Original Article

Corona health-care warriors in India: knowledge, attitude, and practices during COVID-19 outbreak

Rajesh Kumar, Vanya Singh[1], Aroop Mohanty[1], Yogesh Bahurupi[2], Puneet Kumar Gupta[1]

Abstract:

BACKGROUND: COVID-19 has become a global health emergency after its first case in Wuhan city, China. An increasing number of cases and deaths are challenging the health-care system globally. This study aims to assess knowledge, attitude, and practice toward COVID-19 disease among health personnel in rapid outbreak in India.

MATERIALS AND METHODS: A cross-sectional survey was conducted using Google Forms through Google platform on-line. A total of 713 health personal allied health-care staff, working in different public and private health-care facilities, was conducted in the mid of April 2020. A structured knowledge, attitude, and practice questionnaire used to assess health personnel's knowledge, attitude, and practice toward COVID-19. All instruments were validated and pretested before use. Chi-square test, followed by binary logistic and multivariate regression, was applied to determine factors associated with knowledge scores.

RESULTS: Seven hundred and thirteen health personnel participated, and 703 (98.6%) participants responded were analyzed for final results. 95.9% of the health personnel were aware about route of transmission and clinical symptoms (95.3%) of COVID-19. 63.7% believed that virus outbreak would be controlled globally and followed standard precautions (81.8%), including wearing the mask. Further, majority (98.3%) of the participants avoided social contact by not going to crowded places and not calling people to their homes (82.2%) during the advisory of the government. In binary logistic regression analyses, the adequate knowledge score found significantly associated with MBBS/bachelor's degree (odds ratio [OR]: 2.309, confidence interval [CI]: 1.232–4.324, $P < 0.009$) and master's degree (OR: 2.944, CI: 1.485–5.835, $P < 0.002$), working with government health-care facility (OR: 3.662, CI: 1.624–8.285, $P < 0.002$), and holding a post of a physician (OR: 7.735, CI: 2.210–27.091, $P < 0.001$) during outbreak.

CONCLUSIONS: The level of education is associated with adequate knowledge scores among the health personnel. Type of health-care facility and post held in a health-care facility are significant predictors of adequacy of knowledge.

Keywords:

Attitude, coronavirus, COVID-19, health personnel, knowledge, practice

Department of Nursing, All India Institute of Medical Sciences (AIIMS), Rishikesh, Uttarakhand, India, [1]Department of Microbiology, All India Institute of Medical Sciences (AIIMS), Rishikesh, Uttarakhand, India, [2]Department of Community and Family Medicine, All India Institute of Medical Sciences (AIIMS), Rishikesh, Uttarakhand, India

Address for correspondence:
Dr. Yogesh Bahurupi, Department of Community and Family Medicine, All India Institute of Medical Sciences Rishikesh - 249 203, Uttarakhand, India.
E-mail: dr.yogeshab@gmail.com

Received: 18-05-2020
Accepted: 20-07-2020
Published: 27-02-2021

Introduction

A cluster of pneumonia cases were detected in Wuhan in the Hubei province of China at the end of 2019. The new strain of coronavirus was named "severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2)" and disease as "COVID-19."[1] COVID-19 is a respiratory pneumonia which became pandemic spreading rapidly to involve various areas of the world.[2,3] COVID-19 is highly contagious and characterized by symptoms of mild fever, myalgia, dry cough, fatigue, headache, and sometimes gastrointestinal symptoms such as vomiting, abdominal pain, and diarrhea.[3,4] SARS-CoV-2 was

transmitted through direct contact and in the form of droplets mainly.[5] However, a lot of scientific work is underway to figure out the source of infection, reservoir, transmission rate, severity, and impact on health-care system.[2,6,7] Considering the high transmission rate and huge mortality, the World Health Organization (WHO) declared COVID-19 as "Public Health Emergency of International Concern" on January 30, 2020.[8]

