

## Medical Students' Knowledge, Prevention and Perceived Risk of COVID-19

### *Conocimientos, prevención y riesgo percibido de COVID-19 en estudiantes de medicina*

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#### **Summary**

**Objective:** to identify the knowledge, prevention behaviors and perceived risk of COVID-19 in medical students. **Methods:** descriptive, cross-sectional study. Students from a medical school participated from September to December 2020. The inclusion criteria were: to be enrolled in the first to tenth semester of the Medical Surgeon Bachelor's Degree, no matter age or gender, who agreed to participate in the research giving informed consent by answering an online survey consisting of 26 questions including fifteen items on knowledge of COVID-19, nine on prevention behaviors, and two on COVID-19 risk perception. Descriptive analysis was performed. **Results:** 912 surveys were included, 62.2% were female (n=567), 82% said they had received information related to COVID-19 from reliable information sources (n=748), 96.5% talked to their family and friends about prevention measures (n=880), 63.8% were unaware of N95 mask use during intubation, suctioning, bronchoscopy and cardiopulmonary resuscitation procedures (n=582) and 43.3% indicated that they were afraid of becoming infected (n=395). **Conclusion:** most of the participants reported having received adequate information to learn about aspects related to COVID-19, but were unaware of essential aspects such as the use of N95 masks. It is necessary to educate and inform the medical school student population in order to decrease the perception of risk and increase prevention behaviors.

**Keywords:** COVID-19; Knowledge; Students; Medicine; Prevention; Risk

Received: 11/26/2022  
Accepted: 04/11/2022

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Suggestion of quotation: González-Pérez B, Salas-Flores R, Olvera-Mendoza V, Clemente-Martínez G, Sánchez-Márquez W, Reyes-Cruz S. Medical Students' Knowledge, Prevention and Perceived Risk of COVID-19. *Aten Fam.* 2022;29(3):160-166. <http://dx.doi.org/10.22201/fm.14058871p.2022.3.82834>

## Resumen

**Objetivo:** identificar los conocimientos, las conductas de prevención y riesgo percibido de COVID-19 en estudiantes de medicina. **Métodos:** estudio transversal descriptivo. Participaron estudiantes de una facultad de medicina, en el periodo de septiembre a diciembre de 2020. Los criterios de inclusión fueron: ser estudiante inscrito de primero a décimo semestre de la carrera de Médico Cirujano, cualquier edad y sexo, que aceptaron participar en la investigación y otorgaron consentimiento informado contestando una encuesta en línea que consta de 26 preguntas que incluyen quince ítems sobre conocimientos de COVID-19, nueve ítems sobre conductas de prevención y dos ítems sobre percepción del riesgo de COVID-19. Se realizó análisis descriptivo. **Resultados:** se incluyeron 912 encuestas, 62.2% fue de sexo femenino (n=567), 82% aseguró haber recibido información relacionada con COVID-19 en fuentes de información confiables (n=748), 96.5% platicó con sus familiares y amigos sobre las medidas de prevención (n=880), 63.8% desconoció el uso de mascarilla N95 durante procedimientos de intubación, succión, broncoscopia y reanimación cardiopulmonar (n=582) y 43.3% indicó que tenía miedo de infectarse (n=395). **Conclusión:** la mayoría de los participantes refirió haber recibido información adecuada para conocer aspectos relacionados con la COVID-19, pero desconocían aspectos esenciales como el uso de mascarilla N95. Es necesario educar e informar a la población estudiantil de la facultad de medicina para disminuir la percepción de riesgo y aumentar las conductas de prevención.

