Knowledge, individual beliefs and preventive behaviours regarding COVID-19 in Spanish unviersity students

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Original

Abstract

Objective: the objective of this study was to assess the knowledge, beliefs, perceptions, and preventive behaviors for COVID-19 among university students in Spain.

Method: the WHO survey «Monitoring knowledge, risk perceptions, preventive behaviors and trust to inform pandemic outbreak response» was used in this cross-sectional study conducted in May 2020.

Results: 1,285 students joined the study, with an average age of 23.4 (SD=6.0). The average score for self-assessed knowledge was 5.5 (SD= 1,1) (range 0-7). Most of the effective measures were correctly identified as such, with an average of correctly identified measures of 6.9 (SD=1.8) (range 0-17). The average score for infection probability and severity (range 1-7) was 3.8 (SD= 1.5 and 1.6 respectively). The number of effective measures adopted to prevent COVID-19 was 8.6 (SD =1.3) (range 0-10) and the number non-effective measures was 0.4 (SD=0.8) (range 0-7).

Conclusions: the results show an adequate level of knowledge about symptoms and preventive measures. Risk perception, severity, infection probability and ability to avoid infection suggest overconfidence, which should be considered.

Key Words:

Knowledge; Health Risk Behaviors; Coronavirus Infections; Students; Universities

Conocimientos, creencias individuales y conductas preventivas frente a la COVID-19 en estudiantes universitarios españoles

Resumen:

Objetivo: evaluar los conocimientos, las creencias, las percepciones y las conductas preventivas desarrolladas en relación con COVID-19 en estudiantes de universidades españolas.

Metodología: estudio transversal en el que se empleó una versión digital de la encuesta de la OMS "Monitoring knowledge, risk perceptions, preventive behaviours and trust to inform pandemic outbreak response", en el mes de mayo de 2020.

Resultados: participaron 1285 estudiantes, con edad media de 23,4 (DE=6,0). La puntuación media de la autopercepción de conocimiento fue de 5,5 (DE= 1,1) (rango 0-7) y de síntomas correctamente identificados de 6,9 (DE=1,8) (rango 0-17). La probabilidad de infectarse y la severidad, en un rango de 1-7, obtuvieron una puntuación media de 3,8 (DE= 1,5 y 1,6 respectivamente). El número de medidas efectivas adoptadas para prevenir COVID-19 fue de 8,6 (DE = 1,3) (rango 0-10) y de las no efectivas 0,4 (DE = 0,8) (rango 0-7).

Conclusión: los resultados muestran un adecuado nivel de conocimiento de síntomas y medidas preventivas. La percepción de riesgo, severidad, probabilidad de infectarse y capacidad de evitar la infección sugieren un exceso de confianza que debe ser tenido en cuenta.

Palabras clave:

Conocimiento; Comportamientos de Riesgo para la Salud; Infección Coronavirus; Estudiantes; Universidad.

Introduction

As it is well-known now, we are experiencing a new pandemic caused by a coronavirus of which little data is known despite its similarities with previous virus (1). Among the strategies to stop its spread, the scientific community has highlighted vaccination as the most effective measure. There are currently several vaccines in development, but not one has been chosen as standard care and preventive measures are still being recommended and implemented. Therefore, governments are adopting different policies based on recommendations by the European Centre for Disease Prevention and Control (2). Behavioral and environmental measures that should be adopted by the population are among the most effective to prevent infection, such as handwashing, using a mask in public spaces, and social distancing (3,4).

These measures require an adaptation by the population to a new social scenario as well as the acquisition of new behaviors that were not previously performed on a regular basis. Adopting new behaviors is not a simple task, especially when they must be adopted in a short time characterized by the uncertainty of this new social scenario. With this aim in mind, it is necessary for people to perceive a health threat in order to take preventive actions as suggested by the Health Belief Model (HBM). That is, people need to perceive they are susceptible to becoming ill and the disease can severely affect their health (5). On the other hand, it is essential to learn about people's needs about the behaviors to adopt. According to the Behavior Change Wheel (6), there are three determinants that have a strong impact on people's intention to modify their behaviors: capability, opportunity, and motivation. Each determinant is also related to the behavioral needs previously mentioned. For example, capability is related to the need for knowledge or abilities to adopt a new behavior. Opportunity is related to the physical and social environment. Finally, motivation is related to emotional needs or benefits derived from the planned behavior. However, knowing the risk of infection also has an impact on the development of preventive measures (7).