The Ministry of Health and Family Welfare in India reported 26,496 as total confirmed cases (including 111 foreign nationals), 5804 discharged/cured/migrated cases, and 824 deaths with COVID-19 infection till April 26, 2020, 08:00 GMT + 5:30 (https://www.mohfw.gov.in). Globally, the countries need to use robust system for surveillance and audit of COVID-19 testing to detect suspected cases by specified case definition and detailed investigation protocol as recommended by the WHO.[9] In India, certain states namely Maharashtra, Gujarat, and National Capital, Delhi has been severely affected by the attack of the COVID-19 outbreak. The Indian government has taken some unprecedented measures to break the chain of transmission of the COVID-19 in the country including complete lockdown in the country, initially for 21 days, which was extended to another 19 days till May 3, 2020. The lockdown constituted suspension of schools/colleges, public transportation, public places, i.e., restaurant, hotel, bar, religious gathering, and close surveillance of high-density community areas using drone cameras, and mandatory 14-day quarantine for an individual who comes in contact with COVID-19-confirmed case. However, problem to break the chain of transmission of COVID-19 and mortality becomes more complex in reaction to lack of prophylactic vaccine, scientific treatment line, and lack of sound knowledge and experience among health personnel to manage such infectious diseases in the past.[10]

Facing the grim situation, health personnel are holding the frontline to provide round-the-clock services to COVID-19-affected patients. Lack of timely implementation of strict and scientifically oriented infection control measures may propel the disease transmission to the community level.[11] Subclinical and asymptomatic carriers of COVID-19 at the workplace and community are a potential source of infection and remain a big threat to the health personnel. This can make the vulnerable more susceptible to get infection to other patients and hazardous source of infection for other health team members.[11,12]

Winning a war against this deadly virus depends on scientific knowledge, appropriate practice, and optimistic attitude of health personnel toward COVID-2019.[13] Therefore, the health personnel should have scientific knowledge of different aspects of infectious disease

and have an attitude to handle grim situation using appropriate practices to prevent the transmission to others. Thus, the study focusses on assessment of knowledge, attitude, and practices toward COVID-19 among health personnel in India.

Materials and Methods

A cross-sectional survey was conducted using Google Forms through Google platform online. A total of 713 health personnel, physicians, nurses, and allied health staff (dentists, hospital attendants, and student nurses), working in public and private health-care facilities, participated in an online survey, and 703 participants completed the survey for final analysis. The survey questionnaire was adapted for local use,[14] and survey link was shared on E-mail and WhatsApp to the different health-care groups across the nation with a request to participate in the study. The study was planned as a rapid survey to generate evidence for interventions based on study findings. Hence, the survey link was left open for 1 week, and the final analysis was done after closing the link. Survey link: https://drive.google.com/file/d/1jWQOkjXWznBiVf1MawdoO6ynjKwUAC3y/view?usp = sharing

The study was approved by the Institutional Ethics Committee (AIIMS/IEC/20/158). A consent form was also provided in the survey link and asked to provide consent before participating in online survey. However, the survey questionnaire was refrained to obtain any personal information of the participant.

Sociodemographic sheet
It consists information on age, gender, professional qualification, occupation, professional experience, sources of information about COVID-19, involvement in the direct care of COVID-19 patients, and experience of involvement in care of infectious disease, i.e., "SARS," "Middle East respiratory syndrome coronavirus (MERS-CoV)," or influenza A H1N1. The profile was pretested and validated by experts in the field of infectious disease, microbiology, medicine, and nursing.

Knowledge questionnaire
A structured knowledge questionnaire was used to collect information on various aspects of COVID-19. It consists of 11 items on origin, route of transmission, clinical symptoms, preventive strategies, and availability of vaccine in the market to cure COVID-19. Participants were asked to respond to the question on dichotomous response (yes/no) with an extra "not sure/don't know" option. Each right response was scored as one point and zero was assigned to wrong or unknown response. Getting higher knowledge score suggested better

knowledge about COVID-19 and vice versa. Further, the knowledge score was categorized into adequate (>60%) and inadequate (≤60%) level based on correct response of a participant to knowledge items. The knowledge questionnaire was validated and pretested before final use.

