an item-total correlation from 0.47 to 0.56. The internal consistency of the original version of the instrument is acceptable, with a Cronbach's alpha of 0.82 and good stability with an intraclass correlation coefficient of 0.72. The scale can be self-administered and has a 5-point Likert scale ranging from never to always[19]. For interpreting the instrument, it should be considered that it does not have cut-off points and that the higher the score, the greater the fear of COVID-19. The highest possible score is 50 points. A Cronbach's alpha of 0.87 was observed for the present study' sample.

b) *Questionnaire of knowledge, attitudes, and practice towards COVID-19*. It has 12 questions, four regarding clinical presentations, three regarding transmission routes, and five regarding prevention and control of COVID-19. The questions have three polytomous response options: true, false, or "I don't know". A correct answer is assigned 1 point, which means that the questionnaire's score ranges from zero to twelve points. To present the questionnaire's descriptive data, in the knowledge subscale, incorrect answers and the option "I do not know" were included in a single category called incorrect answers. The Cronbach's alpha coefficient of the original version of the questionnaire was 0.71[20], while for the sample of this study, it was 0.79. For interpreting the instrument, it should be considered that it does not have cut-off points and that the higher the score, the greater the knowledge and the attitudes, and the better the practices concerning COVID-19. The highest possible score is 12 points for knowledge, 2 for attitude, and 2 for practice.

c) *The COVID Stress Scale*. It is a 36-item instrument with a 5-point Likert scale ranging from never to always. The instrument has six dimensions determined through confirmatory factor analysis. The dimensions are COVID-19 danger and contamination, COVID-19 socioeconomic consequences, COVID-19 xenophobia, COVID-19 traumatic stress symptoms, and COVID-19 compulsive checking. The internal consistency (Cronbach's alpha coefficient) showed values above 0.8 in all dimensions and correlations above 0.4 in the scale's original version[21]. For interpreting the instrument, it should be considered that it does not have cut-off points and that the higher the score, the greater the COVID-19-related stress. The highest possible score is 180 points. A Cronbach's alpha of 0.84 was calculated for this study's sample.

Procedures

The instruments to describe the population and measure the variables of interest were distributed to the participants' e-mail addresses, and the information was collected using Google forms. The Research Ethics Committee of the School of Nursing of the Universidad Nacional de Colombia approved the study with the number AVAL-011-20. Informed consent was obtained electronically by Google Forms. Before obtaining informed consent, the objectives and justification of the study were explained; it was also explained that Google Forms would not collect personal information to guarantee anonymity and confidentiality. This study was classified as a minimal risk study and complied with the standards for research involving human subjects[22-23].

Permission to use the instruments was obtained from the authors. A certified translator translated the instruments, and the language used was reviewed by a committee composed of a linguist and the five researchers.

Results

In this study, nursing students represented 80.2% of the sample, a low prevalence of smoking (only 2.9%), and they were mainly from the central region of Colombia (71.8%); something expected since most of the nursing schools are located in the central region of the country. The sample of this study reported a 6.4% prevalence of symptoms associated with COVID-19, 13.5% had contact with a suspected case, 9.8% had contact with a confirmed case, 46.1% live with population classified as at risk of severe disease due to COVID-19, and 18% live with health workers in active service of persons with COVID-19 (See Table 1).

The sample of this study reported a 6.4% prevalence of symptoms associated with COVID-19, 13.5% had contact with a suspected case, 9.8% had contact with a confirmed case, 46.1% live with population classified as at risk of severe disease due to COVID-19, and 18% live with health workers in active service of persons with COVID-19.

