

Health-Care Personnel's Perspective on COVID-19 Vaccination – A Cross-Sectional Study

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Abstract

Introduction: The COVID pandemic was a modern world disaster which had physical, psychological, and economical impact among the people. This made the governing agencies and others to rollout vaccine in a prompt basis. The objectives were to assess the attitude of health-care personnel toward COVID-19 vaccination using online survey and to assess the willingness of COVID-19 vaccination and factors affecting it among health-care personnel. **Materials and Methods:** We conducted a cross-sectional study using web-based platforms among 471 health-care personnel's within a period of a month (December 2020–January 2021). The study was conducted after obtaining institution ethic committee approval and informed consent. The questionnaire contains sociodemographic detail, COVID profile section, and questions which reveal the beliefs and attitude toward vaccination particularly COVID-19. The data collected was entered in Microsoft Excel and analyzed using SPSS version 16 software. **Results:** Among the participants, 56 (11.9%) were diagnosed with COVID-19 and 119 (25.3%) were not willing to take vaccine. