Medical Science

25(114), August, 2021

Knowledge, attitude, and practices of healthcare workers in Riyadh, Saudi Arabia regarding the use of face masks for limiting the spread of coronavirus disease

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To Cite:
Al Shammari S, Alrasheed A, Aljurayyan A, Aljufayr M, Alghaihb S, Alelaiwi A. Knowledge, attitude, and practices of healthcare workers in Riyadh, Saudi Arabia regarding the use of face masks for limiting the spread of coronavirus disease. Medical Science, 2021, 25(114), 2001-2010

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Peer-Review History
Received: 01 July 2021
Reviewed & Revised: 04/July/2021 to 01/August/2021
Accepted: 03 August 2021
Published: August 2021

Peer-review Method
External peer-review was done through double-blind method.

ABSTRACT

Background: The World Health Organization (WHO) declared Coronavirus disease 2019 (COVID-19) a global pandemic in March 2020. Healthcare workers (HCWs) are at a higher risk of infection with the virus than other individuals. Therefore, among the recommended protective methods is the wearing of a surgical mask. There is limited information regarding the knowledge, practices, and attitude of HCWs in Saudi Arabia towards the use of face masks. To our knowledge, only one single-center study has investigated this subject. *Objective:* To investigate knowledge, attitude, and practices concerning the use of face masks among HCWs in Riyadh, Saudi Arabia. *Methods:* This was a cross-sectional observational study. We surveyed HCWs using a self-administered online questionnaire. The respondents provided information regarding their demographic characteristics and answered questions on knowledge, attitude, and practices regarding face mask use during the pandemic. *Results:* A total of 506 HCWs (men, 202; women, 304) were included. Of them, 273 (54.0%) participants had good knowledge, 304 (60.1%) had good practice, and 475 (93.3%) had a positive attitude towards using face masks. When knowledge was assessed, 463 (91.5%) had the knowledge to wear a face mask properly. Regarding attitude, 475 (93.9%) was confident that they knew the correct way to wear a face mask. *Conclusions:* The level of knowledge and the practice of using surgical masks were poor among HCWs. HCWs exhibited a favorable attitude but possessed low levels of knowledge and good practice. We highly recommend awareness campaigns and training programs on the proper use of surgical masks.

Keywords: Coronavirus, Healthcare workers, Mask, Riyadh

1. INTRODUCTION

On March 11, 2020, the World Health Organization (WHO) declared coronavirus disease (COVID-19) a global pandemic andone of the worst pandemics in recent history. COVID-19 is a respiratory disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (Cascella et al., 2021; Adhikari et al., 2020; Sohrabi et al., 2020). The main source of person−person transmission (within 1 m) is through respiratory droplets released when a person that has the infection coughs or sneezes. Infection with the virus can also occur when a person contacts virus-contaminated surfaces and touches the mouth, nostrils, or eyes. HCWs that are in close contact with COVID-19 patients are at higher risk of infection with the virus (Zhou et al., 2020). Several protective methods to decrease the risk of viral transmission have been recommended by the WHO. These include wearing a face mask, social distancing, and hand hygiene. Many experimental studies have suggested that a face mask can protect the wearer from airborne viruses (Davies et al., 2013; Lai et al., 2012) and prevent person−person disease transmission (Dharmadhikari et al., 2012). Face masks act as physical barriers that filter out particles, droplets, and spittle that can be contaminated with germs (Mayo Clinic, 2021). However, according to the WHO, in addition to the practice of using a surgical mask, the appropriate use of a surgical mask is important (Wada et al., 2012). Inappropriately using and discarding a facemask might lead to an increased risk of transmission (WHO, 2020).

Only a few studies have assessed the knowledge, attitude, and practices of face mask use among HCWs during the COVID-19 pandemic. On the national level, Ahmed et al., (2020) in a study that involved 29 participants from Prince Sattam Bin Abdulaziz University in Al-Kharj city, found that 86.21% of HCWs believed that wearing a face mask with the white side facing out is the proper way to useaface mask. Additionally, 86% of these HCWs were aware that the face mask comprises three layers, 79.31% stated that a face mask could protect the wearer from COVID-19, and 65.52% said that the middle layer acts as a filter. Regarding mask type, 65.52% of the participants stated that a mask with 95% bacterial filtration efficiency (BFE) and particle filtration efficiency (PFE) was suitable for preventing COVID-19.