Structured attitude and practice questionnaire

Attitude toward COVID-19 was assessed by four questions about "confidence in successful winning over COVID-19 globally," "use of standard precautions to break the chain of transmission," "sharing scientific information about COVID-19 with others," and "behaving more civilized and responsible manner during an outbreak." The practices were measured by six questions on isolation, visiting crowded places, using the mask, washing hands, avoiding social contacts, and compliance to government advisory. Practice items are scored dichotomously (yes/no) indicative presence or absence of a particular practice during an outbreak. The validity of the questionnaires was established through experts' opinions in the field of infectious diseases, microbiology, medicine, and nursing.

Statistical analysis

The demographic characteristics were compared with level of knowledge score using Chi-square test. Bivariate regression analysis was applied using knowledge score as a dependent variable. Similarly, multivariate logistic regression was applied to determine factors associated with knowledge score of health personnel. Odds ratios (ORs) with 95% confidence interval (CI) were used to quantify the strength of association between sociodemographic characteristics and knowledge score of health personnel. Data analyses were carried in IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp The level of significance was set at $P < 0.05$ (two-sided).

Results

The online survey form was responded by 713 participants, and 10 did not give consent to use their information for research purpose and were excluded from the analysis. The final sample size of the study consisted of 703 (98.6%) participants. The mean age of the study population was 30.27 years (standard deviation [SD] ±7.04), ranging from 18 to 68 years. Among the 703 participants, 50.6% were male and 47.7% had a MBBS or bachelor's degree in relevant professions. With regard to profession, majority were nurses (62.2%), followed by doctors (20.6%) and other (17.2%) allied health personnel, i.e., dentists, trainee nursing students, and hospital attendants. In terms of types of health-care facility, 71.8% of the participants were working in a government health-care facility, followed by 22.2% in private health-care facility. More

than 70% of the participants reported no past experience of management of COVID-19 patients or management of SARS, MERS-CoV, or H1N1 during their professional experience. Around half of the health personnel (47.4%) had work experience of <5 years. Further, in terms of source of information on COVID-19, majority (77.52%) of the health personnel gained information through the Internet/social media, followed by journal/reading textbook or attending institutional lectures (54.62%) on COVID-19. However, around half (50.64%) of the participants got updated information on COVID-19 by going through daily newspapers and news on television or radio. The sociodemographic details of the health personnel are summarized in Table 1.

Knowledge of health personnel on COVID-19

The frequency and percentage of correct knowledge response and attitude and practice are described in Table 2. In terms of the origin of COVID-19, 50.9% of the people think that virus may have originated from bat, while 30.7% were not sure about the origin of virus. However, only 18.3% confident that bats did not play any role in its origin of the virus. With regard to transmission of virus, more than 95% of the participants were aware of route of transmission (95.9%) and main clinical symptoms (95.3%). 65.1% of the participants believe that eating or contacting wild animals would not lead to infection while 23% were not sure about it. According to 68% of the participants, young adults have no chance of getting infected with COVID-19 while 17.1% were not sure and 14.9% of the participants believed that young adults are prone to get infected with COVID-19.

Regarding on prevention and control measures, more than 99% of the participants (99.9%) believe that chain of infection is broken by hand hygiene as an important standard precaution. Further, more than 60% of the participants felt that a person with history of contact with COVID-19-confirmed case should be quarantined while 37.1% believed that they should be kept in isolation, while 24% of the participants were not sure about immediate prevention and approaches to control the transmission of COVID-19.

