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## SJ Jadav

Dairy Vigyan Kendra, SMC  
College of Dairy Science,  
Kamdhenu University, Anand,  
Gujarat, India

## PH Shah

M.V.Sc. Scholar, Department of  
Veterinary Extension Education,  
College of Veterinary Science &  
Animal Husbandry, Kamdhenu  
University, Anand, Gujarat,  
India

## MM Sharma

M.V.Sc. Scholar, Department of  
Animal Nutrition, College of  
Veterinary Science & Animal  
Husbandry, Kamdhenu  
University, Anand, Gujarat,  
India

## VD Chauhan

Department of Parasitology,  
College of Veterinary Science &  
Animal Husbandry, Kamdhenu  
University, Anand, Gujarat,  
India

## VR Nimavat

Department of Microbiology,  
College of Veterinary Science &  
Animal Husbandry, Kamdhenu  
University, Anand, Gujarat,  
India

## Corresponding Author:

### PH Shah

M.V.Sc. Scholar, Department of  
Veterinary Extension Education,  
College of Veterinary Science &  
Animal Husbandry, Kamdhenu  
University, Anand, Gujarat,  
India

## Consciousness of veterinary practitioners towards COVID-19 in Gujarat state, India

SJ Jadav, PH Shah, MM Sharma, VD Chauhan and VR Nimavat

### Abstract

In this study, we tried to outlook into our consideration and aimed to assess the consciousness (knowledge, adoption & constraints) of Veterinary practitioners towards COVID-19 in Gujarat state. The cross-sectional study was conducted in all thirty-three districts of Gujarat state (India) from May 18 to 26, 2020, involving a total of 380 veterinary practitioners willingly participated by using Google forms. The results revealed that the mean score of knowledge about COVID-19 was found to be higher in age (up to 30 years) of veterinary practitioners (14.70±1.70), mean adoption score was found to be higher in 31 to 50 years age group (14.94±2.72). Constraint faced by veterinary practitioners during the lockdown due to COVID-19 was highest in convincing the animal owners to keep the social distance (61.84%). As per our acquaintance, this is the first study in India examining the knowledge, adoption, and constraints towards COVID-19 among veterinary practitioners. The study participants showed adequate basic knowledge of COVID-19. There is a strong need to implement periodic educational interventions and training programs on infection control practices and other updates of COVID-19 across veterinary professionals.

**Keywords:** COVID-19, knowledge, adoption, constraints, veterinary practitioner

### 1. Introduction

There have been recorded demonstrations of pandemics that all shaped our history and our society, comprehensive of shaping the very basic principles of modern health sciences. What follows is an outline of major pandemic outbreaks throughout recorded history extending into the twenty-first century (Huremovic, 2019) [5]. In this track very freshly Wuhan, Republic of China grown attention by the World Health Organization (WHO) on 31 December 2019, with emergence of pneumonia cases of unknown origin (Holshue *et al.*, 2019) [4]. The pathogen identified was named as novel coronavirus (2019-nCoV), which later was renamed as Severe Acute Respiratory Syndrome Corona virus-2 (SARS Cov-2). WHO declared coronavirus disease 2019 (COVID-19) a global pandemic on 11 March 2020 (WHO, 2020) [20]. Since December 2019, the novel coronavirus disease (COVID-19) has spread from Wuhan city to other cities in China and around the world (Wang *et al.*, 2020) [9].

There are some incidents recorded which involve the affected animal cases, though the origin of such cases and correlation with humans could not be established completely. As the risk of infection is very high. Veterinary practitioners who come in contact with animal owners from different regions and their animals as well, the consciousness regarding COVID-19 is important to have an introspection as well as to build a barrier to prevent the occurrence of this highly infectious viral pandemic.

After the outbreak WHO and other organizations created several platforms to raise awareness about this crucial pandemic by providing several guidelines, online courses and training sessions. The government of India, State governments and professional organizations plus the electronic media and print media of the country is doing massive publicity on transmission mode of the virus, and sign-symptoms and prevention, control and treatment of COVID-19. Knowledge can influence the perceptions of health care workers due to their past experiences and beliefs (Oppenheim *et al.*, 2019; Scherer, 2019; Vinck *et al.*, 2019) [15, 17, 18]. However, the level of knowledge and adoption of veterinarian toward COVID-19 remain unclear. In this regard, the COVID-19 pandemic offers a unique opportunity to investigate the level of knowledge, adoption and constraints of Veterinary practitioners during this global health crisis. Taking the outlook into our consideration, we aimed to assess the consciousness of Veterinary practitioners of all thirty-three (33) districts in Gujarat state during COVID-19 outbreak which also may help them to contemplate the details of their adaptations and

constraints they might be facing in their routine practice.

## 2. Materials and Methods

### 2.1 Ethical approval

Ethical approval was not required for this study.