According to 51.72% of the participants, a physician could wear a face mask for 8 hours; moreover, 86.21% said that a face mask should cover the nose, mouth, and chin. All the participants reported that the main purpose of the metal strip is to enable the mask to be positioned on the nose, while 82.76% answered that cloth face masks are not as effective as surgical face masks in limiting infection spread (Ahmed et al., 2020). On the international level, in a study involving 392 participants from Dow University of Health Sciences, Karachi, Pakistan, Kumar et al., (2020) reported slightly different results on face mask-related knowledge. Only 56.4% of HCWs had the knowledge to wear aface mask in the correct manner, 68.9% responded that the surgical mask comprises three layers, and 70.9% stated that a surgical mask can protect the wearer from COVID-19. Furthermore, 53% were aware that the middle layer acts as a filter, 64.8% said that a mask with 95% BFE and PFE can protect against COVID-19, and 75.6% were sure that in a day, the maximum amount of time to wear a face mask is 8 hours. Additionally, 74.7% of the HCWs stated that the face mask should cover the nose, mouth, and chin; 92% knew the purpose of the metal strip in the face mask; and 88.2% believed that cloth masks are not as effective as regular face masks (Kumar et al., 2020).

Concerning practice, Ahmed et al., (2020) found that 3.45% of HCWs removed their face mask when conversing with a patient, 27.59% stored their face mask for reuse if they were not sick, and 100% wore the face mask in public places. Further, all the HCWs said that they wore a face mask in the health institute to protect themselves from COVID-19, and 68.97% correctly disposed used face masks in the yellow-coded bag. Regarding the attitude of HCWs toward surgical mask use, 93.10% reported they were confident about the correct way of wearing a face mask (Ahmed et al., 2020). In Kumar et al., (2020) study, 13.8% of HCWs removed their masks when conversing with a patient, 20.2% reused their face masks if they were not sick, 93.9% wore a face mask in public places, 94.6% wore a face mask in the health institute to prevent themselves from COVID-19, 44.9% disposed used face masks in the yellow-coded bag, and regarding attitude, 88.5% were confident about the proper way of using a face mask. A few studies have investigated knowledge, attitude, and practices regarding the use of a surgical mask in preventing COVID-19 among HCWs.

However, to the best of our knowledge, only one single-center study, which included 29 participants, has examined this subject on a national level. Therefore, we conducted a multicenter study involving HCWs to investigate knowledge, attitude, and practices regarding the use of a surgical mask in limiting COVID-19 spread in Saudi Arabia.

2. METHOD

The authors conducted a cross-sectional study including all HCWs (Saudi or non-Saudi) working in five major hospitals in Riyadh, the capital and largest city in Saudi Arabia. Data were collected between January and March 2021. To anonymize the institutions in this paper, they are named, institutions A, B, C, D, and E. The investigators excluded non-HCWs that were working outside Riyadh. A self-administered online questionnaire was distributed to HCWs through social media platforms and WhatsApp groups. The Institutional Review Board of the College of Medicine and King Saud University Medical City approved this study (approval no. E-

20-5520). An online consent form was placed on the first page of the electronic questionnaire, and consent was obtained from all potential participants. The volunteers could withdraw from the study at any time. The privacy of each participant was assured, and data were used for data analysis alone.

According to a previous study, only 50% of people used a facemask correctly during COVID-19. Therefore, we assumed that 50% of our respondents knew the correct way of using a face mask, considering 5% precision and 95% confidence interval. Further, the minimum sample size for our study was 384 participants, but after considering a potential 20% non-response, the final sample size was 480.

We obtained consent to use a validated questionnaire (Kumar et al., 2020), which comprised three sections. The first section consisted of demographic characteristics (age, sex, occupation, place of work, and years of experience), the second section contained nine questions about knowledge regarding the use of a surgical mask to prevent the transmission of COVID-19, and the third section contained six questions about practices and attitude toward the use of a face mask. Additionally, a pilot study was conducted with 20 participants to assess the validity, comprehensibility, and time needed to complete the questionnaire. HCWs who participated in the pilot study were excluded from the main study.

Data were analyzed using the Statistical Package for the Social Sciences version 25.0 (IBM Corporation, New York, United States). Descriptive data are represented as numbers and percentages. A scoring system, which uses median values as cutoff numbers was used. Median values were calculated from initially stratified correct and wrong answers. A correct answer was scored 1, and a wrong answer was scored 0. The median value was calculated for each of the three sections. The final median values for knowledge, practice, and attitude were 7, 5, and 1, respectively. Any value above the median value for knowledge, practice, and attitude indicated good knowledge, good practice, and a positive attitude, respectively.