**Palabras clave:** COVID-19, conocimiento, estudiantes, medicina, prevención, riesgo

## Introduction

In December 2019, a group of patients with pneumonia of unknown etiology, related to a epidemiologically linked to a seafood market in Wuhan City, Hubei Province, China, was reported.<sup>1</sup> The name of that new entity was coronavirus disease 2019 (COVID-19), given by the World Health Organization (WHO).<sup>2</sup>

One year after the emergence of COVID-19, 80,773,033 confirmed cases and 1,783,619 deaths had been reported world-wide, with a global case fatality rate of 2.2%.<sup>3</sup> The first case of COVID-19 in Mexico was detected on February 27, 2020 and by April 30, 64 days after this first case, the number of cases increased exponentially reaching a total of 19,224 and 1,859 deaths.<sup>4</sup> By November 19, 2021, the report in Mexico was 3,851,079 cumulative confirmed cases and 291,573 deaths.<sup>5</sup> As of October 25, 2021, the cumulative cases of COVID-19 in health personnel, according to statistics from the Ministry of Health, was 283,122 in Mexico, distributed as follows: 38.9% nursing personnel, 32% other health care workers, 25.3% physicians, 2% laboratorians, 1.8% dentists; and 45% of 4,517 confirmed deaths, were of medical personnel.<sup>6</sup>

Since the beginning of the pandemic, the Mexican government, in coordination with the Ministry of Health, implemented measures to prevent and control the epidemic such as the National Social Distance Program, frequent hand washing, distance greeting, the “Stay-at-Home” campaign, the isolation of suspected or confirmed cases of COVID-19 and the suspension of “non-essential” activities.<sup>7</sup> These public health measures, imposed to prevent the spread of the disease, posed a major

challenge to academic preparation, in particular medical education.<sup>8,9</sup>

Due to the highly contagious nature of the virus, universities switched to a virtual mode, leading students to take classes remotely and cancel practical workshops, lectures, symposia and conferences. In addition to the fear of infecting family members, in the case of hospital interns, students have also suffered from the lack of preparation for the pandemic, as well as the psychological burden that this entails.<sup>10,11</sup> These challenges have resulted in limited medical training due to the suspension of clinical rotations.<sup>12</sup>

Other challenges include the lack of knowledge and experience in the management of COVID-19 which may increase the risk of infection in this particular population. Given this context, the aim of this study was to identify the knowledge, prevention behaviors, and risk perception of COVID-19 in medical students.

## Methods

A descriptive cross-sectional study was conducted with the participation of students from the Dr. Alberto Romo Caballero School of Medicine of the Autonomous University of Tamaulipas, from September to December 2020. Surveys were conducted to students who were in their academic cycle during the study period, through a non-random selection by convenience. The inclusion criteria were: students enrolled from the first to the tenth semester of the Medical Surgeon career, regardless age or gender, who agreed to participate in the research giving informed consent in the postgraduate area of the School of Medicine; the general objective, and procedures to follow were explained; questions regarding the study were solved. It was

made clear that their participation was entirely voluntary, and they could refuse to participate or stop their participation at any time, without any penalty or consequence. Exclusion criteria included students who provided incomplete data.

A four-section online survey was applied for the collection of information: sociodemographic data, knowledge related to COVID-19, prevention behaviors, and risk perception. Sociodemographic information included age, gender, school year completed, place of residence, whether the received information related to COVID-19 disease came from reliable sources in Spanish and English (WHO, Ministry of Health, Centers for Disease Control and Prevention, etc.) or from social networks.<sup>13-17</sup> To identify knowledge related to COVID-19, an instrument based on a framework of previous studies using fifteen items was applied (two items on the basic science and etiology of COVID-19, two on symptoms and incubation period, one on diagnosis, two on transmission, four on public prevention, one on specific prevention in medical personnel, one on treatment, and one regarding referral of suspected cases) based on a framework of previous studies on MERS and a new review on COVID-19.<sup>18,19</sup> The following sections included nine items on preventive measures and two on risk perception of COVID-19. The validity and reliability of the questionnaire obtained a Cronbach's alpha of 0.8.<sup>20</sup>

The study was authorized by the Research Ethics Committee of the Dr. Alberto Romo Caballero School of Medicine of the Autonomous University of Tamaulipas. The collected data were coded to protect the students' information and only the researchers had access to the database.

The statistical analysis used was descriptive; quantitative variables were expressed as means and standard deviation, while nominal variables were expressed as frequencies and percentages. The data were processed in the SPSS v. 23 statistical program.