Regarding management of COVID-19, 96.9% of the participants were aware that until now, there is no vaccine to prevent the disease while 15.2% of the participants supposed that BCG vaccine may help in prevention of deadly virus and indicate a need to take a shot of BCG vaccine for health personnel [Table 2].

Attitude of health personnel toward COVID-19

Findings show that 63.7% of the participants were confident that transmission of COVID-19 will be controlled successfully while 21.5% were still not sure about the control around the globe. Majority (81.8%) of

Table 1: Sociodemographic characteristics of the health personnel (*n*=703)

Variables	Categories	*F* (%)
Age (years), mean 30.27 years (SD±7.04)	≤35	568 (80.9)
	>35	134 (19.1)
Gender	Male	356 (50.6)
	Female	345 (49.1)
	Prefer not to say	2 (0.3)
Qualification	Diploma	87 (12.4)
	MBBS/bachelor	335 (47.7)
	Master's degree	258 (36.7)
	PhD/doctorate	23 (3.3)
Source of information on COVID-19**	Internet/social media	545 (77.52)
	Textbooks/journals/institutional lectures	384 (54.62)
	TV/newspaper/radio	356 (50.64)
	Friends/family/neighbors	183 (26.03)
Health-care institution	Government	505 (71.8)
	Private	156 (22.2)
	Semi-government	42 (6.0)
Occupation	Physician	145 (20.6)
	Nurse	437 (62.2)
	Allied health personnel*	121 (17.2)
Years of professional experience (years)	<1	66 (9.4)
	1-5	333 (47.4)
	5-10	175 (24.9)
	10-20	100 (14.2)
	>20	29 (4.1)
Exposure to treat COVID-19 patient	Yes	116 (16.5)
	No	508 (72.3)
	May be	79 (11.2)
Experience of treating SARS, MERS-CoV or H1N1	Yes	171 (24.3)
	No	532 (75.7)

*Nursing student, technician, and hospital attendant, **Percentage will exceed 100% due to multiple responses. MBBS=Bachelor of Medicine and Bachelor of Surgery, SD=Standard deviation, SARS=Severe acute respiratory syndrome, MERS-CoV=Middle East respiratory syndrome coronavirus

the participants were agreed that transmission may be prevented by strictly adhering to standard precautions including wearing mask, whereas 12.9% believed that using standard precautions may not be helpful to prevent the transmission. Similarly, 94.6% of the participants were agreed that authentic information regarding disease profile and outbreak must be shared among peers and colleagues to make them aware about the facts and other relevant issues related to virus. Majority (91.9%) of the health personnel show responsibility and behave in more civilized way to stop further transmission of disease [Table 2].

Practice of health personnel toward COVID-19

Majority (99%) of the participants reported that isolation should be done for suspected or confirmed COVID-19. Participants (96.9%) avoided visiting crowded places, washed their hands (97.6%) more frequently, wore masks (90.8%), and maintained social distancing (98.3%) while going outside.

Further, 82.2% of the participants reported that they stopped calling other people to their homes. However, a small proportion of participants visited crowded places frequently (3.1%) and did not maintain social distance (1.7%) during COVID-19 outbreak. The results are summarized in Table 2. The association of sociodemographic variables with level of knowledge of COVID-19 are shown in Table 3.

The mean knowledge score was 7.24 (SD ± 1.4, range: 3–10), with a correct response rate of 72.4% ($7.24 / 10 \times 100$) in the knowledge questionnaire. The knowledge level found significantly associated with participants' qualifications ($P < 0.05$), their types of the health-care facility ($P < 0.05$), and occupation ($P < 0.05$). However, knowledge score did not show any significant association to participants' age, gender, or years of professional experience, the experience of treating COVID-19 patients, and past experience of treating SARS, MERS-CoV, or H1N1 patients in their professional life.

Further, findings represent that adequate knowledge of health personnel on COVID-19 is significantly associated with working with government health-care facility (OR: 3.662, CI: 1.624–8.285, $P < 0.002$) in comparison to health personnel working at semi-government health facility.

