Original article

Knowledge, attitude and practices of healthcare professionals of Riyadh, Saudi Arabia towards covid-19: A cross-sectional study

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A R T I C L E   I N F O

A B S T R A C T

Background & objectives: COVID-19 is an emerging pandemic that necessitates the implementation of effective infection prevention and control steps. The knowledge, attitudes, and practices (KAP) of healthcare professionals toward COVID-19 affect their compliance to prevention and control initiatives. During the evolving pandemic, we examined the KAP among healthcare professionals against COVID-19 in this research.

Materials and methods: This was a cross-sectional study conducted among Riyadh region health care professionals from the beginning of December 2020 to the end of February 2021 using a validated self-administered questionnaire. The knowledge questionnaire contained questions about COVID-19 clinical characteristics, prevention, and management. The evaluation of attitudes and practices included questions regarding actions and adjustments in COVID-19 response activities. Knowledge scores were measured and compared using demographic characteristics, as well as attitudes and practices toward COVID-19. Using SPSS-IBM 25, bivariate statistics were done to analyze the data.

Results: 146 healthcare professionals completed the survey. Physicians were the most prominent party in the survey, accounting for 74 (51 percent), followed by nurses 44 (30 percent) and pharmacists 28 (19 percent). The participants' average age was 39.69 ± 8.48 years. The participant's mean knowledge, attitude, and practice scores were 11.43 ± 1.34, 3.89 ± 0.93, and 3.85 ± 0.81, respectively. With a positive attitude, the mean knowledge score was 11.52, and with proper practice, it was 11.32. With an improvement in knowledge, the attitude score increased significantly (r = 0.172, P = 0.001). Besides, there was a greater association between attitudes and practices (r = 0.170, P = 0.029). A significant enhancement in the practice score of the professionals was noted with an increase in knowledge score (r = 0.095, P = 0.010), an indicator for a positive correlation between practice and knowledge scores.

Interpretation & conclusion: Healthcare practitioners have a good understanding of COVID-19. Improved knowledge and a positive attitude toward COVID-19 infection are linked to appropriate practice. There is a need for more manpower, better COVID-19 management training, and strategies to reduce anxiety among healthcare professionals.

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1. Introduction

A severe acute coronavirus respiratory syndrome triggers COVID-19, a highly infectious disease. As per studies, the infection spreads primarily through respiratory droplets/mists that are released from the infected person during coughing, sneezing, speaking, and even breathing (Rothan and Byrareddy, 2020). The coronavirus disease 2019 (COVID-19) outbreak began in China's Wuhan province; the epidemic has spread farther than initially

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thought, with cases now reported all over the world (Shi et al., 2020). COVID-19 is a modern Betacoronavirus that can infect humans (Zhu et al., 2020). According to the findings, the virus is more closely related to BatCoV RaTG13, a bat coronavirus with a 96.2 percent overall genome sequence identity (Zhou et al., 2020). According to these observations, bats may have been the virus's initial host (Zhu et al., 2020; Zhou et al., 2020).

Coronaviruses can cause a range of illnesses, from the common cold to more serious conditions like Middle East Respiratory Syndrome (MERS-CoV) and Extreme Acute Respiratory Syndrome (SARS-CoV-2) (Torales et al., 2020). COVID-19 is currently diagnosed using genomic techniques such as polymerase chain reaction (PCR) or deep sequencing to detect the virus or viral components (Bai et al., 2020; Mehta et al., 2020; Liu et al., 2019).

According to the literature, everyone is at risk of contracting COVID-19 (Wang et al., 2020a). For healthcare workers, the risk of contamination and cross infection is higher. The COVID-19 pandemic has had a major impact on frontline healthcare staff such as physicians, nurses, and pharmacists (Raudenská et al., 2020). This pandemic has claimed the lives of hundreds of healthcare workers (Bandyopadhyay et al., 2020). Even though the healthcare profession has never faced an obstacle like this from any other disease before, they have demonstrated improved resilience to resolve it (Albott et al., 2020).