Hence, by identifying knowledge, risk infection perception, and behavioral needs people are adopting to prevent becoming infected allows for the development of programs focused on the determinants of preventive behaviors improving people's intention to implement these behaviors (8).

According to the WHO, COVID-19 affects all people, regardless of sex and apparently the number of cases increases with age (9). However, an increase in infection rates has been observed in Spain among people aged 15-29 (10), which includes university students. This age group is of interest due to the high percentage of asymptomatic patients with a high potential for infection (11). Therefore, it is necessary to assess the different aspects that can have an impact on our protection against COVID-19.

This study was developed with the aim of evaluating the knowledge, beliefs, perceptions, and preventive behaviors related to COVID-19 as there is limited information available about Spanish university students' and COVID-19.

Methodology

Study Design

Cross-sectional survey using a web-based questionnaire.

Setting and Participants

The study population was Spanish students of public and private universities. In 2020, Spain has a population of about 1.5 million university students (11-INE). The survey was conducted in May 2020. Researchers obtained an unrestricted sample by disseminating the availability of the questionnaire on social media and university e-mail lists (12).

Measures

WHO's survey tool OMS «Monitoring knowledge, risk perceptions, preventive behaviors and trust to inform pandemic outbreak response» (13) was translated into Spanish and posted in Google Docs. The web-based questionnaire included 7 demographic items (age, sex, level of studies, residence) and 3 items, with 8 questions in total: 3 knowledge-based, 4 risk perception, and 1 about measures to prevent transmission.

For scoring of knowledge, we divided the questions into two subgroups: 1 question to assess self-assessed knowledge with a likert answer (ranged from 1 to 7, where a higher score means higher perceived knowledge); 1 question to assess knowledge about COVID-19 symptoms, which included 10 symptoms with a qualitative answer (is a symptom/is not a symptom), and 1 question about knowledge about the 16 protection measures, qualitatively coded with a dichotomous answer (is an effective measure/is not an effective measure).

For scoring of individual beliefs about COVID-19, 4 questions were used: perception of probability of getting infected, susceptibility, knowledge to protect myself, and ability to avoid infection (ranged from 1 to 7, where a higher score means higher perceived likelihood, susceptibility, knowledge and avoiding respectively).

And 1 question to score the adopted measures to prevent transmission: «have you adopted the following behavior to prevent COVID-19?» Fourteen behaviors were included scored on a 2-point scale (I adopt the measure/I don't adopt the measure).

Data collection

Information about the study was forwarded to university authorities to be shared among students via email and internal channels (e-mail lists) as well as in social media. Emailing respondents received an introductory letter containing basic information about the study (objective, goals, and content) and a box that students had to check to give their permission to join the study. Once their participation was confirmed, they accessed the web-based survey by a hyperlink.

Statistical Analysis

We calculated the number of correct symptoms and preventive measures identified. We also calculated the number of evidence-based preventive actions taken. Continuous data are presented as means with standard deviations (SD). Categorical variables are presented as absolute and relative frequencies. Relevant characteristics are described and stratified according the students' field of studies in two categories: health sciences students and students of other fields. We compared the characteristics and responses between these two groups using Student t-test.

We used a HBM approach to analyze the association between individual beliefs and the reported adherence to recommendations and evidence-based preventive actions (5). We determined this association by calculating the Spearman correlation coefficient. Correlation coefficients of ≤0.29 were considered weak, 0.30-0.49 low, 0.50-0.69 moderate, and ≥0.70 was considered strong correlation (14). We used the statistical software IBM SPSS Statistics version 24 for all analyses.

