ORIGINAL ARTICLE

Knowledge and Attitude on COVID-19 Appropriate Behavior among Frontline Healthcare Workers in a Tertiary Care Hospital: A Cross Sectional Study

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ABSTRACT

INTRODUCTION: Frontline healthcare workers (HCWs) are at higher risk of Covid-19 infection compared to general population. Adherence to COVID-19 preventive measure is an important factor in reducing the risk of exposure to the HCWs. Thus, we conducted a study to evaluate the knowledge and attitude toward COVID-19's preventive measure among the HCWs. Material and Methods: We performed a cross-sectional study among HCWs in COVID care center of Bharati Hospital, Sangli, between June 2021 to December 2021, A validated self- questionnaire on the knowledge of hand-washing and donning-doffing, as well as the attitude towards covid-19 appropriate behavior was administered to the HCWs. A statistical analysis was performed using a Microsoft Office 365 and SPSS-22. Results: Evaluation of knowledge on hand-washing and donning-doffing shown that majority of study participants had an average knowledge (77.12%), whereas only 7.7% had good knowledge and another 14.9% had poor knowledge. Knowledge of HCWs were significantly associated with donning-doffing training ($p < 0.05$). Majority of study participants (94.29%) demonstrated an appropriate behavior to COVID-19. Conclusion: As the study demonstrated an average knowledge on Covid-19 appropriate behavior after receiving a training, a periodic training on infection control and prevention in a healthcare setting and orientation programs related to COVID-19 appropriate behavior is indicated.

Keywords
COVID-19, Health care workers, hand washing, donning doffing

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INTRODUCTION

The novel Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) has rapidly spread worldwide within a span of 90 days and declared as a pandemic by the World Health Organization (WHO) on 30th January, 2020.[1] Later, due to the steep rise in the number of cases and fatalities, WHO declared COVID-19 as a global pandemic on 11 March 2020.[2] Globally, as on 4 August 2022, there have been 578,142,444 confirmed cases of COVID-19, including 6,405,080 deaths, reported to WHO and a total of 12,308,330,588 vaccine doses have been administered.[2]

Healthcare workers (HCWs) also termed as healthcare professionals or health professionals are crucial to any healthcare system. They play a vital role in serving patient care and recognized as "the most valuable resource for health care in the society". The healthcare workforce comprises a wide variety of professions and occupations providing healthcare services. These services are provided by physicians, nurse, practitioners, physician assistants, nurses and by allied health professionals, such as phlebotomists, medical laboratory scientists, dieticians, and social workers. HCWs are at the frontline defense against the coronavirus disease 2019 (COVID-19) pandemic. Their unwavering dedication in the fight against the COVID-19 pandemic was highly appreciable. They are supposed to have the basic knowledge and appropriate behavior related to COVID-19 so that they can serve better for themselves, their family, and the community. Inadequate knowledge and inappropriate attitudes among

them may lead to delayed diagnosis, poor infection control practices, and the spread of diseases.[3] Studies have shown that HCWs overcome the challenges of exposure to high-risk infection, insufficient PPE kits, heavy workloads, manpower shortages, confusion as well as getting separated from their families for a long time during this pandemic.[4] Under these stressful conditions, studies reveal that many HCWs are deeply concerned about being infected by a coronavirus and are extremely anxious about spreading the virus to their family and loved ones or vulnerable clients in the hospital or in the community, despite their effective engagement in the fight against COVID-19.[1] Most of the HCWs are working in isolation units, critical care units, intensive care units (ICUs), emergency units, working in frontline positions, are in direct contact with suspected and confirmed COVID-19 cases. However, enhanced appropriate safe and protective practices eliminate the personal risk of infection among them.[2]

In the current era, people need to understand and accept the precautions related to the pandemic. This pandemic is now almost modifying into an endemic in most things worldwide. It is the responsibility of the public and health care providers to take adequate and appropriate precautions while tackling any suspected viral illness, which is the need of an hour. The COVID-19 pandemic allowed the adoption of many appropriate changes or correct behavior of people termed as covid appropriate behavior. This includes frequent hand hygiene, maintaining physical distancing, use of face masks, wearing face shields, and cough etiquettes, avoiding greetings through physical contact, refraining from gatherings, urination at public places, and avoiding outside food, which were enforced during the COVID pandemic by the government.[3] Healthcare workers' adherence to effective control measures is affected by their knowledge, attitudes, and practices (KAP) towards COVID-19. Thus, knowledge of disease may influence HCWs' attitudes, and incorrect attitudes and practices directly increase the risk of infection and complications.[4] In addition, preventive measures such as using N95 masks, surgical masks, goggles, protective clothing, etc., will be helpful to ensure the safety of healthcare workers during COVID-19 outbreaks and in the future.[8]

Therefore, it is crucial to understand the knowledge of the medical providers and determine the factors that affect their knowledge and attitudes to have adequate practices and protection.[5] Hence, this study was conducted with the primary objective to assess the knowledge and attitude among healthcare professionals at tertiary care institutes in western Maharashtra.

