



## Study of Knowledge, Attitude and Practice (KAP) towards COVID-19 Pandemic in Rural Area

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### Article History

Received: 22 September 2020

Reviewed & Revised: 24/September/2020 to 02/November/2020

Accepted: 03 November 2020

E-publication: 12 November 2020

P-Publication: November - December 2020

### Citation

Amar Taksande, Abhilasha Singh Panwar R, Syed Athhar Saqqaf, Rupesh Rao, Revat Meshram. Study of Knowledge, Attitude and Practice (KAP) towards COVID-19 Pandemic in Rural Area. *Medical Science*, 2020, 24(106), 4144-4157

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### General Note

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### ABSTRACT

*Background:* SARS Cov-2 is a newly identified virus which causes respiratory and other systemic illness with the disease being named as COVID-19. It has been declared as a global pandemic by the World Health Organization. The Indian government has taken

extraordinary measures like suspending all transports, closing down the public places, increasing the medical facility, strict rules for maintaining hygienic practices. *Aims:* To study the knowledge and attitude of people regarding COVID-19 and the preventive measures practiced by the rural population who attending a hospital. *Study Design:* Descriptive cross-sectional study. *Study population:* The population in this study is residents of Wardha District, Maharashtra State, India, who are living there for at least one year. 322 adults (aged 18 years and above) were interviewed using a pre-tested questionnaire regarding their knowledge, attitude and practices about COVID-19. *Results:* In our study (n=322), 50.62% were males, with 54.35% in age group of 18-30 years. The mean knowledge score was 12.48 (SD: 2.15, range: 4-15) suggestive a good knowledge score, attitude score was 16 (SD: 3.93, range: 10-32)- suggesting a positive attitude, practice score was 3.77 (SD=0.54, ranged 0-4), suggesting an overall 90% correct rate in the practices test. Regression analysis showed that male gender, unmarried people who had less education, less income and unemployed or unskilled worker had the lowest scores in all three domains. *Conclusion:* The rural people had a good knowledge about prevention of COVID-19. Most of them had a positive attitude towards covid-19 practicing preventive measures. Preventive strategies are the only means of controlling COVID-19.

**Keywords:** COVID-19, Knowledge, Attitude, Practice, Social distancing, Mask

## 1. INTRODUCTION

In December 2019, a cluster of pneumonia cases were identified in Wuhan, Hubei province in China. This pneumonia was caused by a newly isolated  $\beta$ -coronavirus, hence named by the World Health Organization as the 2019-novel coronavirus (2019-nCoV) on the 12<sup>th</sup> of January 2020 (Iyer et al., 2020). India informed about its first COVID-19 case on January 30, 2020. These cases began to increase in late March and several hotspots have been identified across the country by April 2020. India is facing a serious threat caused by this outbreak. India has to face many challenges to prevent the spread of COVID-19. In children with COVID-19 the symptoms are usually less severe than adults and present mainly with cough and fever, and coinfection has been observed (Iyer et al., 2020; Gupta et al., 2020; Vellingiri et al., 2020). Relatively few cases have been reported of infants confirmed with COVID-19; those experienced mild illness (Feng et al., 2020). Special caution has to be taken to halt the spread of this infection through respiratory droplets. So if we use a face mask, it is very useful for prevention of transmission. We have to maintain personal hygiene and follow public health measures of social distancing, hand washing, using masks. In a densely populated country, with 80% of the population working in the informal sector and with a highly mobile population, it is difficult to impede the transmission of this disease (Gupta et al., 2020; Vellingiri et al., 2020; Feng et al., 2020; Azlan et al., 2020). Public awareness of COVID-19 is important, as the adherence to control measures is affected by the knowledge, attitudes, and practices (KAP) towards COVID-19 (Iyer et al., 2020; Devagappanavar, 2020; Mojally & Al-Hindi, 2020). Thus implementation of the health behaviours among the general public through various communication medium and designing of new policies will flatten the curve of this pandemic. In this study we are assessing the knowledge, attitude and practices of people towards COVID-19, in a rural setting in central India.

## 2. METHODOLOGY

### Setting

Jawaharlal Nehru Medical College, DMIMS, Sawangi Meghe, Wardha is a rural medical college located in Maharashtra.

### Study Design

Across-sectional study was conducted between April 2020 to June 2020 concerning Knowledge, Attitudes, and Practices of people in prevention of COVID-19 in Rural Area. The protocol for the study was reviewed and approved by the Institutional Ethical Committee (IEC) of JNMC, DMIMS, Sawangi, and Wardha.

### Study population

The participants in this study were residents of Wardha Districts, Maharashtra State, India, who were living there for at least one year and are of age between 18-75 yrs. Parents attending pediatric outpatient department (OPD) with their children were the target group. Parents of every other child seen at the pediatric wards were asked to take part in the study. Voluntary participation was taken and no incentives were given.

### Data Collection

People who visited the outpatient departments, either as patients or their attendants were interviewed with a pre-designed questionnaire. The study participants were approached using convenience sampling. Verbal consent for a face to face interview was taken. People were interviewed in Local Language. Modified Kuppaswamy scale was used to finding the socioeconomic status of the family. People who failed to respond to all questions or who left before completing the interview were not included. All medical personnel including medical students, doctors and nurses were excluded from the study. Face-to-face interview was based on a pretested questionnaire which comprised of 29 questions, and was divided into four sections. Interviews were conducted by Residents of Pediatric Department, JNMC, Sawangi Meghe, Wardha, who underwent training in interviewing techniques under professional supervision. To ensure reliability, the interviewers thoroughly discussed the questionnaires before taking data. A pre-designed self-administered Marathi language questionnaire was used after validation and reliability. The questionnaire was initially structured in English, thereafter content was validated by pediatrician and public health experts. The questionnaire was then translated into Marathi and back translated into English to validate language proficiency. Before distribution, the Marathi version was further reviewed by experts. Test-retest reliability was applied by the researcher for testing internal consistency of the study tools were tested by using test- retest reliability. It was done through the administration of the same participants under similar conditions on two occasions 1 week apart. The tools' reliability has been verified with Cronbach's  $\alpha$  values of 0.79. After being validated, Google forms were used to format the questionnaire, which is internet-based software, commonly used for data collection.