The proportions of participants with good/poor knowledge, good/bad practices, and positive/negative attitude were compared using the chi-square test. A p-value of ≤ 0.05 was considered statistically significant. Multivariate logistic regression analysis was performed using significant factors from the univariate analysis to determine the most significant demographic characteristic that could identify participants with good/poor knowledge, good/bad practice, and positive/negative attitude.

3. RESULTS

A total of 506 HCWs with a mean age of 28.7 years were included. There were 202 (39.9%) men and 304 (60.1%) women. Of them, 233 (46.0%) participants were physicians, 31 (6.1%) were dentists, 36 (7.1%) were pharmacists, 97 (19.2%) were nurses, and 109 (21.5%) were allied HCWs. Two hundred and forty (47.4%) participants were working at institution A, 39 (7.7%) were working at institution B, 120 (23.7%) were working at institution C, 53 (10.5%) were working at institution D, and 54 (10.7%) were working at institution E. Regarding years of experience, 339 (67.0%) respondents had less than 5 years of experience, 112 (22.1%) had 5 to 10 years of experience, and 55 (10.9%) had more than 10 years of experience (Table 1). Regarding knowledge, 463 (91.5%) respondents knew the correct way to wear a surgical mask and 407 (80.4%) believed that using a face mask could protect the wearer from SARS-CoV-2 infection (Table 2).

Table 1 Demographic data of healthcare workers

Variable	Category	N (%)
Age	Mean	28.7
	20–29	344 (68%)
	30–39	130 (25.7%)
	40 or more	32 (6.3%)
Sex	Men	202 (39.9%)
	Women	304 (60.1%)
Occupation	Physician	233 (46%)
	Pharmacist	36 (7.1%)
	Nurse	97 (19.2%)
	Dentist	31 (6.1%)
	Allied HCW	109 (21.5%)

Institution	A	240 (47.4%)
	B	39 (7.7%)
	C	120 (23.7%)
	D	53 (10.5%)
	E	54 (10.7%)
Years of experience	< 5	339 (67.0%)
	5–10	112 (22.1%)
	> 10	55 (10.9%)

Table 2 Knowledge, Practice, and attitude regarding the correct use of masks

Questions on Knowledge	Response	N (%)
The correct way of wearing a face mask to protect against COVID-19	White side facing in	463 (91.5%)
	White side facing out	43 (8.5%)
Using face masks protect against COVID-19	Yes	407 (80.4%)
	No	99 (19.6%)
The number of layers in a surgical mask	Two	132(26.1%)
	Three	345 (68.2%)
	Four	29 (5.7%)
The layer that works as filter layer	First layer	74 (14.6%)
	Middle layer	245 (48.4%)
	Last layer	26 (5.1%)
The type of mask that effectively protects against COVID-19	99% BFE and PFE	104 (20.6%)
	97% BFE and PFE	49 (9.7%)
	95% BFE and PFE	325 (64.2%)
	91% BFE and PFE	104 (20.6%)
The maximum duration to wear a surgical mask in a day	8 hours	280 (55.3%)
	4 hours	179 (35.4%)
	2 hours	32 (6.3%)
	1 hour	15 (3.0%)
For effectiveness, parts of the face a surgical mask should cover	Nose alone	7 (1.4%)
	Nose and mouth	63 (12.5%)
	Nose, mouth, and chin	436 (86.2%)
The aim of the metal strip in the face mask	For positioning on the nose	478 (94.5%)
	For positioning on the chin	17 (3.4%)
	No purpose	11 (2.2%)
The cloth mask has the same effectiveness of a face mask	Yes	162 (32.0%)
	No	344 (68.0%)
Questions on Practice	Response	N (%)
During clinic hours, while communicating with a patient, do you take your mask off?	Yes	34(6.7%)
	No	472 (93.3%)

Do you save your face mask for another use?	Yes	101 (20.0%)
	No	405 (80.0%)
Do you use the face mask in outdoor places to prevent COVID-19 infection?	Yes	478 (94.5%)
	No	28 (5.5%)
Do you use the face mask around the hospital facilities to prevent COVID-19 infection?	Yes	495 (97.8%)
	No	11 (2.2%)
What color-coded bag do you discard the mask in?	Red-coded bag	14 (2.8%)
	Yellow-coded bag	380 (75.1%)
	Blue-coded bag	42 (8.3%)
	Black-coded bag	70 (13.8%)
Question on Attitude	Response	N (%)
Do you believe you know the correct way of wearing a face mask?	Yes	475 (93.9%)
	No	31 (6.1%)

*Only those who answered correctly on the number of layers in a surgical mask were directed to this question.

