Knowledge, attitude and practice regarding COVID-19 among healthcare workers in Chitwan, Nepal

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Research article

Keywords: knowledge, attitude, practice, COVID-19, healthcare workers, Nepal

Posted Date: May 8th, 2020

DOI: https://doi.org/10.21203/rs.3.rs-26774/v1

Abstract

Background

COVID-19 is a viral respiratory disease that was recently recognized in humans. The number of COVID-19 cases has been gradually increasing in Nepal. The objective of this study was to evaluate knowledge, attitude and practice regarding COVID-19 among healthcare workers in Chitwan, one of the districts located in central Nepal.

Methods

It was a cross-sectional study conducted among healthcare workers from various health institutions located in Chitwan district of Nepal. A self-reported questionnaire was circulated online. Bivariate analyses were done using Spearman's correlation coefficient, Pearson's chi square test, and student's t test as appropriate, whereas multivariate analyses were done using linear regression models.

Results

A total of 353 responses were analyzed, out of which 47% were nurses, 28.9% were doctors, 11.6% were health assistants, 2% were certified medical assistants, and the remaining 10.5% were categorized as others. The majorities were females (58.9%), were in the age group of 16–29 years (67.1%) and had work experience of less than 5 years (62%). The majority of healthcare workers obtained good to moderate knowledge and practice scores (n = 82.15%, 83.57%, respectively) and had positive attitude scores (n = 90.93%). Mean score values were 21.65 ± 4.71 out of 33 in knowledge section, 8.07 ± 1.49 out of 13 in attitude section and 13.89 ± 5.33 out of 20 in practice section. Mean knowledge and practice scores were significantly associated with job descriptions of healthcare workers (p value – 0.000, 0.007, respectively) with highest mean knowledge scores among doctors (23.70 ± 4.48) and highest mean practice scores among health assistants (15.10 ± 3.61). Higher practice scores (ß = 0.626) and infection prevention training (ß = 1.467) were significantly associated with higher knowledge scores; higher knowledge (ß = 1.366) and higher practice scores (ß = 0.110) were significantly associated with higher attitude scores; and higher knowledge scores (ß = 0.308) and higher attitude scores (ß = 0.265) were significantly associated with higher practice scores.

Conclusion

The majority of healthcare workers from Chitwan, Nepal, had good to moderate knowledge and practice scores and had a positive attitude toward COVID-19. There was a significant association between knowledge, attitude and practice scores regarding COVID-19 among healthcare workers.

1. Background

Contagious diseases continue to terrorize and unsettle human populations worldwide. It was Herpes and Legionnaires' disease in the 1970s to be followed by AIDS and Ebola, then came severe acute respiratory syndrome (SARS) in 2002 and now COVID-19 (1). COVID-19, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), first appeared in Wuhan, Hubei Province, China, in December, 2019 and was later declared as a pandemic by World Health Organization on 11th March, 2020 (2). After severe acute respiratory syndrome and middle east respiratory syndrome coronaviruses, for the third time in as many decades, a zoonotic coronavirus has again crossed species from bats to infect human populations (3). As of end of April 2020, COVID-19 has spread to 210 countries, with more than 3 million cases and more than 200,000 deaths.

Nepal was the first South Asian nation to have a confirmed COVID-19 case in a 32 year old Wuhan returnee on 24th January, 2020 (4). Bordering the world's two largest populations of India and China, Nepal is in a vulnerable state of possible health crisis today and needs strong strategic plans to fight COVID-19. Being ranked 111th among 195 countries on the Global Heath Security Index 2019 and 150th in the 'detection and reporting' category, Nepal lags far behind the global average and is ill prepared to deal with the lurking epidemic of COVID-19 (5). For developing countries like Nepal, preparedness is a crucial investment as the unmitigated cost of health emergency of this pandemic is something that countries like Nepal can't deal with (6). Preparedness to fight contagious diseases like COVID-19 starts with knowledge, positive attitude and safe practices. It is believed that confused perception and negative attitude towards an emerging infectious disease lead to unnecessary chaos and terror that aggravates the epidemic. The misconceptions and panic of the Chinese public during the SARS epidemic from 2002 to 2004 made them resistant to follow suggested preventive measures, culminating into rapid spread of the virus and hit China the most (7). Lack of information and discrepancy in the level of knowledge among the general public and healthcare workers facilitate the spread of contagious diseases; eventually leading to epidemics and pandemics (8). Thus, to facilitate outbreak management of COVID-19 in Nepal, there is an urgent need to understand the awareness of COVID-19 among healthcare workers. The purpose of this study is to assess knowledge, attitude, and practice regarding COVID-19 among healthcare workers in Chitwan, one of the districts in central Nepal.

