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ORIGINAL ARTICLE

Knowledge, attitudes, and practices toward COVID-19 among emergency medicine residents during COVID-19 outbreak

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ABSTRACT

BackgroundAs an emerging infectious disease, COVID-19 has led to overwhelming pressure on healthcare facilities and has caused significant morbidity and mortality worldwide. The WHO declared it a pandemic in early 2020, and due to a lack of knowledge at the initial phase, there were numerous misconceptions. During the pandemic, evidence-based practices improved patient care. Here we surveyed a representative sample of Saudi emergency medicine physicians in-training to assess their knowledge, attitudes, and practices about COVID-19.

MethodsAn online survey with 18 questions was generated using survey monkey and provided to the target audience via the messaging service WhatsApp.

ResultsMost of the participants' ages ranged between 26 and 31 years old, and males were slightly higher in number. Most of the participants demonstrated awareness of the cardinal symptoms of COVID-19 and risk factors for the severity of the infection. Half of the participants believed they could differentiate between COVID-19 and the common cold based on clinical encounters alone, and a quarter of them believed antibiotics decrease overall mortality.

ConclusionGeneral knowledge about COVID-19's cardinal symptoms was adequate; however, there are gaps in knowledge in multiple areas with regard to treatment and practice, and our study shows certain misconceptions that need to be addressed.

Keywords: COVID-19, emergency medicine, knowledge, attitude, and practices.

Introduction

Coronavirus disease 2019 (COVID-19) is one of the critical respiratory infections caused by a novel coronavirus (SARS-CoV-2), which emerged in December 2019 in Wuhan, China [1]. In a short period of time, the World Health Organization (WHO) declared COVID-19 a public health emergency of international concern (PHEIC) on January 30, 2020, and then it quickly declared COVID-19 a global pandemic on March 11, 2020 [2].

As per the U.S. Center for Disease Control and Prevention (CDC), coronavirus spreads mainly in a person-to-person manner. The mechanism of transmission is through droplets caught directly by close contact with infected people within a six-foot radius coughing and/or sneezing or indirectly by touching contaminated surfaces [3]. It has the usual spectrum of viral clinical symptoms, which include but are not limited to fever, dry cough, fatigue, myalgia, and dyspnea. The clinical course initially was not yet

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well-established; however, based on research findings, patients who are at increased risk for more severe infection forms are the elderly and individuals with chronic comorbidities [3]. Transmission prevention is key to control and/or break the transmission circle, which can be achieved by washing hands regularly, and wearing face masks that can both limit droplet spread by infected persons and prevent inhalation of droplets by the uninfected individuals [3].

On a larger scale, there has been an international effort with regard to public health measures to limit the spread of the virus, which have included, but are not limited to, the suspension of public transportation, the closure of public spaces, and the application of isolation systems for infected and suspected cases in addition to contact tracing [1].

In an era where clinicians are exposed to rapidly updating information, misconceptions and incorrect assumptions surrounding COVID-19 have been unavoidable which has become a source of concern among healthcare workers who are on the frontlines of the pandemic response. Innovative ways to counter the misconceptions have included online-based didactic, interactive lectures, courses, and workshops. This study aims to assess information regarding the knowledge, attitudes, and practices of Saudi emergency medicine physicians in-training regarding COVID-19 infection. The study also broadens our understanding of where we can improve and identify gaps in the knowledge that need the most attention during the COVID-19 pandemic.

Methodology

We created a survey drawn from several published online surveys from China and several other countries [4-7] regarding the knowledge, attitude, and behavior of healthcare providers towards COVID-19. The survey consists of demographic questions, fourteen questions about knowledge of facts about COVID-19, two questions regarding practices, and two questions relating to attitudes (Table 1). The survey was distributed online among Saudi emergency residents through surveymonkey. At the time of the study, there were approximately 800 emergency medicine residents in training in Saudi Arabia. The survey was distributed by sending a weblink of the survey through the messaging application WhatsApp. We targeted the entire cohort of trainees. The study started in March 2022 and was concluded in July 2022. Statistical analysis of the data was done using SPSS version 28. Categorical data was analyzed using descriptive statistics and is presented as frequency and percentages. Inferential statistics were carried out using Pearson's chi-square test, with the cut-off for the p value set at 0.05. T tests were performed to compare the continuous dependent variable. The approved answers for the knowledge section were taken from Rosen's Emergency Medicine: Concepts and Practice, 10th edition, CDC and FDA guidelines [8-10]. A variable for scoring knowledge was created and its value ranges from 0 to 14, where a score of 14 indicates excellent knowledge. Institutional Review Board (IRB) approval for this project was obtained through King Abdulaziz University's IRB Office and informed