Additionally, 345 (68.2%) participants knew that a surgical mask has three layers, and of these participants, 245 (48.4%) knew that the middle layer of the mask acts as a filtration barrier. Furthermore, 325 (64.2%) believed that masks with 95% BFE and PFE can protect against COVID-19, and 280 (55.3%) were aware that 8 hours daily is the maximum duration to wear a face mask. Of the entire cohort, 436 (86.2%) knew that the surgical mask should cover the nose, mouth, and chin; 478 (94.5%) knew the purpose of the metal strip, and 344 (68.0%) knew that the surgical mask was more effective than the cloth mask. Concerning practices and attitude, 34 (6.7%) HCWs usually removed the mask when talking to a patient in the clinic. Additionally, 101 (20.0%) HCWs stored their used mask for future use, 478 (94.5%) used the mask in public places, 495 (97.8%) wore the mask around the hospital premises, and 380 (75.1%) knew how to properly discard used masks in the yellow-coded bag. Regarding attitude, 475 (93.9%) respondents were sure about the proper way to use a face mask. Patients aged ≥40 years (68.8%) had better knowledge about the correct way to wear a surgical mask than those aged 20–29 years (50.0%) and 30–39 years (60.8%) (Table 3) (Figure 1).

Table 3 Level of knowledge, attitude, and practice in HCWs with different demographics characteristics

Variable	Category	Knowledge			Practice			Attitude		
		Good N (%)	Bad N (%)	P-value	Good N (%)	Bad N (%)	P-value	Positive N (%)	Negative N (%)	P-value
Age (years)	20–29	172 (50.0%)	172 (50.0%)	0.025	191 (55.5%	153 (44.5%)	0.003	323 (93.9%)	21 (6.1%)	0.267
	30–39	79 (60.8%)	51 (39.2%)		87 (66.9%)	43 (33.1%)		120 (92.3%)	10 (7.7%)	
	40 or more	22 (68.8%)	10 (31.3%)		26 (81.3%)	6 (18.8%)		32 (100%)	0 (0.0%)	
Sex	Men	108 (53.5%)	94 (46.5%)	0.465	115 (56.9%)	87 (43.1%)	.139	194 (96.0%)	8 (4.0%)	0.069
	Women	165 (54.3%)	139 (45.7%)		189 (62.2%)	115 (37.8%)		281 (92.4%)	23 (7.6%)	
Occupation	Physician	142 (60.9%)	91 (39.1%)	0.014	131 (56.2%)	102 (43.8%)	.031	222 (95.3%)	11 (4.7%)	0.346
	Pharmacist	13 (36.1%)	23 (63.9%)		19 (52.8%)	17 (47.2%)		35 (97.2%)	1 (2.8%)	

	Nurse	53 (54.6%)	44 (45.4%)		68 (70.1%)	29 (29.9%)		89 (91.8%)	8 (8.2%)	
	Dentist	14 (45.2%)	17 (54.8%)		24 (77.4%)	7 (22.6%)		30 (96.8%)	1 (3.2%)	
	Allied HCW	51 (46.8%)	58 (53.2%)		62 (56.9%)	47 (43.1%)		99 (90.8%)	10 (9.2%)	
Institution	A	152 (63.3%)	88 (36.7%)		153 (63.8%)	87 (36.3%)		228 (95.0%)	12 (5.0%)	
	B	29 (74.4%)	10 (25.6%)		26 (66.7%)	13 (33.3%)		38 (97.4%)	1 (2.6%)	
	C	45 (37.5%)	75 (62.5%)	<0.001	60 (50.0%)	60 (50.0%)	0.029	109 (90.8%)	11 (9.2%)	0.111
	D	24 (45.3%)	29 (54.7%)		37 (69.8%)	16 (30.2%)		47 (88.7%)	6 (11.3%)	
	E	23 (42.6%)	31 (57.4%)		28 (51.9%)	26 (48.1%)		53 (98.1%)	1 (1.9%)	
Years of experience	< 5	180 (53.1%)	159 (46.9%)		191 (56.3%)	148 (43.7%)		319 (94.1%)	20 (5.9%)	
	5–10	55 (49.1%)	57 (50.9%)	0.044	71 (63.4%)	41 (36.6%)	0.014	103 (92.0%)	9 (8.0%)	0.513
	> 10	38 (69.1%)	17 (30.9%)		42 (76.4%)	13 (23.6%)		53 (96.4%)	2 (3.6%)	