### 2.2 Sampling area and size

The cross-sectional survey study was conducted in all districts of the Gujarat state (India) from May 18 to 26, 2020. Gujarat state has a total of 33 districts. Gujarat state (Geographic coordinates: 22.30°N, 72.13°E) is located on the western coast of India. Respondents of this study were veterinary practitioners who are treating the animals (Domestic animals, Wild animals, Birds, etc.) in the Gujarat state. Currently, there are 3,515 active veterinarians working in the Gujarat state as per Gujarat Veterinary Council. To calculate the sample size for this study, we used slovin's formula with a confidence level of 95% and an error tolerance of 0.05 (Ellen, S. Slovin's Formula). Formula for sample size determination:  $n = N / (1 + Ne^2)$  where  $n$  = number of samples,  $N$  = total population and  $e$  = error tolerance (level). The formula provided that the significant sample size was 359 sufficient for this study.

### 2.3 Data collection

All the veterinarians across the state were explained about the rationale behind the study and consents were obtained before the collection of data in the questionnaire itself. An online structured questionnaire was developed by using Google forms. The link of the questionnaire was sent through WhatsApp and other social media to the contacts of the veterinary practitioners. The questionnaire contains closed-ended type of questions on various aspects of COVID-19, i.e. knowledge, adoption, constraints & facilities provided by the organization was used to interview the respondents. A total of 19 questions were framed to assess their knowledge about COVID-19 (Shown in table 2) and 10 questions for their adoption practice associate to control COVID-19 (shown in table 4). The information about independent variables, viz., age, gender, educational qualification in veterinary science, working in a type of organization, experience in veterinary practices, monthly income, and suffering from any chronic disease was collected. The draft questionnaire was checked by experts and finally, it was revised as per experts' opinions and suggestions.

### 2.4 Score grading

In the knowledge section, 1 mark was given to the correct answer, and 0 for the incorrect answer. Knowledge scores range from 0 to 19. In the adoption section, 2 scores for always practice, 1 score for some time, and 0 scores for never practice for practice 1-9 were given. For practice-10, 1 score for installed Aarogya setu app and 0 scores for not installed was given. Aarogya Setu mobile application is a useful technological solution developed by the National Informatics Centre under the Ministry of Electronics and Information Technology, Government of India to facilitate contact tracing of persons infected with COVID-19, inform persons at-risk of precautions to be taken, and allow health departments to take effective actions to mitigate the spread of the pandemic and

enhance their preparedness (MyGovIndia, 2020) [13]. Adoption scores range from 0 to 19.

### 2.5 Statistical analysis

Surveyed data was analyzed by SPSS IBM 20 software. Frequency, percentage, range, mean and standard deviation were calculated under descriptive statistics. The association between the different responses and respondents' demographic characteristics was tested using t-test, one-way ANOVA, or Chi-square test as appropriate. The level of significance was set to 0.05 and 0.01 (two-tailed) in all tests.

## 3. Results

A total of 380 respondents willingly participated in the study. Table 1 reveals that the majority of the respondents were male (93.90%), of age up to 30 years (58.70%), completed a bachelor B.V.Sc. & A.H. degree (59.70%), working in state animal husbandry department (46.60%), have experience in veterinary practices up to ten years (76.58%) and earn 30,001 to 60,000 Indian rupees in a month (59.20%). There was 97.60 percent of veterinary practitioners who have not suffered any chronic diseases. There were 1.80 and 0.50 percent of veterinary practitioners suffering from diabetes and heart disease, respectively. The mean COVID-19 knowledge score of veterinary practitioners was 14.45 (SD:1.83, Range: 8-18). Knowledge score was significantly differed across age, education, experience, and monthly income ( $p < 0.05$ ). The adoption score has significantly differed with age and experience. Mean score of knowledge about COVID-19 was found to be higher in age (up to 30 years) of veterinary practitioners (14.70±1.70), Female veterinarian (14.70±1.77), Master in veterinary science education and higher degree (14.73±1.80), Working in the zoo (15.67±0.58), 10.01 to 20 years of experience in veterinary practice (14.72±1.94) and earning monthly 30,001 to 60,000 Indian rupees (14.65±1.73). The mean adoption score of veterinary practitioners was 14.44 (SD: 2.89, Range: 5-19). Mean adoption score was found to be higher in 31 to 50 years age group (14.94±2.72), Male (14.48±2.90), Master in veterinary science education and higher degree (14.44±2.69), Working in the zoo (15.33±1.53), Have 10.01 to 20 years' experience in veterinary practice (15.09±2.95) and monthly earning 60,001 to 90,000 Indian rupees (14.99±2.69). Other information is shown in table 1.