A positive attitude and good work practices are aided by extensive knowledge, which reduces the risk of infection (McEachan et al., 2016; Alshrari, 2020). The knowledge, attitudes, and practices (KAP) of healthcare professionals toward COVID-19 influence their adherence to control initiatives. The knowledge, attitude and practice (KAP) of health care professionals (HCP) regarding COVID-19 are critical to stopping the spread of the virus and the success of the overall COVID-19 response. The current literature indicates a conflicting picture regarding HCPs' KAP regarding COVID19. Some studies (Kassie et al., 2020; Olum et al., 2020) have indicated that HCPs have good knowledge of and positive attitude toward COVID-19 as well as practice safer infection, prevention and control practices put forward by international and local health authorities. On the other hand, an Ethiopian study reported poor prevention practices toward COVID-19 among HCPs (Asemahagn, 2020) while close to half of HCPs in Nepal were reported to have negative attitudes toward COVID-19 (Limbu et al., 2020). An earlier study (Temsah et al., 2020) published on KAP of Saudi Arabian health care staff found that they had a good understanding of COVID-19. However, the majority of the participants in this study were nurses (75%) who worked in the critical care unit. As a result, there is still a need for general health care professionals to understand the KAP. Further, to have appropriate practices and protection, it is important to understand the expertise of different classes of healthcare professionals and identify the factors that influence their attitudes and practices. As a result, the aim of this study was to evaluate healthcare professionals' knowledge, attitudes, and practices regarding COVID-19 infections in the Riyadh region of Saudi Arabia during the continuing pandemic.

2. Materials and methods

2.1. Study design

This was a cross-sectional study conducted among Riyadh region health care professionals from the beginning of December 2020 to the end of February 2021 (Saudi Arabia). The purpose of the study was briefly explained at the start of the questionnaire. After reaching the study center, researchers shared an informed consent form with participants electronically along with a questionnaire form that included sections on the study's intent, risks,

expectations, financial and other compensation (if any), ways to contact the investigators, and a request for a copy of the questionnaire filled out by the participants.

2.2. Study population

This questionnaire-based survey included 146 health care professionals, including physicians, nurses, and pharmacists, to determine their knowledge, attitudes, and practices about COVID-19.

2.3. Questionnaire design

This was a questionnaire-based cross-sectional study. The questionnaire used in this study was divided into two parts: part 1 covered sociodemographic variables and part 2 included 13 knowledge-based items, as well as five items in each of the attitude and practice domains (KAP). The sociodemographic characteristics included in part 1 were age (continuous variable), gender (male/female), marital status (married/unmarried), educational level (bachelor/master/Ph.D.), professional type (Physician/nurse/pharmacist), nationality (Saudi/non-Saudi), hospital class (Tertiary/Secondary/Primary health care), and hospital nature (Private/Public). The items in the KAP were taken from the literature (Limbu et al., 2020). Thirteen true and false questions were used to determine knowledge. These questions tested healthcare professionals' knowledge of COVID-19's clinical manifestations, transmission mode, prevention, and control. Internal accuracy was calculated by Cronbach's alpha, which was 0.78, suggesting that the survey was accurate. Expert researchers and statisticians conducted logical and material validity tests based on the suggested outcomes. As a result, a self-administered pretest of the questionnaire was conducted on a small sample of the target population. Correct answers to knowledge questions received a 1 score, while incorrect answers received a 0 score (hence the knowledge maximum score was 13). Based on the adjusted Bloom's cut-off points, each participant's knowledge score was divided into three categories: poor (60 percent: 8), fair (60 percent –79 percent: 9–11), and good (80 percent: 12, 13). Positive and negative attitudes were analyzed. The average attitude questionnaire score was measured and used as a cutoff for positive and negative responses. The average score was three, and any score below three was considered negative. In terms of practice questions, the correct practice received a score of 1, while the incorrect practice received a score of 0. (hence a maximum practice score of 5). Improper practice was defined as a score of 3 or less, whereas proper practice was defined as a score of 3 or more.

2.4. Data collection

Medical staff physicians, pharmacists, and nurses from various public and private hospitals (05 each) in Riyadh, Saudi Arabia, participated in this research. The questionnaire was distributed electronically to members via web-based media in compliance with COVID-19 guidelines. The study's five researchers directly visited the participants at their worksites to distribute the questionnaire. Data was collected from the beginning of December 2020 to the end of February 2021. The Research Committee of College of Pharmacy, AlMaarefa University approved this project [MCST/(AU)-COP 20–42/RC dated 25/11/2020]. Participants were informed about the study's goal through verbal contact as well as a brief explanation written at the beginning of the questionnaire type. There was no incentive or coercion for the participants. Their identity was kept anonymous and secrecy of their responses was guaranteed to them.