Table 1. Demographic characteristics of the study's sample

Sociodemographic Variables		Count	%
Highest Level of Education Completed	Recent graduated	321	19,80
	Nursing Student	733	80,20
Smoker	No	1574	97,10
	Yes	47	2,90
Socioeconomic stratum	1	294	18,14
	2	662	40,84
	3	555	34,24
	4	99	6,11
	5	8	0,49
	6	3	0,19
Region of residence	Amazonia	19	1,17
	Andean	1164	71,81
	Caribbean	223	13,76
	Orinoquia	104	6,42
	Pacific	111	6,85
Age	Average ± SD (range)	20.4 ± 1.84 (18-13)	

Of the study participants, 6.35% of them had had similar symptoms of COVID-19, 13.51% had been in contact with a person considered a suspect COVID-19 case, 9.8% had been in contact with a confirmed case, 46% lived with a population at risk for severe disease, and 17.9% lived with a health care worker in the active care of patients. Table 2 presents the findings mentioned above.

Table 2. Participants' suspicion of, contact with, and exposure to COVID-19

Variable	Answer	Count	%
Have you had symptoms in the last 14 days such as cough, sore throat, fever, general malaise?	Yes	103	6,35
Have you been in contact with anyone considered a suspect COVID-19 case?	Yes	219	13,51
Have you been in contact with any person diagnosed-with COVID-19?	Yes	159	9,81
Do you live with some populations at risk for COVID-19, such as people with chronic disease, older adults, or children under 1 year old?	Yes	747	46,08
Someone in your family (living with you) is a health care worker in the active care of patients.	Yes	291	17,95

Table 3 presents the descriptive statistics of the variable fear of COVID-19, total and by dimensions. We observed a mean of 20.69 points (SD 6.1) on a maximum possible score of 50.

Table 3. Descriptive statistics of fear of COVID-19

Scale	M	SD	Min.	Max.	95% CI	
					LI	UL
Total, Fear	20,69	6,109	10	47	20,39	20,99

Note: M=mean, SD= standard deviation, Min= minimum value, Max= maximum value, 95%CI= 95% confidence interval, LL= lower limit, UL=upper limit.

Table 4 presents the descriptive statistics of the variable stress before the COVID-19 total and by dimensions. A mean stress score of 89.15 points (SD 29.5) on a maximum possible scale of 180 points was observed.

Table 4. Descriptive statistics of stress caused by COVID-19

Scale/Subscales	M	SD	Min.	Max.	95% IC	
					LL	UL
Total, Stress	89,15	29,589	36	180	87,71	90,59
Danger	19,82	5,761	6	30	19,54	20,10
Socioeconomic consequences	14,94	6,791	6	30	14,60	15,27
Xenophobia	14,12	6,579	6	30	13,80	14,44
Contamination	17,29	6,779	6	30	16,96	17,62
Traumatic stress	10,25	5,681	6	30	9,97	10,52
Compulsive checking	12,74	5,737	6	30	12,46	13,02

Note: M=mean, SD= standard deviation, Min= minimum value, Max= maximum value, 95%CI= 95% confidence interval, LL= lower limit, UL=upper limit.

Table 5 presents the descriptive statistics of the variable knowledge, attitudes, and practice (KAP) towards COVID-19, the total and by dimensions. We observed a mean KAP score of 10.4 points (SD 2.3) on a maximum possible score of 14 points.

Table 5. Descriptive statistics of knowledge, attitudes, and practice towards COVID-19

Scala/Subscales	M	SD	Min.	Max.	IC 95%	
					LL	UL
Total, KAP	10.4	2.3	6	14	10.12	10.27
Knowledge	8.32	1.2	4	12	8.03	8.28
Attitudes	1.35	0.32	0	2	1.26	1.29
Practice	1.28	0.36	0	2	1.12	1.21

Note: M=mean, SD= standard deviation, Min= minimum value, Max= maximum value, 95%CI= 95% confidence interval, LL= lower limit, UL=upper limit.

Table 6 shows the significant correlations between the study variables. Weak and inverse correlations were observed between fear and attitudes and practice towards COVID-19, as well as weak and positive correlations between fear and total stress and its dimensions. Weak and positive correlations were observed between knowledge and attitudes and attitudes and practice. Finally, moderate to strong positive correlations were found between total stress and its dimensions.