2. Methods

2.1. Participants

This cross-sectional study was conducted over a span of two weeks from April 1st to April 14th, 2020, during the period when the Government of Nepal imposed a nationwide lockdown to try to curtail the spread of COVID-19. Data was collected online through a survey form during the specified period. A self-made questionnaire was circulated online which also included a brief introduction on the background, objective, voluntary nature of participation and declarations of anonymity and confidentiality. The Institutional Review Committee of Bharatpur Hospital, Nepal, approved our study protocol prior to the formal survey. Healthcare workers above 16 years of age, from various hospitals and other health institutions in Chitwan, who agreed to participate in this study, were included. Different healthcare workers

included doctors, nurses, health assistants, certified medical assistants, pharmacists, medical lab technologists, and medical microbiologists. Participants had to answer a yes-no question to confirm their voluntary participation. After confirmation for participation, they were directed to complete the questionnaire.

2.2 Measures

The questions are listed in Table 1. Each correct answer/ positive attitude/ safe practice was scored 1 point and incorrect answer/ negative attitude/ unsafe practice/ I don't know was scored 0 points. Maximum knowledge/attitude/practice score was computed as 33, 13, and 20, respectively. An arbitrary system was used to classify scores: 0 to < 50% - poor, 50 to < 75% - moderate and ≥ 75% - good scores. Attitude score of ≥ 50% was taken as positive, and < 50% was taken as negative.

Table 1
Questionnaire

Knowledge (Tick the answers – multiple tick marks allowed where suitable)

1. What is the causative organism of COVID – 19? ☐ Bacteria ☐ Virus ☐ Fungi ☐ I don't know

2. What is/are source of infection of COVID – 19? ☐ An infected person ☐ Animals/Birds ☐ Both of them ☐ I don't know

3. What are possible modes of transmission of COVID-19?☐ Droplets during coughing, sneezing from an infected person ☐ Close contact with an infected person ☐ Touching contaminated surfaces ☐ Airborne transmission ☐ Consuming meat products ☐ I don't know

4. Do you know in which age group the disease is found to be more severe? ☐ Neonates and children☐ Young and middle aged adults☐ Elderlies ☐ Patients with underlying chronic diseases ☐ I don't know

5. What is incubation period of COVID- 19? ☐ Less than 7 days ☐ About 14 days ☐ About 21 days ☐ I don't know

6. Which of the following symptoms are due to COVID- 19? ☐ sore throat ☐ cough ☐ runny nose ☐ fever ☐ shortness of breath ☐ bodyache and headaches ☐ GI symptoms like diarrhea and vomiting ☐ I don't know

7. Which of the following complications do you think COVID-19 could cause? ☐ acute kidney injury ☐ acute respiratory distress syndrome ☐ myocarditis ☐ multiple organ failure ☐ death ☐ I don't know

8. Do you think asymptomatic carriers in subclinical stage can spread the disease? ☐ Yes ☐ No ☐ I don't know

9. Do you think mild cases of COVID-19 that improves in few days on its own; need to be isolated? ☐ Yes ☐ No ☐ I don't know

10. Are there treatments for COVID – 19? ☐Yes ☐ No ☐ I don't know

11. Do you think COVID-19 cases can be treated at home? ☐ Yes ☐ No ☐ I don't know

12. Do you think antibiotics are treatment of choice for COVID- 19? ☐ Yes ☐ No ☐ I don't know

13. Are there vaccines for COVID- 19? ☐ Yes ☐ No ☐ I don't know

14. Which of the following tests should be done for diagnosing COVID – 19 infections? ☐ Real time PCR with respiratory material (oropharyngeal or nasopharyngeal swab, tracheal aspirate or bronchoalveolar lavage) ☐ Real time PCR with serum sample ☐ Chest XRAY ☐ Others ☐ I don't know

15. Have you received any training on infection prevention related to COVID-19? ☐ Yes ☐ No

16. In case you have to come in contact with a suspected COVID-19 case, do you know how to use personal protective equipment? ☐ Yes ☐ No

17. Do you know the precautionary measures to be taken during aerosol generating procedures like endotracheal intubation, noninvasive ventilation, tracheostomy, cardiopulmonary resuscitation etc. on COVID-19 patients? ☐ Yes ☐ No

18. Do you know what you should do if you develop symptoms and signs suggestive of COVID-19? ☐ Yes ☐ No

Attitude (Tick the answer – multiple tick marks allowed where suitable)