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2.5. Statistical analysis

The data was gathered and analyzed using SPSS statistical tools. The chi-squared test was used to examine the relationship between physicians, nurses, and pharmacists. The dependent variables (knowledge, attitude, and practice) were correlated with sociodemographic characteristics using descriptive analysis. It is considered significant if the P-value is less than 0.05.

3. Results

3.1. Knowledge level of health care professionals

Altogether 210 participants were approached, 156 participated with a response rate of 74%. Further, 10 samples were removed due to missing data. Finally, 146 healthcare professionals completed the survey. Physicians were the most prominent party in the survey, accounting for 74 (51 percent), followed by nurses 44 (30 percent) and pharmacists 28 (19 percent). Table 1 shows the basic characteristics of respondents based on their knowledge level (poor, fair, and good). The Average age of participants was 39.69 ± 8.48 (mean ± Standard deviation) years. Overall, the mean knowledge score of the participant was 11.43 ± 1.34. The significantly higher number of young aged participants (7 out of 8) showed a good level of knowledge on the COVID-19, however, very few respondents from this age group participated in our study. No significant difference was found between the physician, nurses,

and pharmacist on the knowledge score. The average score of physicians, nurses, and the pharmacist was 11.52, 11.38, and 11.25, respectively (Fig. 1). The number of pharmacists with good knowledge scores was slightly lesser than the other two professionals. The mean knowledge score (11.54) of master's degree holders was non-significantly higher than bachelor's degree holders (11.41) and Ph.D.'s (11.20). There was no significant difference between male and female participants in terms of knowledge score (11.59 female Vs 11.32 male). Similarly, professionals from Saudi nationality had slightly better knowledge (11.59) compared to non-Saudi participants (11.33). On the other hand, married participants (11.48 Vs 11.13), those working in secondary care hospitals (11.69 Vs 11.40 and 11.09) and public hospitals (11.50 Vs 11.36) showed non-significantly better mean knowledge score compared to the unmarried, those working in a tertiary care/primary care and private hospitals, respectively.

3.2. Attitude and practice scores of health care professionals

Fig. 2 depicts the mean attitude and practice score of the participants against demographic variables. The average attitude and practice scores of the study participants were 3.89 ± 0.93 and 3.85 ± 0.81 (mean ± SD), respectively. No significant variation was found between the demographic variables and attitude score of the healthcare professionals, whereas, a significant (P value = 0.050) increase in the practice score was noted in unmarried professionals compared to the married ones.

Table 1
Knowledge level of healthcare professionals on COVID-19.

Demographics	Knowledge type				P-value*
	Poor N (%)	Fair N (%)	Good N (%)	Total	
Professional type	3 (2)	62 (43)	81 (56)	146	0.458
Physician	1 (1)	30 (41)	43 (53)	74 (51)	
Nurse	2 (5)	17 (39)	25 (57)	44 (30)	
Pharmacist	0	15 (54)	13 (46)	28 (19)	
Gender	3 (2)	62 (43)	81 (56)	146	0.350
Male	3 (3)	36 (41)	48 (55)	87 (60)	
Female	0	26 (44)	33 (56)	59 (40)	
Age	3 (2)	62 (43)	81 (56)	146	**0.023**
≤ 25 years	1 (13)	0	7 (88)	8 (5)	
26–40 years	2 (3)	33 (47)	36 (51)	71 (49)	
>40 years	0	29 (43)	38 (57)	67 (46)	
Educational level	3 (2)	62 (43)	81 (56)	146	0.579
Bachelor	0 (0)	24 (45)	29 (55)	53 (36)	
Masters	2 (3)	24 (38)	38 (59)	64 (44)	
Ph.D. or equivalent	1 (3)	14 (48)	14 (48)	29 (20)	
Nationality	3 (2)	62 (43)	81 (56)	146	0.239
Saudi	1 (2)	19 (34)	36 (64)	56 (38)	
Non-Saudi	2 (2)	43 (48)	45 (50)	90 (62)	
Marital status	3 (2)	62 (43)	81 (56)	146	0.670
Married	2 (2)	53 (43)	69 (56)	124 (85)	
Unmarried	1 (5)	9 (41)	12 (55)	22 (15)	
Hospital type	3 (2)	62 (43)	81 (56)	146	0.553
Public	1 (2)	28 (42)	38 (57)	67 (46)	
Private	2 (3)	34 (43)	43 (54)	79 (54)	
Hospital class	3 (2)	62 (43)	81 (56)	146	0.178
Tertiary	1 (2)	29 (45)	35 (54)	65 (45)	
Secondary	1 (2)	18 (37)	30 (61)	49 (34)	
Primary health care	1 (3)	15 (47)	16 (50)	32 (22)	
Attitude	3 (2)	62 (43)	81 (56)	146	0.563
Negative	1 (2)	22 (49)	22 (49)	45 (31)	
Positive	2 (2)	40 (40)	59 (59)	101 (69)	
Practice	3 (2)	62 (43)	81 (56)	146	0.326
Improper	2 (4)	21 (46)	23 (50)	46	
Proper	1 (1)	41 (41)	58 (58)	100	