The four main parts of the questionnaire included the following aspects

1. Socio-demographic data such as sex, income, family member, education, employment and complaining any health related problems.
2. Knowledge part which includes data on most important symptoms of COVID-19. The knowledge scale consists of 15 items using a 2-point Likert-type scale: 1 for correct answer and 0 for do not know or wrong answer. 0 to 15 was the range for the total knowledge score. The knowledge was considered good if percentages of knowledge score were more than 70% and poor knowledge if percentage was equal to or less than 70%.
3. Attitude part which includes questions reflecting his/her mindset towards the precautionary measures. The score of the attitude based on 5 points Likert scale, in which the score of 1 to 5 was given from strongly agree to strongly disagree. A mean score of 2 (answering for strongly agree or agree) was carried out as a positive attitude and a score of 3 to 5 indicated a negative attitude (answering strongly disagree or disagree or undecided). Therefore, the lesser was the attitude score, the more was the probability of positive attitude and the vice versa for a high score.
4. Practice part which includes various methods used by the people to prevent acquiring the infection such as use of face mask, hand washing, social distancing and avoidance of going outside. The Practice scale consists of 4 items using a 2-point Likert-type scale: 1 for correct practice and 0 for wrong practice. The total practice score ranged from 0 to 4. The practice was considered good if percentages of practice score were more than 75% and poor practice if percentage was equal to or less than 75%. The sample size was determined by keeping an indicator of the Wardha district population 1300000, margin of error of 5.5 %, indicator percentage of 0.50 and confidence interval of 95%, the calculated sample size was 318.

### Statistical Analysis

Data were entered into Microsoft Excel and then imported into the STATA 10 version. Output measures were demonstrated as simple frequency (n) and percentage (%), while, mean and standard deviation (SD) were used to express level of outcome. Knowledge, attitudes and practices scores of different persons according to demographic characteristics were compared with independent- samples t test and one-way analysis of variance (ANOVA) as appropriate. Multivariable linear regression analysis using all of the demographic variables as independent variables with outcome variable as the knowledge score was conducted to identify various factors associated with knowledge. Similar regression analyses were used to identify factors associated with attitudes and practices. Unstandardized regression coefficients ( $\beta$ ), standard error and p value were used to quantify the associations between variables and KAP. A p <0.05 was set as the statistical significance level.

## 3. RESULTS

A total of 350 individuals were approached for participation in the study. 28 individuals declined to participate in this study. Thus a total of 322 individual volunteered for participation in the study conducted at the AVBR Hospital, Wardha. These 322 individuals were then interviewed with a questionnaire after due consent in order to learn about what knowledge they carry regarding the virus, what is there attitude and what practices they are following to fight the novel Coronavirus pandemic. The gender distribution was

found to be almost proportional with 50.62% males and 49.38% females. Most of the volunteers were observed to be from the younger generation, with 54.35% of them belonging to the age group of 18-30 years, while only 5.59% of them belonging to more than 50 years age group. Of these majorities of them were married (56.21%) and were educated graduates and post graduates (42.24%). Majority of these volunteers were observed to be working as Non-government employees and were often falling into the criteria of having a family income of more than Rs.19575, which comes under the highest class of the Modified Kuppuswamy Scale for socioeconomic status of family household incomes.

**Table 1** Participant's knowledge of COVID-19

S.No	Question based on Knowledge of COVID-19 (n=322)	True	False	Not Sure
1	Virus is the cause of COVID-19	286(88.82%)	30(9.31%)	6(1.86%)
2	The main clinical symptoms of COVID-19 are fever, cough, sore throat and breathing difficulties	306(95.03%)	12(3.72%)	4 (1.24%)
3	COVID-19 is transmitted by close contact with the infected person.	290(90.06%)	26(8.07%)	6(1.86%)
4	The COVID-19 virus spreads via respiratory droplets of infected individuals.	281(87.27%)	32(9.93%)	9(2.79)
5	Patients with underlying chronic disease are at a higher risk of infection and death.	294(91.30%)	26(8.07%)	2(0.62%)
6	Eating chicken or contacting wild animals would result in the infection by the COVID-19 virus.	38(11.80%)	272(84.47%)	12(3.72)
7	Ordinary residents can wear face masks to prevent the infection by the COVID-19 virus.	309(95.96%)	8(2.48%)	5(1.55%)
8	Washing hand with soap and water can help in prevention of disease transmission.	305(94.72%)	14(4.34%)	3(9.31%)
9	Social distancing can help in prevention of disease transmission.	284(88.20%)	27(8.38%)	11(3.41)
10	It is necessary for children and old age person to take extra precautions to prevent the infection by the COVID-19.	295(91.6%)	19(5.90%)	8(2.48%)
11	Individuals should avoid going to crowded places to prevent the infection by COVID-19	271(84.16%)	36(11.18%)	15(4.65%)
12	People should avoid touching their eyes, nose and face with unwashed hands	301(93.48%)	13(4.03%)	8(2.48%)
13	Healthy food and drinking water increase the body's immunity and resistance to COVID-19	287(89.13%)	29(9.0%)	6(1.86%)
14	An effective vaccine against the virus is currently available	160(49.69%)	122(37.88%)	40(12.42%)
15	COVID-19 could be fatal if not treated properly	302(93.79%)	18(5.59%)	4(1.24%)

As far as knowledge was concerned, the 322 volunteers were asked regarding the various information they knew regarding the COVID-19 pandemic that has affected their lives for the worse. Regarding the source of information on COVID-19, 69.87% came to know about COVID-19 through television followed by mobiles (60.55%), newspaper (42.54%), friends (41.92%), health worker (17.70%) and radio (9.93%). Figure 1a, Figure 1b and Figure 1c depicted the knowledge of COVID 19 in the participants. While 88.82% of the population interviewed were well aware of the fact that it was caused by a virus but there were another 11.17% of them who were still not considering the virus to be the main culprit or were not sure about it. 95.03% were aware of fever, cough, sore throat and breathing difficulties to be the major danger signs and 90.06% were convinced that the disease was transmitted by close contact with an infected person. Respiratory droplets were considered to be the major route of spread (87.27%) and 91.30% considered that people with co-morbid illnesses were at a higher risk of being infected with the disease. While some also considered chicken or wild animals to be causing the spread, but most (84.47%) were aware of this as a myth. Almost all the participants were convinced that using face masks, hand washing and social distancing were the correct steps towards prevention of the disease and