COVID-19 knowledge among veterinary practitioners was assessed by 19 items. Each question of COVID-19 knowledge and its options and the right answer were described with graded scores in table 2. Table 2 shows that the majority of veterinary practitioners had knowledge about COVID-19 affecting the respiratory system, Vaccine available for the prevention of COVID-19 in humans (99.21%), WHO is responsible for monitoring and surveillance of COVID-19 in humans (98.68%), Quarantine days for the suspected COVID-19 case (95.53%), COVID-19 is one type of virus (94.47%), Consumption of egg/poultry meat can cause COVID-19 (93.68%), N-95 Mask as a protective tool against COVID-19 (93.42%) and ivermectin and hydroxychloroquine, antiparasitic drugs of animals have not been proven to be 100% curative against COVID-19 in humans (90.26%).

**Table 1:** Demographic characteristics of veterinary practitioners and knowledge & adoption score of COVID-19 by demographic variables (n = 380)

Variables	Categories	No. (%) of participants	Knowledge score (Mean±SD)	t/F	Adoption score (Mean±SD)	t/F
Age	Young (Up to 30 years)	223 (58.70)	14.70±1.70	7.785**	14.29±2.84	7.932**
	Middle aged (31 to 50 years)	140 (36.84)	14.20±1.89		14.94±2.72	
	Old (More than 50 years)	17 (04.50)	13.18±2.21		12.17±3.56	
Gender	Male	357 (93.90)	14.43±1.83	-0.672	14.48±2.90	1.197
	Female	23 (06.10)	14.70±1.77		13.74±2.58	
Educational qualification in veterinary science	B.V.Sc & A.H.	227 (59.70)	14.26±1.83	6.010*	14.43±3.02	0.002
	M.V.Sc & higher degree	153 (40.26)	14.73±1.80		14.44±2.69	
Working in type of organization	Co-operative Dairy	133 (35.00)	14.19±1.87	1.283	14.59±3.21	0.215
	State Animal Husbandry Department	177 (46.60)	14.60±1.77		14.30±2.73	
	NGO	16 (04.20)	14.25±1.53		14.38±2.31	
	As a private	22 (05.80)	14.18±2.09		14.23±2.41	
	Private company or dairy	11 (02.90)	14.82±1.89		14.64±2.25	
	University	18 (04.70)	14.94±1.98		14.67±3.55	
Experience in veterinary practice (Years)	Up to 10 years	291 (76.58)	14.58±1.72	11.471**	14.50±2.76	4.533*
	10.01 to 20 years	47 (12.37)	14.72±1.94		15.09±2.95	
	More than 20 years	42 (11.05)	13.21±1.98		13.31±3.40	
Monthly income (In Indian Rupees)	Up to 30,000 Rs.	26 (06.80)	14.31±1.96	4.183**	14.81±2.82	2.032
	30,001 to 60,000 Rs.	225 (59.20)	14.65±1.73		14.25±2.86	
	60,001 to 90,000 Rs.	93 (24.50)	14.36±1.84		14.99±2.69	
	More than 90,000 Rs.	36 (09.50)	13.53±2.08		13.89±3.42	
Suffering from any given chronic disease	Diabetes	7 (01.80)	13.43±2.23	1.175	12.29±4.31	2.495
	Heart Disease	2 (00.50)	14.00±1.41		16.50±0.71	
	Cancer	0 (0.00)	-		-	
	Kidney disease	0 (0.00)	-		-	
	None	371 (97.60)	14.47±1.82		14.47±2.85	

**Note:** \* =Significant at 0.05 level; \*\* =Significant at 0.01 level, SD: Standard Deviation

**Table 2:** COVID-19 knowledge among veterinary practitioners (n= 380)

Knowledge Questions	Options	Determination/score	No. (%) of participants
K1: Is COVID-19 a zoonotic disease?	Yes	Incorrect/0	119 (31.32)
	No	Incorrect/0	162 (42.63)
	May be	Correct/1	99 (26.05)
K2: Is COVID-19 one type of virus?	Yes	Correct/1	359 (94.47)
	No	Incorrect/0	21 (05.53)
K3: Does COVID-19 affect the respiratory system?	Yes	Correct/1	377 (99.21)
	No	Incorrect/0	3 (0.79)
K4: Can the consumption of egg/poultry meat cause COVID-19?	Yes	Incorrect/0	24 (6.32)
	No	Correct/1	356 (93.68)
K5: Is COVID-19 transmitted by the aerosol route?	Yes	Correct/1	289 (76.05)
	No	Incorrect/0	91 (23.95)
K6: Can canine corona virus (CCoV) affect dog which produce gastroenteritis and related symptoms?	Yes	Correct/1	314 (82.63)
	No	Incorrect/0	66 (17.37)
K7: Is vaccine available for the prevention of diarrhea in puppies caused by Canine corona virus (CCoV)?	Yes	Correct/1	279 (73.42)
	No	Incorrect/0	101 (26.58)
K8: Is vaccine available for the prevention of COVID-19 in humans?	Yes	Incorrect/0	3 (0.79)
	No	Correct/1	377 (99.21)
K9: Are there any effective Antiviral drugs available for the treatment of COVID-19?	Yes	Incorrect/0	72 (18.95)
	No	Correct/1	308 (81.05)
K10: Have ivermectin and hydroxychloroquine, antiparasitic drugs of animals been proven to be 100% curative against COVID-19 in humans?	Yes	Incorrect/0	37 (9.74)
	May be	Correct/1	343 (90.26)
K11: Which international organization is responsible for monitoring and surveillance of COVID-19 in humans?	UNESCO	Incorrect/0	0 (0.00)
	UNICEF	Incorrect/0	2 (0.53)
	WHO	Correct/1	375 (98.68)
	International Health Organization (IHO)	Incorrect/0	3 (0.79)
K12: Which international organization is responsible for monitoring and surveillance of animal diseases?	WHO	Incorrect/0	52 (13.68)
	OIE	Correct/1	293 (77.11)
	WWF	Incorrect/0	14 (3.68)
	IFAW	Incorrect/0	21 (5.53)
K13: Which is/are considered as confirmatory diagnostic tool for COVID-19?	Rt-PCR	Incorrect/0	206 (54.21)
	ELISA	Incorrect/0	17 (4.48)