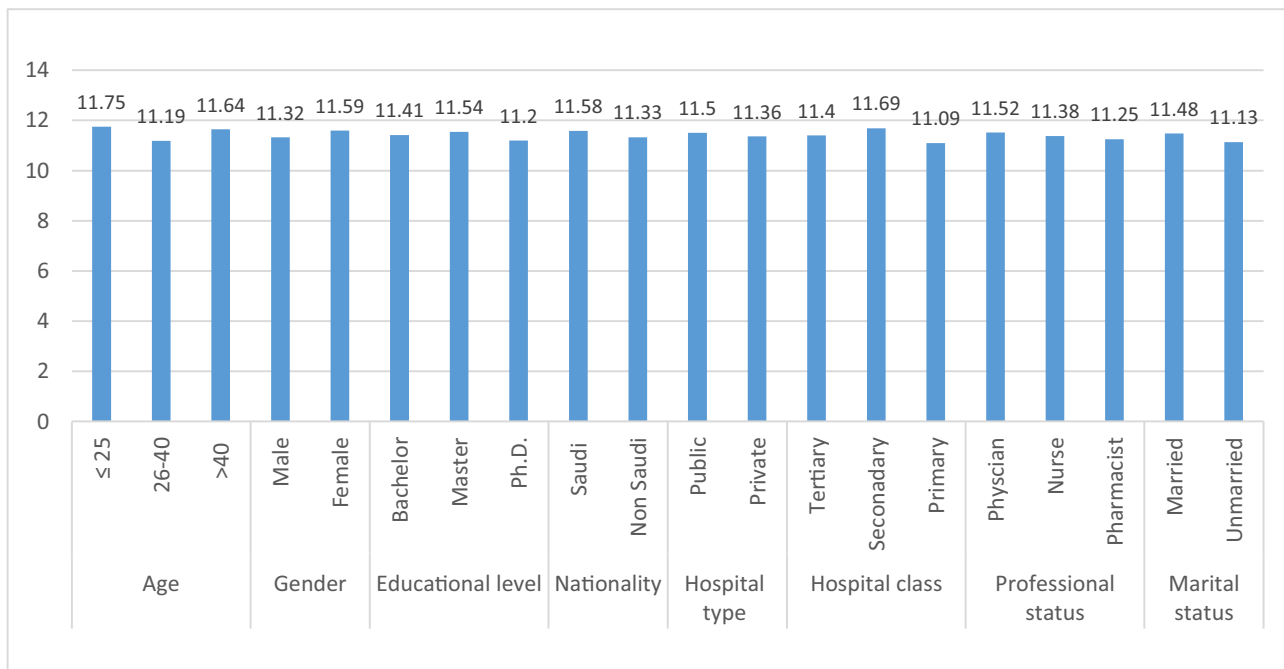*Pearson Chi-Square; *P value less than 0.05.