### Results

A total of 1,053 surveys were carried out, of which 912 met the selection criteria. The average age of the studied sample was  $20.1 \pm 1.9$  years; also, 62.2% were female (n=567). In relation to the school year, 76.8% were enrolled between the 1st and 5th semester of the Medical Surgeon degree (n=696), 28.5% were foreign students (n=260), 82% claimed to have received information related to COVID-19 from reliable sources (n=748), and 91.7% received information from social networks (n=837); see Table 1.

In relation to the identification of knowledge about COVID-19, 94.5% of the students identified the etiology of the disease (n=862). 63.8% were unaware of the use of N95 mask during intubation, suction, bronchoscopy and cardiopulmonary resuscitation procedures (n=582), and 85.2% of the students were able to identify a suspected case and refer it to a nearby medical care center (n=777), see Table 2.

Regarding COVID-19 prevention behaviors, most students followed the recommendations to prevent the disease and 96.5% talked to their family and friends about COVID-19 prevention measures (n=880), see Table 3.

Regarding risk perception by medical students, 41.6% have the perception that they may get infected with COVID-19 occasionally (n=379) and 43.3% indicated that they are afraid of getting infected (n=395), see Table 4.

**Table 1. General Characteristics of the Studied Population**

| Variables   | n   | (%)  |
|---|-----|------|
| <b>Gender</b>   |     |      |
| Male  | 345 | 37.8 |
| Female  | 567 | 62.2 |
| <b>Academic Level</b>   |     |      |
| 1st - 5th semester  | 696 | 76.8 |
| 6th - 10th semester   | 216 | 23.2 |
| <b>Place of residence</b>   |     |      |
| Local   | 652 | 71.5 |
| Foreign   | 260 | 28.5 |
| <b>Received information related to COVID-19 from reliable information sources</b> |     |      |
| Yes   | 748 | 82.1 |
| No  | 164 | 17.9 |
| <b>Received information related to COVID-19 on social networks</b>                |     |      |
| Yes   | 837 | 91.7 |
| No  | 75  | 8.3  |

**Table 2. Medical Students' Knowledge about COVID-19**

| Variables  | n   | (%)  |
|--|-----|------|
| <b>COVID-19 -19 is a respiratory infection caused by a new species of virus of the coronavirus family</b>  |     |      |
| False  | 50  | 5.5  |
| True   | 862 | 94.5 |
| <b>The first COVID-19 case was diagnosed in Wuhan, China</b>   |     |      |
| False  | 14  | 1.5  |
| True   | 898 | 98.5 |
| <b>The origin of COVID-19 is unclear, but it appears to have been transmitted to humans through seafood, snakes or bats</b>                                |     |      |
| False  | 105 | 11.4 |
| True   | 807 | 88.5 |
| <b>Common symptoms are fever, cough and shortness of breath, but nausea and diarrhea are rare</b>  |     |      |
| False  | 51  | 5.6  |
| True   | 861 | 94.4 |
| <b>The incubation period is up to 14 days with an average of 5 days</b>  |     |      |
| False  | 15  | 1.6  |
| True   | 897 | 98.4 |
| <b>It can be diagnosed by PCR testing of samples extracted from nasopharyngeal and oropharyngeal secretions or sputum and bronchial lavage</b>             |     |      |
| False  | 19  | 2.1  |
| True   | 893 | 97.9 |
| <b>Transmission is through respiratory droplets such as coughs and sneezes</b>   |     |      |
| False  | 8   | 9    |
| True   | 904 | 99.1 |
| <b>Transmission is through close contact with an infected case (especially in family members, crowded places and health centers)</b>                       |     |      |
| False  | 11  | 1.2  |
| True   | 901 | 98.8 |
| <b>The disease can be prevented by hand washing and personal hygiene</b>   |     |      |
| False  | 20  | 2.2  |
| True   | 892 | 97.8 |
| <b>A medical mask is useful to prevent the spread of respiratory droplets during coughing</b>  |     |      |
| False  | 11  | 1.2  |
| True   | 901 | 98.8 |
| <b>The disease can be prevented by not having close contact such as shaking hands or kissing, not attending meetings and disinfecting hands frequently</b> |     |      |
| False  | 20  | 2.2  |
| True   | 892 | 97.8 |
| <b>Everyone should wear face masks</b>   |     |      |
| False  | 35  | 3.8  |
| True   | 877 | 96.2 |
| <b>An N95 mask should be worn only during intubation, suction, bronchoscopy and cardiopulmonary resuscitation</b>  |     |      |
| False  | 582 | 63.8 |
| True   | 330 | 36.2 |
| <b>The disease can be treated with standard antiviral drugs</b>  |     |      |
| False  | 553 | 60.6 |
| True   | 359 | 39.4 |
| <b>If symptoms appear within 14 days after direct contact with a suspected case, the person should consult a nearby public health center</b>               |     |      |
| False  | 135 | 14.8 |
| True   | 777 | 85.2 |