K14: For how many days the suspected COVID-19 case must be kept for quarantine?	Both of above	Correct/1	150 (39.47)
	None of above	Incorrect/0	7 (1.84)
	7 days	Incorrect/0	1 (0.26)
	14 days	Correct/1	363 (95.53)
	21 days	Incorrect/0	10 (2.63)
K15: Is N-95 Mask preferable over the surgical mask as a protective tool against COVID-19?	28 days	Incorrect/0	6 (1.58)
	Yes	Correct/1	355 (93.42)
	No	Incorrect/0	25 (6.58)
K16: Which type of laboratories are needed for diagnosing the COVID-19 cases?	BSL-I laboratories	Incorrect/0	44 (11.58)
	BSL-II laboratories	Incorrect/0	63 (16.58)
	BSL-III laboratories	Correct/1	114 (30.00)
	BSL-IV laboratories	Incorrect/0	159 (41.84)
K17: Is PPE kit useful to veterinarians while handling the animal patients during outbreak of COVID-19?	Yes	Correct/1	316 (83.16)
	No	Incorrect/0	64 (16.84)
K18: Is social distancing (minimum 1-meter distance/3 ft) useful to control COVID-19 while treating animals?	Yes	Correct/1	301 (79.21)
	No	Incorrect/0	79 (20.79)
K19: SARS & MERS were zoonotic epidemics of animal origin caused by Coronavirus.	Yes	Correct/1	267 (70.26)
	No	Incorrect/0	113 (29.74)

There were 5,635 (78.05%) indicated correct knowledge among the total 7,220 answers. The analysis with the Chi-square test, Table 3 shows that young veterinary practitioners had significantly higher scores for K2, K6, K7, and K12 compared to other age groups. There was strong evidence for a relation ( $p = .029$ ) with female veterinary practitioners and the correct answer in K12 & K18. Veterinary practitioners with M.V.Sc and higher degree had significantly higher

scores for K4, K7, K12, and K14 than only bachelor degrees in veterinary science. There was a statistically significant relationship with the experience of veterinary practitioners and K2, K6, K7, K8, K12, and K17. The higher experience in veterinary practices (more than 20 years) had low scores for knowledge questions K2, K6, K7, K8, K12, and K17. Other items were found to be no statistically significant relation between groups which are shown in table 3.