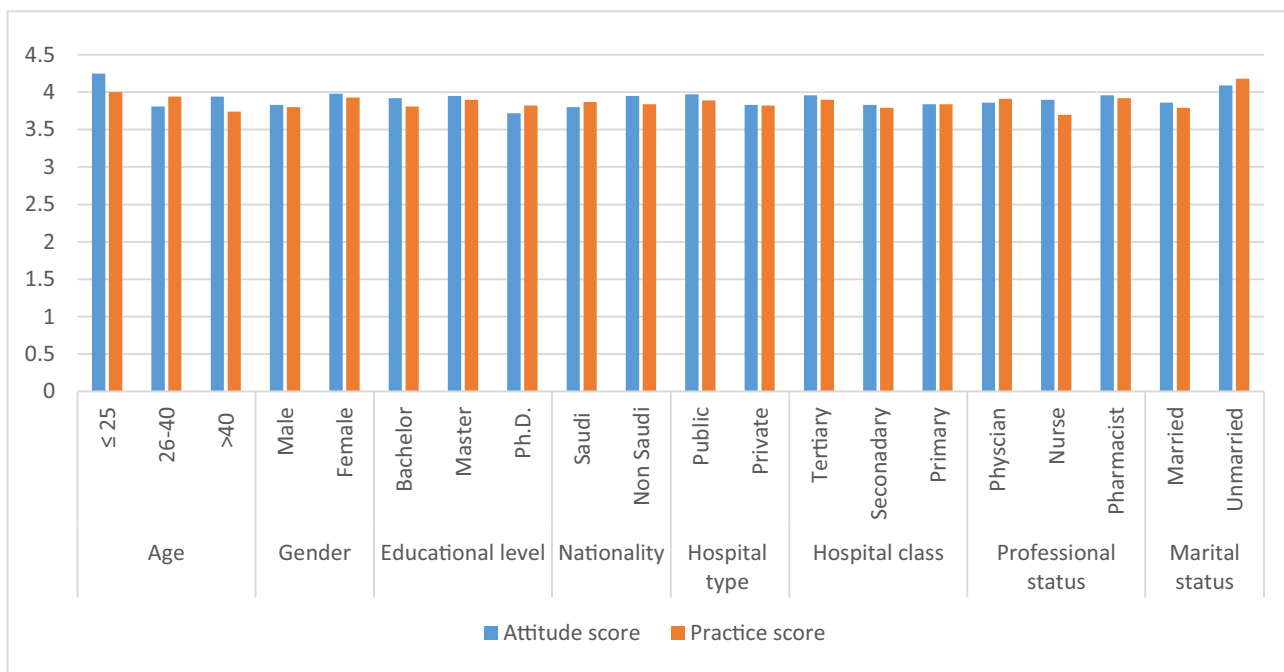**Fig. 1.** Knowledge score against demographic variables.

Fig. 2. Attitude and Practice scores against demographic variables.

3.3. Frequency of correct answers in knowledge, attitude, and practice of the participants

Table 2 presents the frequency of the correct responses to items of evaluations included in knowledge, attitude, and practices domains against the professional type of the participants. There were thirteen items included in the knowledge domain and the percentage of correct responses to the items ranged between 72 and 100%. Item number 1 on determining the knowledge of the participants on 'common clinical symptoms

of COVID-19′ received 100% correct response, whereas, the 'possibility of transfer of infection from COVID-19 infected person with fever to other people' received only 72% correct response. The level of the performance of all three classes of health care professionals was not significantly different from each other for twelve items, however, 93% of the physician and 82% of the nurses understand that 'there is no current treatment of COVID-19 infection, but early symptomatic and supportive treatment can help the most patient recover from infection', while, only 71% of the pharmacist had this knowledge. Therefore the

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Table 2
Frequency of correct responses on knowledge, attitude and Practice [n (%)].