**Table 3. Prevention Behaviors on covid-19**

| Variables  | n   | (%)    |
|--|-----|--------|
| <b>Canceled or postponed meetings with friends, meals out and sporting events</b>  |     |        |
| Yes  | 894 | 98%    |
| No   | 18  | -2%    |
| <b>Reduced use of public transportation</b>  |     |        |
| Yes  | 902 | 98.90% |
| No   | 10  | 1.10%  |
| <b>Went shopping less frequently</b>   |     |        |
| Yes  | 897 | 98.40% |
| No   | 15  | 1.60%  |
| <b>Reduced the use of enclosed spaces, such as the library, theaters and cinemas</b>   |     |        |
| Yes  | 911 | 99.90% |
| No   | 1   | 0.10%  |
| <b>Avoided coughing around people as much as possible</b>  |     |        |
| Yes  | 908 | 99.60% |
| No   | 4   | 0.40%  |
| <b>Prevented places where a large number of people gather</b>  |     |        |
| Yes  | 898 | 98.50% |
| No   | 14  | 1.50%  |
| <b>Increased the frequency of cleaning and disinfection of items that can be easily touched by hands (i.e., door handles and surfaces)</b> |     |        |
| Yes  | 855 | 93.80% |
| No   | 57  | 6.30%  |
| <b>Washed hands more frequently than usual</b>   |     |        |
| Yes  | 897 | 98.40% |
| No   | 15  | 1.60%  |
| <b>Discussed COVID-19 prevention with family and friends</b>   |     |        |
| Yes  | 880 | 96.50% |
| No   | 32  | 3.50%  |

**Table 4. Perception of Risk Regarding covid-19**

| Variables   | n   | (%)  |
|---|-----|------|
| <b>I can get infected with COVID-19 more easily than others</b> |     |      |
| Never   | 235 | 25.8 |
| Occasionally  | 379 | 41.6 |
| Frequently  | 190 | 20.8 |
| Very often  | 108 | 11.8 |
| <b>I am afraid of getting infected with COVID-19</b>            |     |      |
| Never   | 101 | 11.2 |
| Occasionally  | 180 | 19.7 |
| Frequently  | 236 | 25.8 |
| Very often  | 395 | 43.3 |

## Discussion

The rapid spread of the COVID-19 pandemic has had a major impact on public health.<sup>21</sup> Governments, health authorities, and the scientific community around the world are trying to control and contain infection, because this disease puts people at risk of developing life-threatening conditions.<sup>22,23</sup> This presents a challenge for medical education, as the training of medical students is affected as a result of the closure of schools and faculties.<sup>24</sup>

Because medical students' education was disrupted and the fear of getting the disease, and potentially infecting their family, friends, and anyone else they came in contact with, they were forced to acquire COVID-19-related knowledge from various sources and share it with those they were in contact.<sup>25</sup>

This study found that more than half of the medical students obtained COVID-19 information from reliable sources with scientific rigor, and from social networks, which is similar to that reported by Saefi et al.<sup>26</sup> In this pandemic, some of the most relevant characteristics of social networking platforms have been the rapid dissemination of disease management protocols at regional, national and international levels. Sharing protocols on treatment, personal protective equipment, seminars in support of medical education, or the possibility of organizing collaborative research projects, surveys, and multi-center studies has become a constant.<sup>27</sup>