91.6% of them also considered the children and the seniors citizens to be more prone to the disease. While 84.16% of the people avoided being to crowded places, but there still persisted few who were not convinced of it to be a preventive measure. 93.48% avoided touching their eyes, nose and face with unwashed hands and 89.13% considered healthy food and drinking water to improve their immunity against the disease. Most of them were aware that currently no vaccine is available against the virus but 49.69% of them were optimistic of there being a preventive vaccine against the same, but also considered COVID-19 to be fatal if not treated adequately and with prompt measures. Table 1 shows the data revealing the knowledge of cause of COVID-19, transmission, its symptoms and preventive measures. Based on our results, the majority of the population had good knowledge about the disease. The mean COVID-19 knowledge score was 12.48 (SD: 2.15, range: 4-15), suggesting an overall good knowledge of COVID-19. Knowledge scores significantly differed across genders, age-groups, marital status, education levels, occupation and monthly income level ( $P < 0.001$ ) (Table 2). Multiple linear regression analysis showed that male gender vs. female showed  $\beta$ : -0.745,  $p < 0.002$ , age-group of 50 years vs 18-30 years had  $\beta$ : -1.009,  $p < 0.000$ , marital status of never-married vs. married,  $\beta$ : -0.690,  $p < 0.004$ , education of primary school vs graduates had  $\beta$ : -0.348,  $p < 0.031$ ; middle school vs intermediates had  $\beta$ : -1.29,  $p < 0.000$ ; primary school vs high school had  $\beta$ : -0.683,  $p < 0.037$ , occupations of unemployed vs. semiprofession had  $\beta$ : -0.508 and  $p < 0.000$ ; clerical, shop owner, farmer vs unskilled worker, labourer had  $\beta$ : -0.492,  $p < 0.110$ ; Semi-skilled worker vs Unemployed had  $\beta$ : - 1.202 and  $p < 0.000$ , family income of  $< 979$  vs  $> 19575$  had  $\beta$ : -0.568 and  $p < 0.000$ ; 4894-7322 vs 9788-19574 had  $\beta$ : -0.154 and  $p < 0.435$ ;  $< 979$  vs 7323-9787 had  $\beta$ : -0.837 and  $p < 0.000$  were significantly associated with lower knowledge score (Table 3).

**Table 2** Participants knowledge Attitude and Practice score of COVID-19 by demographic variable

Characteristics		Number of participants (%)	Knowledge score (Mean $\pm$ SD)	t / F	P value	Attitude score (Mean $\pm$ SD)	t / F	P value	Practice score (Mean $\pm$ SD)	t / F	P value
Gender	Male	163(50.62%)	11.34 $\pm$ 2.52	3.19	0.0015	18.28 $\pm$ 4.84	-1.33	0.01823	3.85 $\pm$ 0.45	2.86	0.004
	Female	159(49.38%)	12.11 $\pm$ 1.74			17.56 $\pm$ 4.88			3.68 $\pm$ 0.48		
Age group	18-30	175(54.35%)	12.17 $\pm$ 1.66	9.48	0.0001	17.09 $\pm$ 4.48	6.83	0.0012	3.88 $\pm$ 0.38	13.50	0.000
	30-50	129(40.06%)	11.33 $\pm$ 2.53			18.69 $\pm$ 5.17			3.68 $\pm$ 0.38		
	>50	18(5.59%)	10.38 $\pm$ 3.03			20.44 $\pm$ 4.70			3.27 $\pm$ 0.82		
Marital Status	Unmarried	141(43.79%)	12.17 $\pm$ 1.72	3.17	0.0016	16.95 $\pm$ 4.67	-3.18	0.0016	3.87 $\pm$ 0.43	3.10	0.002
	Married	181(56.21%)	11.39 $\pm$ 2.45			18.67 $\pm$ 4.90			3.69 $\pm$ 0.60		
Education	Profession or Honors	2(0.62%)	15 $\pm$ 0	50.32	0.0000	14 $\pm$ 1.41	18.45	0.0000	4 $\pm$ 0	33.14	0.000
	Graduate & Postgraduate	136(42.24%)	12.36 $\pm$ 1.60			16.01 $\pm$ 4.03			3.91 $\pm$ 0.30		
	Intermediate or Post High school Diploma	79(24.53%)	12.39 $\pm$ 1.42			17.43 $\pm$ 4.60			3.92 $\pm$ 0.26		
	High School certificate (8-10std)	61(18.94%)	11.68 $\pm$ 1.53			18.98 $\pm$ 4.31			3.78 $\pm$ 0.41		
	Middle school Certificate (4-8std.)	17(5.28%)	10.64 $\pm$ 1.90			22.17 $\pm$ 2.78			3.58 $\pm$ 0.79		
	Primary school Certificate (1-4std)	3(0.93%)	11.66 $\pm$ 0.57			23.66 $\pm$ 0.57			3.34 $\pm$ 0.57		
	Illiterate (1)	24(7.45%)	6.62 $\pm$ 1.90			24.25 $\pm$ 4.84			2.62 $\pm$ 0.92		
Occupation	Profession/ Government	12(3.73%)	13.58 $\pm$ 0.79	19.92	0.0000	15.41 $\pm$ 2.60	23.17	0.0000	4 $\pm$ 0	14.19	0.000

	employee										
	Semi-Profession/ Non-government employee	113(35.09%)	12.46 ± 1.30			15.02 ± 3.90				3.98±0.13	
	Clerical, shop-owner, Farmer	10(3.11%)	12.7 ± 1.15			16.9 ± 4.25				4±0	
	Skilled worker	20(6.21%)	12.75 ± 1.25			15.2 ± 4.31				4±0	
	Semi-Skilled worker	66(20.50%)	12.18 ± 1.66			19.59 ± 4.28				3.80±0.40	
	Unskilled worker Farmer, Laborer	37(11.49%)	10.67 ± 2.59			20.72 ± 4.35				3.56±0.68	
	Unemployed	64(19.88%)	9.79 ± 2.69			21.17 ± 4.20				3.34±0.85	
Family Income Per Month (Rs)	> 19575	110(34.16%)	12.58 ± 1.56			16.05 ± 4.37				3.93±0.24	
	9788-19574	97(30.12%)	11.80 ± 1.90			16.92 ± 4.48				3.87±0.43	
	7323-9787	47(14.60%)	12.36 ± 1.34	26.69	0.0000	18.27 ± 4.17	16.13	0.0000	18.00	3.80±0.39	0.000
	4894-7322	22(6.83%)	11.50± 1.26			21.18 ± 3.31				3.81±0.39	
	2936-4893	8(2.48%)	12 ± 3.29			19.75 ± 3.91				3.25±0.70	
	980-2935	7 (2.17%)	8.58 ± 2.63			22.57 ± 3.50				3.09±0.94	
	<979	31(9.63%)	7.74 ± 1.38			23.29 ± 4.46				3±1	