No	Question	Physician [74 (100)]	Nurse [44 (100)]	Pharmacist [28 (100)]	Total (146)	P value*
	Knowledge					
1	Fever, dry cough, difficulty in breathing, tiredness are the common clinical symptoms of COVID-19.	74 (100)	44 (100)	28 (100)	146 (100)	–
2	Sneezing, runny nose, stuffy nose and headache are less common in persons infected with COVID-19.	65 (88)	34 (77)	25 (89)	124 (85)	0.232
3	Loss of taste and smell are also the feature of COVID 19 infection.	55 (74)	31 (70)	20 (71)	106 (73)	0.891
4	Currently, there is no treatment of COVID-19 infection, but early symptomatic and supportive treatment can help the most patient recover from infection.	69 (93)	36 (82)	20 (71)	125 (86)	**0.014**
5	Majority of COVID-19 infective patient will not develop severe illness but elderly, patient having a chronic illness, DM, COPD are likely to develop severe illness.	62 (84)	38 (86)	24 (86)	124 (85)	0.923
6	COVID-19 infected person with fever can infect to other people.	55 (74)	29 (66)	21 (75)	105 (72)	0.568
7	COVID-19 virus spread via respiratory droplets.	58 (78)	33 (75)	24 (86)	115 (79)	0.552
8	Ordinary people should wear a general mask.	69 (93)	43 (98)	25 (89)	137 (94)	0.333
9	People maintain 2-meter distance in the public places.	68 (92)	42 (96)	24 (86)	134 (92)	0.341
10	Adherence to restrictive measures is effective to slow the spread of infection	70 (95)	44 (100)	27 (96)	141 (97)	0.295
11	People infected with COVID-19 should immediately place in proper isolation.	69 (93)	43 (98)	26 (93)	138 (95)	0.534
12	Suspected COVID19 patient should be sent to a quarantine centre or home quarantine	69 (93)	43 (8)	26 (93)	138 (95)	0.534
13	Health care professional with direct contact should take additional prophylactic steps.	70 (95)	41 (93)	25 (89)	136 (93)	0.638
	Attitude					
14	Can Saudi Arabia win the battle against COVID-19?	64 (87)	40 (91)	24 (86)	128 (88)	0.733
15	Are you confident to work in hospital during COVID-19 pandemic?	54 (73)	31 (71)	22 (79)	107 (73)	0.747
16	Does your family support you to work in a hospital during a pandemic?	63 (85)	39 (87)	26 (93)	128 (88)	0.556
17	Do you experience anxiety and fear while working with suspected COVID-19 patients?	57 (77)	34 (77)	20 (71)	111 (76)	0.818
18	Have all the healthcare professionals from various department actively involved in COVID-19 Pandemic response?	48 (65)	28 (64)	19 (68)	95 (65)	0.934
	Practice					
19	Are you being trained to work for COVID-19 patient?	47 (64)	19 (43)	16 (57)	82 (56)	0.098
20	Have you followed social distancing?	56 (76)	36 (82)	24 (86)	116 (80)	0.480
21	Have you been wearing a mask and gloves during hospital practice?	67 (91)	40 (91)	25 (90)	132 (90)	0.973
22	Do you regularly follow infection protection measures?	67 (91)	36 (82)	24 (86)	127 (87)	0.386
23	Are you attending patient suspected with COVID-19?	53 (72)	32 (73)	21 (75)	106 (73)	0.943

*Pearson Chi-Square;*P value less than 0.05.

level of knowledge on this item had a significant variation (P value = 0.014) among different health care professionals.

The five items each of the attitude and practice domain are also included in Table 2. No significant variation was found among different healthcare professionals on all the ten items included in this table. The percentage of the correct response to the attitude items ranged between 65 and 88%. Only 65% of the participants feel that 'all healthcare professionals from various departments actively involved in COVID-19 Pandemic response", whereas, 35% of the respondents believe differently. A majority (88%) of the healthcare professionals think that Saudi Arabia will win the fight against COVID-19 and they enjoy good family support during this time. The proper answers related to the practice domain ranged between 56 and 90%. Most of them say that they do not have any proper training to fight against the virus (56%), while, use of face masks and gloves in their practice received higher ratings (90%).

3.4. Percentage of participants with good knowledge, positive attitude, and proper practice

Table 3 describes that the physicians have non-significantly good knowledge, positive attitude, and proper practice than nurses and pharmacists. The number of participants with good knowledge among pharmacists was less compared to nurses. Similarly, females, younger individuals, master's degree holders, Saudi nationals, married professionals, and those working in secondary class hospitals and the public sector have better knowledge and a positive attitude. Further, a good number of unmarried professionals showed proper practice skills towards managing COVID-19.

3.5. Correlation of knowledge, attitude, and practices

The mean knowledge score with a negative attitude (≤ 3 scores) was 11.22 and with a positive attitude (score, >3) was 11.52 indicating no significant variation in knowledge score with a change in attitude. However, a positive correlation was observed between attitude and knowledge scores. The attitude score increased significantly with an increase in knowledge score (r = 0.172, P = 0.001). Further, the average knowledge score of healthcare professionals with proper practice (score,>3) was 11.48 and those with improper practice (≤ 3 scores) had a score of 11.32, a significant enhancement in the practice score of the professionals were noted with an increase in knowledge score (r = 0.095, P = 0.010), an indicator for a positive correlation between practice and knowledge scores. Additionally, a significant positive correlation was found between attitude and knowledge as well practices towards COVID-19, and also a similar correlation was witnessed between practices with knowledge and attitude scores (Table 4).

4. Discussion

The current cross-sectional study looked at the levels and determinants of KAP against COVID-19 among Saudi Arabian frontline healthcare professionals. Our findings indicate that a large percentage of healthcare staff in Riyadh have a sound knowledge of COVID-19, as well as a positive attitude and proper practice skills.