The students participating in this study who were taking the basic and clinical subjects showed to have knowledge about COVID-19, this is similar to other reported studies.<sup>28,29</sup> However, in the item of: "Only during



intubation, suction, bronchoscopy and cardiopulmonary resuscitation, N95 mask should be used” 63.8% of wrong answers were identified (n=582), since this is a special protection for medical professionals. According to the CDC recommendation, the N95 mask is preferred when performing or undergoing procedures that generate aerosols.<sup>30</sup> Hence, it is important that medical students graduating in the near future receive more courses on self-protection and correct handling of the COVID-19.

It was identified that most of the students implement the preventive measures toward COVID-19, similar to what was reported in another study.<sup>31</sup> In addition, they reported discussing the preventive measures with their family and friends, which may effectively increase awareness of the current situation. This indicates the importance of health education that could improve prevention behavior toward COVID-19 in society.<sup>32</sup>

Regarding risk perception about COVID-19, contrary to other studies reporting positive risk perceptions,<sup>33,34</sup> this study identified that students were afraid of getting infected and infecting their loved ones. This implies that college students may be more concerned about their parents and other older family members than about themselves, an aspect that has been seen in another study.<sup>35</sup> Risk perception is an important factor influencing behavior. Students who have a low perceived risk of contracting COVID-19 disease are more likely to minimize preventive behaviors such as not wearing a face mask, and not being able to maintain social distance, while those who have a high perceived risk are more likely to take appropriate preventive measures.<sup>36</sup>

A limitation of this study is its single-center nature, as well as exploratory weaknesses of the questionnaire, which may influence response biases in the studied population.

### Conclusion

In this study, it was identified that medical students have knowledge about COVID-19 obtained from reliable information sources with scientific rigor and on social networking platforms, so programs should be contemplated in medical school to ensure continued access to online health information resources such as free courses, clinical management guidelines, and webinars on COVID-19 to improve their knowledge and awareness to decrease the risk perception of the disease and encourage the practice of preventive behaviors.

### Authors' Contribution

B G-P: research problem statement, article development; R S-F: research design; V O-M: training, students; G C-M: advice, style editing; W S-M: discussion and conclusions, students; S R-C: analysis, information processing. All authors approve the publication of this paper.

### Funding

The present research did not receive external funding.

### Conflicts of interest

The authors declare not having conflicts of interest.

### References

1. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. China Novel Coronavirus Investigating and Research Team. A Novel Coronavirus from Patients with Pneumonia in China, 2019. *N Engl J Med* 2020; 382(8): 727-733. DOI: 10.1056%2FNEJMoa2001017
2. WHO. Director-General's opening remarks at the media briefing on COVID-19—11 March 2020. [Internet]. [Citado 2021 Ago 14]. Disponible en: <https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020>
3. Gobierno de México. Información internacional y nacional sobre nuevo coronavirus (COVID-2019). 2020. [Internet]. [Citado 2021 Ago 14]. Disponible en: <https://www.gob.mx/salud/documentos/informacion-internacional-y-nacional-sobre-nuevo-coronavirus-2019-ncov>
4. Suárez V, Suárez-Quezada M, Oros-Ruiz S, Ronquillo-De Jesús E. Epidemiology of COVID-19 in Mexico: from the 27th of February to the 30th of April 2020. *Rev Clin Esp (Barc)*. 2020;220(8):463-471. DOI: 10.1016/j.rce.2020.05.007
5. WHO. Coronavirus Disease (COVID-19) Situation Report. [Internet]. [Citado 2021 Nov 19]. Disponible en: <https://covid19.who.int/region/amro/country/mx>
6. Secretaría de Salud. Informes sobre el personal de Salud COVID19 en México. México: Dirección General de Epidemiología; 2021. [Internet]. [Citado 2021 Nov 19]. Disponible en: <https://www.gob.mx/salud/documentos/informes-sobre-el-personal-de-salud-covid19-en-mexico-2021>
7. Aburto-Morales JS, Romero-Méndez J, Lucio-García CA, et al. México ante la epidemia de COVID-19 (SARS-CoV-2) y las recomendaciones al Subsistema Nacional de Donación y Trasplante. *Rev Mex Traslpl*. 2020;9(1):6-14. DOI: 10.35366/94024
8. Kaul V, Gallo de Moraes A, Khateeb D, Greenstein Y, Winter G, Chae J, et al. Medical Education During the COVID-19 Pandemic. *Chest*. 2021;159(5):1949-1960. DOI: 10.1016/j.chest.2020.12.026
9. O' Byrne L, Gavin B, McNicholas F. Medical students and COVID-19: the need for pandemic preparedness. *J Med Ethics*. 2020;46(9):623-626. DOI: 10.1136/medethics-2020-106353
10. Choi B, Jegatheeswaran L, Minocha A, Alhilani M, Nakhoul M, Mutengesa E. The impact of the COVID-19 pandemic on final year medical students in the United Kingdom: a national survey. *BMC Med Educ*. 2020; 20(1):206. DOI:10.1186/s12909-020-02117-1
11. Miller DG, Pierson L, Doernberg S. The Role of Medical Students During the COVID-19 Pandemic. *Ann Intern Med*. 2020;173(2):145-146. DOI: 10.7326/m20-1281
12. Akers A, Blough C, Iyer MS. COVID-19 Implications on Clinical Clerkships and the Residency Application Process for Medical Students. *Cureus*. 2020;12(4):e7800. DOI: 10.7759/cureus.7800

