Original Research

Factors Associated with Knowledge and Perceptions Regarding the COVID-19 Pandemic among Future Health Science Professionals: A Logistic Model Analysis

Casimira Chuquimez[1], Jasmín De la Cruz[1], Daniel Alvitez-Temoche[1], Abigail Temoche[2], Arnaldo Munive-Degregori[3], Frank Mayta-Tovalino[1,4]

[1]Academic Department, Faculty of Dentistry, Universidad Nacional Federico Villarreal, [2]Academic Department, Faculty of Medicine, Universidad Nacional Federico Villarreal, Lima, Peru, [3]Academic Department of Rehabilitating Stomatology, Faculty of Dentistry, Universidad Nacional Mayor de San Marcos, Lima, Peru, [4]Postgraduate Department, CHANGE Research Working Group, Faculty of Health of Sciences, Universidad Científica del Sur, Lima, Peru

Abstract

Aim: This study aimed to determine the factors associated with knowledge and perceptions regarding the coronavirus disease-2019 (COVID-19) pandemic among undergraduate students in different health science fields. **Materials and Methods:** An analytical, cross-sectional, prospective study was conducted. Data were collected between January and March 2021, from health science undergraduate students attending Federico Villarreal National University in Peru. To calculate the sample size, a formula to estimate a proportion was applied using Stata 15 software (n = 527). The examined factors were faculty, year of study, gender, region, residence, living with parents, and having family members infected with COVID-19, which were analyzed using a logit model to identify the impact of the intervening variables with a significance of $P < 0.05$. **Results:** None of the variables studied were found to affect knowledge and perceptions regarding COVID-19 preventive measures among Peruvian health science students, with the following odds ratios (OR) obtained: faculty (OR = 0.96; 95% confidence interval [CI]: 0.83–1.12), year of study (OR = 0.98; CI: 0.77–1.25), gender (OR = 1.12; CI: 0.54–2.28), region (OR = 1.32; CI: 0.35–4.78), residence (OR = 0.97; CI: 0.48–1.95), living with parents (OR = 1.5; CI: 0.52–4.39), and having infected family members (OR = 1.5; CI: 0.64–3.49). **Conclusion:** The results of this study show that students at a Peruvian public university have adequate knowledge and perceptions regarding preventive strategies to avoid contracting and spreading COVID-19. In addition, none of the examined factors were significant in this relationship.

Keywords: COVID-19, Health Sciences, Knowledge, Pandemic, Perception

Received: 23-05-2021, **Revised:** 20-07-2021, **Accepted:** 08-11-2021, **Published:** 30-11-2021.

Introduction

In December 2019, in Wuhan, China, cases began to be reported of which, at the time, was believed to be a type of pneumonia, with initial symptoms similar to that of the flu (e.g., high fever, dry cough, and general malaise), but that could be complicated by respiratory distress, chest tightness, joint pain, diarrhea, and loss of smell, taste, and appetite. However, the cause of this condition was then unknown.[1] Several weeks later, SARS-CoV-2 (i.e., severe acute respiratory syndrome, produced by coronavirus 2), a novel RNA virus of the coronavirus family which causes coronavirus disease-2019 (COVID-19), was identified. COVID-19 spread rapidly, causing a large number of infections and deaths worldwide.[2] On March 11, 2020, the COVID-19 outbreak was declared a pandemic by the World Health Organization (WHO). As of February 22, 2021, WHO had reported a total of 111,102,016 accumulated COVID-19 cases, with 1,275,899 total confirmed cases in Peru.[3]

Access this article online

Quick Response Code:

Website: www.jioh.org

DOI: 10.4103/jioh.jioh_121_21

Address for correspondence: Dr. Frank Mayta-Tovalino, Postgraduate Department, Faculty of Stomatology, Universidad Nacional Federico Villarreal, and Universidad Científica del Sur, Av. Paseo de la República 5544, Miraflores 15074, Peru.
E-mail: fmayta@unfv.edu.pe

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How to cite this article: Chuquimez C, De la Cruz J, Alvitez-Temoche D, Temoche A, Munive-Degregori A, Mayta-Tovalino F. Factors associated with knowledge and perceptions regarding the COVID-19 pandemic among future health science professionals: A logistic model analysis. J Int Oral Health 2021;13:579-85.