Table 6. Descriptive statistics of knowledge, attitudes, and practice towards COVID-19

U	Fear total score	Know-ledge total score	Attitudes total score	Practice total score	Danger	Socioeco-nomic conse-quences	Xeno phobia	Contami-nation	Trau-matic stress	Compul-sive checking	Fear total score
Fear total score	1										
Knowledge total score	0,003	1									
Attitudes total score	-,050*	,070**	1								
Practice total score	-,056*	0,002	,100**	1							
Danger	,220**	0,001	0,024	-0,019	1						
Socioeconomic consequences	,166**	-0,042	0,025	0,007	,623**	1					
Xenophobia	,162**	-0,022	0,041	0,006	,513**	,626**	1				
Contamination	,200**	-0,004	0,015	-0,020	,675**	,522**	,665**	1			
Traumatic stress	,185**	-0,042	-0,001	0,008	,423**	,533**	,554**	,507**	1		
Compulsive checking	,154**	-0,038	0,022	0,002	,433**	,499**	,511**	,500**	,675**	1	
Fear total score	,228**	-0,031	0,027	-0,003	,772**	,809**	,823**	,822**	,767**	,750**	1

Note: Pearson's Correlation Test (r). p value: *<0.05 **<0.01 and ***<0.001

Discussion

This study aimed to describe and correlate the level of fear, stress, knowledge, attitudes and practice regarding COVID-19 in nursing students and recent nursing graduates in Colombia. As observed throughout the literature review, these variables are recurrent to know cognitive, emotional, and behavioral aspects related to COVID-19. The knowledge of these variables becomes a helpful input for decision making regarding the development of improvement strategies in the population of nursing students and recent graduates, given their future inclusion in the health workforce that will care for people with COVID-19; but also for taking priority measures that currently allow the containment of the virus and its effects on the population of interest[9,10,14]. The main findings derived from this study, and its contributions and limitations, are discussed below.

The variable fear of COVID-19 was between 20.39 and 20.99 points with 95% CI, which places this behavior at an intermediate point given that the highest possible score was 50 points (See Table 3). However, the level of fear of COVID-19 reported in this study is higher than that re-ported by Winter et al.[24] with a mean of 15.6 points for sample one and 18.3 points for sample 2, in New Zealand, at the time when the alert for Covid was at its highest level. The high level of fear in Colombia versus that reported in New Zealand is striking, con-sidering that the sample for this study was collected when Colombia was beginning to relax restrictive measures to prevent infection, and the first peak of the pandemic was declining. On the other hand, the level of fear in this study was similar to that reported by Sakib et al.[25] in their study in Bangladesh with the general population when that region was on high alert and confinement. A conditioning factor for the higher score of fear could be that the participants are nursing students or recent graduates, and they are considered to be at a higher risk of becoming infected and transmitting the infection to their families[26].

The high level of fear in Colombia versus that reported in New Zealand is striking, considering that the sample for this study was collected when Colombia was beginning to relax restrictive measures to prevent infection, and the first peak of the pandemic was declining.

On the other hand, stress due to COVID-19 was between 87.71 and 90.59 points out of 180, the highest possible score (see Table 4). These levels of COVID-19 stress are much higher than those reported by Montano and Lacaran[27] in the Philippines, in the general population, considering that the two studies took place in the two countries during similar stages of the pandemic. In the case of Colombia, the most affected dimensions were danger and contamination, while traumatic stress had the lowest score. These findings contrast with the current behavior of the Colombian population because although concerned about danger and contamination, fewer and fewer people are accepting risk control measures[28]. In their study with nursing students, Aslan et al. observed moderate stress levels due to COVID-19, similar to our study, finding higher levels of stress in women and first-year nursing students[29]. Fear of getting infected is a pattern identified by Savitsky et al. related to high prevalence of anxiety where resilience functions as a moderating factor[30]. Finally, regarding stress, the present study's findings are similar to those reported in a study conducted in Spain, where mild to moderate levels of general stress were observed during the COVID-19 pandemic and confinement[31]. This finding indicates not only that stress for COVID-19 probably exists in the sample of the present study, but that, at a general level, pre-existing general stress situations may also be aggravated and even, as discussed by the authors of the study conducted in Spain, post-traumatic stress disorders may be predicted[31].