Table 2: Knowledge, attitude, and practice toward COVID-19 (*n*=703)

Questions related to knowledge	Percentage of correct response rate
K1. COVID-19 is thought to be originated from bats	50.9
K2. COVID-19 is transmitted through contact and air borne droplet routes	95.9
K3. Fever, fatigue, dry cough, and myalgia are the common clinical symptoms of COVID-19	95.3
K4. An individual with COVID-19 can transmit the virus to other individuals after only having or developing fever	81.1
K5. Use of meat, pork, beef and other wild animals can leads to COVID-19 infection	65.1
K6. Young adults are more prone to get infected with COVID-19 virus	68.0
K7. Hand hygiene is an important standard precaution for general infection prevention and control	99.9
K8. People with contact history with the COVID-19-confirmed case should be immediately quarantined for a period of 14 days	60.3
K9. BCG vaccination will able to reduce the infection and prevention rate of COVID-19	60.7
K10. Vaccine of COVID-19 is available in market for use	96.9
K11. PCR is an important diagnostic tool used to diagnose SARS-CoV-2	85.3
Questions related to attitude	
A1. Do you think that there will be successful global control over COVID-19?	63.7
A2. Do you agree that transmission of COVID-19 infection can be prevented using standard precautions including wearing N95 mask?	81.8
A3. Do you feel that any authentic and scientific related information about COVID-19 should be shared among peers and other health personnel?	94.6
A4. Do you believe that people should behave in more civilized and responsible way to prevent spread the transmission in a country?	91.9
Questions related to practice	
P1. Suspected or confirmed COVID-19 patients must be kept in isolation	99.0
P2. Have you use mask (homemade, surgical, or any other) while going outside of home?	90.8
P3. During government advisory on lockdown, have you visited any crowded place?	96.9
P4. In recent days, do you wash your hands more frequently than earlier?	97.6
P5. In recent days, have you stopped calling other people at your home?	82.2
P6. During COVID-19 outbreak, have you followed the instructions of government authority for social distancing to prevent transmission?	98.3

SARS-Cov-2=Severe acute respiratory syndrome conronavirus-2, PCR=Polymerase chain reaction

However, the adequacy of knowledge was not found a significant association with health personnel working in private health-care facility (COR: 1.100, CI: 0.477–2.536, $P >.05$).

Similarly, the adequacy of knowledge of health professional on COVID-19 is significantly associated with occupation, physician (COR: 7.735, CI: 2.210–27.091, $P < 0.001$). However, the adequacy of knowledge was not significantly associated with nursing as profession (COR: 1.135, CI.632–2.039, $P > 0.05$).

Binary logistic regression analysis results revealed that health professional's adequate knowledge on COVID-19 is significantly associated with their MBBS/bachelor's degree (COR: 2.309, CI: 1.232–4.324, $P < 0.009$) and master's degree (COR: 2.944, CI: 1.485–5.835, $P < 0.002$) in reference to health personnel who have only diploma education in medical profession. However, the adequacy of knowledge was not associated with PhD or doctorate degree holder (COR: 2.739, CI: 0.587–12.782, $P > 0.05$) [Table 4].

Multivariate logistic regression is applied for the variables found significant in binary logistic regression.

Regression findings revealed that health personnel working in government health facility have adequate knowledge (AOR: 3.029, CI: 1.319–6.942, $P < 0.009$) as compared to semi-government facility. Similarly, physicians have better knowledge of COVID-19 as compared to allied health personnel (AOR: 6.315, CI: 1.775–22.466, $P < 0.004$) [Table 5].

Discussion

Currently, the most discussed topic in media and community is COVID-19, especially among sick individuals and their caregivers. Health personnel are seemed to have an increased risk of infection. To the best of our knowledge, this is the first study in Indian scenario assessing the knowledge, attitude, and practice of health personnel toward COVID-19. We further assume that study findings will be useful in developing of IEC programs aimed at prevention and control of this deadly emerging infectious disease.