COVID-19 is transmitted directly from person-to-person through sneezing or coughing and by contact with oral and nasal membranes.[4,5] Future health science professionals are a high-risk population for contracting and spreading this virus, because they will be exposed to fluids, mucous membranes, microorganisms, and patient secretions, and will likely come in contact with contaminated materials and rooms.[6-8] Given their potential exposure to such risk factors, it is vital for all health science students and future professionals to have accurate knowledge and perceptions regarding preventive strategies to avoid contracting and spreading COVID-19; however, it is also essential for them to know the associated factors that influence the development of the virus.[9,10]

This study aimed to determine the factors associated with knowledge and perceptions regarding the COVID-19 pandemic among undergraduate students from different health science fields.

Materials and Methods

Sample size

An analytical, cross-sectional, prospective study was conducted. Participants comprised university students from different health science fields. Data were collected from Universidad Nacional Federico Villarreal (UNFV) from January to March 2021. To calculate the sample size, the formula for estimating the proportion was applied using the Stata 15 program (n = 527 students). The calculation of the sample was carried out through a pilot study from which the proportions that were analyzed with a beta of 0.8 and an alpha of 0.05 were obtained. Because it was a virtual survey, the 527 students could be evaluated in 3 months. Finally, for this study, the STROBE guidelines (that is, Strengthening the Report of Observational Studies in Epidemiology) were followed.

When selecting participants, inclusion criteria were as follows: students of any gender, those who were enrolled in the 2021 academic year, who provided signed informed consent, and those who were studying health sciences at UNFV. The exclusion criteria of the study were students who did not want to participate, had already graduated or who had Internet connection problems.

Associated factors

The factors considered when evaluating participants' knowledge and perceptions regarding COVID-19 were faculty (X1), year of study (X2), gender (X3), region (X4), residence (X5), living with parents (X8), and having infected family members (X7). These factors were analyzed using a logit model to identify the influence of the intervening variables with a value of $P < 0.05$.

Data collection and measurements

Data were obtained from health sciences students using a questionnaire previously validated by Gohel *et al.*[9] The questionnaire has two dimensions, each with 12 questions. The first dimension is related to knowledge about COVID-19, whereas the second dimension is related to perceptions of COVID-19. The database was prepared, and the collected information was analyzed. The questionnaire was prepared using current WHO reports on COVID-19. The questionnaire has shown face and content validity. Six topics were used to evaluate related factors.

Statistical analysis

For the univariate analysis, descriptive statistics of the qualitative and quantitative variables distributed in frequency tables were obtained. To calculate the normality of the numerical variables, the Kolmogorov−Smirnov test was used. Next, to determine the associated factors, a logistic regression model with respective odds ratios (OR) was used. All analyses were conducted using Stata 15 statistical software. The significance level was set at $P > 005$.

Results

Regarding participant characteristics, the highest proportion was composed of dentistry, psychology, and medicine students, with 56.7%, 14.6%, and 9.9% of the total sample, respectively. As for year of study, 30.9% were in their fourth year. Women were more prevalent in the sample than men, comprising 71.5%. Regarding place of residence, 94.9% of the sample lived in the coastal region, with 84.1% of the total sample residing in urban areas. In addition, 86.3% of the students currently lived with their parents, and 77.2% had relatives or acquaintances who had previously contracted COVID-19 [Table 1].

As shown in Table 2, the results only indicated a statistically significant association between gender in participants from all health science fields and Q1 (i.e., Where did you first hear about COVID-19?), $P = 0.001$. The other questions that evaluated students' knowledge regarding COVID-19 were not associated with gender, $P > 0.05$.

Further, Table 3 shows the results regarding participants' perceptions of COVID-19. The results indicated that there was only a statistically significant association between gender in participants from all health science fields and question Q8 (i.e., Can an ultraviolet (UV) disinfection lamp kill the new coronavirus?), $P = 0.002$.

In the logistic regression analysis, no variables were found to be associated with health science students' knowledge levels regarding COVID-19, with the following results obtained: faculty (OR = 0.9; 95% confidence interval [CI]: 0.83–1.12), year of study (OR = 0.9; CI: 0.77−1.25), gender (OR = 1.1; CI: 0.54–2.28), region (OR = 1.3; CI: 0.35–4.78), residence (OR = 0.9; CI: 0.48–1.95), living with parents (OR = 1.5; CI: 0.52–4.39), and having infected family members (OR = 1.5; CI: 0.64–3.49; [Table 4]).