19. Do you worry about getting COVID-19? ☐ Yes ☐ No

20. Are you scared that you might be transmitting it to your family members? ☐ Yes ☐ No

21. Has your daily life been affected with COVID-19 pandemic? ☐ Yes ☐ No

22. Do you think hand washing with soap and water frequently and practicing respiratory etiquette would protect you from virus? ☐Yes☐ No☐ I don't know

23. Do you think wearing a mask would protect you from the virus? ☐ Yes ☐ No ☐ I don't know

24. Will you take vaccine for COVID-19 if they are made available? ☐ Yes ☐ No

25. Do you follow news regarding COVID – 19 regularly? ☐ Daily ☐ Sometimes ☐ Never

26. Which of the following sources have you used for COVID – 19 information? ☐ Official National and international sites ☐ Social media (Facebook and others) ☐ Newspapers and written media ☐Television and radio ☐ Colleagues ☐ Academic trainings ☐ None of the above

27. Do you think the preparedness in your institution is sufficient to manage COVID-19 outbreak? ☐ Yes ☐ No ☐ I don't know

28. Do you think current medical supplies and PPE are sufficient for the possible COVID-19 outbreak in your community? ☐ Yes ☐ No ☐ I don't know

29. To what extent are you confident that you would be able to handle COVID-19 patients in your setup? ☐ not at all ☐ to some extent ☐ to considerable extent ☐ to great extent

Practice (Tick the answer – multiple tick marks allowed where suitable)

30. While coughing and sneezing ,

Do you cover your mouth and nose with elbow or tissue or handkerchief? ☐ Yes ☐ No

Do you throw the tissue you use safely in a dustbin? ☐ Yes ☐ No

Do you wash your hands after sneezing or coughing? ☐ Yes ☐ No

Do you spit in public area? ☐ Yes ☐ No

31. How often do you wash your hands or use alcohol based sanitizer?

☐ Only when I feel its dirty like I have always been doing ☐ When I feel I have touched contaminated surface and objects

☐ After touching or shaking hands with others ☐ At least every hour

32. Which of the following have you been practicing to prevent transmission of COVID-19 infection in your setup? ☐ frequent hand washing and use of alcohol based sanitizers ☐ eating well cooked foods ☐ putting masks on suspected COVID 19 patients

☐ protective clothing and masks to health staff ☐ routine disinfection of surfaces that comes in contact of suspected COVID-19 cases

☐ placing suspected patients in adequately ventilated single rooms ☐ avoiding unnecessary moving of patients

33. What type of mask are you wearing most of the time? ☐ Cloth mask ☐ Surgical mask ☐ Respirators ☐ None

34. Do you dispose your mask when it becomes moist or after 8 hours of work? ☐ Yes ☐ No

35. Do you think you are using your masks correctly? ☐ Yes ☐ No

36. If you have flu like symptoms, do you avoid normal activities? ☐Yes ☐ No

37. Do you notify a suspected COVID – 19 case to authority? ☐ Yes ☐ No

38. Are you practicing social distancing of at least 1 meter (3 feet)? ☐ Yes ☐ No

39. Have you been following a protocol for triage and isolation of suspected COVID-19 cases in your workplace? ☐ Yes ☐ No ☐ I don't know

2.3 Statistical analysis

SPSS version 25 was used for analysis. Descriptive statistics were presented using means and standard deviation for continuous variables, frequencies, and percentages for categorical variables. Knowledge, attitude, and practice scores were compared with different variables using independent-sample t test, one-way analysis of variance (ANOVA), or Pearson's chi-square test as appropriate. Spearman's correlation was also computed between knowledge, attitude, and practice scores. Multivariable linear regression models were made to explore the association of knowledge, attitude, and practice scores with different variables. The statistical significance level was set up at p value < 0.05. Cronbach's alpha was computed for reliability analysis, which was found to be 0.783 for our questionnaire.

3. Results

The study had 441 responders, out of which 353 samples were eligible for analysis. The majority of the respondents were female (n = 208, 58.92%) and most of the respondents were in age group of 16–29 years (n = 240, 67.4%). More than half of the respondents had less than 5 years of work experience (n = 219, 61.5%). 28.9% of respondents were doctors, 47.03% were nurses, 11.61% were health assistants, and 1.98% were certified medical assistants. The demographic profile of the sample is shown in Table 2 below. Likewise, the distribution of knowledge, attitude, and practice scores with obtained mean values are shown in Table 3 below. The majority of the study sample obtained good to moderate knowledge and practice scores (n = 82.15% and 83.57% respectively) and positive attitude scores (n = 90.93% respectively). Average scores obtained by healthcare workers according to their job distributions are shown in Table 4 below.