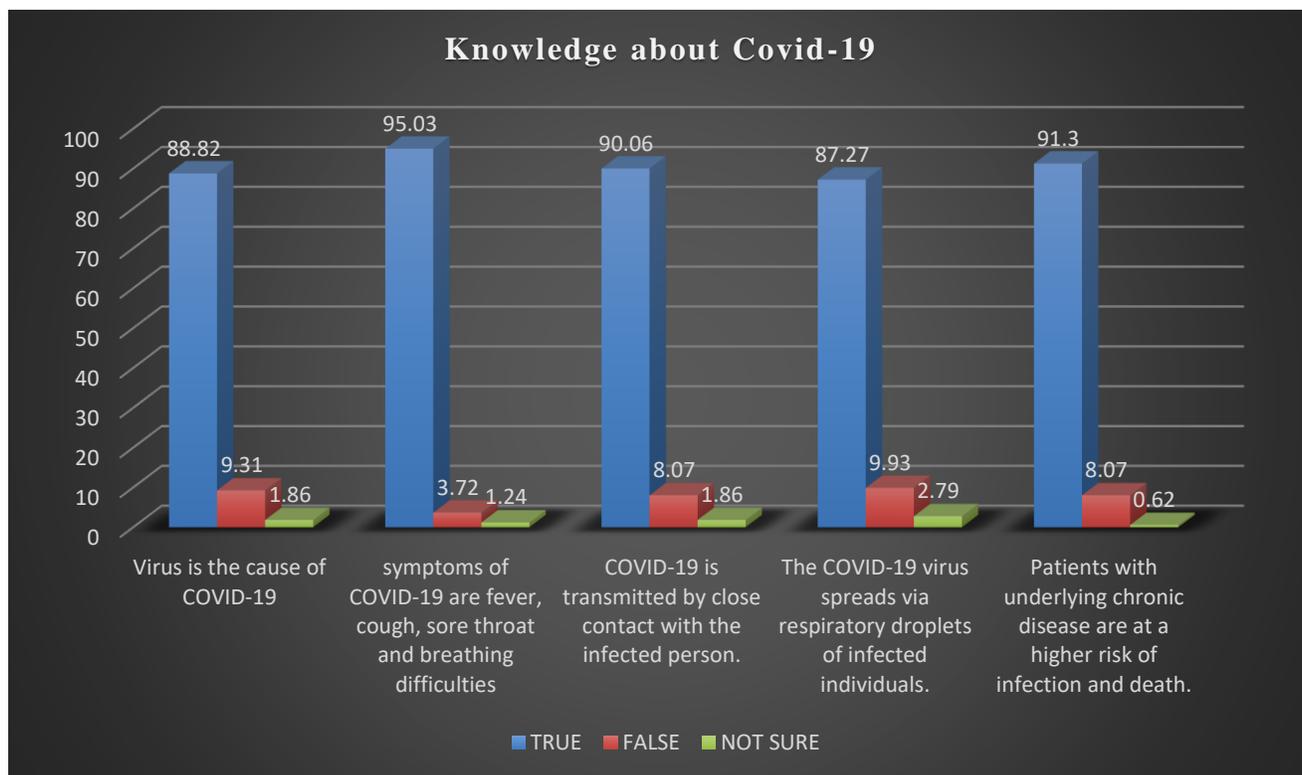


Figure 1a Participant’s knowledge of COVID-19

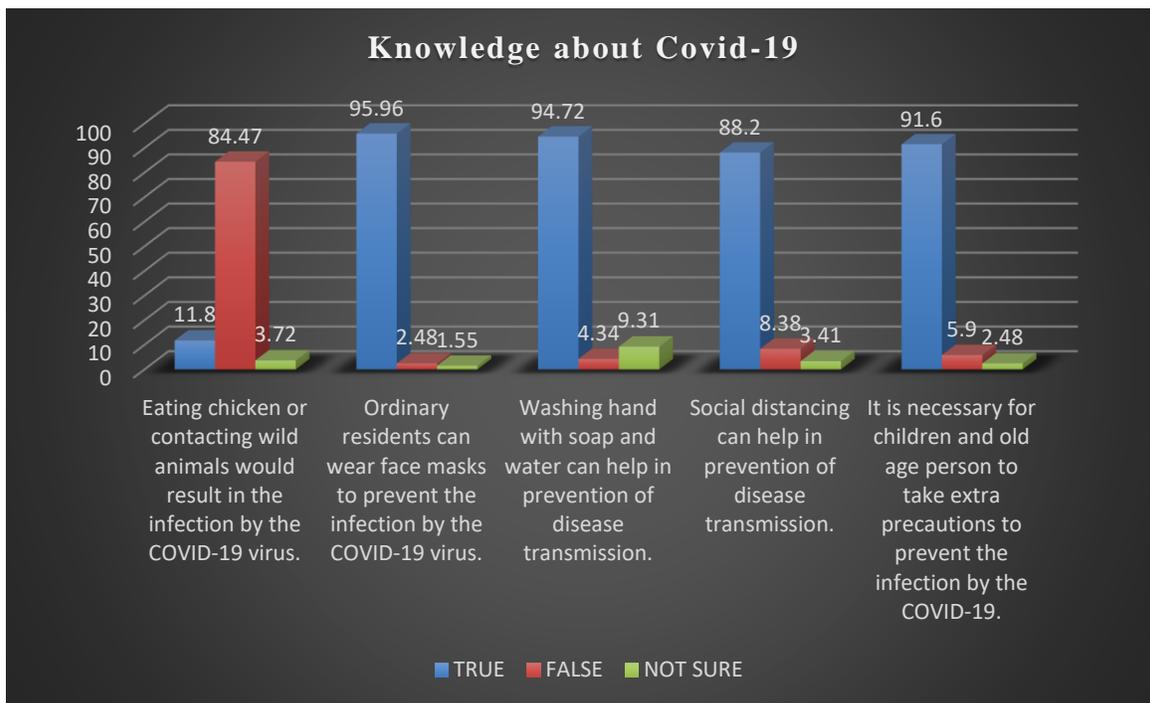


Figure 1b Participant’s knowledge of COVID-19

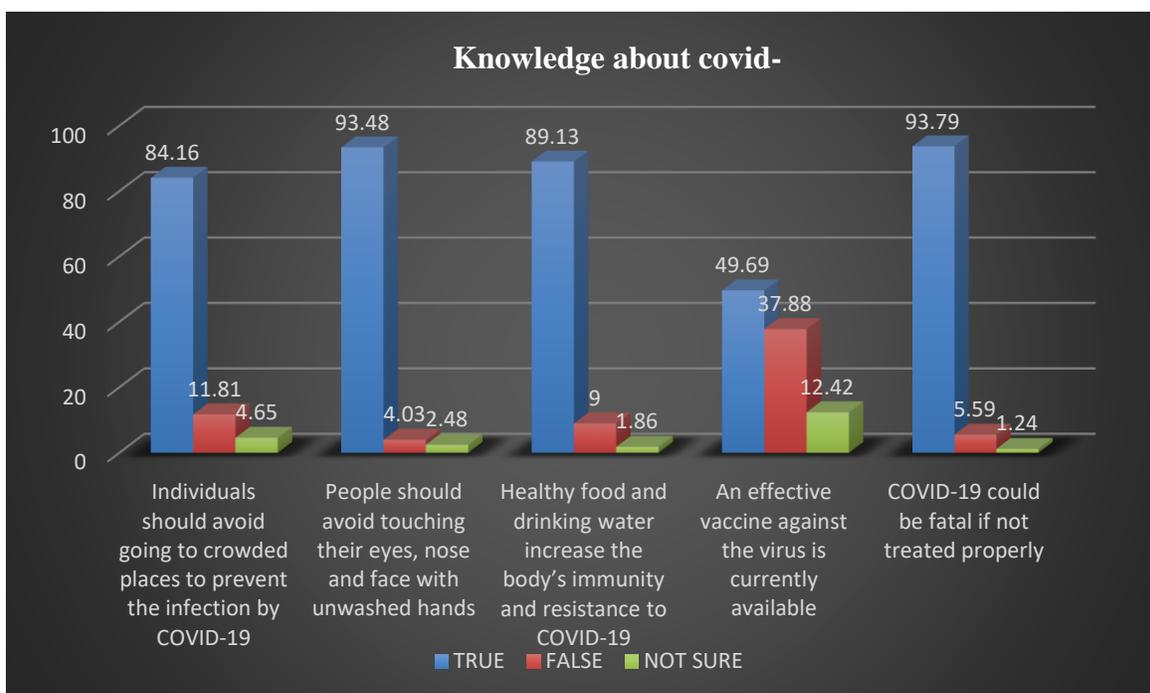


Figure 1c Participant’s knowledge of COVID-19

Table 3 Multiple linear regressions on factors associated with poor knowledge of COVID-19

Variable	Coefficient	Standard error	t	P
Gender (male vs. female )	-0.745	0.236	-3.15	0.002
Age (18-30 vs. >50)	-1.009	0.190	-5.30	0.000
Marital status (married vs. unmarried)	-0.690	0.238	-2.89	0.004
Education (Graduate & Post graduate vs. primary school certificate)	-0.348	0.159	-2.18	0.031