MATERIAL AND METHODS

A cross-sectional study was conducted from June 2021 until December 2021 at Bharati Vidyapeeth Medical College and Hospital, Sangli, a tertiary care teaching hospital in Western Maharashtra which cater around 5 lakh population. During the Covid-19 pandemic, the hospital was well-equipped as a tertiary care center for COVID patients.

Health Care Workers (HCWs) who had worked for a minimum of two months in a dedicated COVID care centre and consented to the study were recruited as study participants. A self-administered questionnaire was designed, tested and validated before being used with the 'Hand Hygiene Knowledge Questionnaire for Healthcare Workers' by WHO as the study tools.[6] A pilot study was conducted with 50 participants to assess the validity and reliability of the tool study tool. The questionnaire was reviewed by the field experts including professors from the departments of Medicine, Community Medicine, Epidemiology, and Microbiology, and members of the general public. The questionnaire was finalized after considering their feedback and literature references. The Cronbach's alpha value is 0.68, indicated acceptable internal consistency and reliability of the newly designed questionnaire.

The questionnaire was related to knowledge of hand washing and donning-doffing, as well as regarding covid appropriate behavior. This questionnaire was subdivided into two sections. The first section was about socio-demographic information questions whereas the second section consisted of knowledge and attitude-related questions on hand hygiene, donning-doffing mechanics of

PPE, disease transmission dynamics and its risk factors, and biomedical waste disposal. Individual responses were then entered into Microsoft Excel before being analysed using the statistical software SPSS-22.

Knowledge scores for hand washing practices and COVID-19 appropriate behavior were calculated by assigning 1 point to each correct answer and a 0 to an incorrect/unknown answer; and were coded accordingly. The total knowledge score was divided into three different categories poor (score<mean–standard deviation), average (mean – standard deviation < score < mean + standard deviation), and good (score > mean + standard deviation).

Participants' attitude regarding COVID appropriate behavior were assessed and the item analysis was performed in terms of frequency and percentages for attitude. The score for appropriate behavior was given as 1 and inappropriate behavior was scored as 0. Appropriate behavior is defined as a good practice by adhere to the guidelines and laws established by public health authorities and governments to avoid spreading of the virus. The appropriate behaviour is the practice of wearing a mask, hands washing, staying 6 feet away from others, avoiding large crowds, staying home if sick or exposed to COVID-19, and getting vaccinated when possible.

In order to assess the overall appropriate/inappropriate attitude of the participants, total score of attitudes were calculated. If the score is less than 50%, it was considered as inappropriate behavior, whereas if it is ≥ 50% it was considered as appropriate behavior.

Prior to the main survey, a pilot study with 50 healthcare professionals was conducted to determine the sample size and identify any research gaps. Thus, the final study was able to be completed with the least numbers of bias and with the greatest amount of feasibility. The participants from the pilot study were not enrolled for the main study. With a prevalence of 81.5% [5], the calculated sample size for the main study was 402 with alpha (type I error) = 1%, absolute precision, (d) = 0.05. Accordingly, 440 questionnaires were distributed among health care providers of the tertiary care hospital, Sangli.

The entered data was exported into Statistical Package for Social Sciences (SPSS) version 22 for analysis. Data were analyzed by using appropriate tests of statistical significance. Frequency and percentages were obtained for qualitative characters, and mean and standard deviation for quantitative characters. The chi-square test / Fisher's exact test was used to check the association between knowledge and socio-demographic characters as well as knowledge and hand washing training and donning doffing training. To find out whether the knowledge is dependent on COVID infection, a chi-square test was used. To check the interaction effect and significant difference in adjusted mean scores of pieces of knowledge of participants regarding hand washing and donning doffing training, 2-way ANOVA (2 X 2 Factorial analysis) was used.