Ethical Considerations

Ethical approval was obtained from the Principado de Asturias Committee of Ethics (ref. 220/2020). The survey did not collect identifiable data. A consent form was prepared, and participants were assured that their participation was voluntary, that their right to withdraw at any time would be upheld and that their collected information would remain confidential. The participants

were also informed that all collected data would be destroyed after project completion. All study procedures involving human participants were conducted in accordance with the Declaration of Helsinki. All the participants provided informed consent to participate in the study before completing the web-based questionnaire.

Results

Population characteristics

We received a total of 1,285 answers, primarily from women (65.9%), with an average of 23.4 years (SD = 6.0) mainly from health sciences (72.8%).

Real and perceived knowledge

Scoring for the question related to self-assessed knowledge was 5.4 (SD = 1.1) and the average of correctly identified symptoms was 6.9 (SD = 1.8), both averages being significatively superior among health sciences students. The symptoms «shortness of breath», «fever», and «cough» were the most frequently identified (Table 1). Health sciences students generally identified a higher number of symptoms than students from other fields of knowledge (Table 2).

High success rates were identified in relation to knowledge about effective preventive measures, being «taking herbal supplements» the one with the lower percentage (Table 2).

Perceived susceptibility to and severity of disease

The average score for susceptibility of infection was 3.8 (SD = 1.5), while the score for severity identified by the participants was 3.8 (SD =1.6). Significative differences were identified according to the field of knowledge of the participants in both cases. In relation to

Table 1. Real and perceived knowledge about COVID-19 preventive measures and symptoms

Variables	Total n=1,285	Health sciences n=584	Other n=701	P value
Self-assessed knowledge				
How would you rate your knowledge level on how to prevent the spread of the novel coronavirus? (ranged from 1 to 7; higher score=higher perceived knowledge), mean (SD)	5.4 (1.1)	5.5 (1.1)	5.3 (1.1)	0.008
Knowledge symptoms related to the newly coronavirus (% correct answers)				
Shortness of breath	1,271 (98.9)	583 (99.8)	688 (98.1)	0.004
Fever	1,261 (98.1)	578 (99.0)	683 (97.4)	0.042
Cough	1,188 (92.5)	558 (95.5)	630 (89.9)	<0.001
Fatigue (tiredness)	1,079 (83.3)	525 (89.9)	545 (77.7)	<0.001
Loss of taste and smell	1,001 (77.9)	491 (84.1)	510 (72.8)	<0.001
Muscle or body aches	860 (66.9)	421 (72.1)	439 (62.6)	<0.001
Headaches	803 (62.5)	396 (67.8)	407 (58.1)	<0.001
Diarrhea	619 (48.2)	341 (58.4)	278 (39.7)	<0.001
Sore throat	525 (40.9)	259 (44.3)	266 (37.9)	0.020
Runny or stuffy nose	278 (21.6)	133 (22.8)	145 (20.7)	0.365
Number of correctly identified symptoms (ranged from 0 to 10), mean (SD)	6.9 (1.8)	7.3 (1.7)	6.5 (1.9)	<0.001

Table 2. Percentages of measures identified as effective and non-effective against COVID-19

Variables	Total n=1,285	Health sciences n=584	Other n=701	P value
Effective measures identified as effective (% correct answers)				
Avoiding touching your eyes, nose, and mouth with unwashed hands	1,277 (99.4)	582 (99.7)	695 (99.1)	0.244
Physical distancing	1,275 (99.2)	582 (99.7)	693 (98.9)	0.105
Covering your mouth when you cough	1,271 (98.9)	579 (99.1)	692 (98.7)	0.462
Staying home when you are sick or when you have a cold	1,267 (98.6)	578 (99.0)	689 (98.3)	0.299
Use of disinfectants to clean hands when soap and water is not available for washing hands	1,264 (98.4)	574 (98.3)	690 (98.4)	0.840
Hand washing for at least 20 seconds	1,257 (97.8)	574 (98.3)	683 (97.4)	0.296
Disinfecting surfaces	1,256 (97.7)	574 (98.3)	682 (97.3)	0.230
Wearing a face mask	1,244 (96.8)	572 (97.9)	672 (95.9)	0.034
Disinfecting the mobile phone	1,240 (96.5)	573 (98.1)	667 (95.1)	0.004
Getting the flu vaccine	1,022 (79.5)	440 (75.3)	582 (83.0)	0.001
Self-isolation	1,117 (86.9)	505 (86.5)	612 (87.3)	0.660
Non-effective measures identified as non-effective (% correct answers)				
Taking herbal supplements	1,022 (79.5)	440 (75.3)	582 (83.0)	0.001
Using homeopathic remedies	1,176 (91.5)	521 (89.2)	655 (93.4)	0.007
Eating garlic	1,210 (94.2)	539 (92.3)	671 (95.7)	0.009
Eating ginger	1,210 (94.2)	535 (91.6)	675 (96.3)	<0.001
Eating lemon	1,211 (94.2)	534 (91.4)	677 (96.6)	<0.001
Using antibiotics	1,211 (94.2)	536 (91.8)	675 (96.3)	0.001
Number of correctly identified measures (ranged from 0 to 17), mean (SD)	6.9 (1.8)	7.3 (1.7)	6.5 (1.9)	<0.001