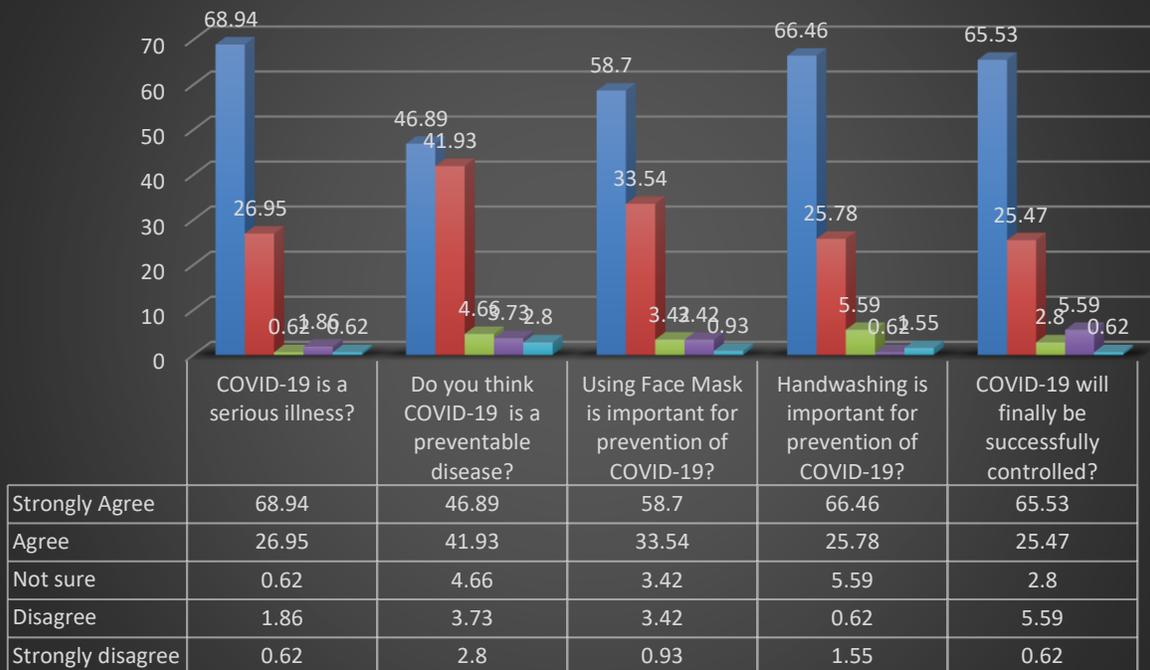
Education (Intermediate or post high school diploma vs. middle school certificate)	-1.29	0.168	-7.65	0.000
Education (High school certificate vs. primary school certificate)	-0.683	0.319	-2.13	0.037
Occupation (Semi-profession/Non-government employee vs. Unemployed)	-0.508	0.061	-8.27	0.000
Occupation (Clerical, shop owner, farmer vs. Unskilled worker , laborer)	-0.492	0.302	-1.63	0.110
Occupation (Semi-skilled worker vs. Unemployed)	-1.202	0.203	-5.91	0.000
Family income (> 19575 vs. <979)	-0.568	0.897	-6.34	0.000
Family income (9788-19574 vs. 4894-7322)	-0.154	0.196	-0.78	0.435
Family income (7323-9787 vs. <979)	-0.837	0.139	-6.02	0.000