**Table 3:** Comparison of COVID-19 knowledge between different groups (n=380)

Knowledge Questions/Variables	Age n (%)				Gender n (%)			Education n (%)			Experience n (%)			
	Young (Up to 30 years)	Middle aged (31 to 50 years)	Old (More than 50 years)	$\chi^2$ (P)	Male	Female	$\chi^2$ (P)	B.V.Sc & A.H.	M.V.Sc & higher degree	$\chi^2$ (P)	Up to 10 years	10 to 20 years	More than 20 years	$\chi^2$ (P)
K1-correct	66 (29.60)	29 (20.71)	4 (23.53)	3.581 (0.167)	92 (25.77)	7 (30.43)	0.244 (0.621)	61 (26.87)	38 (24.84)	0.197 (0.657)	77 (26.46)	15 (31.91)	7 (16.67)	2.784 (0.249)
K2-correct	213 (95.52)	133 (95.00)	13 (76.47)	11.092** (0.004)	337 (94.40)	22 (95.65)	0.065 (0.799)	212 (93.39)	147 (96.08)	1.263 (0.261)	277 (95.19)	46 (97.87)	36 (85.71)	7.497* (0.024)
K3-correct	222 (95.55)	139 (99.30)	16 (94.12)	5.971 (0.051)	354 (99.16)	23 (100.0)	0.195 (0.659)	224 (98.68)	153 (100.0)	2.038 (0.153)	290 (99.66)	46 (97.87)	41 (97.62)	3.171 (0.205)
K4-correct	211 (94.62)	128 (91.43)	17 (100.0)	2.679 (0.262)	334 (93.56)	22 (95.65)	0.160 (0.689)	206 (90.75)	150 (98.04)	8.210** (0.004)	271 (93.13)	43 (91.49)	42 (100)	3.367 (0.186)
K5-correct	176 (78.92)	102 (72.86)	11 (64.71)	2.996 (0.224)	269 (75.35)	20 (87.96)	1.598 (0.206)	169 (74.45)	120 (78.43)	0.796 (0.372)	228 (78.35)	32 (68.09)	29 (69.05)	3.614 (0.164)
K6-correct	194 (87.00)	109 (77.86)	11 (64.71)	8.989* (0.011)	294 (82.35)	20 (86.96)	0.319 (0.572)	183 (80.62)	131 (85.62)	1.595 (0.207)	248 (85.22)	38 (80.85)	28 (66.67)	8.925* (0.012)
K7-correct	172 (77.13)	100 (71.43)	7 (41.18)	10.914** (0.004)	263 (73.67)	16 (69.57)	0.187 (0.666)	158 (69.60)	121 (79.08)	4.210* (0.040)	227 (78.01)	34 (72.34)	18 (42.86)	23.269** (<0.001)
K8-correct	222 (99.55)	139 (99.29)	16 (94.12)	5.971 (0.051)	354 (99.16)	23 (100.0)	0.195 (0.659)	225 (99.12)	152 (99.35)	0.060 (0.806)	290 (99.66)	47 (100)	40 (95.24)	9.574** (0.008)
K9-correct	174 (78.03)	120 (85.71)	14 (82.35)	3.329 (0.189)	291 (81.51)	17 (73.91)	0.813 (0.367)	182 (80.18)	126 (82.35)	0.282 (0.595)	231 (79.38)	39 (82.98)	38 (90.48)	3.071 (0.215)
K10-correct	203 (91.03)	123 (87.86)	17 (100.0)	2.906 (0.234)	320 (89.64)	23 (100.0)	2.641 (0.104)	201 (88.55)	142 (92.81)	1.891 (0.169)	262 (90.03)	40 (85.11)	41 (97.62)	4.025 (0.134)
K11-correct	221 (99.10)	138 (98.57)	16 (94.12)	3.045 (0.218)	352 (98.60)	23 (100.0)	0.326 (0.568)	222 (97.80)	153 (100.0)	3.415 (0.065)	287 (98.63)	47 (100)	41 (97.62)	1.001 (0.606)
K12-correct	192 (86.10)	91 (65.00)	10 (58.82)	25.057** (<0.001)	271 (75.91)	22 (95.65)	4.771* (0.029)	157 (69.16)	136 (88.89)	20.146** (<0.001)	236 (81.10)	37 (78.72)	20 (47.62)	23.385** (<0.001)
K13-correct	90 (40.36)	55 (39.29)	5 (29.41)	0.796 (0.672)	139 (38.94)	11 (47.83)	0.715 (0.398)	95 (41.85)	55 (35.95)	1.333 (0.248)	115 (39.52)	23 (48.94)	12 (28.57)	3.851 (0.146)
K14-correct	214 (95.96)	133 (95.00)	16 (94.12)	0.270 (0.874)	341 (95.52)	22 (95.65)	0.001 (0.976)	212 (93.39)	151 (98.69)	6.009* (0.014)	280 (96.22)	45 (95.74)	38 (90.48)	2.839 (0.242)
K15-correct	210 (94.17)	131 (93.57)	14 (82.35)	0.270 (0.874)	335 (93.84)	20 (96.00)	1.665 (0.197)	208 (91.63)	147 (96.08)	2.943 (0.086)	274 (94.16)	45 (95.74)	36 (85.71)	4.729 (0.094)
K16-correct	66 (29.60)	42 (30.00)	6 (35.29)	0.244 (0.885)	106 (29.69)	8 (34.78)	0.267 (0.606)	63 (27.75)	51 (33.33)	1.355 (0.244)	86 (29.55)	16 (34.04)	12 (28.57)	0.434 (0.805)
K17-correct	187 (83.86)	117 (83.57)	12 (70.59)	2.013 (0.366)	297 (83.19)	19 (82.61)	0.005 (0.942)	193 (85.02)	123 (80.39)	1.399 (0.237)	247 (84.88)	42 (89.36)	27 (64.29)	12.588** (0.002)

K18-correct	176 (78.92)	114 (81.43)	11 (64.71)	2.601 (0.272)	287 (80.39)	14 (60.87)	5.001* (0.025)	185 (81.50)	116 (75.82)	1.791 (0.181)	229 (78.69)	40 (85.11)	32 (76.19)	1.272 (0.529)
K19-correct	164 (73.54)	92 (65.71)	11 (64.71)	2.786 (0.248)	249 (69.75)	18 (78.26)	0.749 (0.387)	152 (66.96)	115 (75.16)	2.943 (0.086)	209 (71.82)	31 (65.96)	27 (64.29)	1.473 (0.479)

**Note:** \* =Significant at 0.05 level; \*\* =Significant at 0.01 level

Table 4 shows that the majority of veterinary practitioners have installed the ‘Aarogya Setu’ app in their mobile. The data show that the majority of the veterinary practitioners are using alcohol-based sanitizers, wearing a face mask, using disinfectants for the disinfection of veterinary dispensary periodically, keeping social distance during treating animals

and using Aarogya Setu app daily (95.53%, 88.42%, 77.90%, 74.21%, and 70.00%, respectively). There was more than fifty percent of veterinary practitioners never wear PPE kit (56.84%) and face shield (50.26%) during treating the animals in high-risk areas.