Although the level of knowledge about COVID-19 is high in this study, it still presents suboptimal levels in all areas (See Table 5). For example, there is not much knowledge about symptoms, progression of the disease to severe stages, type of masks that common people can use, and the possibility of getting infected in interactions with wild animals. These findings are congruent with those reported in China, where it was also identified that students with good knowledge and positive attitudes develop more and better preventive behaviors[32]. Similarly, Provenzano et al. identified high levels of knowledge, attitudes, and practices (KAP) in nursing students in Italy immediately after the lockdown was imposed. In contrast to Colombia, the Italian study reported a positive association between years of study and KAP[33]. Given the results of this study, it can be concluded that, despite having high levels of KAP, nursing students and recent graduates have a moderate prevalence of fear and stress due to COVID-19. These findings can be understood in light of the transition process that students go through. Although adequate KAP are expected given their training process, facing issues such as clinical practice and the potential risk involved makes situations such as fear and stress prevalent[34-35].

> **Although the level of knowledge about COVID-19 is high in this study, it still presents suboptimal levels in all areas (See Table 5). For example, there is not much knowledge about symptoms, progression of the disease to severe stages, type of masks that common people can use, and the possibility of getting infected in interactions with wild animals.**

Regarding the relationships between variables, an inverse and significant relationship was observed between fear and attitudes and practices towards COVID-19, a finding contrary to that reported in a European study where cultural differences in European regions but no correlations between these variables were reported[36]. A positive and significant relationship was also found between fear and stress in all dimensions, similar to the result reported by Rodriguez et al., who told the complex relationship between fear and stress regarding COVID-19 and how they predict depressive states[37]. These findings contrast with those observed in Colombia among general practice physicians, where no correlations were found between the variables[38]. Finally, positive and significant relationships were found between knowledge and attitudes and attitudes and practices. These results strengthen the evidence regarding the predictive role of knowledge in attitudes and practices and the need to address the prevention of COVID-19 infection from a cognitive and behavioral perspective (See Table 5)[39,40].

Compared to a similar study conducted in Mexico, in terms of population, research dates, and variables, the Colombian study sample reported lower levels of fear and stress, with very similar levels of knowledge of COVID-19. In the case of attitudes and practices, these variables were not reported in the Mexican study. Since this study was conducted in a Latin American country with a similar level of income, containment measures, access to tests, and health system response than Colombia, it is the one with which it can best be compared. In this regard, it is striking that, with similar levels of knowledge, Colombian participants presented lower levels of fear and stress for COVID-19. In this sense, and considering that these variables should not only be seen as negative but in many cases as protective factors against possible contagion, stressing virus containment measures in the Colombian population is necessary[41].

Noteworthy in this study is the robustness of the sample in terms of size and representativeness of all Colombian regions, according to the nursing schools that exist in the country. As a limitation, the authors state that it is impossible to generalize the results directly, given that convenience sampling was used; however, the results can be extrapolated to populations with similar characteristics to those of the present study, which is why the sociodemographic characteristics of the sample were extensively described. Regarding its practical use, it can be assured that the present study has already taken a first step with the development of two training days on COVID-19 (10 sessions each) open to ACOEEN members and nursing personnel. It has been shown that strengthening knowledge directly impacts on variables such as attitudes, practices, stress, fear, anxiety, and depression. In this way, coping mechanisms are promoted, which are necessary and a priority in this situation of mandatory confinement and therefore urges to deal with related negative emotions[42].

Conclusions

Nursing students and recent nursing graduates in Colombia have moderate levels of fear and stress due to COVID-19, and a direct correlation between these two variables was presented; the greater the stress, the greater the fear of COVID-19. A high level of knowledge, attitudes, and practices was also observed, with a direct relationship between knowledge and attitudes and attitudes and practices. Therefore, it is necessary to strengthen the cognitive component of COVID-19 to have a positive impact on attitudes and practices.

An adequate cognitive level but an emotional deficiency towards COVID-19 were observed, which shows the need to implement emotional containment and support strategies for this key population in the current and future control of health crises. It is pertinent to consider that although low levels of fear and stress regarding COVID-19 are ideal, risk awareness strategies should prevail to maintain containment strategies.