Table 1. *Knowledge, attitude, and practice questions.*

Knowledge	
1.	The main clinical symptoms of COVID-19 are fever, fatigue, dry cough, and myalgia.
2.	Unlike the common cold, stuffy nose, runny nose, and sneezing are less common in persons infected with COVID-19.
3.	There is currently no effective cure for COVID-19, but early symptomatic and supportive treatment can help most patients recover from the infection.
4.	Risk factors for illness severity include advanced age, chronic disease, and obesity.
5.	Eating or contacting wild animals would result in infection by the COVID-19 virus.
6.	Persons with COVID cannot spread the virus to others when a fever is not present.
7.	The COVID-19 virus spreads via respiratory droplets of infected individuals.
8.	Regular facemask prevents transmission.
9.	It is not necessary for children and young adults to take measures to prevent infection by the COVID-19 virus.
10.	To prevent infection by COVID-19, individuals should avoid going to crowded places and practice safe distance.
11.	Isolation and treatment of people who are infected with the COVID-19 virus are effective ways to reduce the spread of the virus.
12.	People who have contact with someone infected with the COVID-19 virus should be immediately isolated?
13.	Does Ceftriaxone and azithromycin administration improve mortality among COVID patients?
14.	Does steroid administration among COVID patients improve mortality?
Attitude	
1.	Do you agree that COVID-19 will finally be successfully controlled?
2.	Do you have confidence that Saudi Arabia can win the battle against the COVID-19 virus and its variance?
Practice	
1.	In recent days, have you gone to any crowded places?
2.	In recent days, have you worn a mask when leaving home?

consents were obtained from each participant before completing the self-administered survey.

Results

We obtained 94 respondents who completed the survey after obtaining informed consent from them. Their demographic data differs, with approximately 59% of the study participants identifying as male, with the remaining 41% identifying as female. Participants ranged in age from 5% between 21 and 25 years old, 80% between 26 and 31 years old, and 60% over 32 years old.

Knowledge

Ninety-nine percent of the participants answered correctly with regard to the cardinal symptoms, and more than 50% of the participants agreed that COVID-19 could be differentiated from common cold symptoms. Only 2% of respondents believe that there is an effective cure for COVID-19, and 98% accurately answered the question about COVID-19 risk factors (advanced age, obesity, and chronic illness). Seventeen percent believe infection with COVID-19 might occur from eating or having contact with wild animals.

Five percent of respondents believe a patient cannot transmit the disease in the absence of a fever. Ninety-seven percent of participants agreed with the transmissibility of COVID-19 via droplets, and around 60% of the participants believed facemasks could prevent the transmission of COVID-19. Ninety-five percent of the participants agree that children and young adults should also be included in precautionary measures. Forty-two percent of the participants believed that people who have been in contact with a positive COVID-19 case should immediately be put in isolation, and 25% thought that the concurrent administration of antibiotics (Ceftriaxone or Azithromycin) during infection would decrease mortality. Just over half of respondents believe that administration of corticosteroids during the disease course reduces COVID-19 mortality. Almost 98% of participants believe that to prevent transmission, people should practice social distancing and avoid crowded places; however, only 54% believe that immediate isolation of the person