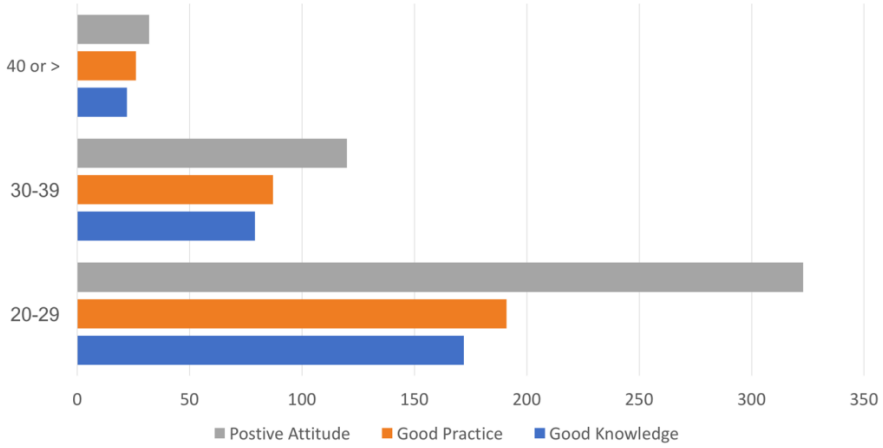

Figure 1 Shows level of knowledge, practice and attitude among different age categories.

Women (54.3%) showed a higher level of knowledge than men (53.5%). Regarding HCWs; who exhibited good knowledge of using a face mask, the largest proportion was noted among physicians (60.9%), followed by nurses (54.6%), allied HCWs (46.8%), dentists (45.2%), and pharmacists (36.1%). Respondents from institution B showed a significantly higher level of knowledge (74.4%) than those from the other institutions. Moreover, HCWs who were working at institution C (62.5%) showed significantly poorer knowledge about the use of a face mask. Participants with more than 10 years of experience had a higher level of knowledge (69.1%) than those with less than 5 years (53.1%) or 5–10 years (49.1%) of experience. Significantly good practice was noted in 81.3% of HCWs aged 40 years and above, followed by 66.9% in those aged 30–39 years, and 55.5% in those aged 20–29 years. Men (56.9%)

showed a lower level of good practice than women (62.2%). Dentists and nurses had a significantly higher level of good practice than other health workers (77.4% and 70.1%, respectively). Further, 69.8% of respondents from institution D and 66.7% of respondents from institution B showed good practice in using a surgical mask within the COVID-19 pandemic.

HCWs with more than 10 years of work experience had a higher level of good practice (76.4%) than those with 5–10 years' (63.4%) and less than 5 years' (56.3%) experience. A positive attitude was predominant in individuals aged 40 years and above (100%), men (96.0%), pharmacists (97.2%), respondents from institution E (98.1%), and those with more than 10 years of work experience (96.4%).

Overall, 273 respondents (54.0%) had good knowledge, 304 (60.1%) had good practices, and 475 (93.3%) had a positive attitude towards using a surgical mask within the COVID-19 pandemic (Figure 2). Regarding knowledge and practice, individuals in the 20–29 year's age group were twice as good as those in the 30–39 year's age group. Pharmacists and nurses showed better knowledge than the other HCWs, although pharmacists and physicians showed better practice than the other HCWs (Figure 3). HCWs from institution C were 1.52 times more knowledgeable regarding the correct use of a face mask and 1.08 times better in practice than HCWs from other institutions; years of experience was directly related to knowledge and practice (Table 4).

Table 4 Multivariate logistic regression analysis: predictive factors of a good level of knowledge and practice

Variable	Category	Knowledge		Practice	
		OR*	P-value	OR	P-value
Age (years)	20–29	2.65	0.076	2.77	0.081
	30–39	1.02	0.973	1.69	0.321
	40 or more	Reference	0.020	Reference	0.155
Occupation	Physician	0.55	0.023	0.94	0.816
	Pharmacist	1.27	0.569	0.94	0.884
	Nurse	0.93	0.817	0.58	0.090
	Dentist	0.80	0.600	0.26	0.005
	Allied HCW	Reference	0.073	Reference	0.025
Institution	A	0.54	0.061	0.53	0.061
	B	0.30	0.013	0.69	0.429
	C	1.52	0.240	1.08	0.829
	D	1.03	0.940	0.42	0.041
	E	Reference	<0.001	Reference	0.014
Years of experience	< 5	0.92	0.867	1.2	0.711
	5–10	1.87	0.115	1.26	0.579
	> 10	Reference	0.049	Reference	0.855