Similarly, no variables were found to be associated with health science students' perceptions of COVID-19, with

Table 1: Descriptive characteristics of the variables corresponding to Peruvian undergraduate students

Variable	Categories	*n*	%
Faculty	Dentistry	299	56.7
	Medicine	52	9.9
	Psychology	77	14.6
	Nutrition	46	8.7
	Nursing	14	2.7
	Obstetrics	10	1.9
	Laboratory	3	0.6
	Physical therapy	11	2.1
	Language therapy	10	1.9
	Radiology	4	0.8
	Optometry	1	0.2
Year of study	First	13	2.5
	Second	87	16.5
	Third	66	12.5
	Fourth	163	30.9
	Fifth	126	23.9
	Sixth	63	12.0
	Graduate	9	1.7
Sex	Female	377	71.5
	Male	150	28.5
Region where you currently live	Coast	500	94.9
	Sierra	21	4.0
	Jungle	6	1.1
Current place of residence	Urban	443	84.1
	Urban–rural	68	12.9
	Rural	16	3.0
Living with you parents	Yes	455	86.3
	No	72	13.7
Family members have had COVID-19	Yes	407	77.2
	No	120	22.8

the following results obtained: faculty (OR = 0.9; CI: 0.85–1.09), year of study (OR = 0.9; CI: 0.76−1.10), gender (OR = 0.8; CI: 0.50–1.47), region (OR = 1.1; CI: 0.44–2.96), residence (OR = 1.1; CI: 0.64–2.04), living with parents (OR = 1.0; CI: 0.48–2.09), and having infected family members (OR = 1.6; CI: 0.84–3.16).

Discussion

The global COVID-19 pandemic has disrupted the normal development of daily activities, including academic activities at universities.[11] College students have been overexposed to various types of information regarding the pandemic, including conspiracy theories and inaccurate or false information.[12] In this study, students were asked to show their knowledge regarding COVID-19, its viral transmission, and its characteristics, and the results showed values similar to or higher than those obtained in Elhadi *et al.*[13]

In particular, in this study's population, 71% could accurately identify the name of the virus, 98.9% considered it to be contagious, 85.7% knew its incubation period, 81.7% could identify the populations most vulnerable to the virus, 34.6% knew that its transmission method is person-to-person, 47% recognized that it is transmitted via by respiratory droplets, and 76.6% could identify the relevant diagnostic tests. In addition, the impact of social networks (39.8%) and television (51.9%) should be noted, as these were the sources from which students first learned about COVID-19.

In Hatabu *et al.*,[14] the results regarding students' knowledge levels were also high, as was found in this study; however, they found that national students at Japanese universities had greater knowledge levels compared to foreign students (OR = 3.3; CI 1.3−8.3). However, Barret *et al.*[15] found a significant negative correlation in men compared to women regarding hand hygiene ($P < 0.01$), as well as in behavior and risk perception ($P < 0.01$). The high knowledge levels may be due to the large amount of information disseminated on social networks and television, in addition to the significant impact the COVID-19 pandemic has had on daily and educational life. The present results were also consistent with Kopp *et al.*,[16] in which health science students showed that they could satisfactorily participate in disease control through

Table 2: Level of knowledge of undergraduate health sciences students about COVID-19