The attitudes of the respondents were assessed using a set of 10 questions regarding COVID-19. 96.89% of the participants in the study believed that COVID-19 is a serious illness. 88.82 % respondents opined that Covid-19 can be prevented. Majority of them, 95.03% considered that face mask is important for prevention of COVID-19. Figure 2 depicted the attitude of the participants against COVID 19. Whereas 81.4% respondents agreed that hand washing is important for prevention of COVID-19 and about 84.16% respondents agreed that COVID-19 can be successfully controlled. In our study 97.52% of participants had agreed that India can win the battle against the COVID-19 pandemic. Overall, 72.98% of participants were confident that government has the prime responsibility to control the spread of the disease. 95.96 % respondents agreed that quarantine of the suspected contact of COVID-19 infected person is important to prevent the spread of the disease. Almost all participants 92.86% of the volunteers believed that lockdown is a good option for controlling COVID-19. Table 4 shows the attitude of respondents towards COVID-19. The mean attitude score was 16(SD: 3.93, range: 10-32), suggesting an overall positive attitude toward of COVID-19. Attitude scores were significant between genders, age-groups, marital status, education levels, occupation and monthly income level ( $P < 0.001$ ) (Table 2). Multiple linear regression analysis showed that male gender vs. female,  $\beta$ : 0.515,  $p$ -0.240, age-group of 50yrs vs 18-30 years,  $\beta$ :1.967,  $p$ -0.000, marital status of married vs non-married,  $\beta$ :0.735,  $p$ -0.096, education of illiterate vs graduate & post graduate,  $\beta$ :1.458,  $p$ -0.000; middle school vs intermediate or post high school diploma,  $\beta$ :1.038 and  $p$ -0.032; illiterate vs high school,  $\beta$ :2.105 and  $p$ -0.000, occupation of unemployed vs semi professional/NGO,  $\beta$ : 0.843 and  $p$ -0.000; unskilled worker, farmer, labourer vs clerical, shop owner, farmer with  $\beta$ :0.418 and  $p$ -0.402; unemployed vs semi skilled worker with  $\beta$ :1.328 and  $p$ -0.000, family income of <979 vs >19575 had  $\beta$ :0.669,  $p$ -0.000; Rs.4894-7322 vs 9788-19574 with  $\beta$ :0.690,  $p$ -0.113; <979 vs 7327-9787 had  $\beta$ :0.816,  $p$ -0.001 were significantly associated with higher attitude scores which meant lower attitude levels (Table 5).

**Table 4** Attitude of the Participants towards COVID-19

S.No	Question based on Attitude of COVID-19	Strongly Agree	Agree	Not sure	Disagree	Strongly disagree
1	COVID-19 is a serious illness?	222 (68.94)	90 (27.95)	2 (0.62)	6 (1.86)	2 (0.62)
2	Do you think COVID-19 is a preventable disease?	151 (46.89)	135 (41.93)	15 (4.66)	12 (3.73)	9 (2.80)
3	Using Face Mask is important for prevention of COVID-19?	189 (58.70)	108 (33.54)	11 (3.42)	11 (3.42)	3 (0.93)
4	Handwashing is important for prevention of COVID-19?	214 (66.46)	83 (25.78)	18 (5.59)	2 (0.62)	5 (1.55)
5	Do you agree that COVID-19 will finally be successfully controlled?	211 (65.53)	82 (25.47)	9 (2.80)	18 (5.59)	2 (0.62)

## Attitude of the participants against covid-19



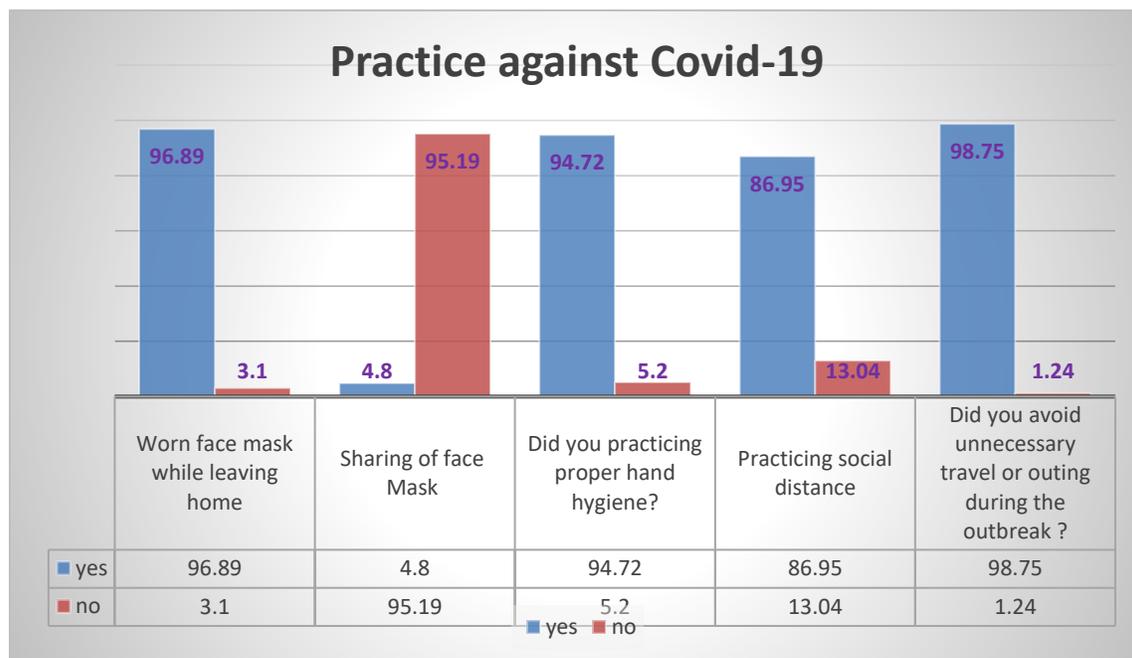
**Figure 2** Participant's Attitude against COVID-19

**Table 5** Multiple linear regressions on factors significantly associated with attitude towards COVID-19

Variable	Coefficient	Standard error	t	P
Gender (male vs. female )	0.515	0.438	1.18	0.240
Age Group (18-30 vs. >50)	1.967	0.445	4.42	0.000
Marital status ( married vs. unmarried)	0.735	0.440	1.67	0.096
Education (Graduate & post graduate vs. illiterate)	1.458	0.155	9.39	0.000
Education (Intermediate or post high school diploma vs. middle school certificate)	1.038	0.476	2.18	0.032
Education (high school certificate vs. illiterate)	2.105	0.304	6.92	0.000
Occupation (Semi professional/ Non government employee vs. unemployed)	0.843	0.116	7.24	0.000
Occupation (clerical, shop owner, farmer vs. unskilled worker farmer, laborer)	0.418	0.495	0.85	0.402
Occupation (semi-skilled worker vs. unemployed)	1.328	0.365	3.63	0.000
Family income (>19575 vs. <979)	0.669	0.135	4.94	0.000
Family income ( 9788-19574 vs. 4894-7322)	0.690	0.432	1.60	0.113
Family income (7323-9787 vs. <979)	0.816	0.237	3.43	0.001

Practices toward COVID-19 were measured using four main questions enquiring on: Face mask, hand wash, social distancing and avoidance of crowded places. There were a total of 4 questions to access practice among the participants. A high percentage of participants washed their hands and used a face mask, which represented a good practice of the participants towards COVID-19. The second most common practice in the study population was to maintain social distance during this outbreak. Figure 3 depicted the practice of the participants against COVID 19. A high percentage of the participants avoided unnecessary travel or outing during the outbreak. Table 6 shows the practice of respondents towards COVID-19. The correct answer score of the 4 questions regarding the rate of practice against COVID-19 was 3.77 (SD=0.54, ranged 0-4), suggesting an overall 90% correct rate in the practices test.