*OR, odds ratio, **CI, confidence interval

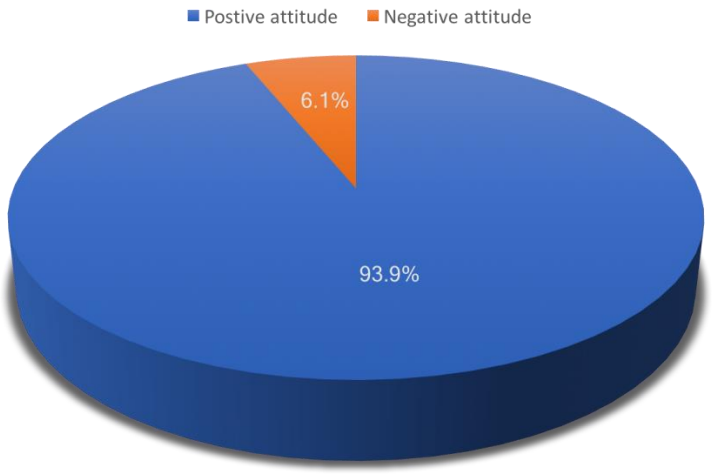

Figure 2 Shows HCWs attitude toward correct usage of masks.

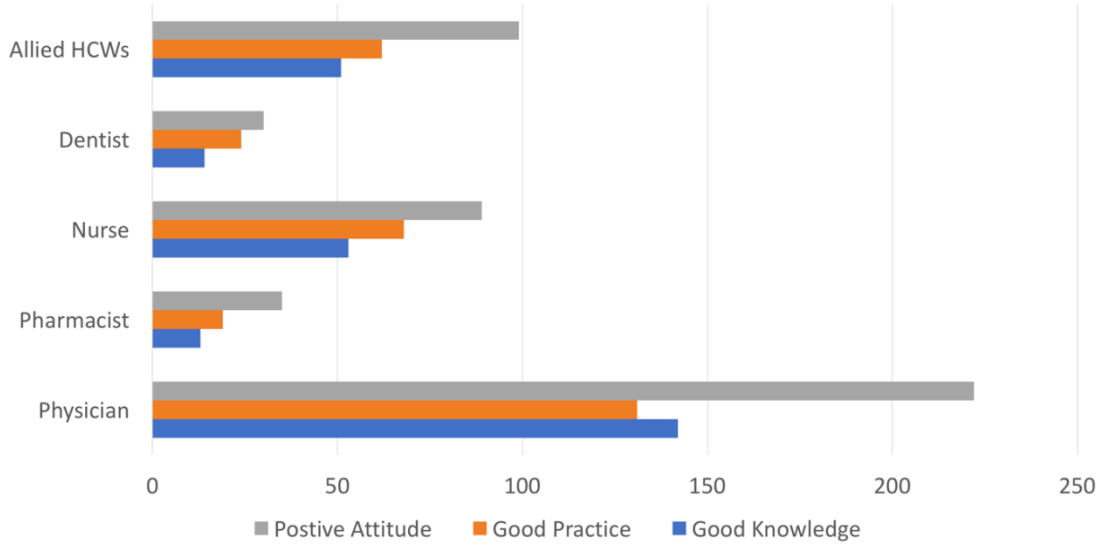

Figure 3 Shows level of knowledge, Practice and attuite among different health care professions.

4. DISCUSSION

Our study found that 93.3% of respondents were confident that they knew the correct way to wear a face mask. However, only 54.0% correctly answered questions on knowledge. Moreover, 60.1% of the study participants had good practices in using a face mask. These findings are inconsistent with those in a study by Kumar et al., (2020) where in 88.5% of HCWs believed that they knew the correct way of wearing a surgical mask, but only 35.0% of them were correct. In this study, around 80.0% of HCWs agreed that a surgical mask should not be reused, and about 55.3% answered that 8-hours-a-day was the maximum duration for which a face mask could be safely worn. These results are similar to those of a study by Ahmed et al., (2020) where in 72.4% of participants did not practice reusing face masks and 51.72% knew that 8-hours-a-day was the maximum duration. The WHO (2020) currently recommends that a face mask should not be reused and the maximum time in a day to wear a face mask is 8 hours. Additionally, increasing awareness through webinars and frequent real-time assessments will help institutions minimize the risk of COVID-19 outbreaks (Abdel Wahed et al., 2020; Shaikhain et al., 2021).