**Table 4:** Adoption of veterinary practitioners regarding practices associate to control COVID-19 (n= 380)

Practices↓	No. (%) of participants		
	Always/2	Sometime/1	Never/0
Determination/score →			
P1: Do you follow the social distancing to prevent transmission of COVID-19 during animal treatment?	282(74.21)	79(20.79)	19(5.00)
P2: Do you wear a PPE kit during the treatment of the animals?	49(12.89)	115(30.26)	216(56.84)
P3: Do you use face mask during animal treatment?	336(88.42)	41(10.79)	3(0.79)
P4: Do you use hand gloves while handling the animals?	228(60.00)	125(32.89)	27(7.11)
P5: Do you use a face shield during treating animals in high-risk areas?	128(33.68)	61(16.05)	191(50.26)
P6: Are you using the website of the Ministry of health and family welfare, Govt. of India as well as WHO for updating the knowledge of COVID-19?	253(66.58)	111(29.21)	16(4.21)
P7: Are you using Aarogya setu daily?	266(70.00)	102(26.84)	12(3.16)
P8: Are you using disinfectants for the disinfection of veterinary dispensary periodically?	296(77.90)	71(18.68)	13(3.42)
P9: Are you using alcohol-based hand sanitizers regularly?	363(95.53)	16(4.21)	1(0.26)
P10: Have you installed the Aarogya setu app on your personal mobile?	Install		Not Install
	363(95.53)		17(4.47)

Table 5 shows that 100 percent of old aged (more than 50 years) veterinary practitioners had installed Aarogya setu on personal mobile. With the chi-square analysis, there was a significant association with age and practices P3, P4, P6, P7, P8, and P10 associate to control COVID-19. Male veterinarians (p= .049) had more used the website of the Ministry of health and family welfare, Govt. of India as well

as WHO compare to female veterinarians for updating their knowledge of COVID-19 (P6). There was a significant relation with experience in veterinary practices and adoption practices of P2, P3, P4, P8, and P9. There was no statistically significant relation with education and adoption practices. Other non-significant data was present in table 5.

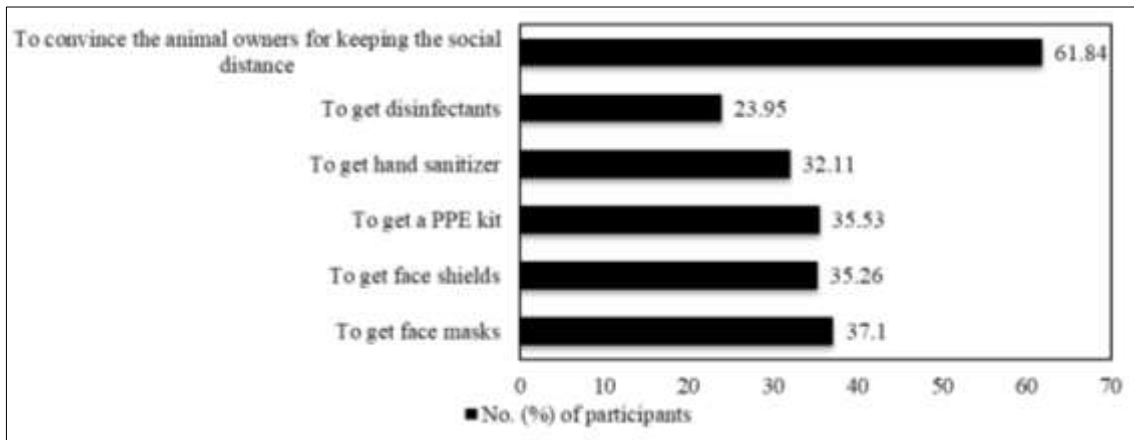
**Table 5:** Comparison of adoption practices about COVID-19 between different groups (n=380)