An approval for scientific and ethical clearance of the research were obtained from Research Review Committee (RRC) and Institutional Ethical Committee (IEC) prior to conduct of the study [IEC ref: BV(DU)MC&H /Sangli/ IEC/438/21]. After received the approvals formally, the medical superintendent and nursing superintendent from Hospital's General Administrations Department were contacted regarding their permission and smooth conduct of the study. The study participants provided their written informed consent prior to their enrollment into the study, and the confidentiality was maintained throughout the study period. The consent portion stated the purpose, nature of the survey, study objectives, volunteer participation, declaration of confidentiality, and anonymity. The study participants remained anonymous as their identifications were not collected in the questionnaire form to ensure confidentiality.

RESULTS

A total of 440 study participants responded to the questionnaires to determine their knowledge and attitudes toward general COVID-19 Appropriate Behavior. After excluding respondents with missing data, 403 respondents were included in the final analyses (90% responses). Majority of respondents (68.2%) were aged between 20 and 29 (Mean ± SD: 29.86±8.59 years) with male-to-female ratio of 1:1.44.

Table I. Table showing the Frequency distribution of some socio-demographic characteristics and some important factors.

		Frequency	Percent
Gender	Female	238	59.1
	Male	165	40.9
Age groups (in yrs)	20 - 40	356	88.3
	40 - 60	44	10.9
	> 60	3	0.7
Profession	Consultant	48	11.9
	Resident Doctor	116	28.8
	Intern	93	23.1
	Staff Nurse	98	24.3
	Students Nurse	38	9.4
	Other	10	2.5
Training of hand hygiene	No	29	7.2
	Yes	374	92.8
Donning doffing training	No	61	15.1
	Yes	342	84.9
COVID infection	No	277	68.7
	Yes	126	31.3
Total		403	100%

Table I shows the frequency distribution of participants based on various socio-demographic characteristics and whether they have received any training such as hand washing, donning, and doffing of PPE equipment, and whether or not they have COVID infection. Majority of study participants were resident doctors (28.8%) followed by staff nurses (24.3%) and interns (23.1%). Majority of participants had completed their trainings on hand washing (92.8%) and donning doffing (84.9%). A total of 318 study participants (78.9%) received training from the Department of Hospital Infection Committee, whereas another 8.7% received online training, 6.7% trained by colleagues and 5.7% did not undergone any training. There were a total of 126 participants (31.3%) who had been infected with Covid-19. The sources of infection were from hospital (65.87%), community (14.29%), household contact (9.52%), or unknown (3.97%).

Out of 403 participants, majority had an average knowledge (77.12%), whereas only 31 participants (7.70%) had good knowledge and 60 participants (14.9%) had inadequate/poor knowledge. Although age and gender were not significantly related to knowledge, the poor knowledge participants were noted to have an average age of 40 years and being male participants. The poor knowledge was noted to be high in other HCw2 (othan medical and nursing professionals) (60%), followed by Nursing students, 16 (42.1%) and staff nurses, 21(21.4%). Only 5 (4.3%) resident doctors had inadequate/poor knowledge. (Table II)

Table II: Association of knowledge with socio-demographic characteristics

		Knowledge Score Groups			Total	Significance
		Poor	Average	Good		
Age (in years)	20-30	47	229	21	297	Fisher's Exact Test = 9.264, p = 0.127
		15.80%	77.10%	7.10%	100.00%	
	30-40	11	45	3	59	
		18.60%	76.30%	5.10%	100.00%	
	40-50	2	25	6	33	
		6.10%	75.80%	18.20%	100.00%	
	>= 50	0	13	1	14	
		0.00%	92.90%	7.10%	100.00%	
Gender	Female	37	184	17	238	Pearson Chi-Square = 0.398, p = 0.82
		15.50%	77.30%	7.10%	100.00%	
	Male	23	128	14	165	
		13.90%	77.60%	8.50%	100.00%	
Profession	Consultant	0	38	10	48	--
		0.00%	79.20%	20.80%	100.00%	
	Intern	12	66	15	93	
		12.90%	71.00%	16.10%	100.00%	
	Nursing students	16	22	0	38	
		42.10%	57.90%	0.00%	100.00%	
	Other	6	4	0	10	
		60.00%	40.00%	0.00%	100.00%	
	Resident Doctors	5	105	6	116	
		4.30%	90.50%	5.20%	100.00%	
	Staff Nurse	21	77	0	98	
		21.40%	78.60%	0.00%	100.00%	
Hand Washing Training	No	10	16	3	29	Pearson Chi-Square = 10.342, p = 0.006
		34.50%	55.20%	10.30%	100.00%	
	Yes	50	296	28	374	
		13.40%	79.10%	7.50%	100.00%	
Donning Doffing Training	No	25	36	0	61	Fisher's Exact Test = 35.142, p = 0.000
		41.00%	59.00%	0.00%	100.00%	
	Yes	35	276	31	342	
		10.20%	80.70%	9.10%	100.00%	
Total		60	312	31	403	
		14.90%	77.40%	7.70%	100.00%	

Table II shows the relationship between knowledge and training programs, such as hand washing and donning and doffing of PPE equipment. This training has a strong association with knowledge scores. Participants who have not attended any training have a limited understanding of what constitutes proper behavior.