The results of Spearman's correlation coefficient showed a strong correlation between knowledge and practice scores (r = 0.476, p value 0.000) and a somewhat weaker correlation between attitude and practice scores (r = 0.238, p value 0.000) (Table 4). Pearson's chi square testing between demographic variables to obtained knowledge, attitude, and practice scores showed that there was a significant association between job descriptions of healthcare workers and knowledge scores (p < 0.001) (Table 5).

3.1 Bivariate analysis

3.1.1 Knowledge score

The results of the bivariate analysis showed that a significantly higher mean knowledge score was found among doctors as compared to other job descriptions of healthcare workers (p value – 0.000) (Table 7).

Similarly higher mean knowledge scores were also found in the male gender (p value – 0.019) and in the age group 30 to 59 years (p value – 0.006).

Table 2
Demographic variables: (N = 353)

Variables	Subgroups	n (%)
Age	16 to 29 years	237 (67.1)
	30 to 59 years	115 (32.6)
	60 years and above	1 (0.3)
Gender	Male	145 (41.1)
	Female	208 (58.9)
Job Description	Doctor	102 (28.9)
	Health assistant	41 (11.6)
	Nurse	166 (47)
	Others	37 (10.5)
	Certified medical assistant	7 (2)
Work experience	Less than 5 years	219 (62)
	5 to 10 years	94 (26.6)
	More than 5 years	40 (11.3)

Table 3
Knowledge, attitude and practice scores (N-353)

Variables	mean ± S.D.	Good (%)	Moderate (%)	Poor (%)
knowledge score	21.65 ± 4.71	30.59	51.56	17.85
attitude score	8.07 ± 1.49	15.01	68.56	16.43
practice score	13.89 ± 5.33	44.19	46.74	9.07

3.1.2 Attitude score

Higher mean attitude scores were significantly found in the age group 30 to 50 years (p – 0.035) (Table 7) and in those with work experience of more than 10 years (p value – 0.019).

3.1.3 Practice score

Bivariate analysis showed that higher mean practice scores were found among health assistants (p value – 0.007) (Table 7) as compared to other job descriptions, in the male gender (p value – 0.044), and in healthcare workers with work experience of 5 to 10 years (p value – 0.013).

Table 4
Knowledge, attitude and practice scores according to job description (N-353)

Job description	n	Variables	minimum	maximum	mean
Doctor	102	knowledge	11	32	23.70
		attitude	5	11	8.04
		practice	9	20	14.30
Nurse	166	knowledge	10	32	21.02
		attitude	4	11	7.90
		practice	6	20	13.52
Health assistant	41	knowledge	13	28	21.49
		attitude	5	11	8.39
		practice	8	20	15.10
CMA	7	knowledge	13	29	20.00
		attitude	5	10	8.29
		practice	5	18	11.14
Others	37	knowledge	11	29	19.30
		attitude	5	11	8.49
		practice	7	20	13.57

Table 5
Analysis of KAP scores using Spearman's correlation coefficient

Variables	Correlation	attitude	knowledge	practice
attitude	coefficient (r)	1.000	0.074	0.238
	p value	.	0.167	0.000*
knowledge	coefficient (r)	0.074	1.000	0.476
	p value	0.167	.	0.000*
practice	coefficient (r)	0.238	0.476	1.000
	p value	0.000*	0.000*	.

Table 6
Association of demographic variables with KAP scores using Pearson's Chi square testing

Job description	**Knowledge**		**Attitude**		**Practice**	
	Poor	Good/Moderate	Negative	Positive	Poor	Good/Moderate
Doctor	7.8%	92.2%	13.7%	86.3%	7.8%	92.2%
Nurse	19.8%	80.7%	19.3%	80.7%	11.4%	88.6%
Health assistant	17.1%	82.9%	12.2%	87.8%	4.9%	95.1%
CMA	28.6%	71.4%	14.3%	85.7%	28.6%	71.4%
Others	17.8%	82.2%	16.2%	83.8%	2.7%	97.3%
p value	< 0.001*		0.720		0.123	
Work experience	Knowledge		Attitude		Practice	
	Poor	Good/Moderate	Negative	Positive	Poor	Good/Moderate
< 5 years	19.2%	80.8%	19.2%	80.8%	10.5%	89.5%
5 to 10 years	16.0%	84.0%	10.6%	89.4%	5.3%	94.7%
10 years	15.0%	85.0%	15.0%	85.0%	10.0%	90.0%
p-value	0.700		0.169		0.334	