Table 2. *Participants' answers to knowledge, attitude, and practice questions.*

Questions	Correct answer *N* (%)	Wrong answer/I do not know *N* (%)
Knowledge		
The main clinical symptoms of COVID-19 are fever, fatigue, dry cough, and myalgia.(The correct answer is Yes)	93 (98.9%)	1 (1.1%)
Unlike the common cold, stuffy nose, runny nose, and sneezing are less common in persons infected with COVID-19.(The correct answer is No)	41 (43.6%)	53 (56.4%)
There is currently no effective cure for COVID-19, but early symptomatic and supportive treatment can help most patients recover from the infection.(The correct answer is Yes)	88 (93.6%)	6 (6.4%)
Risk factors for illness severity include advanced age, chronic disease, and obesity.(The correct answer is Yes)	93 (98.9%)	1 (1.1%)
Eating or contacting wild animals would result in infection by the COVID-19 virus.(The correct answer is No)	59 (62.8%)	35 (37.2%)
Persons with COVID cannot spread the virus to others when a fever is not present.(The correct answer is No)	85 (90.4)	9 (9.6%)
The COVID-19 virus spreads via respiratory droplets of infected individuals.(The correct answer is Yes)	91 (96.8%)	3 (3.2%)
Regular Facemask prevents transmission. (The correct answer is No)	56 (59.6%)	38 (40.4%)
It is not necessary for children and young adults to take measures to prevent infection by the COVID-19 virus. (The correct answer is No)	89 (94.7%)	5 (5.3%)
To prevent infection by COVID-19, individuals should avoid going to crowded places and practice safe distance. (The correct answer is Yes)	92 (97.9%)	2 (2.1%)
Isolation and treatment of people who are infected with the COVID-19 virus are effective ways to reduce the spread of the virus.(The correct answer is Yes)	93 (98.9%)	1 (1.1%)
People who have contact with someone infected with the COVID-19 virus should be immediately isolated? (The correct answer is Yes)	51 (54.3%)	43 (45.7%)
Does Ceftriaxone and azithromycin administration improve mortality among COVID patients?(The correct answer is No)	39 (41.5%)	55 (58.5%)
Does steroid administration among COVID patients improve mortality?(The correct answer is Yes)	50 (53.2%)	44 (46.8%)
Attitude		
	Yes	**No** / **I do not know**
Do you agree that COVID-19 will finally be successfully controlled?	73 (77.7%)	15 (16%) / 6 (6.4%)
Do you have confidence that Saudi Arabia can win the battle against the COVID-19 virus and its variance?	81 (86.2%)	6 (6.4%) / 7 (7.4%)
Practice		
	Yes	**No**
In recent days, have you gone to any crowded places?	75 (79.8%)	19 (20.2%)
In recent days, have you worn a mask when leaving home?	68 (72.3%)	26 (27.7%)

who contacted a confirmed case should be carried out, see table 2 for a summary of answers.

Attitude

The majority of the participants showed a positive attitude regarding the control of COVID-19. Over three-quarters of respondents (77%) believe that COVID-19 will eventually be contained, and 86% of them have confidence that the Saudi Arabian healthcare infrastructure will eventually emerge victorious in the battle against COVID-19. Males have slightly higher believe than females (80% *vs.* 74%) in believing COVID-19 will eventually be controlled and also were slightly more confident (90% *vs.* 79%) that Saudi Arabia will the battle against COVID-19.

Behavior

When it comes to participants' practices, around 80% of participants have visited crowded places recently, and only 72% of them have worn masks in these crowded areas.

Pearson's chi-square test was carried out to compare gender against different variables, and we did not find a statistical significance between genders with regards to those who wear facemasks outside the house and those who do not (Pearson chi-square is 0.32 and *p* value is 0.570). Another chi-square test showed no statistical significance between different genders and the belief of the efficacy of Ceftriaxone and Azithromycin (Pearson chi-square is 0.44 and *p* value is 0.50). There is also no difference between genders with regards to the belief in the efficacy of corticosteroids on disease course (Pearson chi-square is 0.124 and *p* value is 0.72). We compared to gender and knowledge about the cardinal symptoms of COVID-19, and this also lacked statistical significance (Pearson chi-square is 1.4 and *p* value is 0.23). Knowledge score was compared against gender through unpaired *t* test and showed statistical significance (*p* value 0.0004) as male residents scored slightly higher than females (figure 1). Knowledge score was also compared against the different age groups and did not show any statistically significant result as the *p* value is 0.107 (figure 2).

We tested the attitude and practice questions by comparing both genders with their answers and even though we found little difference; however, the Pearson chi-square test did not find any statistical significance between genders when it comes to both attitude and practice questions (in all tests *p* value is > 0.05).

Discussion

Most of our participants were aged between 26 and 31, which is an age group that encompasses most clinicians in training. Almost all (99%) of the participants were aware about the cardinal symptoms of COVID-19, which indicates a good knowledge about the disease. In addition, 98% of participants correctly identified the risk factors for infection severity. However, more than half of the participants agreed with the statement that COVID-19 can be differentiated from symptoms of the common cold. This incorrect knowledge in turn leads to preventable exposure to high-risk groups in the population and increases viral spread. The Center for Disease Control and Prevention (CDC) states the two infections cannot be differentiated solely based on