Practice scores significantly varied across genders, age-groups, marital status, education levels, occupation and monthly income level ( $P < 0.001$ ) (Table 2). Multiple linear regression analysis showed female vs male showed  $\beta: -0.173, p=0.004$ , age group  $>50$  years vs  $18-30$  years had  $\beta: -0.303, p=0.000$ , married vs unmarried showed  $\beta: -0.188, p=0.002$ , education of illiterate vs graduate postgraduate had  $\beta: -0.257, p=0.000$ ; middle school vs intermediate or post high school diploma had  $\beta: -0.167, p=0.003$ ; illiterate vs high school had  $\beta: -0.387$  and  $p=0.000$ , occupation of unemployed vs semi professional / NGO had  $\beta: -0.127$  and  $p=0.000$ ; unskilled worker farmer, labourer vs clerical, shop owner, farmer had  $\beta: -0.144, p=0.055$ ; unemployed vs semi skilled worker  $\beta: -0.229, p=0.000$ , family income  $< 979$  vs  $>19575$   $\beta: -0.156$  and  $p=0.000$ ;  $4894-7322$  vs  $9788-19574$   $\beta: -0.029$  and  $p=0.570$ ;  $<979$  vs  $7323-9787$  has  $\beta: -0.202$  and  $p=0.000$  had significantly associated with lower practice (Table 7).



**Figure 3** Participant's Practice against COVID-19

**Table 6** Practice of the Participants against COVID-19

S.no	Question based on Practice				
Face Mask					
1.	Worn face mask while leaving home	Yes [n= 312 (96.89%)]			No [n= 10 (3.10%)]
2	Type of Face Mask used	Surgical Mask (31.08%)	Cloth Mask (54.16%)	N95 Mask (14.74%)	
3	Sharing of face Mask	Yes (4.80%)	No (95.19%)		
4	Where do you dispose mask?	Home Dustbin (76.92%)	Roadside dustbin (11.21%)	Other Area (11.85%)	
Hand wash					
5	Did you practicing proper hand hygiene?	Yes [n= 305 (94.72%)]			No [n= 17 (5.2%)]
6	How frequently you wash your hand?	<5times (35.25%)	5-10times (44.87%)	>20times (17.62%)	
7	How many seconds do you wash hand?	10-20sec (37.50%)	20-30sec (32.05%)	>30 sec (28.20%)	
Social Distancing					
8	Practicing social distance	Yes [n= 280 (86.95%)]			No [n= 42 (13.04%)]
9	How much distance to be maintained between 2 individual?	1-2 meter (24.28%)	2-3 meter (45.71%)	>3 meter (30%)	

	Others		
10	Did you avoid unnecessary travel or outing during the outbreak ?	Yes [n= 318 (98.75%)]	No [n=4 (1.24%)]

**Table 7** Multiple linear regressions on factors significantly associated with practices towards COVID-19

Variable	Coefficient	Standard error	t	P
Gender (male vs. female)	-0.173	0.060	-2.87	0.004
Age (18-30 vs. >50)	-0.303	0.054	-5.56	0.000
Marital status (married vs unmarried)	-0.188	0.060	-3.11	0.002
Education (Graduate & post graduate vs. illiterate)	-0.257	0.020	-12.80	0.000
Education (Intermediate or post high school diploma vs. middle school certificate)	-0.167	0.054	-3.08	0.003
Education (high school certificate vs. illiterate)	-0.387	0.048	-8.04	0.000
Occupation (Semi professional/ Non government employee vs. unemployed)	-0.127	0.016	-7.76	0.000
Occupation (clerical, shop owner, farmer vs. unskilled worker farmer, laborer)	-0.144	0.073	-1.97	0.055
Occupation (semi-skilled worker vs. unemployed)	-0.229	0.058	-3.93	0.000
Family income (> 19575 vs. <979)	-0.156	0.021	-7.27	0.000
Family income ( 9788-19574 vs. 4894-7322)	-0.029	0.050	-0.57	0.570
Family income (7323-9787 vs. <979)	-0.202	0.051	-3.95	0.000

#### 4. DISCUSSION

Coronavirus disease 2019 (COVID-19) occurs due to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which is closely related to bat SARS related coronaviruses. World Health Organization (WHO) declared COVID-19 to be a pandemic on 11 March 2020, which is 72 days after the first official announcement of clusters of patients with community-acquired pneumonia in Wuhan, Hubei Province of China on 31 December 2019 (day 1). After its onset in China this disease has been increasing worldwide. According to the ICMR update on June 19, 2020, more than 3,80,000 individuals have been confirmed positive in India. Ever since the announcement of COVID-19 as a pandemic by the WHO, the knowledge, attitude and practices toward COVID-19 has been growing day by day. The complete clinical picture of COVID-19 is yet to be understood, however, fever, cough, and dyspnea are the most commonly reported symptoms of COVID-19 (Bonyan et al. 2020). Till date no specific antiviral drug or vaccine for the virus has been found. COVID-19 is a relatively new virus that has had devastating effects within a short time of its detection in December 2019. Till date, there has been limited published data on population knowledge, attitudes and practices toward COVID-19, specifically in India. It is therefore of absolutely necessary to study the knowledge, attitudes and practices of the people to guide preventive efforts.

Lack of awareness can often lead to inadequate preparation to battle the condition and thereafter often lead to unwanted and uncontrollable levels of calamities. We in our study have tried to understand about the different aspects of the knowledge of the rural people of India about the COVID-19. During the initial few days of the study it was observed that the people had very less information regarding the disease. Gradually as the government started spreading more and more awareness amongst the rural people at the grass root level it was observed that they have started acknowledging the knowledge of the disease and also the importance of cooperation of the nation together towards fighting the disease during such times of global crisis (Vellingiri et al., 2020; Feng et al., 2020; Azlan et al., 2020). The average knowledge score of Indians in regard to COVID-19 was good 12.48±2.15 with an overall rate of 80%. The knowledge rates of COVID-19 ranged widely indicating that while some participants had high levels of knowledge on the disease, others did not. Malaysians more than 50 years of age had a higher knowledge scores, mainly due to their awareness about the high risk of the contraction of the disease and complications from the disease (Feng et al., 2020). But in our study we found that age group of 18-30 years had the maximum knowledge score. On the other hand, those with low monthly income scored among the lowest knowledge scores which were similar to our study. This can be due to less access to plausible and on time information about the virus (Azlan et al., 2020; Modi et al., 2020). Studies conducted in other Asian countries have indicated high levels of COVID-19 knowledge among the general population and healthcare workers (Van et al., 2020; Singhal, 2020).