Table 7
Bivariate analysis of different variable with KAP scores

Variables	Knowledge (mean ± SD)	Attitude (mean ± SD)	Practice (mean ± SD)
Gender			
male	22.35 ± 4.89	8.15 ± 1.61	14.32 ± 3.45
female	21.15 ± 4.53	8.00 ± 1.40	13.59 ± 3.21
p-value	0.019*	0.364	0.044*
Age			
16–29 years	21.09 ± 4.61	7.99 ± 1.49	13.76 ± 3.41
30 to 59 years	22.77 ± 4.74	8.25 ± 1.45	14.23 ± 3.09
≥ 60 years	24.00 ± 0.0	5.00 ± 0.00	7.00 ± 0.00
p-value	0.006*	0.035*	0.054
Job description			
Doctor	23.70 ± 4.48	8.04 ± 1.32	14.30 ± 3.13
Nurse	21.02 ± 4.53	7.90 ± 1.45	13.52 ± 3.26
Health assistant	21.49 ± 4.24	8.39 ± 1.57	15.10 ± 3.61
CMA	20.00 ± 5.41	8.29 ± 1.97	11.14 ± 4.48
Others	19.30 ± 4.61	8.49 ± 1.82	13.57 ± 3.14
p-value	0.000*	0.127	0.007*
Work experience			
Less than 5 years	21.27 ± 4.68	7.89 ± 1.45	13.53 ± 3.32
5 to 10 years	22.31 ± 4.70	8.35 ± 1.43	14.73 ± 5.32
> 10 years	22.55 ± 4.79	8.35 ± 1.70	13.88 ± 3.09
p-value	0.148	0.019*	0.013*
Received Infection prevention training			
Yes	23.44 ± 4.69	8.16 ± 1.92	13.70 ± 3.29
No	21.40 ± 4.66	8.05 ± 1.42	15.26 ± 3.29
p-value	0.007*	0.648	0.04*
Follow COVID-19 news			
Sometimes	20.19 ± 5.79	6.73 ± 1.50	12.51 ± 3.61

Variables	Knowledge (mean ± SD)	Attitude (mean ± SD)	Practice (mean ± SD)
Daily	21.94 ± 4.41	8.33 ± 1.34	14.17 ± 3.20
p-value	0.009*	0.000*	0.000*
Notify suspects			
Yes	22.31 ± 4.56	8.21 ± 1.44	14.54 ± 3.23
No	20.20 ± 4.72	7.76 ± 1.56	12.47 ± 3.09
p-value	0.000*	0.008*	0.000*
Worry about transmitting to family members			
Yes	21.50 ± 4.854	8.21 ± 1.44	13.82 ± 3.30
No	22.37 ± 3.897	7.35 ± 1.54	14.22 ± 3.46
p-value	0.194	0.000*	0.405
Will take vaccine			
Yes	21.84 ± 4.62	8.10 ± 1.42	13.90 ± 3.35
No	20.03 ± 5.17	7.79 ± 2.00	13.76 ± 3.17
p-value	0.025*	0.229	0.805
Confidence in handling COVID-19			
Not at all	21.26 ± 4.80	6.95 ± 1.25	12.80 ± 3.15
To some extent	21.59 ± 4.62	8.15 ± 1.20	14.20 ± 3.40
To considerable extent	22.68 ± 4.72	9.25 ± 1.17	15.02 ± 2.94
To great extent	21.06 ± 4.86	10.13 ± 1.02	15.38 ± 2.94
p-value	0.306	0.000*	0.000*

Similarly the bivariate analysis also showed that healthcare workers who had received training on infection prevention had better mean knowledge and practice scores (p value-0.007, 0.004, respectively). Healthcare workers who followed COVID-19 news daily had significantly better means of knowledge, attitude, and practice scores (p value – 0.000, 0.008, and 0.000, respectively). Healthcare workers who said that they were confident of handling the COVID-19 outbreak had significantly higher attitudes and practice scores (p value – 0.000, 0.000, respectively) (Table 7). The confidence level was not significantly associated with knowledge scores (Table 7/10), however on analyzing confidence level to some of the pertinent questions in the knowledge and attitude sections, a significant association was found between confidence level and knowledge regarding the use of personal protective equipment (p value – 0.007), knowledge regarding aerosol precautions to COVID-19 (p value – 0.000), infection prevention training (p value – 0.009), and attitude regarding sufficient institutional preparation (p value – 0.044) (Table 11).

Table 7: Bivariate analysis of different variables with KAP scores (end of the document)

3.1. Multivariable analysis

The result of the first linear regression model, taking attitude as the dependent variable showed that higher practice scores (ß= 0.110) and higher knowledge scores (ß= 1.366) were significantly associated with higher attitude scores. However, job description, age, gender and work experience were not found to be associated to attitude scores in this multivariable analysis (Table 8/Model 1).