New WHO recommendations suggest that the general population should use a face mask, not only HCWs. As mentioned in a previous study, this recommendation of the WHO has resulted in a significant increase in the demand for face masks and the popularity of alternative options, including cloth masks (WHO, 2020). Among our study participants, 32.0% believed that a cloth mask was as effective as a surgical mask. This belief may have been due to the high availability and common use of cloth masks by the general population and HCWs. In the study by Kumar et al., (2020) 11.7% of respondents believed that a cloth mask was as effective as a regular face mask, while in another study published in October 2020, the percentage was 36.8% (Tadesse et al., 2020). In a previous study that was published in April 2020, the percentage of HCWs who knew the proper way to use a face mask (white side facing in) was 56.4%, and 44.9% of the people correctly disposed face masks in the yellow-coded bag (Kumar et al,. 2020). However, since this publication, the level of awareness has significantly increased worldwide, as shown in a study by Tadesse et al., (2020) and in the present study. There were more women than men in our study sample, and we noticed that most of the participants were aged between 20 and 29 years, with a few years of work experience. This participant selection might be attributable to our use of an online questionnaire, which was more accessible to individuals in this age group. Further, 46.0% of the participants were physicians because physicians were more attuned to filling the questionnaire and spreading the information to other physicians than other HCWs.

In our study, we noted a higher level of knowledge among the older HCWs than the younger HCWs. This difference suggests that work experience and the exposure of the older adults to previous pandemics may have influenced their knowledge, practice, and attitude toward the use of face masks during the COVID-19 pandemic. Moreover, a study conducted in the Saudi population found similar good knowledge scores among all age groups, but the older age group showed a positive attitude towards the use of face masks (Al Naam et al., 2021). Although pharmacists showed lowest levels of knowledge and practice, compared to other healthcare professionals, they believed they knew the correct way to use a face mask. Currently, patient care is not centered around

a physician and nurse; patients are commonly attended to by a multidisciplinary team. Therefore, awareness concerning the correct use of a face mask should be increased among all HCWs since they are all involved in patient care and anyone can transmit COVID-19 (Shelus et al., 2020).

Strengths and Limitations

The multicenter setting is a significant strength of the current study. Despite our use of an online questionnaire, an adequate sample size was achieved, with a good response rate. Additionally, a validated scoring system was used to assess the level of knowledge, practice, and attitude concerning wearing a surgical mask, and we assessed the association between these parameters and sociodemographic characteristics. Moreover, significant factors in the univariate analysis were entered into the multivariate logistic regression to identify factors related to better levels of knowledge and practice. However, this study is limited by its cross-sectional design (information was collected at specified time points); thus, cause and effect association could not be studied. Further, the study was based on data collected from a single geographical region; therefore, the results cannot be generalized to HCWs in other areas of the country. Furthermore, respondents to the questionnaire were not equally distributed across age groups because online platforms are more accessible to young people.

Recommendations

Our results suggest that awareness campaigns about the proper use of face masks using social media channels and other resources, such as workshops and continued professional education, would greatly impact the knowledge, practice, and attitude of HCWs towards the use of surgical masks within the COVID-19 pandemic. Moreover, we recommend that a nationwide longitudinal study should be conducted to assess the knowledge, practice, and attitude of HCWs and the general public towards face mask use.

5. CONCLUSION

The knowledge and practice of using surgical masks were poor in HCWs. Enrolled HCWs had a favorable attitude but inadequate knowledge and practice about properly wearing surgical masks. Age, profession, institution, and work experience were significantly associated with knowledge and good practice of using a face mask.

Author's contributions

Prof. Suliman Abdullah Alshammari: Supervise the entire research project, Generate a research question, objectives and hypotheses, Literature review, Study design, Data collection, Data management and analysis, Manuscript writing and Final report.
Abdulrahman Nssser Aljurayyan, Abdulrahman Ahmed Alrasheed, Muath Abdullah Aljufayr, Abdullah Abdulhameed Alelaiwi, Shatha Ghaihb Alghaihb: Literature review, Study design, Pilot study, Data collection, Data management and analysis, Manuscript writing, Final report.

Ethical approval

The study was approved by the medical ethics committee of The Institutional Review Board of the College of Medicine and King Saud University Medical City (approval no. E-20-5520).

Funding

No external funding was received for this study.

Conflict of interest

The authors declare no conflict of interest.

Data and materials availability

All data associated with this study are present in the paper.

REFERENCES AND NOTES

1. Abdel Wahed WY, Hefzy EM, Ahmed MI, Hamed NS. Assessment of knowledge, attitudes, and perception of health care workers regarding COVID-19, a cross-sectional study from Egypt. J Commun Health 2020; 45(6):1242-51.