probability of contagion, perception was higher among health sciences students, while perception of severity was higher among students from other fields (probability p=0.013; severity p=0.010) (Figure 1).

Perceived self-efficacy

The score for perception of self-efficacy to protect themselves against COVID-19 was 5.5 (SD = 1.1), while the score for perception of ability to avoid infection was 4.4 (SD = 1.3) (Figure 1). Health sciences students perceived a greater ability to protect themselves on average (p<0.001) but a reduced ability to prevent infection (p=0.007) (Figure 2).

Performance of preventive measures

The average value for the variable that assessed adherence to recommendations was 6.2 (SD = 0.9), and no significant statistical differences were observed between the two student groups (p=0.359). In relation to the performance of preventive measures, very high percentages were observed for almost every effective recommendation, and low percentages were observed for recommendations described as non-effective or unnecessary (Table 3). The percentage of health sciences students who reported adopting certain evidence-based preventive measures (covering your mouth when you cough; avoiding touching your eyes, nose, and mouth with unwashed hands;

Fig.1 Comparison of the probability and severity perceived between health sciences students and students from other fields of knowledge (scores ranged from 1 to 7; higher score=high perception).

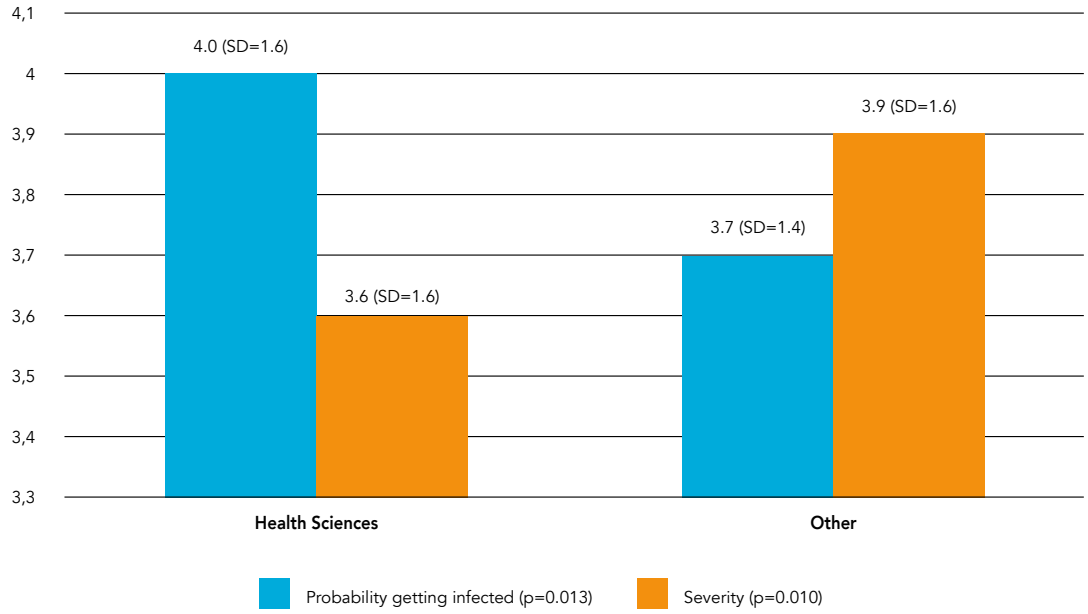

Fig. 2 Comparison of the perceived self-efficacy between health sciences students and students from other fields of knowledge (scores ranged from 1 to 7; higher score=high perception)