References

1. **Instituto Nacional de Salud.** COVID-19 en Colombia, panorama. Consulta: mayo 11, 2020. https://www.ins.gov.co/Noticias/Paginas/Coronavirus.aspx

2. **Ministerio de Salud y Protección Social.** Documentos Técnicos covid-19. Consulta: mayo 14, 2020. https://www.minsalud.gov.co/salud/publica/PET/Paginas/Documentos-tecnicos-covid-19.aspx

3. **Revista Semana**. Coronavirus: en Colombia hay 169 profesionales de la salud contagiados. Consulta: mayo 14, 2020. https://www.semana.com/nacion/articulo/coronavirus-en-colombia-hay-169-profesionales-de-la-salud-contagiados/664913

4. **Instituto Nacional de Salud.** COVID-19 en Colombia, poblaciones. Consulta: mayo 14, 2020. https://www.ins.gov.co/Noticias/paginas/coronavirus.aspx

5. **Periódico El Tiempo.** Médicos colombianos hablan de miedos y falta de protección ante el coronavirus - Salud Consulta: mayo 14, 2020. https://www.eltiempo.com/salud/medicos-colombianos-hablan-de-miedos-y-falta-de-proteccion-ante-el-coronavirus-477704

6. **Periódico El Espectador.** "El personal de salud no es inmune al miedo" salud mental en personal sanitario. Consulta: mayo 14, 2020. https://www.elespectador.com/coronavirus/el-personal-de-salud-no-es-inmune-al-miedo-articulo-916025

7. **Revista Semana.** Decreto presidencial obliga a trabajadores de la salud a estar disponibles para enfrentar el covid-19. Consulta: mayo 14, 2020. https://www.semana.com/nacion/articulo/decreto-presidencial-obliga-a-trabajadores-de-la-salud-a-estar-disponibles-para-enfrentar-el-covid-19/663156

8. **Presidencia de la República**. Decretos abril 2020. Consulta: mayo 14, 2020. https://dapre.presidencia.gov.co/normativa/decretos-2020/decretos-abril-2020

9. **Pakpour AH, Griffiths MD**. The fear of COVID-19 and its role in preventive behaviors. *Journal of Concurrent Disorders.* 2020. 2 (1): 58-63. http://irep.ntu.ac.uk/id/eprint/39561/1/1313636_Griffiths.pdf

10. **Harper CA, Satchell LP, Fido D, Latzman RD.** Functional Fear Predicts Public Health Compliance in the COVID-19 Pandemic. *Int J Ment Health Addict*. 2020. https://doi.org/10.1007/s11469-020-00281-5

11. **Bohlken J, Schömig F, Lemke MR, Pumberger M R-HS.** COVID-19 Pandemic: Stress Experience of Healthcare Workers - A Short Current Review. *Psychiatr Prax.* 2020;47(4):190'197. https://doi.org/10.1055/a-1159-5551

12. **Petzold MB, Plag J, Ströhle A.** Dealing with psychological distress by healthcare professionals during the COVID-19 pandemia. *Nervenarzt. Springer Medizin*; 2020. https://europepmc.org/article/med/32221635

13. **Wu W, Zhang Y, Wang P, Zhang L, Wang G, Lei G, et al.** Psychological stress of medical staffs during outbreak of COVID-19 and adjustment strategy. *J Med Virol.* 2020 Apr 21. https://doi.org/10.1002/jmv.25914

14. **Moro M, Vigezzi G Pietro, Capraro M, Biancardi A, Nizzero P, Signorelli C, et al.** 2019-novel coronavirus survey: Knowledge and attitudes of hospital staff of a large Italian teaching hospital. *Acta Biomed*. 2020; 91:29–34. https://doi.org/10.23750/abm.v91i3-S.9419

15. **Zhang M, Zhou M, Tang F, Wang Y, Nie H, Zhang L, et al.** Knowledge, attitude and practice regarding COVID-19 among health care workers in Henan, China. *J Hosp Infect.* 2020 Apr; 105: 183-187. https://doi.org/10.1016/j.jhin.2020.04.012