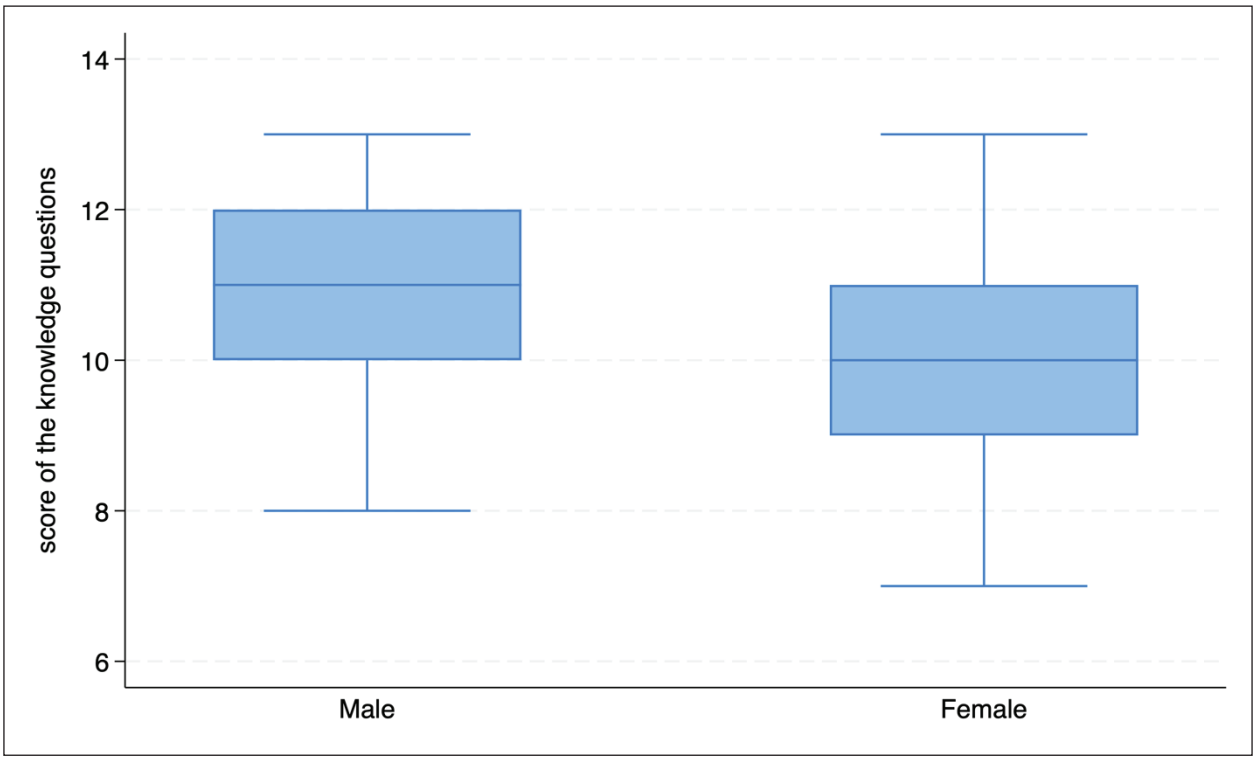

Figure 1. *Knowledge score among participants.*

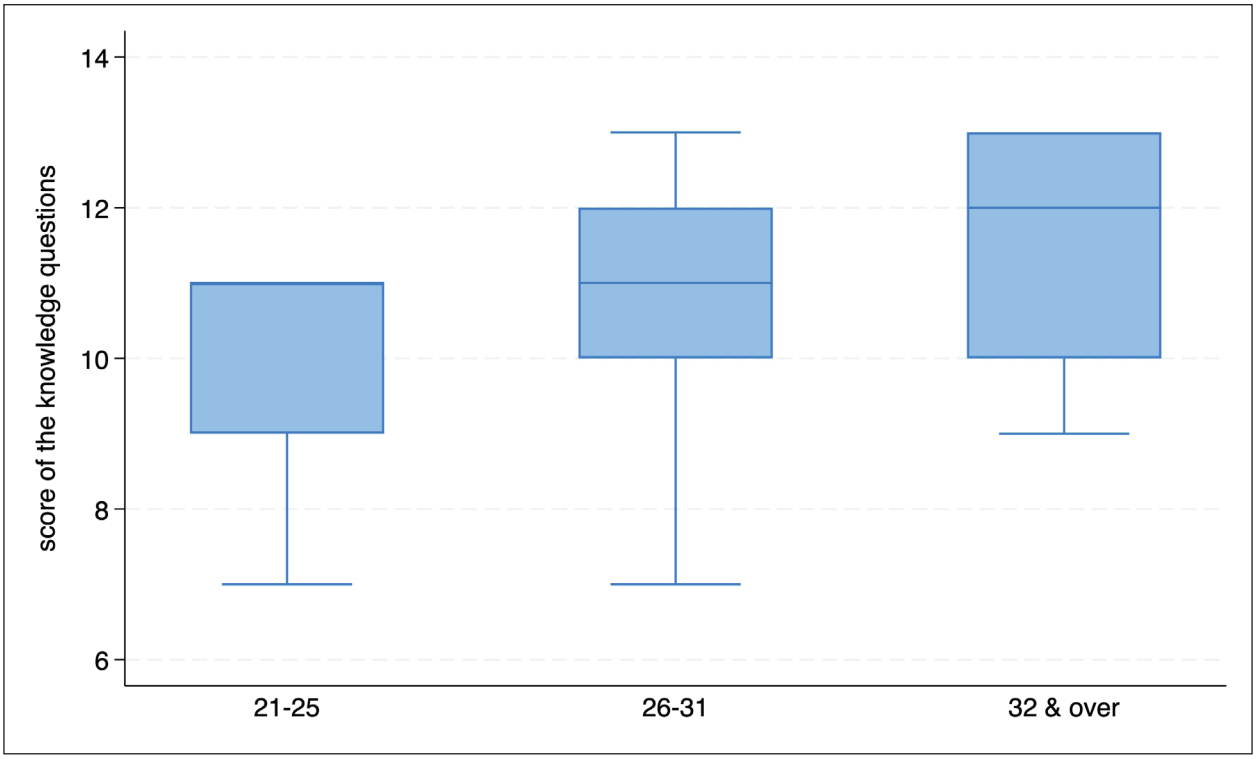

Figure 2. *Knowledge score among different age group.*

symptoms and testing is required to early isolate and treat COVID-19 [11].

In addition, 17% hold the belief that COVID-19 might result from eating or being in contact with wild animals. This idea could stem from the fact that COVID-19 is thought to be due to cross-species transmission from animals to humans. Yet, as far as the evidence has shown, viral transmission is through human-to-human contact and not through wild animal contact [11]. The survey responses indicated that 60% of the participants believe regular face mask usage prevents the transmission of COVID-19. However, regular facemask usage only reduces the risk of transmission and does not completely prevent it [12]. The level of reduction and protection varies according to the type of mask, the number of layers, and the fit of the mask relative to the user. According to some studies, facemasks reduce the reproduction number (R) by 19% [13]. Chu et al. [14] found facemask reduces transmission in healthcare settings while Howard et al. [15] found conflicting results when the study was done in a community setting.

When we tested the knowledge, attitudes, and practices toward interventions we found only 54% of the participants believed immediate isolation of the confirmed cases is necessary. The U.S CDC recommends early quarantine and strict mask use for suspecting individuals until testing results are available. Based on recent literature, steroids proved effective at reducing mortality in moderate to severe COVID-19 infections. In our study, slightly over half of the participants were aware of steroid effectiveness. Furthermore, a quarter of participants thought antibiotics such as ceftriaxone or azithromycin reduce COVID-19 mortality. There is no evidence to support the use of antibiotics as a treatment for COVID-19. In fact, steroids were the only medication that showed mortality benefit.