Developing a positive attitude that leads to proper practice requires knowledge acquisition. Healthcare practitioners' expertise is more valuable because it impacts not just their own lives but also the community's standard of care. The more knowledge they have, the more they will be able to monitor the spread of a pan-

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Table 3
Percentage of participants with good knowledge, positive attitude, and proper practice.

Demographics	Good Knowledge		Positive Attitude		Proper Practice	
	N (%)	P value*	N (%)	P value*	N (%)	P value*
Professional type						
Physician	43 (58)	0.458	49 (66)	0.729	53 (72)	0.476
Nurse	25 (57)		32 (73)		27 (61)	
Pharmacist	13 (31)		20 (71)		20 (71)	
Gender						
Male	48 (55)	0.350	58 (67)	0.425	59 (68)	0.831
Female	33 (56)		43 (73)		41 (70)	
Age						
≤ 25 years	7 (88)	0.023	6 (75)	0.934	5 (63)	0.297
26–40 years	36 (51)		49 (69)		53 (75)	
>40 years	38 (57)		46 (69)		42 (63)	
Educational level						
Bachelor	29 (55)	0.579	38 (72)	0.388	35 (66)	0.257
Masters	38 (59)		46 (72)		48 (75)	
Ph.D. or equivalent	14 (48)		17 (59)		17 (59)	
Nationality						
Saudi	36 (64)	0.239	35 (63)	0.168	37 (66)	0619
Non-Saudi	45 (50)		66 (73)		63 (70)	
Marital status						
Married	69 (56)	0.670	85 (69)	0.696	81 (66)	**0.050**
Unmarried	12 (55)		16 (73)		19 (87)	
Hospital type						
Public	38 (57)	0.888	48 (72)	0.553	47 (70)	0.692
Private	43 (54)		53 (67)		53 (67)	
Hospital class						
Tertiary	35 (54)	0.852	45 (69)	0.998	45 (69)	0.812
Secondary	30 (61)		34 (69)		32 (66)	
Primary health care	16 (50)		22 (69)		23 (72)	

*Pearson Chi-Square;*P value less than 0.05.

Table 4
Correlation between knowledge, attitude and practice scores.

Variables	Knowledge		Attitude		Practice	
	Correlation coefficient (r)	P value	Correlation coefficient (r)	P value	Correlation coefficient (r)	P value
Knowledge	1		0.172	0.000	0.095	0.010
Attitude	0.172	0.000	1		0.170	0.029
Practices	0.095	0.010	0.170	0.029	1	

demic like COVID-19. The results of this study showed that health-care professionals have a clear understanding of a variety of essential items that were assessed. The overall correct answer rate for the questionnaire's knowledge domain items was 88 percent. This study's results are close to those of a previous study conducted in China during the lockdown period (Zhang et al., 2020), which found that healthcare workers answered nearly 89 percent of the knowledge domain items correctly. Although the participants in this study had varying professional backgrounds (some were physicians, nurses, and pharmacists), their expertise appeared to be on par. In comparison, other studies have shown that different types of healthcare professionals have different levels of expertise (Giao et al., 2020). Since the research was conducted nearly 8–9 months after the outbreak of the pandemic in the region, they would have had enough time to gain valuable knowledge.

However, we discovered several differences in healthcare professionals' knowledge and attitudes about COVID-19. For example, approximately 30% of pharmacists and nurses are unaware that COVID-19 causes loss of smell and taste, and 30% of pharmacists believe that the infection is treatable. This insufficient information would harm their practice. Nursing professionals often play an important role in enforcing discipline and taking the required measures to avoid infection spreading. However, in this study, about

34% of them were unaware that an infected person with a fever might spread the infection to others.

The presence of anxiety among health care professionals after a long duration of exposure to COVID-19 was another troubling finding of this report. Although only 25% of healthcare professionals reported anxiety in this survey, there is a need to resolve this problem because anxiety affects mental functioning, which can harm their performance. Anxiety symptoms were identified in about 60% of healthcare staff in a study conducted in Turkey (Shahin et al., 2020). In the early stages of the pandemic, 10% of healthcare staff in Italy contracted Covid-19, with 3% dying (Mokhtari et al., 2020). Anxiety and depression are common among healthcare workers around the world as a result of the high infectivity and mortality rates. More than 32% of healthcare staff in a previous study in Saudi Arabia had a high level of anxiety (Thamer et al., 2020), while the remaining 68 percent had a low or medium level of anxiety. The current state of anxiety in our study is very promising, as there is a remarkably low number of anxious participants. This may be due to healthcare providers' experience with the COVID-19 situation. Additionally, family support is important in managing anxiety, as is an assurance of their family's and children's wellbeing (Martin, 2011). A significant percentage of study participants (88%) reported that their families were fully support-

ive during this difficult period. Nonetheless, there is also room for progress in terms of anxiety reduction.