2. Adhikari SP, Meng S, Wu YJ, Mao YP, Ye RX, Wang QZ, Sun C, Sylvia S, Rozelle S, Raat H, Zhou H. Epidemiology, causes, clinical manifestation and diagnosis, prevention and control of coronavirus disease (COVID-19) during the early outbreak period: a scoping review. Infect Dis Pover 2020; 9(1):29.
3. Ahmed NJ, Alanazi OS, Alzahrani AA, Alonazi RE. Knowledge, practices and attitude of healthcare providers about using face mask to limit the spread of the novel coronavirus disease. J Pharm Res Int 2020:41-6.
4. Al Naam YA, Elsafi SH, Alkharraz ZS, Alfahad OA, Al-Jubran KM, Al Zahrani EM. Community practice of using face masks for the prevention of COVID-19 in Saudi Arabia. PLOS ONE 2021; 16(2):e0247313.
5. Cascella M, Rajnik M, Aleem A, Dulebohn SC, Di Napoli R. Features, evaluation, and treatment of coronavirus (COVID-19). Stat Pearls. Treasure Island (FL): StatPearls Publishing Copyright © 2021, StatPearls Publishing LLC. 2021.
6. Davies A, Thompson KA, Giri K, Kafatos G, Walker J, Bennett A. Testing the efficacy of homemade masks: would they protect in an influenza pandemic? Disaster Med Public Health Prep 2013; 7(4):413-8.
7. Dharmadhikari AS, Mphahlele M, Stoltz A, Venter K, Mathebula R, Masotla T, et al. Surgical face masks worn by patients with multidrug-resistant tuberculosis: impact on infectivity of air on a hospital ward. Am J Respir Crit Care Med 2012; 185(10):1104-9.
8. Kumar J, Katto MS, Siddiqui AA, Sahito B, Jamil M, Rasheed N,Ali M. Knowledge, attitude, and practices of healthcare workers regarding the use of face mask to limit the spread of the new coronavirus disease (COVID-19). Cureus 2020; 12(4):e7737.
9. Lai AC, Poon CK, Cheung AC. Effectiveness of facemasks to reduce exposure hazards for airborne infections among general populations. J R Soc Interface 2012; 9(70):938-48.
10. Mayo Clinic. How well do face masks protect against coronavirus? (Mayo Clinic 2021).
11. Shaikhain TA, Al-Husayni FA, Alhejaili EA, Al-Harbi MN, Bogari AA, Baghlaf BA, Baghlaf BA, Alzahrani MS. COVID-19-related knowledge and practices among health care workers in Saudi Arabia: cross-sectional questionnaire study. JMIR Form Res 2021; 5(1):e21220.
12. Shelus VS, Frank SC, Lazard AJ, Higgins ICA, Pulido M, Richter APC, Vandegrift SM, Vereen RN, Ribisl KM, Hall MG. Motivations and barriers for the use of face coverings during the COVID-19 pandemic: messaging insights from focus groups. Int J Environ Res Public Health2020; 17(24):9298.
13. Sohrabi C, Alsafi Z, O'Neill N, Khan M, Kerwan A, Al-Jabir A,Iosifidis C, Agha R.World Health Organization declares global emergency: a review of the 2019 novel coronavirus (COVID-19). Int J Surg 2020; 76:71-6.
14. Tadesse T, Tesfaye T, Alemu T, Haileselassie W. Healthcare worker's knowledge, attitude, and practice of proper face mask utilization, and associated factors in police health facilities of Addis Ababa, Ethiopia. J Multidiscip Healthc 2020; 13:1203-13.
15. Wada K, Oka-Ezoe K, Smith DR. Wearing face masks in public during the influenza season may reflect other positive hygiene practices in Japan. BMC Public Health 2012; 12:1065.
16. World Health Organization. Advice on the use of masks in the community, during home care and in health care settings in the context of the novel coronavirus (2019-nCoV) outbreak: interim guidance, 29 January 2020. No.WHO/nCov/IPC_Masks/2020.1. World Health Organization; 2020.
17. World Health Organization. Mask use in the context of COVID-19: interim guidance, 1 December 2020. No. WHO/2019-nCoV/IPC_Masks/2020.5. World Health Organization; 2020.
18. Zhou F, Yu T, Du R, Fan G, Liu Y, Liu Z, Xiang J, Wang Y, Song B, Gu X, Guan L, Wei Y, Li H, Wu X, Xu J, Tu S, Zhang Y, Chen H, Cao B. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. Lancet 2020; (10229)395:1054-62.