The findings of our study revealed acceptable knowledge and favorable attitude of health personnel toward COVID-19. The present study reported that majority of the health personnel have adequate knowledge

Table 3: Association of sociodemographic variables with level of knowledge of COVID-19 (*n*=703)

Variables	Categories	Knowledge score		P
		Adequate knowledge, *F* (%)	Inadequate knowledge, *F* (%)	
Age (years)	≤35	64 (85.3)	504 (80.4)	0.303
	>35	11 (14.7)	123 (19.6)	
Gender	Male	319 (51.0)	37 (49.3)	0.790
	Female	307 (49.0)	38 (50.7)	
Qualification	Diploma	69 (11.0)	18 (24.0)	0.011*
	MBBS/bachelor	301 (47.9)	34 (45.3)	
	Master's degree	237 (37.7)	21 (28.0)	
	PhD/doctorate	21 (3.3)	2 (2.7)	
Type of health-care facility	Government	470 (74.8)	35 (465.7)	0.0001*
	Private	125 (19.9)	31 (41.3)	
	Semi-government	33 (5.3)	9 (12.0)	
Occupation	Physician	142 (22.6)	3 (4)	0.001*
	Nurse	382 (60.8)	55 (77.3)	
	Allied health personnel**	104 (16.6)	17 (22.7)	
Years of professional experience (years)	<1	56 (8.9)	10 (13.3)	0.097
	1-5	292 (46.5)	41 (54.7)	
	5-10	162 (25.8)	13 (17.3)	
	10-20	94 (15.5)	6 (8.0)	
	>20	24 (3.8)	5 (6.7)	
Exposure to treat COVID-19 patient	Yes	102 (16.2)	14 (18.7)	0.864
	No	455 (72.5)	53 (70.7)	
	May be	71 (11.3)	8 (10.7)	
Experience of treating SARS, MERS-CoV, or H1N1	Yes	157 (25.0)	14 (18.7)	0.227
	No	471 (75.0)	61 (81.3)	

**Nursing student, dentist, and hospital attendant. SARS=Severe acute respiratory syndrome, MERS-CoV=Middle East respiratory syndrome coronavirus

Table 4: Binary logistic regression analysis on factors significantly associated with knowledge score on COVID-19 (*n*=703)

Variables	COR (95% CI)	P
Qualification		
Diploma	Ref.	Ref.
MBBS/bachelor's degree	2.309 (1.232-4.324)	0.009*
Master's degree	2.944 (1.485-5.835)	0.002*
PhD/doctorate	2.739 (0.587-12.782)	0.200
Type of health-care facility		
Semi-government	Ref.	Ref.
Government	3.662 (1.624-8.285)	0.002*
Private	1.100 (0.477-2.536)	0.824
Occupation		
Allied health personnel**	Ref.	Ref.
Physician	7.735 (2.210-27.091)	0.001*
Nurse	1.135 (0.632-2.039)	0.671

**Nursing student, dentist, and hospital attendant. Ref.=Reference category, COR=Crude Odds Ratio, CI=Confidence interval, MBBS=Bachelor of Medicine and Bachelor of Surgery

and reported a correct response rate of 72.4% about COVID-19. Recent studies conducted on COVID-19 in Iran[15] and China[13] had reported a correct response rate of 90%.

Source of information about COVID-19 for majority of the participants was the Internet and social media, journals and lectures, and television. Our findings were similar to the findings reported in similar studies. [10,12] These findings are of concern for clinical use and emphasize the need to access the authentic source for extracting the information on novel coronavirus.