The second multivariate regression model, taking knowledge as the dependent variable showed that higher practice scores (ß = 0.626) and taking infection prevention training (ß = 1.467) were significantly associated with higher knowledge scores. Likewise, being a doctor as compared to a CMA (ß =3.871) and being a nurse as compared to a CMA (ß =1.654) were significantly associated with higher knowledge scores (Table 8/Model 2).

The third linear regression model, taking practice as the dependent variable, showed that higher knowledge scores (ß= 0.308) and higher attitude scores (ß= 0.265) were significantly associated with higher practice scores. Also, this regression model showed that being a doctor as compared to a CMA (ß = 2.318), being a nurse as compared to a CMA (ß = 2.429), and being a health assistant as compared to a CMA (ß = 3.075) were significantly associated with higher practice scores (Table 3/Model 3).

Table 8.1.Multivariable analysis taking attitude as dependent variable (end of the document)

Table 8.1
Multivariate analysis taking attitude as dependent variable

Model 1: taking attitude as dependent variable				**95.0% C.I. for B**	
Variables	Unstandarized B	Standarized B	Sig	Lower	Upper
knowledge score	1.366	4.309	0.031*	0.123	2.610
knowledge square	-0.066	-8.822	0.033*	-0.128	-0.005
knowledge cube	0.001	4.529	0.039*	0.000	0.002
practical score	0.110	0.246	0.000*	0.056	0.165
doctor	-0.535	-0.163	0.352	-1.664	0.594
nurse	-0.898	-0.300	0.135	-2.076	0.280
HA	-0.400	-0.086	0.506	-1.583	0.783
others	-0.255	-0.052	0.671	-1.436	0.925
Work experience < 5yrs	-0.360	-0.117	0.252	-0.978	0.258
Work experience 5–10 yrs	-0.094	-0.028	0.750	-0.677	0.488
age 16–29 yrs	2.116	0.666	0.154	-0.795	5.027
age 30–59 yrs	2.154	0.677	0.143	-0.733	5.041
gender	0.337	0.111	0.196	-0.175	0.848
trainings	-0.134	-0.029	0.587	-0.618	0.350
use of PPE	0.320	0.100	0.069	-0.025	0.665
** CMA in job description/ Work experience of 10 years/ Age ≥ 60 years are reference category					

Table 8.2.Multivariable analysis taking knowledge as dependent variable (end of the document)

Table 8.2
Multivariable analysis taking knowledge as dependent variable

Model 2: taking knowledge as dependent variable			**95% C.I. for B**		
Variables	Unstandarized B	Standarized B	Sig	Lower	Upper
practical score	0.626	0.442	0.000*	0.488	0.763
attitude score	0.002	0.001	0.992	-0.354	0.357
doctor	3.871	0.373	0.000*	2.342	5.400
Health Assistant	1.093	0.074	0.227	-0.683	2.868
nurse	1.654	0.175	0.019*	0.278	3.030
age 16-29yrs	-6.766	-0.676	0.099	-14.817	1.285
age_30-59yrs	-6.396	-0.637	0.116	-14.378	1.586
Work experience 5-10yrs	-0.607	-0.057	0.459	-2.218	1.004
Work experience < 5yrs	-0.719	-0.074	0.409	-2.430	0.992
training	1.467	0.102	0.029*	0.152	2.782
use of PPE	0.728	0.072	0.134	-0.225	1.681

**CMA in job description/ Work experience > 10 years/ age group ≥ 60 years are reference category

Table 8.3.Multivariable analysis taking practice as dependent variable (end of the document)

Table 8.3
Multivariable analysis taking practice as dependent variable

Model 3: taking practice as the dependent variable				**95.0% C.I for B**	
Variables	Unstandarized B	Standarized B	Sig.	Lower	Upper
attitude score	0.265	0.119	0.036*	0.017	0.513
knowledge score	0.308	0.436	0.000*	0.241	0.375
doctor	2.318	0.316	0.036*	0.148	4.488
nurse	2.429	0.364	0.037*	0.149	4.710
HA	3.075	0.296	0.008*	0.809	5.342
others	2.430	0.224	0.036*	0.157	4.704
Work experience < 5yrs	0.040	0.006	0.947	-1.155	1.235
Work experience 5-10yrs	0.789	0.105	0.167	-0.332	1.909
age 16-29yrs	5.496	0.776	0.054	-0.101	11.093
age 30-59yrs	5.319	0.749	0.060	-0.230	10.868
gender	-0.222	-0.033	0.660	-1.216	0.771
training	0.679	0.067	0.150	-0.247	1.606
use of PPE	0.876	0.123	0.009*	0.216	1.535
confidence to handle	0.396	0.094	0.094	-0.068	0.860
**CMA in job description/ Work experience > 10 years/ age group ≥ 60 years are reference category					