16. **Taghrir MH, Borazjani R, Shiraly R.** COVID-19 and Iranian Medical Students; A Survey on Their Related-Knowledge, Preventive Behaviors and Risk Perception. *Arch Iran Med.* 2020 Apr 1; 23(4): 249–54. https://doi.org/10.34172/aim.2020.06

17. **Polit DF, Beck CT.** Nursing Research: Generating and Assessing Evidence for Nursing Practice. Lippincott Williams & Wilkins; 2008. 796 p.

18. **Polit DF.** Statistics and data analysis for nursing research. 446 p.

19. **Ahorsu DK, Lin CY, Imani V, Saffari M, Griffiths MD, Pakpour AH.** The Fear of COVID-19 Scale: Development and Initial Validation. *Int J Ment Health Addict.* 2020;1-9. https://doi.org/10.1007/s11469-020-00270-8

20. **Zhong BL, Luo W, Li HM, Zhang QQ, Liu XG, Li WT, et al.** Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey. *Int J Biol Sci.* 2020;16(10):1745–52. https://doi.org/10.7150/ijbs.45221

21. **Taylor S, Landry CA, Paluszek MM, Fergus TA, McKay D, Asmundson GJG.** Development and initial validation of the COVID Stress Scales. *J Anxiety Disord.* 2020 May 1;72. https://doi.org/10.1016/j.janxdis.2020.102232

22. **República de Colombia.** Resolucion 8430 de 1993 Consulta: Mayo 14, 2020. http://www.unisabana.edu.co/fileadmin/Documentos/Investigacion/comite_de_etica/Res__8430_1993_-_Salud.pdf

23. **Consejo de Organizaciones Internacionales de las Ciencias Médicas.** Pautas éticas internacionales para la investigación biomédica en seres humanos. 2008. p. 1–119. http://www.cioms.ch/publications/guidelines/pautas_eticas_internacionales.htm

24. **Winter T, Riordan B.C, Pakpour A.H, et al.** Evaluation of the English Version of the Fear of COVID-19 Scale and Its Relationship with Behavior Change and Political Beliefs. *Int J Ment Health Addiction* (2020). https://doi.org/10.1007/s11469-020-00342-9

25. **Sakib N, Bhuiyan AKMI, Hossain S, et al.** Psychometric Validation of the Bangla Fear of COVID-19 Scale: Confirmatory Factor Analysis and Rasch Analysis [published online ahead of print, 2020 May 11]. *Int J Ment Health Addict.* 2020;1-12. https://doi.org/10.1007/s11469-020-00289-x

26. **Salah R, Ibrahim Z, Mohamed G, Mohammad L.** Mental strain and changes in psychological health hub among intern-nursing students at pediatric and medical-surgical units amid ambience of COVID-19 pandemic: A comprehensive survey. *Rev Nurse Education in Practice.* 2020 49. https://doi.org/10.1016/j.nepr.2020.102915

27. **Montano RLT, Acebes KML.** Covid stress predice síntomas de depresión, ansiedad y estrés de los encuestados filipinos. *Revista Internacional de Investigación en Ciencias Empresariales y Sociales.* 2020; 9 (4); 78-103. https://doi.org/10.20525/ijrbs.v9i4.773

28. **Ruiz J, Barrera J.** Análise espaço-temporal da infringência de normas legais sobre o confinamiento na Colômbia pelo COVID-19. *Revista Logos Ciencia & Tecnología.* 2020; 12(3); 20-32. http://dx.doi.org/10.22335/rlct.v12i3.1251

29. **Aslan H, Pekince H.** Nursing students' views on the COVID-19 pandemic and their percieved stress levels. *Perspect Psychiatr Care.* 2020; 1– 7. https://doi.org/10.1111/ppc.12597

30. **Savitsky B, Findling Y, Ereli A, Hendel T.** Anxiety and coping strategies among nursing students during the covid-19 pandemic. *Nurse Education in Practice.* 2020 Jul; 46:102809. https://doi.org/10.1016/j.nepr.2020.102809