About the route of transmission and preventive measures, findings reported that 96% of the health personnel knew about the routes of transmission and clinical symptoms (95%) and nearly 100% were aware of hand hygiene as the most important preventive measure to break the chain of transmission of coronavirus. Earlier published research presented a close similar finding on precautionary measures, hygiene issues, and hallmark symptoms of MERS. [16] Health personnel were aware about unavailability of vaccine for disease prevention. Similar findings are reported in earlier published studies on coronavirus disease. [10,16]

The study findings reflect a favorable attitude of health personnel toward COVID-19. About 63% believed that the COVID-19 epidemic will finally be successfully controlled globally. Health personnel show an excellent response (81.8%) for using standard precautions and use of mask to prevent the transmission of COVID-19. Similar findings represented in previous studies conducted on COVID-19 and MERS for the use of standard precautions and wearing mask to break the transmission of deadly virus. [10,17] Similarly, there was a high response rate for

Table 5: Multivariate logistic regression to find the factors associated with knowledge on COVID-19 (*n*=703)

Variables	AOR (95% CI)	*P*
Qualification		
Diploma	Ref.	Ref.
MBBS/bachelor's degree	1.452 (0.745-2.829)	0.273
Master's degree	1.892 (0.902-3.969)	0.092
PhD/doctorate	1.492 (0.295-7.561)	0.629
Type of health-care facility		
Semi-government	Ref.	Ref.
Government	3.029 (1.319-6.942)	0.009*
Private	0.867 (0.372-2.065)	0.763
Occupation		
Allied health personnel**	Ref.	Ref.
Physician	6.315 (1.775-22.466)	0.004*
Nurse	1.048 (0.554-1.983)	0.886

**Nursing student, dentist, and hospital attendant. Ref.=Reference category, AOR=Adjusted Odds Ratio, CI=Confidence interval, MBBS=Bachelor of Medicine and Bachelor of Surgery

sharing authentic information on disease with other health personnel to make them aware.

Health personnel were aware about preventive measures to be taken for avoiding getting infected such as avoiding visit to crowded places and using mask. These findings could be better represented and better understood in shadow of the risk-taking behavior of an individual.[18] Further, health personnel knowledge on COVID-19 documented a significant association with occupation, profession, and types of health-care facility. Our findings are similar to a study conducted among Chinese residents.[13]

The strength of our study is due to the significant sample size of health personnel during the early days of this emerging infectious disease with an over-representative of experienced medical and nursing graduates working in different types of health-care facility across the nation. Since COVID-19 can be transmitted through droplets or close contacts, an online survey was conducted to reduce the chances of transmission and could be considered a major limitation for the study. However, an overwhelming response of health personnel enabled researchers to completed the survey on a serious global threat. Strictly speaking, the findings of this study can only be extrapolated to Indian health personnel and shall be used cautiously to the general population.

Conclusions

The current study findings represent a good knowledge, favorable attitude, and practice, followed by health personnel during pandemic of COVID-19. This highlighted the need of focused education and training program for health-care professional across the nation to enforce and update COVID-19 knowledge to encourage an optimistic attitude and follow safe practices during ongoing outbreak. However, united efforts of the Indian government and Indian citizens for control of Covid-19; India will surely win the war against COVID-19. However, a limited sample size warrants more studies on the same issue to study KAP toward COVID-19 among health-care professional and Indian citizens.

Conflicts of interest
There are no conflicts of interest.