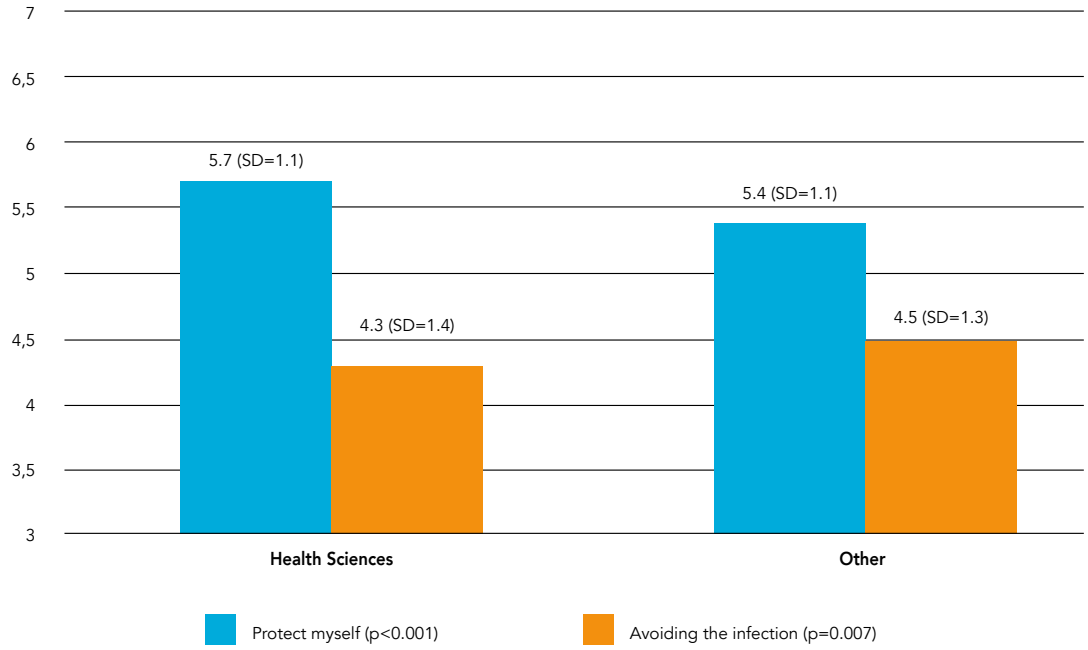

Table 3. Percentage of effective and non-effective measures adopted

Variables	Total n=1,285	Health sciences n=584	Other n=701	P value
% evidence-based preventive measures (% correct answers)				
Covering your mouth when you cough	1,253 (97.5)	575 (98.5)	678 (96.7)	0.046
Physical distancing	1,225 (95.3)	559 (95.7)	666 (95.0)	0.547
Staying home when you are sick or when you have a cold	1,156 (90.0)	528 (90.4)	628 (89.6)	0.624
Hand washing for at least 20 seconds	1,152 (89.6)	530 (90.8)	622 (88.7)	0.236
Avoiding touching your eyes, nose, and mouth with unwashed hands	1,147 (89.3)	531 (90.9)	616 (87.9)	0.079
Use of disinfectants to clean hands when soap and water is not available for washing hands	1,082 (84.2)	518 (88.7)	564 (80.5)	<0.001
Wearing a face mask	1,046 (81.4)	505 (86.5)	541 (77.2)	<0.001
Disinfecting surfaces	992 (77.2)	477 (81.7)	515 (73.5)	<0.001
Disinfecting the mobile phone	855 (66.5)	414 (70.9)	441 (62.9)	0.003
Self-isolation	776 (60.4)	334 (57.2)	442 (63,1)	0.032
Number of evidence-based measures taken (range from 0 to 10), mean (SD)	8.3 (1.6)	8.5 (1.5)	8.1 (1.7)	<0.001
% of Non-evidence-based preventive measures developed				
Eating lemon	91 (7.1)	60 (10.3)	31 (4.4)	<0.001
Taking herbal supplements	82 (6.4)	43 (7.4)	39 (5.6)	0.189
Eating garlic	75 (5.8)	49 (8.4)	26 (3.7)	<0.001
Eating ginger	51 (4.0)	31 (5.3)	20 (2.9)	0.025
Using antibiotics	25 (1.9)	12 (2.1)	13 (1,9)	0.796
Using homeopathic remedies	19 (1.5)	9 (1.5)	10 (1.4)	0.865
Number of non-evidence-based measures taken (range from 0 to 7), mean (SD)	0.4 (0.8)	0.5 (0.9)	0.3 (0.7)	<0.001