Adoption Practices/Variables	Age n (%)				Gender n (%)			Education n (%)			Experience n (%)			
	Young (Up to 30 years)	Middle aged (31 to 50 years)	Old (More than 50 years)	χ <sup>2</sup> (P)	Male	Female	χ <sup>2</sup> (P)	B.V.Sc & A.H.	M.V.Sc & higher degree	χ <sup>2</sup> (P)	Up to 10 years	10 to 20 years	More than 20 years	χ <sup>2</sup> (P)
P1-Always	162 (72.65)	111 (79.29)	9 (52.94)	6.660 (0.155)	268 (75.07)	14 (60.87)	2.351 (0.309)	173 (76.21)	109 (71.24)	1.256 (0.534)	218 (74.91)	36 (76.60)	28 (66.67)	1.836 (0.766)
P2-Always	30 (13.45)	18 (12.86)	1 (5.88)	9.042 (0.060)	49 (13.73)	0 (0.00)	5.721 (0.057)	27 (11.89)	22 (14.38)	0.629 (0.730)	39 (13.40)	6 (12.77)	4 (9.52)	12.192* (0.016)
P3-Always	202 (90.58)	126 (90.00)	8 (47.06)	32.976** ( $<0.001$ )	313 (87.68)	23 (100.00)	3.206 (0.201)	198 (87.22)	138 (90.20)	2.344 (0.310)	265 (91.07)	43 (91.49)	28 (66.67)	26.337** ( $<0.001$ )
P4-Always	143 (64.13)	81 (57.86)	4 (23.53)	11.783* (0.019)	214 (59.94)	14 (60.87)	2.032 (0.362)	126 (55.51)	102 (66.67)	5.537 (0.063)	185 (63.57)	26 (55.32)	17 (40.48)	9.560* (0.049)
P5-Always	69 (30.94)	55 (39.29)	4 (23.53)	4.260 (0.372)	121 (33.89)	7 (30.43)	0.406 (0.816)	78 (34.36)	50 (32.68)	0.452 (0.798)	92 (31.62)	23 (48.94)	13 (30.95)	7.610 (0.107)
P6-Always	140 (62.78)	105 (75.00)	8 (47.06)	10.440* (0.034)	243 (68.07)	10 (43.48)	6.036* (0.049)	157 (69.16)	96 (62.75)	3.106 (0.212)	195 (67.01)	34 (72.34)	24 (57.14)	5.889 (0.207)
P7-Always	144 (64.57)	112 (80.00)	10 (58.82)	12.612* (0.013)	250 (70.03)	16 (69.56)	2.616 (0.270)	168 (74.01)	98 (64.05)	4.882 (0.087)	199 (68.38)	37 (78.72)	30 (71.43)	3.663 (0.454)
P8-Always	178 (79.82)	112 (80.00)	6 (35.29)	22.117** ( $<0.001$ )	276 (77.31)	20 (86.96)	1.627 (0.443)	170 (74.89)	126 (82.35)	3.482 (0.175)	236 (81.10)	36 (76.60)	24 (57.14)	15.489** (0.004)
P9-Always	213 (95.52)	135 (96.43)	15 (88.24)	4.774 (0.311)	341 (95.52)	22 (95.65)	0.066 (0.968)	217 (95.59)	146 (95.42)	0.755 (0.686)	279 (95.88)	46 (97.87)	38 (90.48)	9.538* (0.049)
P10-Installed	208 (93.27)	138 (98.57)	17 (100.00)	6.482* (0.039)	342 (95.80)	21 (91.30)	1.021 (0.312)	220 (96.92)	143 (93.46)	2.549 (0.110)	275 (94.50)	46 (97.87)	42 (100.0)	3.287 (0.193)

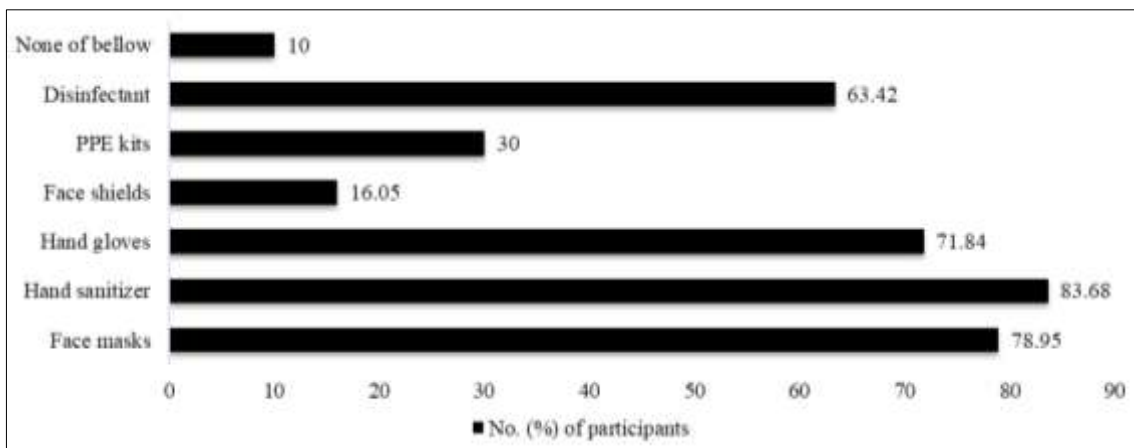
**Note:** \* =Significant at 0.05 level; \*\* =Significant at 0.01 level

Constraints faced by veterinary practitioners during the lockdown due to COVID-19 are shown in Fig.1. Constraints faced by veterinary practitioners arranged in descending order like 1) To convince the animal owners for keeping the social distance (61.84%), 2) To get face mask (37.10%), 3) To get PPE kit (35.53%), 4) To get face shield (35.26%), 5) To get

hand sanitizer (32.11%) and 6) To get disinfectants (23.95%). There were 83.68 percent veterinary practitioners who responded that their organization provided hand sanitizer followed by face mask (78.95%), hand gloves (71.84%), disinfectant (63.42), PPE kit (30.00%) and face shield (16.05%) information shown in Fig.2.