References

1. Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, *et al*. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. JAMA Netw Open 2020;3:e203976.
2. Rothe C, Schunk M, Sothmann P, Bretzel G, Froeschl G, Wallrauch C, *et al*. Transmission of 2019-nCoV infection from an asymptomatic contact in Germany. N Engl J Med 2020;382 (10):970-1.
3. Cameron MJ, Bermejo-Martin JF, Danesh A, Muller MP, Kelvin DJ. Human immunopathogenesis of severe acute respiratory syndrome (SARS). Virus Res 2008;133(1):13-9.
4. Wevers BA, van der Hoek L. Recently discovered human coronaviruses. Clin Lab Med 2009;29(4):715-24.
5. Baseer MA, Ansari SH, AlShamrani SS, Alakras AR, Mahrous R, Alenazi AM. Awareness of droplet and airborne isolation precautions among dental health professionals during the outbreak of corona virus infection in Riyadh city, Saudi Arabia. J Clin Exp Dent 2016;8(4):e379-87.
6. Olum R, Chekwech G, Wekha G, Nassozi DR, Bongomin F. Coronavirus Disease-2019: Knowledge, Attitude, and Practices of Health Care Workers at Makerere University Teaching Hospitals, Uganda. Frontiers in Public Health. 2020 Apr 30;8:181.
7. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, *et al*. A novel coronavirus from patients with pneumonia in China, 2019. N Engl J Med 2020;382:727-33.
8. World Health Organization. Statement on the Second Meeting of the International Health Regulations (2005) Emergency Committee Regarding the Outbreak of Novel Coronavirus (2019-nCoV). World Health Organization; 2020. Available from: https://www.who.int/news-room/detail/30-01-2020-statement-on-the-secondmeeting-%0Aof-the-international-health-regulations-(2005)-emergency-committee-regarding-the-outbreakof-%-0Anovel-coronavirus-(2019-ncov). [Last accessed on 2020Apr 15].
9. World Health Organization. Global Alert and Response (GAR). World Health Organization; 2014. Revised Interim Case Definition for Reporting to WHO-Middle East Respiratory Syndrome Coronavirus. Interim Case Definition as of; 14 July, 2014. Available from: http://www.who.int/csr/disease/coronavirus_infections%0A/case_definition/en/[Last accessed on 2020 Apr 15].
10. Huynh G, Nguyen TN, Tran VK, Vo KN, Vo VT, Pham LA. Knowledge and attitude toward COVID-19 among healthcare workers at District 2 Hospital, Ho Chi Minh City. Asian Pac J Trop Med 2020;13(6):260-5
11. Khan G. A novel coronavirus capable of lethal human infections: An emerging picture. Virol J 2013;10:66.
12. Nour MO, Babilghith AO, Natto HA, Al-Amin FO, Alawneh SM.

Knowledge, Attitude and Practices of Healthcare Providers Towards MERS-CoV Infection at Makkah Hospitals, KSA; 2015. Available from: http://www.netjournals.org/pdf/IRJMMS/2015/4/15-046.pdf. [Last accessed on 2020 Apr 15]

13. Zhong BL, Luo W, Li HM, Zhang QQ, Liu XG, Li WT, *et al*. Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: A quick online cross-sectional survey. Int J Biol Sci 2020;16:1745-52.

14. Al-Amri S, Bharti R, Alsaleem SA, Al-Musa HM, Chaudhary S, Al-Shaikh AA. Knowledge and practices of primary health care physicians regarding updated guidelines of MERS-CoV infection in Abha city. J Family Med Prim Care 2019;8:455-61.

15. Erfani A, Shahriarirad R, Ranjbar KM, MoghadamiM. Knowledge, attitude and practice toward the novel coronavirus (COVID-19) outbreak: A population-based survey in Iran. [Preprint] Bull World Heal Organ E-pub 2020;37: doi: http://dx.doi.org/10.2471/BLT0.20.256651

16. Khan MU, Shah S, Ahmad A, Fatokun O. Knowledge and attitude of healthcare workers about Middle East Respiratory Syndrome in multispecialty hospitals of Qassim, Saudi Arabia. BMC Public Health 2014;14:1281.https://doi.org/10.1177/147470490800600104

17. Faizi N, Kazmi S. Universal health coverage-There is more to it than meets the eye. J Family Med Prim Care 2017;6 (1):169-70.

18. Pawlowski B, Atwal R, Dunbar RIM. Sex Differences in Everyday Risk-Taking Behavior in Humans. Evolutionary Psychology. 2008.6(1): 29-42. doi:10.1177/147470490800600104