The participation of their colleagues is a fascinating finding made by healthcare professionals. Around a third of them feel that not all of their colleagues are actively participating in the COVID-19 pandemic management. The healthcare professional is likely to be under additional stress as a result of the pandemic, and, as a consequence, they feel they're not receiving the help they need from their colleagues. The shortage of frontline healthcare staff is the source of the problem's magnitude. The proposed strategy for improving COVID-19 staffing could include a call for all experts – retired practitioners with vital expertise, skills, and attitudes – to assist in delivering holistic treatment for COVID-19 patients (Legido-Quigley et al., 2020; Valdez and Nichols, 2013). This will enable hospitals to expand their capacity and accept more patients. It could be suggested that requests for volunteers, such as healthcare interns and students who are willing and have worked in a clinical environment, be made to overcome the shortage of frontline health care workers.

COVID-19 received a positive attitude from 78 percent of healthcare professionals. This result is close to that of other Chinese studies (Jiang et al., 2018). A large majority of healthcare professionals believe Saudi Arabia will defeat COVID-19. Saudi Arabia's authorities took the requisite measures to prevent the spread and lethality of COVID-19 starting in March 2020. According to the estimated number of cases in the provinces and regions, the regulations and restrictions have changed and updated from time to time. Riyadh, the capital and most populous city in Saudi Arabia, has the largest number of confirmed cases. However, owing to the combined efforts of the public and authorities, the situation is still under control and is expected to improve in the coming days. The Kingdom of Saudi Arabia had removed many of the COVID-19 restrictions at the time of this study. Saudi Arabia, according to the healthcare professionals who took part in this report, will be able to successfully tackle the pandemic.

Unfortunately, 56% of the participants say that they were not given enough training to combat the pandemic. The pandemic's onset was so abrupt that officials did not have enough time to implement the requisite plans and actions to prepare health care professionals. However, healthcare professionals must be qualified to prevent and monitor the spread of this infectious disease (Allegranzi and Pittet, 2007). Authorities and policymakers have taken a range of steps to prepare practitioners in the latter half of 2020 and early 2021. Overall, the participant's mean practice score was over 77 percent, suggesting that proper practice was present among the healthcare staff.

The practices of healthcare professionals were found to be largely acceptable, regardless of their demographic characteristics or knowledge scores. Also, the practice had a clear correlation with their attitude. This result is similar to one from a similar study in China, which found that 89.7% of healthcare staff adopted proper COVID-19 practices (Zhang et al., 2020). Furthermore, since they are the most susceptible to infection, they can not disregard their defense at work by adopting best practices (Wang et al., 2020b).

We discovered a strong positive association between knowledge and attitudes in the current study, which is consistent with previous COVID-19 research (Salman et al., 2020; Kumar et al., 2020). However, our study's magnitude of correlation was poor, close to a previous Indonesian report (Sari et al., 2020). This is possible since, while knowledge is critical in shaping attitudes, it is not the only factor to be considered. The relationship between attitudes and practices was found to be greater, meaning that promoting knowledge alone is inadequate, and that successful strategies to improve practices should concentrate on promoting both appropriate knowledge and positive attitudes.

Since this study only involved a limited number of healthcare professionals in the Riyadh region of Saudi Arabia, the results should be viewed with caution. Furthermore, self-reported practices may not be correct, necessitating further analysis. Also, since the pandemic situation is still changing, some new items considered essential for handling COVID-19 will need to be added to make the tool for evaluating KAP more comprehensive and accurate.

5. Conclusions

According to this study, there is a correlation between healthcare professionals' knowledge of COVID-19 and the use of effective clinical practices. The attitude of healthcare professionals is directly linked to their practice. As a result, despite having more knowledge, a more positive attitude at the place of practice is needed. During the COVID-19 pandemic response, education and training on prevention and protective measures are also needed to promote positive attitudes and better work practices.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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