31. **Ozamiz-Etxebarria N, Dosil-Santamaria M, Picaza-Gorrochategui M, Idoiaga-Mondragon N.** (2020). Niveles de estrés, ansiedad y depresión en la primera fase del brote del COVID-19 en una muestra recogida en el norte de España. *Cadernos de Saúde Pública,* 36(4). https://doi.org/10.1590/0102-311x00054020

32. **Yuan T, Liu H, Dong X, Rong H.** Factors Affecting Infection Control Behaviors to Prevent COVID-19: An Online Survey of Nursing Students in Anhui, China in March and April 2020. *Rev. Med Sci Monit,* 2020; 26: e925877. http://doi.org/10.12659/MSM.925877

33. **Provenzano S, Santangelo OE, Armetta F, Pesco G, Allegro A, Lampasona M, et al.** COVID-19 infection: comparing the knowledge, attitude and practices in a sample of nursing students. *Acta Biomed.* 2020 Nov 30;91(12-S):e2020001. https://doi.org/10.23750/abm.v91i12-S.10252

34. **Merchan N, Meza M, Palma J, Zambrano Z.** Salud Emocional De Los Internos De Enfermería Durante La Pandemia Del Covid-19: Salud Emocional De Los Internos De Enfermería. *Revista Científica Multidisciplinaria*. 2020; 4(3); 93-98.
https://doi.org/10.47230/unesum-ciencias.v4.n1.2021.287

35. **Peres M, Brandão M, Aperibense P, Lacerda A, Paim L, Ferreira M.** Facing Up Covid-19: What Cannot Be Relativized In Nursing Higher Education. *Texto & contexto enferm.* 2020; 29: e20200236. https://doi.org/10.1590/1980-265x-tce-2020-0236

36. **Mohammad A, Zakir U, Palash C, Fatema A, Shamita Z, Abu M, et al.** Knowledge, attitude, practice and fear of COVID-19: A cross-cultural study. *medRxiv*. 2020.
https://doi.org/10.1101/2020.05.26.20113233

37. **Rodríguez A, Pantaleón Y, Dios I, Falla D.** Fear of COVID-19, Stress, and Anxiety in University Undergraduate Students: A Predictive Model for Depression. *Frontiers in Psychology*. 2020; 11 (1); 3041. https://doi.org/10.3389/fpsyg.2020.591797

38. **Monterrosa Á, Dávila R, Mejía A, Contreras J, Mercado M, Florez C.** Estrés laboral, ansiedad y miedo al COVID-19 en médicos generales colombianos. *MedUNAB*. 2020; 23(2), 195-213. https://doi.org/10.29375/01237047.3890

39. **Cortés JA, Espitia P, Rosero-Lasso YL.** Preparación de la ciudad para la pandemia: una encuesta de conocimientos, actitudes y prácticas sobre la prevención de infecciones respiratorias en Bogotá, Colombia. *Biomédica*. 2020; 40(2) :159-65.
https://doi.org/10.7705/biomedica.5526

40. **Rios C.** Conocimientos, actitudes y prácticas hacia COVID-19 en paraguayos el periodo de brote: una encuesta rápida en línea. *Rev. salud publica Parag.* 2020 Dec; 10(2): 17-22.
https://doi.org/10.18004/rspp.2020.diciembre.17

41. **Medina IA, Carreño SP, Chaparro LP, Gallegos-Torres RM, Medina JA, Hernández EK.** Fear, Stress, and Knowledge regarding COVID-19 in Nursing Students and Recent Graduates in Mexico. *Invest Educ Enferm*. 2020; 39(1):e05. https://doi.org/10.17533/udea.iee.v39n1e05

42. **Valero N, Vélez M, Durán A, Portillo M.** Afrontamiento del COVID-19: estrés, miedo, ansiedad y depresión?. *Enferm Inv.* 2020;5(3):63-70.
https://revistas.uta.edu.ec/erevista/index.php/enfi/article/view/913