use of disinfectants to clean hands when soap and water is not available for washing hands; wearing a face mask; disinfecting surfaces and disinfecting the mobile phone) was statistically higher. However, students in the other fields reported adopting the measure of self-isolation more frequently. On average, health sciences students reported adopting more evidence-based preventive measures than those in other fields. In addition, students in health sciences reported engaging in certain non-evidence-based preventive measures such as eating lemon, garlic or ginger more often than those in other fields. On average, health sciences students reported adopting more non evidence-based preventive measures than those in other fields.

Correlation between the performance of preventive measures and individual beliefs

The correlation analysis showed a weak association between the perception of adherence to recommendations as well as in the real number of recommendations implemented and the variables susceptibility, severity, self-assessed knowledge, and self-efficacy to protect oneself (Table 4).

Discussion

To our knowledge, this study is the first investigation about COVID-19 and Spanish university students. Therefore, it provides valuable insights into public health education and preventative measures in Spanish

Table 4. Spearman correlation coefficients between individual beliefs and adherence to recommendations and evidence-based preventive actions taken

			Individual beliefs *(higher scores=higher belief)*			
			Probability	**Severity**	**Preparedness and perceived self-efficacy**	**Self-assessed knowledge**
			What do you consider to be your own probability of getting infected with the novel coronavirus? (ranged from 1 to 7)	How severe would contracting the novel coronavirus be for you? (ranged from 1 to 7)	Overall evaluation of preparedness and perceived self-efficacy (ranged from 2 to 14)	Self-assessed knowledge to prevent spread (ranged from 1 to 7)
Actions	I follow the recommendations from authorities in my country to prevent spread of novel coronavirus. (ranged from 1 to 7; higher score=greater adherence)	Total students	-0.042	0.077**	0.218**	0.251**
		Health sciences students	-0.073	0.034	0.244**	0.295**
		Students of other fields	-0.019	0.115**	0.198**	0.215**
	Number of evidence-based preventive actions taken (ranged from 0 to 10)	Total students	0.101**	0.172**	0.070*	0.173**
		Health sciences students	0.159**	0.167**	0.063	0.145**
		Students of other fields	0.042	0.188**	0.073	0.186**

universities during the COVID-19 pandemic. The results of this study show that the participants had and perceived an appropriate level of knowledge about COVID-19 symptoms, and an adequate adherence to evidence-based preventive measures but could improve their perception for their own risk of infection for COVID-19.

Participants identified most of the most frequent signs of infection such as «shortness of breath», «fever» or «cough» (15). However, other less frequent symptoms also associated with the infection such as «diarrhea», «sore throat» or «stuffy nose» were not identified. This discovery is extremely relevant as an early identification of symptoms can contribute to avoid transmission while adopting a positive attitude towards self-protection (15,16).

Knowledge had previously been assessed in other studies, in which heterogeneity was observed. The good results observed in this study were similar to the ones observed in previous studies (16-18) or were even better (19). We would like to highlight the consistency with the results of Galle et al. (17) in whose study Italian students correctly identified the main preventive measures, such as «handwashing» and «social distancing» as well as the non-effective.