**Fig 1:** Constraints faced by veterinary practitioners during the lockdown due to COVID-19 (n=380)



**Fig 2:** Items or facilities provided by your organization for the control and prevention of COVID-19 (n=380)

**4. Discussion**

As per our acquaintance, this is the first study in India examining the knowledge, adoption, and constraints towards COVID-19 among veterinary practitioners. Veterinary practitioners are directly in contact with animals like cattle, dogs, cats, birds, wild animals, etc. for the treatment aspect. COVID-19 virus infections are widely spread among humans all over the world. There is a chance for some animals to become infected through close contact with infected persons. Infection of animals with COVID-19 virus may have implications for animal health and welfare, and for wildlife conservation. Several dogs, cats, and tigers have tested positive to COVID-19 virus following close contact with infected humans (Islam, 2020) [10].

We found that veterinary practitioners had a 76.05 percent correct rate on the knowledge test about COVID-19. A similar result was found by (Zhong *et al.*, 2020) [22] reported that Chinese residents had an overall correct rate of 90% on the knowledge questionnaire about COVID-19 and Huynh *et al.* (2020) [6] reported that the healthcare workers possessing sufficient knowledge were recorded as 88.4%. The finding of a high correct rate of COVID-19 knowledge among veterinary practitioners was expected, because of educational

background. It is also associated with knowledge questions & adoption practice about using the website of the Ministry of health and family welfare, Govt. of India & WHO, for updating the knowledge of COVID-19. The study reports the knowledge score significantly varies with different age groups, education, experience, and monthly income. A similar result was reported by (Rahman and Sathi, 2020) [16] that the knowledge score significantly varies with different age groups, gender, education, occupation, marital status, and residence type. Adoption scores were significantly different from age and experience. Rahman and Sathi, (2020) [16] reported that the mean score of COVID-19 preventive practice varies across different age groups and marital status. Our study found that younger veterinarians with higher education and 10 to 20 years' experience in veterinary practices have higher knowledge scores towards COVID-19. Middle-aged veterinarians with 10-20 years of experience in veterinary practice have higher adoption scores. It shows that younger and middle-aged veterinarians are more conscious about COVID-19 than old aged veterinarians.

The study testified that most veterinarians used face masks (88.42%) and hand gloves (60.00%) always during animal treatment. This finding is in line with another study which

shows that the most positive attitude of healthcare workers was regarding the use of protective equipment when dealing with MERS patients (Khan *et al.*, 2014) <sup>[11]</sup>. In the study, 95.53 percent of veterinarians used alcohol-based hand sanitizers regularly to prevent transmission of COVID-19. Olum *et al.* (2020) <sup>[14]</sup> reported that some 54% of the health care workers always wore a mask when coming into contact with the patients and up to 96% washed their hands before and after touching each patient. A similar finding from the Xu *et al.*, (2020) <sup>[21]</sup> reported among health care workers with correct knowledge about hand hygiene. In this study, more than fifty percent of veterinary practitioners never wear PPE kit (56.84%) and face shield (50.26%) during treating the animals in high-risk areas although it is highly recommended by WHO and CDC and even reported elsewhere (Modi *et al.*, 2017) <sup>[12]</sup> which is inconsistent in the present study with low percentages of users of PPE kits. Around one-third of veterinary practitioners had faced constraints to get face masks (37.10%), PPE kit (35.53%), face shield (35.26%), and hand sanitizer (32.11%). This may be due to high demand masks and other protective equipment during lockdown. Since the onset of the coronavirus pandemic there has been an increased use of masks (Feng *et al.*, 2020) <sup>[2]</sup> and sanitizers resulting in exhaustion of resources in the market. A shortage of personal protective equipment endangers health workers worldwide (WHO, 2020) <sup>[2]</sup>.

## 5. Conclusion

The study participants showed adequate basic knowledge of COVID-19. There is a strong need to implement periodic educational interventions and training programs on infection control practices and other updates of COVID-19 across Veterinary professionals. Additional online education interventions and campaigns are also required. This would improve the knowledge and confidence of veterinarians to provide the right measures to protect themselves and patients/animal owners from COVID-19.

## 6. Financial support

None.

## 7. Declaration of Competing Interest

None.

## 8. Acknowledgement

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