Table 9
Source of information for COVID-19 used by HCW

Source	**Official sites**	**Social media**	**Newspapers**	**TV/Radio**	**Trainings**	**Colleagues**
Yes	75.9%	67%	31.7%	56.4%	12.7%	32.9%
No	24.1%	33%	69.3%	43.6%	87.3%	77.1%

Table 10
Association of Confidence of handling COVID-19 to KAP using Pearson's Chi square testing

Confidence level	Knowledge score		Attitude score		Practice score	
	< 50%	≥ 50%	< 50%	≥ 50%	< 50%	≥ 50%
Not at all (n)	21	81	36	66	14	88
To some extent (n)	31	148	21	158	18	161
To considerable extent (n)	8	48	1	55	0	56
To great extent (n)	3	13	0	16	0	16
(N-353)	63	290	58	295	32	321
p-value	0.789		0.000*		0.018*	

Table 11
Association of Confidence of handling COVID-19 to different variables using Pearson's Chi square testing

Confidence level	Received IP training		Knows how to use PPE		Sufficient Institutional preparation			Sufficient medical supplies			Knowledge about aerosol precautions	
	Yes	No	Yes	No	Yes	No	I Don't know	Yes	No	I Don't know	Yes	No
Not at all (n)	7	95	57	45	19	79	4	4	96	2	50	52
To some extent (n)	20	159	126	53	28	145	6	12	164	3	81	98
To considerable extent (n)	14	42	43	13	17	36	3	6	49	1	43	13
To great extent (n)	2	14	14	2	7	8	1	2	14	0	14	2
(N-353)	43	310	240	113	71	268	14	24	323	6	188	165
p-value	0.009*		0.007*		0.044*			0.705			0.000*	

4. Discussion

To the best of our knowledge, this is the first KAP study regarding COVID-19 done among healthcare workers from Nepal. In our study, the vast majority of healthcare workers practicing in Chitwan had moderate to good knowledge and practice scores (n = 82.15%, 83.57%, respectively) and had a positive attitude (n = 90.93%) regarding COVID-19 (Table 3). This may be because the study was conducted during the early stage of an outbreak of this disease when the entire health system and healthcare workers were

being prepared to deal with a possible epidemic of COVID-19 in Nepal. The findings were similar to a study done by Saqlain et al., where 93.2% of respondents had good knowledge, positive attitude, and 88.7% of them had good practice towards COVID-19 (9). Similarly, Zhou et al. also reported that the majority of HCWs in a study in China had sufficient knowledge and good practice towards COVID-19 (n = 89%, 89.7%, respectively) (10).

Doctors followed by health assistants were found to have higher mean knowledge scores (23.70 ± 4.48, 21.49 ± 4.24, respectively, p value – 0.000) as compared to other job descriptions in our study and health assistants followed by doctors had higher mean practice scores (15.10 ± 3.61, 14.30 ± 3.13, respectively, p value- 0.007) (Table 7). These findings were somewhat similar to the study by Zhou et al. where doctors followed by nurses had better knowledge scores as compared to other HCWs (10). On correlation analysis in our study, knowledge and attitude scores were positively correlated with practice scores (p value- 0.000, r = 0.476; p value- 0.000, r = 0.238, respectively (Table 5). A similar positive correlation between attitude and practice scores was also seen in a study regarding COVID-19 by Peng et al. (r = 0.319, p value < 0.001) (11). Saqlain et al. also reported positive linear correlation between knowledge and practice scores (r = 0.142, p value- 0.016), and between attitude and practice scores (r = 0.174, p value- 0.004) in their study (9). The right knowledge, along with the right attitude, can eventually lead to safe practices and healthy behaviors (12). These findings clearly emphasize the need to improve COVID-19 knowledge among HCWs via various means and develop a positive attitude to promote safe practice and control measures eventually.

Age, gender, and type of job description were significantly associated with better knowledge scores in this study; whereas work experience was not found to have any significant association to knowledge scores (Table 7). Association of the job description to knowledge scores was also reported in a study by Giao et al. (13). However, the association of age and gender to knowledge score in our study could have resulted due to the fact that the majority of doctors and health assistants were males (n = 82.35%, 78.04%, respectively) and most of the doctors (n = 58.8%) were in the age group of 30 to 59 years. There was no significant association of job description to attitude scores in our study, which was different from the finding by Giao et al (13).