The assessment of adherence to evidence-based preventive measures recommended by health authorities has shown positive results. Most of the participants admitted to performing those behaviors. Adherence to the two main measures considered essential since the beginning of the pandemic must be highlighted: handwashing and the use of masks. The percentage of adherence was 89.6% and 81.4% respectively, both being quite superior to the percentages observed in previous studies with university students (17, 20). For example, the study carried out by Olaimat et al. (20) among

Jordan students shown percentages of adherence of 66.8% and 39.8% respectively. Maybe the positive results in our study can be attributed to the students' high level of knowledge. Association between poor knowledge about COVID-19 and negative attitudes toward protective measures has been analyzed in other studies, concluding in the performance of risk practices related to infection spread (21,22). Adoption of preventive measures is essential to control the COVID-19 routes of infection and to develop prevention and control trainings with preventive measures to lower the risk of transmission (23).

The variables used to assess attitude showed average scores for probability of infection and perception of severity. On the contrary, high scores were observed for self-efficacy to protect oneself and avoid infection, a reality observed in other studies among university students (24). The analysis of the results of these variables should be considered, as they could suggest excessive confidence or a lack of intention of performing preventive measures, which could have a negative impact on curbing the pandemic. As postulated by the HBM, the non-perception of the existence of a health problem causes the failure to take action to prevent or solve said problem (7). An example of this can be found in Wilson et al. (25) who concluded that not perceiving the severity of disease outcome might explain why young adults might attend social events or not wear a mask.

The analysis of the variables according to the students' field of knowledge could be considered a less important factor than the analysis of the global data, but the differences found in the students' knowledge about symptoms must be highlighted as health sciences students performed better. It is not rare for these students to stand out, as other authors have already suggested (17,22,26), this could be explained by their trainings in microbiology, preventive health or public health.

In relation to protective measures, health sciences students showed the best percentages of adherence, being superior to 81% for all of the recommended measures except for «self-isolation». Students from other fields of knowledge showed variable percentages depending on the behavior, without any behavior standing out in a negative sense, and in 9 of the behaviors, significant differences were found, with health sciences students standing out. Again, the awareness of these students can influence the results. Previous studies that assessed protective measures did not find any differences between health sciences students and students from other fields, maybe because they only incorporated the most popular measures (26). Information about preventive measures has been widely shared through diverse communication channels, which has allowed the information to reach all the population. However, this does not justify the adoption of these measures. The fact that knowledge about these measures was high is relevant as it suggests that the lack of implementation of protective measures cannot be attributed to a lack of knowledge. This finding also contradicts previous studies in which it is suggested that knowledge is associated with the performance of behaviors (21, 22).

This could be explained by the scores about individual beliefs. Health sciences students were less concerned about severity of infection. Similar results were observed by Olaimat et al. (20) in both variables among Jordanian students. This could be attributed to the fact that health sciences students, apart from having more information, are also more familiar with preventive measures and are in contact with communicable diseases during their clinical practice. On the other hand, the relation observed between individual beliefs and adherence to recommendations and evidence-based preventive measures is extremely interesting. Even though the correlations were weak, they were positive, following the theoretical framework of the HBM.

Finally, to our knowledge, another study related to COVID-19 was developed among Spanish university students but as studies carried out in other countries (28, 29) it only included health sciences students (27). Even though they used different measuring tools, the results are consistent with the ones presented by Cervera-Gash et al. (27), as both studies confirm that the level of knowledge and preventive measures among health sciences students is very adequate.

One limitation of our survey is the impossibility to calculate a response rate, an often-cited issue in web-based surveys, especially those with unrestricted samples (12). We only know the number of completed questionnaires and not the number of people who refused to participate.

The information contained in this study can be useful to inform future information campaigns by health authorities. It is extremely important to assess the knowledge, but also individual the beliefs about infection prevention. These variables determine how the population faces the pandemic and they also influence the evolution of the pandemic.

Conclusion

The results of this study carried out among Spanish university students show an adequate level of knowledge about symptoms, preventive measures, and their performance. Variables perception of risk and severity, probability of infection and ability to avoid infection suggest excessive confidence and should be taken into consideration, as they could become an obstacle for curbing the pandemic.

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