13. Gobierno de México. Todo sobre el COVID-19. 2021. [Internet]. [Citado 2021 Ago 14]. Disponible en: <https://coronavirus.gob.mx/>
14. Organización Mundial de la Salud. Brote de enfermedad por coronavirus (COVID-19). [Internet]. [Citado 2021 Ago 14]. Disponible en: <https://www.who.int/es>
15. Centros para el Control y la Prevención de Enfermedades. COVID-19. [Internet]. [Citado 2021 Ago 14]. Disponible en: <https://www.cdc.gov/coronavirus/2019-ncov/index.html>
16. Hernández-García I, Giménez-Júlvez T. Assessment of Health Information About COVID-19 Prevention on the Internet: Infodemiological Study. *JMIR Public Health Surveill.* 2020;6(2):e18717. DOI: 10.2196/18717
17. Venegas-Vera AV, Colbert GB, Lerma EV. Positive and negative impact of social media in the COVID-19 era. *Rev Cardiovasc Med.* 2020;21(4):561-564. DOI:10.31083/j.rcm.2020.04.195
18. Kim JS, Choi JS. Middle East respiratory syndrome-related knowledge, preventive behaviours and risk perception among nursing students during outbreak. *J Clin Nurs.* 2016 Sep;25(17-18):2542-9. DOI:10.1111/jocn.13295
19. Kenneth McIntosh M. Coronavirus disease 2019 (COVID-19). [Internet]. [Citado 2020 Jul 08]. Disponible en: <https://www.uptodate.com/contents/126981>
20. 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;23(4):249-254. DOI: 10.34172/aim.2020.06
21. Sreepadmanabh M, Sahu AK, Chande A. COVID-19: Advances in diagnostic tools, treatment strategies, and vaccine development. *J Biosci.* 2020;45(1):148. DOI:10.1007/s12038-020-00114-6
22. Böger B, Fachi MM, Vilhena RO, Cobre AF, Tonin FS, Pontarolo R. Systematic review with meta-analysis of the accuracy of diagnostic tests for COVID-19. *Am J Infect Control.* 2021;49(1):21-29. DOI:10.1016/j.ajic.2020.07.011
23. Olaimat AN, Aolyamat I, Elshahory N, Shahbaz HM, Holley RA. Attitudes, Anxiety, and Behavioral Practices Regarding COVID-19 among University Students in Jordan: A Cross-Sectional Study. *Am J Trop Med Hyg.* 2020;103(3):1177-1183. DOI:10.4269/ajtmh.20-0418
24. Alsoufi A, Alsuyhili A, Msherghi A, Elhadi A, Atiyah H, Ashini A, et al. Impact of the COVID-19 pandemic on medical education: Medical students' knowledge, attitudes, and practices regarding electronic learning. *PLoS One.* 2020;15(11):e0242905. DOI: 10.1371/journal.pone.0242905
25. Khasawneh AI, Humeidan AA, Alsulaiman JW, Bloukh S, Ramadan M, Al-Shatanawi TN, et al. Medical Students and COVID-19: Knowledge, Attitudes, and Precautionary Measures. A Descriptive Study From Jordan. *Front Public Health.* 2020 May 29;8:253. DOI: 10.3389/fpubh.2020.00253