Almost one-third of our survey cohort did not wear a mask when leaving home. We found no difference in the adherence to this practice between both genders and at all age groups. We believe the relatively low mask usage of respondents compared to other studies [16] is due to the time-period that our study was conducted in, whereby as the total number of COVID-19 cases dropped in the Kingdom, precautionary measures such as lockdowns and safe distancing were not enforced as stringently as during previous waves of higher incidences earlier in the pandemic. Finally, we believe we demonstrate that age and gender were likely not contributing factors to the differences in knowledge and mask adherence among our study cohort. We do recommend correcting the misconceptions and improving the knowledge of the healthcare provider through online education and courses.

Conclusion

Evidence-based knowledge, attitudes, and best practices regarding COVID-19 is of paramount importance to healthcare workers, particularly frontline emergency physicians who are often a healthcare delivery system's point of contact with patients with more severe symptoms. Gaps in knowledge, misconceptions, or negative attitudes all might be factors that contribute to delays in early detection and isolation, which thereby hinder preventative measures to control the pandemic on both a smaller and larger scale. We hope this study and our findings will have illuminated potential targets for

interventions that will improve the knowledge, attitudes, and practices of emergency physicians in Saudi Arabia.

Conflict of interests
The authors declare that there is no conflict of interest regarding the publication of this article.

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Consent to participate
Informed consents were taking from participants before filling the survey.

Ethical approval
This project was approved by the King Abdulaziz IRB committee. Approval Number: 272-22, Dated: 23-05-2022.

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