Question	Answer	Female	%	Male	%	*P**
Q1: From where did you first hear about COVID-19?	College	3	0.5	7	1.3	
	Print media	3	0.5	7	1.3	
	Social media	152	28.8	58	11.0	0.001
	TV	204	38.7	70	13.2	
	Others	15	2.8	8	1.5	
Q2: Which of the following is novel coronavirus?	Middle East respiratory syndrome-CoV	35	6.6	18	3.4	
	Sever acute respiratory syndrome-CoV	9	1.7	2	0.3	0.505
	COVID-19	266	50.4	109	20.6	
	All of the above	67	12.7	21	3.9	
Q3: Is COVID-19 contagious?	Yes	373	70.7	149	28.2	
	No	4	0.7	0	0.0	0.128
	No idea	0	0.0	1	0.1	
Q4: What is the origin of COVID-19?	Civet bats	151	28.6	61	11.5	
	Dromedary camels	1	0.1	1	0.1	
	Domestic animals/pets	207	39.2	80	15.1	0.9
	Yet not known	18	3.4	8	1.5	
	Don't know	0	0.0	0	0.0	
Q5: What is the incubation period of COVID-19?	2–14 days	325	61.6	127	24.1	
	1–5 days	48	9.1	20	3.8	0.839
	30 days	3	0.5	2	0.3	
	90 days	1	0.1	1	0.1	
Q6: Is there any similarity among COVID-19, SARS-CoV, and MERS-CoV?	Yes	305	57.8	120	22.7	
	No	14	2.6	8	1.5	0.697
	No idea	58	11.0	22	4.1	
Q7: Who are more prone to COVID-19?	Young/adults	2	0.3	1	0.1	
	Older/geriatrics or person with comorbidities	309	58.6	122	23.1	0.311
	All of the above	64	12.1	36	6.8	
	No idea	2	0.3	1	0.1	
Q8: Do you know the fatality rate of a person infected with COVID-19?	50%	86	16.3	31	5.8	
	30%	55	10.4	13	2.4	0.053
	3%	113	21.4	62	11.7	
	No idea	123	23.3	44	8.3	
Q9: Do you think a person infected with COVID-19 can remain asymptomatic?	Yes	371	70.4	146	27.7	
	No	5	0.9	2	0.3	0.339
	No idea	1	0.1	2	0.3	
Q10: What are the symptoms of severe COVID-19?	Respiratory symptoms	277	52.5	112	21.2	
	Enteric symptoms	3	0.5	0	0.0	
	Neurological symptoms	1	0.1	0	0.0	0.329
	All of the above	93	17.6	34	6.4	
	No idea	3	0.5	4	0.7	
Q11: How does the COVID-19 spread?	Person to person	123	23.3	60	11.3	
	Respiratory droplets	182	34.5	66	12.5	
	From feces	2	0.3	0	0.0	0.173
	All of the above	68	12.9	21	3.9	
	No idea	2	0.3	3	0.5	
Q12: What are the diagnostic tests for COVID-19?	RT-PCR	103	19.5	45	8.5	
	Immunofluorescent antigen detection assay	35	6.6	22	4.1	0.194
	Both	151	28.6	49	9.3	
	No idea	88	16.7	34	6.4	

RT-PCR = reverse transcription polymerase chain reaction. *Chi-square test

electronic and virtual means in patients and the general community.

Furthermore, in a study of health science students from Ecuador, Lincango-Naranjo[17] also found results similar to this study, although it is important to note the participants' pessimistic attitudes toward the ability of the authorities to control the pandemic (23%), a situation that could be replicated in Peru due to the scenario of political

Table 3: Level of perception of undergraduate health sciences students about COVID-19

Question	Answer	Female	%	Male	%	*P**
Q1: What are the ways of prevention from	Washing hands with alcohol-based sanitizer	8	1.8	7	1.6	
COVID-19 infection?	Maintain 1 m distance between yourself and anyone who is coughing or sneezing	6	1.4	2	0.4	0.087
	Avoid personal contact	20	4.7	2	0.4	
	All of the above	343	80.7	139	32.7	
Q2: Do you think wearing a surgical	Yes	274	64.4	104	24.4	
mask can protect people from COVID-19?	No	92	21.6	42	9.8	0.692
	No idea	11	2.5	4	0.9	
Q3: Is it safe to receive a package from any areas	Yes	52	12.2	22	5.1	
where a case of COVID-19 has been reported?	No	287	67.5	113	26.5	0.967
	No idea	38	8.9	15	3.5	
Q4: At present, do you think antibiotics are	Yes	69	16.2	27	6.3	
effective in preventing COVID-19?	No	248	58.3	97	22.8	0.924
	No idea	60	14.1	26	6.1	
Q5: At present, do you think vaccines are	Yes	122	28.7	42	9.8	
effective in preventing COVID-19?	No	121	28.4	63	14.8	0.098
	No idea	134	31.5	45	10.5	
Q6: Are traditional herbal medicines	Yes	72	16.9	20	4.7	
effective for COVID-19?	No	179	42.1	75	17.6	0.285
	No idea	126	29.6	55	12.9	
Q7: Are hand dryers effective in killing	Yes	12	2.8	9	2.1	
new coronavirus?	No	253	59.5	98	23.0	0.328
	No idea	112	26.3	43	10.1	
Q8: Can an ultraviolet (UV) disinfection lamp	Yes	77	18.1	52	12.2	
kill the new coronavirus?	No	161	37.8	48	11.2	0.002
	No idea	139	32.7	50	11.7	
Q9: Are thermal scanners helpful in detecting	Yes	179	42.1	78	18.3	
fever in people infected with new coronavirus?	No	108	25.4	32	7.5	0.229
	No idea	90	21.1	40	9.4	
Q10: Can spraying alcohol or chlorine all over	Yes	103	24.2	51	12.0	
your body kill the new coronavirus?	No	217	51.0	73	17.1	0.173
	No idea	57	13.4	26	6.1	
Q11: In your opinion, can eating garlic help prevent	Yes	58	13.6	13	3.0	
infection with the new coronavirus?	No	248	58.3	105	24.7	0.121
	No idea	71	16.7	32	7.5	
Q12: In which climatic condition COVID-19	Winter	168	39.5	59	13.8	
infection can primarily occur?	Spring or fall	22	5.1	6	1.4	0.137
	Round the year	173	40.7	73	17.1	
	Don't know	14	3.2	12	2.8	