26. Saefi M, Fauzi A, Kristiana E, Adi WC, Muchson M, Setiawan ME, et al. Survey data of COVID-19-related knowledge, attitude, and practices among Indonesian undergraduate students. *Data Brief.* 2020;31:105855. DOI: 10.1016/j.dib.2020.105855
27. González-Padilla DA, Tortolero-Blanco L. Social media influence in the COVID-19 Pandemic. *Int Braz J Urol.* 2020;46(suppl.1):120-124. DOI: 10.1590/s1677-5538.ibju.2020.s121
28. Alsoghair M, Almazyad M, Alburaykan T, Al-sultan A, Alnughaymishi A, Almazyad S, et al. Medical Students and COVID-19: Knowledge, Preventive Behaviors, and Risk Perception. *Int J Environ Res Public Health.* 2021;18(2):842. DOI: 10.3390/ijerph18020842
29. Soltan EM, El-Zoghby SM, Salama HM. Knowledge, Risk Perception, and Preventive Behaviors Related to COVID-19 Pandemic Among Undergraduate Medical Students in Egypt. *SN Compr Clin Med.* 2020;9:1-8. DOI:10.1007/s42399-020-00640-2
30. Feng S, Shen C, Xia N, Song W, Fan M, Cowling BJ. Rational use of face masks in the COVID-19 pandemic. *Lancet Respir Med.* 2020;8(5):434-436. DOI:10.1016/s2213-2600(20)30134-x
31. Careaga D, Gil BV, González X, Gómez Y, Valle D. Conocimientos sobre prevención y control de la COVID-19 en estudiantes. *Rev Ciencias Médicas [Internet].* 2020 [citado 2022 Mar 30]. Disponible en: [http://scielo.sld.cu/scielo.php?script=sci\\_arttext&pid=S1561-31942020000600005&lng=es](http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1561-31942020000600005&lng=es)
32. Elhadi M, Msherghi A, Alsoufi A, Buzreg A, Bouhuwaish A, Khaled A, et al. Knowledge, preventive behavior and risk perception regarding COVID-19: a self-reported study on college students. *Pan Afr Med J.* 2020;11;35(Suppl 2):75. DOI: 10.11604/pamj.supp.2020.35.2.23586
33. Qin S, Zhou M, Ding Y. Risk Perception Measurement and Influencing Factors of COVID-19 in Medical College Students. *Front Public Health.* 2021;9:774572. DOI: 10.3389/fpubh.2021.774572
34. Piñel CS, Gómez-Roso MJ, López JJ. Percepción y ansiedad de los estudiantes de Medicina en su rotación clínica en Obstetricia durante la pandemia por COVID-19. *Rev Esp Edu Med.* 2021;2(1):13-21.
35. Ding Y, Du X, Li Q, Zhang M, Zhang Q, Tan X, Liu Q. Risk perception of coronavirus disease 2019 (COVID-19) and its related factors among college students in China during quarantine. *PLoS One.* 2020;15(8):e0237626. DOI:10.1371/journal.pone.0237626
36. Rayani M, Rayani S, Najafi-Sharjabad F. COVID-19-related knowledge, risk perception, information seeking, and adherence to preventive behaviors among undergraduate students, southern Iran. *Environ Sci Pollut Res Int.* 2021;28(42):59953-59962. DOI:10.1007/s11356-021-14934-y