Infection prevention training was significantly associated with better knowledge and practice scores in our study (Table 7, 8). Likewise, the regular following of COVID-19 news by healthcare workers was an important factor significantly associated with higher knowledge, attitude, and practice scores (Table 7). About 75.9% of healthcare workers used official national and international sites as their source of information. A similar finding was also seen in a study by Asaad et al. regarding MERS, where a majority of HCWs (n = 50%) used the Ministry of Health website as a source of information for MERS (14). This finding sets greater responsibility on health care authorities to increase the accessibility of educational materials to HCWs by various modes of information delivery (14). 67% of HCWs in our study also used social media as a source of information. Saqlain et al. reported that 87.68% of respondents in their study relied on social media for information on COVID-19 (9) .This is a matter of considerable concern as the

internet and social media have a sea of unverified information that can misguide HCWs. Thus, HCWs should practice meticulous evaluation of related information present in social media (15)(16).

Aerosol generating procedures need to be done with additional infection control measures like performing the procedure with least number of health personnel in a single room, using the most qualified personnel, and use of personal protective equipment (17). Aerosol generating procedures are not just limited to tracheal intubation, rather also involve procedures like nebulization, sputum induction, chest physiotherapy, airway suction and cardio-pulmonary resuscitation (17). 46.7% of health care workers in this study did not know about precautions to be taken during aerosol generating procedures, which could have disastrous consequences on the safety of health care professionals (18). Likewise, nearly 75.9% respondents did not believe that there was sufficient institutional preparation for dealing with COVID-19, and about 91.5% respondents said that there were no sufficient medical supplies in their health setup to fight against COVID-19. 32.01% of health care workers did not know how to use personal protective equipment, and 87.8% of them did not have any infection prevention training.

In our study, only 20.4% healthcare workers believed that they were considerably or greatly confident of being able to handle the COVID-19 outbreak in their healthcare setup. Confidence of healthcare workers was found to be significantly associated with infection prevention training (p value – 0.009), attitude regarding sufficient institutional preparation in their healthcare setup (p value – 0.044), knowledge regarding aerosol precautions to COVID-19 (p value – 0.000) and knowledge regarding the use of personal protective equipment (p value- 0.007) (Table 11). Similarly, in a study regarding the Ebola virus disease by Iliyasu et al., such a negative attitude was related to lack of knowledge about the use of PPE and the shortage of PPE (19). Thus, this undesirable finding of poor attitude of HCWs towards a highly infectious disease like COVID-19 must be addressed by concerned authorities by the provision of sustained supply of PPE while augmenting education on infection prevention and control practices. Added work incentives, insurance policy, job security and provision for families of HCWs, are other motivational approaches that must be explored by policy-makers to inspire greater confidence among HCWs (19). The limitation of this study is that it was based on a self- reported questionnaire, which may be susceptible to self- presentation bias.

5. Conclusion

In summary, the majority of healthcare professionals working in Chitwan had good to moderate knowledge and practice scores and had a positive attitude towards COVID-19. However, the majority of HCWs did not believe that they were confident to handle this outbreak in their healthcare setup. Furthermore, there was a significant association between knowledge, attitude, and practice scores, which highlights the need to strengthen knowledge regarding COVID-19 among healthcare workers via different means to develop a more optimistic attitude eventually and to promote safe practices to fight against this disease.

Abbreviations

AIDS - acquired immune deficiency syndrome

CMA - certified medical assistants

COVID-19 - coronavirus disease 2019

EVD - Ebola virus disease

H.A - health assistants

HCWs - health care workers

KAP - knowledge, attitude, practice

MERS - middle east respiratory syndrome

PPE - personal protective equipment

SARS - severe acute respiratory syndrome

Declarations

Ethics approval

This study was approved by the Institutional Review Committee (IRC) of Bharatpur Hospital, Nepal (2020-03-30).

Consent to participate

Participants answered a yes-no question online prior to questionnaire to confirm their voluntary participation.

Consent for publication

Not applicable

Availability of data and materials

Data and materials used in this research will be made available from corresponding author on reasonable request.

Competing interests

None declared

Funding

None

Acknowledgements

We thank all the healthcare workers who participated in this study.

Authors' contributions

RN [Richa] conceptualized the study, analyzed, interpreted the data and wrote original draft of the study.

KS [Kalyan] developed methodology, interpreted the data, reviewed and edited original draft of the study.

RN [Rhishikesh] analyzed the data of the study.

NP analyzed the data of the study.

BA reviewed and edited the original draft

PP interpreted the data, reviewed and edited the original draft of the study.

KS [Kiran] reviewed and edited the original draft

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