*Chi-square test

Table 4: Multifactorial logistic regression analysis of perception and Knowledge of undergraduate health sciences students about COVID-19

	Associated factors	OR	*P*	CI 95%
Perception	Faculty	0.9	0.600	0.85–1.09
	Year	0.9	0.370	0.76–1.10
	Sex	0.8	0.580	0.50–1.47
	Region	1.1	0.760	0.44–2.96
	Residence	1.1	0.640	0.64–2.04
	Live	1.0	0.970	0.48–2.09
	Family	1.6	0.141	0.84–3.16
Knowledge	Faculty	0.9	0.621	0.83–1.12
	Year	0.9	0.883	0.77–1.25
	Sex	1.1	0.769	0.54–2.28
	Region	1.3	0.680	0.35–4.78
	Residence	0.9	0.934	0.48–1.95
	Live	1.5	0.454	0.52–4.39
	Family	1.5	0.340	0.64–3.49

OR = odds ratios, CI = confidence interval

instability and general elections, in addition to being one of the countries most affected by the pandemic. This previous study observed that students' health science field of study was not a factor that affected their knowledge and perceptions regarding infection prevention (OR = 0.96; CI: 0.83– 1.12), and neither was year of study (OR = 0.98; CI: 0.77−1.25), gender (OR = 1.12; CI: 0.54−2.28), region (OR = 1.32; CI: 0.35−4.78), residence (OR = 0.97; CI: 0.48−1.95), living with parents (OR = 1.5; CI: 0.52–4.39), and if they had relatives infected by COVID-19 (OR = 1.5; CI: 0.64−3.49).

The main limitation was that it was carried out only with health science students in a purely virtual environment; therefore, the integrity and veracity of the questions could have been affected by different factors. This could lead to a possible bias in the collection of the evaluated data. However, in this study, selection criteria were applied so that only students who had the commitment to collaborate for the survey were included in this research. Finally, it is recommended that future longitudinal research[18−20] should be conducted to authenticate the relationship between the different associated factors and their impact on knowledge and perceptions regarding the COVID-19 pandemic among young health science professionals in the process of receiving their undergraduate education.

Conclusion

The results of this study showed that students at a Peruvian public university had adequate knowledge and perceptions regarding preventive strategies to avoid contracting and spreading COVID-19. In addition, none of the examined factors were found to be significant in this relationship.

Acknowledgement

We wish to thank the Faculty of Dentistry of the Universidad Nacional Federico Villarreal and Universidad Cientifica del Sur.

Financial support and sponsorship

This work was partially funded by the Vice-rectorate of Research of the Universidad Nacional Federico Villarreal to carry out this study con Código RN° 7802-2020-CU-UNFV.

Conflicts of interest

There are no conflicts of interest.

Authors' contributions

CC, JD, and FMT contributed to the study conception of the paper. FMT, CC, and JD contributed to the data collection. DAT, FMT, JA, and AT contributed to the data acquisition and analysis. AMD, DAT, JA, and FMT were involved in data interpretation. FMT, AMD, AT, and JA were involved in manuscript writing.

Ethical policy and institutional review board statement

The study was approved and reviewed by the Ethics Committee of the Faculty of Dentistry of the Federico Villarreal National University with code No. 0001-11-2020 CEI-FO-UNFV.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Data availability statement

The data that support the study results are available from the corresponding author (Dr. Frank Mayta-Tovalino, e-mail: fmayta@unfv.edu.pe) on request.

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