The total knowledge score was 63 with a minimum of 0 and a maximum of 56 with Mean ± SD as 40.88 ± 9.18. Participants with a feminine gender and an age greater than 40 had a higher mean knowledge score, although this was not statistically significant. The individuals who received hand washing and donning doffing training had considerably higher mean knowledge scores ($P<0.01$). Participants who had not been infected with COVID had a higher mean knowledge score, but this difference was not statistically significant.

Hand washing instruction was obtained by 374 (93.1%) of the 403 participants, and donning and doffing training was received by 342 individuals. Out of 31 individuals with good knowledge, 28 (7.5%) had received hand washing training, and 31 (9.1%) had received donning and doffing instruction. This demonstrates an extremely substantial relationship ($p<0.01$). (Table III)

Table III: Attitude of Study participants towards COVID-19

Sr. No.	Attitude related questions	Appropriate Behavior n (%)	Inappropriate Behavior n (%)
1	Routinely use an alcohol-based hand rub	388 (96.3)	15 (3.7)
2	Completely vaccinated for COVID-19	328 (81.4)	75(18.6)
3	Get enough water to remain hydrated before donning PPE kits	377(93.5)	26(6.5)
4	Get personal belongings removed before donning PPE kits	371(92.1)	32(7.9)
5	Always sanitize hands before touching PPE components before donning PPE kits	368(91.3)	35(8.7)
6	Always perform donning pro-cedure before entering patient care area	376(93.3)	27(6.7)
7	Always check integrity of com-ponents of PPE kit	365(90.6)	38(9.4)
8	Always appoint an observer with checklist	276(68.5)	127(31.5)
9	After having fever and cough for 2 days, visit immediately fever surveillance OPD and get RTPCR done	291(72.2)	112(27.8)

When the participants' attitudes toward the COVID Appropriate Behavior were assessed, most of them demonstrated the appropriate behavior. Overall appropriate behavior was found in 380 (94.29%) participants. 96.3% of participants exhibited proper behavior when using an alcohol-based hand rub on a regular basis. Regarding complete vaccination, 75 (18.6%) individuals had an unacceptable attitude about COVID conduct. The reason for not having the complete vaccination given by them as 'Unavailability of vaccine' by 29 (38.67%) out of 75 participants. 11(14.67%) participants mentioned that 'they were afraid about side effects / complications' and remaining of participants mentioned the reasons like 'Information about vaccine safety is not enough', 'don't feel vaccines are preventive enough', 'Do not know where to get it from' or 'Registration process is complex', etc.

Similarly, it was observed that 27.8% of individuals exhibited inappropriate behavior related to hiring an observer with a checklist (31.5%), attending a fever surveillance OPD, and getting RTPCR done promptly after experiencing a fever and cough.

Table IV: Summary of 2-way ANOVA (2 X 2 Factorial analysis) of knowledge score of participants

Source	df	Sum of Squares	Mean Sum of Square	F	Significance
Handwashing Training (A)	1	189.15	189.15	2.566	0.11
Donning Doffing Training (B)	**1**	**1220.457**	**1220.457**	**16.56**	**0.000**
Hand-washing Training* Donning Doffing Training (A X B)	1	30.468	30.468	0.413	0.521
Error	399	29406.54	73.701		
Total	403	707399			
Corrected Total	402	33886.28			

The adjusted F value is significant for the factor training of donning and doffing. It shows that there is a significant difference in adjusted mean scores of knowledge of participants, regarding donning-doffing training when knowledge score is taken as a dependent factor. (Table IV)

DISCUSSION

Coronavirus disease (COVID-19) is an emerging infectious disease caused by the SARS-CoV-2 virus. Healthcare workers working at different levels in healthcare settings are at high risk of exposure to the corona virus during the time of providing services to COVID-19 patients, and the likelihood of acquiring this disease is higher.[7]

Our study was a cross-sectional study conducted with the objective of assessing the knowledge and attitude among HCWs toward the current outbreak of the coronavirus pandemic. It was devised to study knowledge and attitude towards COVID-appropriate behavior amongst HCWs as both are critical as well as important components of the prevention of COVID infection.