Comparisons of knowledge levels across various studies were not possible due to difference in the scoring systems. 95.03% were aware of fever, cough, sore throat and breathing difficulties to be the major danger signs and 90.06% were convinced that the disease was transmitted by close contact with an infected person. Linear regression analysis showed that male gender, age group of more than 50 years, people who were unmarried with education of middle school and illiterate people with occupation of unskilled workers and unemployed had the lowest knowledge scores. The main sources of knowledge about COVID-19 were TV, mobile phones, social media, news (TV/video, magazines, newspapers), family, friends, school and health-care providers.

Feng et al. mentioned that proper disposal of the used masks and hand hygiene should be performed. More than 4.03% of the respondents were of the opinion that the use of a face mask/respirator is not essential or advised for asymptomatic normal individuals or people not in contact with a suspected or infected COVID-19 patient. Azlan AA et al. reported that half of the participants indicated that they did not wear a face mask when leaving the home. These measures are well known to prevent many infectious diseases particularly respiratory transmitted infections such as COVID-19. However, more than 75% of the participants supports the attitude of wearing mask and its practice as a preventive measure against the infection (Van et al., 2020). In our study 95.03% of the participants support the attitude of wearing face masks. Based on the attitude of the people and their practice of preventive measures shows that it might be due to the information which has been shared within the society. Thus it is important to have further awareness operations for controlling the spread of this disease. Correct hand hygiene practices has an important role in preventing the spread of infection. Azlan AA et al. stated that most participants are taking precautions such as practicing proper hand hygiene which shows that they are ready to take up good hygienic measures due to covid-19 crisis. Almost everyone in our study was washing their hands regularly few times in a day. The present study indicates that 11.79% people did not maintain social distances as well as 15.83% regularly met with friends and colleagues and 4.03% did not wear masks when they went outside. Though people had positive attitude towards COVID-19, most residents took precautions to prevent infection by COVID-19: by not going to crowded places and wearing masks when going outside. These stringent practices are due to the control measures carried out by the local government and also due to the good knowledge of the residents. Multiple regression analysis of attitude score showed that males, people more than 50 years of age, married people with education of middle school and illiterate and occupation of unskilled worker and unemployed with a family income <979 had the maximum attitude score which meant that they had more negative attitude towards covid-19 prevention.

In our study it was seen that 1.24% residents went to crowded places and 3.10% did not wear masks when leaving homes recently. As suggested by findings from previous studies regarding age and gender patterns of risk-taking behaviors, men and late adolescents are more likely to engage in risk-taking behaviors. Face masks can protect against both coarser droplet and finer aerosol transmission, though N95 respirators are more effective against finer aerosols, and may be superior in preventing droplet transmission as well (Roy et al., 2020; Mitja et al., 2020; Alzoubi et al., 2020). The earlier the masks are adopted the greater is the population-level benefit and at least some benefit is realized across a range of epidemic intensities. To control the spread of the virus lockdown measures were taken as rapid human-to-human transmission occurred (Zhong et al., 2020; Maheshwari et al., 2020; Huynh et al., 2020; Paules et al., 2020; Joshi et al., 2020). It was difficult to implement these measures due to lot of wrong information on social media. Azlan et al. observed that most participants were also taking precautions such as avoiding crowds (83.4%) and practising proper hand hygiene (87.8%) before the lockdown started. However, the wearing of face masks was less common (51.2%). He also noted that, 83.4% of participants reported that they were avoiding crowded places. Among various demographic groups, it was found that there were significant associations between age group, income category and avoidance of crowded places. 51.2% of participants reported wearing a face mask when going out in public and 48.8% participants did not wear a mask. Multiple regression analysis of practice scores showed female with age group >50 years, married people with education of middle school and illiterate and occupation of unskilled worker and unemployed people with family income <979 had lower practice scores. Educating such people on the various aspects of the fatality of the disease and of the survival time of the virus can help in their understanding of the need to disinfect the objects and practice hygiene (Paules et al., 2020; Joshi et al., 2020). Creating awareness amongst the rural public about the risk of acquiring the disease will help people to self-quarantine and simultaneously break the chain of the spread. But there was a major portion of the population who were aware of the major signs and symptoms of the disease and were well aware and educated about the disease and very well were following the guidelines like maintaining social distancing, using of face masks, regular hand washing, etc. in order to overcome the disease and thereby resume life back to normalcy (Gupta et al., 2020). Various drugs including antivirals and antimalarials are currently under trial. Hydroxychloroquine an antimalarial drug has shown to have antiviral activity against SARS- CoV-2 and can be used for chemoprophylaxis in high risk groups. Various clinical trials for the treatment of COVID-19 are underway and their results will be monitored closely (Alzoubi et al., 2020).

## 5. CONCLUSION

The people of rural area had a good knowledge about prevention of COVID- 19. Most of them had a positive attitude towards covid-19. And most of them were practicing these preventive measures. They considered that it was essential to follow the preventive measures to overcome this pandemic. Majority of the people believed that Indians will be able to win this pandemic. However small percentage of this population had little knowledge about the disease and was not practicing adequate measures. So it is essential to have more health education programmers to improve the knowledge and attitude of people thus increasing the preventive practices.

### Acknowledgement

We thank all the subject who had participated in this study and contributed to the samples in the study.

### Author Contributions

Dr. Amar Taksande: Concepts, design, definition of intellectual content, data analysis, statistical analysis, manuscript editing, and manuscript review.

Dr. Abhilasha Singh Panwar: data acquisition, data analysis, manuscript preparation

Dr. Syed Athhar Saqqaf: data acquisition, data analysis.

Dr. Rupesh Rao: Data acquisition, data analysis.

Dr. Revat Meshram: Manuscript preparation, manuscript editing, and manuscript review.

### Funding

This study has not received any external funding.

### Conflict of Interest

The authors declare that there are no conflicts of interests.

### Informed consent

Oral informed consent was obtained from all individual participants included in the study.

### Ethical approval

The study was approved by the Medical Ethics Committee of Datta Meghe institute of Medical sciences and research (Ethical approval code: DMIMS (DU)/IEC/May-2019/8725).

### Data and materials availability

All data associated with this study are present in the paper and available upon requested.

### Peer-review

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

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