In our study, knowledge was found to be average in all the age groups and almost equal in both gender. There

was no gender inequality with respect to knowledge of COVID-appropriate behavior. Among all the professions, resident doctors had maximum average knowledge. The highest knowledge was observed may be due to the current ongoing medical education in their post-graduation curriculum. The other healthcare professionals were consultants, staff nurses, and intern doctors. Knowledge was found to be average among healthcare workers who had undergone training about hand washing and, donning & doffing as compared to those who have not. This study indicated that a maximum number of participants had average knowledge about hand washing due to ongoing training conducted related to it on the college premises. In our study, average knowledge was scored by 79%, and Shukla M at AIIMS Patna in 2016 found 72% average knowledge regarding hand-washing, which is nearly similar.[8] In the study, average knowledge was scored by 79% of the participants, but Dutta G (2020) observed that only 36.6% have good knowledge.[9] This percentage is very less, and it may be due to Dutta G has studied knowledge regarding only hand hygiene, and nearly 59% of participants have not received the training. It reinforces regular training since information connected to the job is highly vital, which enhances practices. In different studies, KAP towards COVID-19 among Chinese, the total correct rate of the knowledge questionnaire was 90%, while US residents demonstrated that 80% of individuals had good knowledge.[10,11] The percentage of participants with good/average knowledge varies among research due to differences in sample, sampling design, and sample size. A worldwide pandemic raised awareness of the significance of hand hygiene, leading to improved absorption of hand washing information and procedures. Some of the reasons for such good knowledge include continuous training by the hospital's infection control staff and improved general awareness through the media. Provision of PPE kits, face masks, hand sanitizers to HCWs and at the same time, good hand washing practices & better policies at the hospital level will greatly help them to tackle the COVID crisis in a positive way by eliminating healthcare-associated infections.

Knowledge is essential for establishing preventive measures, forming positive attitudes, and promoting constructive behaviors, and thus the individuals' cognition and attitudes towards disease. This affects the effectiveness of their coping strategies and behaviors to a certain extent.[4] More than 94% of participants exhibit COVID-appropriate behavior, including questions about-wearing a mask, washing hands, staying 6 feet away from others, avoiding large crowds, staying home if sick or exposed to COVID-19, and vaccination. In this study, higher understanding, i.e., The participants, who scored higher, had appropriate behavior of COVID-19 among healthcare staff correlates with their attitude toward the disease while at work. This conclusion is consistent with earlier research showing that knowledge directly affects their attitude and confidence.[12–14]

However, inadequate knowledge is one of the important aspects adversely affecting the care of patients. Some studies do indicate types of HCWs, the burden of patient load, long working hours, and inadequate resources also do affect the care of patients.[15] The present study shows that irrespective of knowledge level, the use of alcohol-based hand rub is invariably practiced by most HCWs. Fear of the disease and better hand-washing training before the occurrence of the pandemic might be some of the reasons behind it.

The attitude of the participants was found to be high as compared to studies done by Limbu DK (2020), Nepal R (2020), and Rajesh Kumar (2020).[5,16,17] Better training and motivation to tackle COVID united were some of the reasons behind it. Moreover, the availability of treatment and the good vaccine boosted the morale of the staff. Similar results have also been seen in studies conducted by Rastogi A.[18]

CONCLUSION

Out of 403, only 31 (7.7%) participants have good knowledge, and 77.4% have average knowledge. This study highlights the lack of knowledge among Nurses and Interns and the need for conducting periodic training on infection control and prevention in a healthcare setting. There should be orientation/training programs related to COVID-appropriate behavior for Health Care Professionals.

Strengths and Limitations of the study

In the study, knowledge and attitude levels of different occupations and different educational levels were assessed.

The study was cross-sectional and conducted in only one tertiary care hospital. Hence it had limitations of the cross -sectional and hospital-based study. Results may not be generalizable to other healthcare workers or to another hospital. As only a limited number of questions were added, the measurement of knowledge and attitude may not be precise. As observation of the participants in the actual field, like wards, was not done, participants' attitude may not be assessed exactly. Further, at a larger scale and national level research is required for generalization.

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AUTHORS' CONTRIBUTIONS

All authors substantially contributed to drafting and revising the article, as well as the final approval of the version to be submitted.

CONFLICTS OF INTEREST

There are no conflicts of interest.

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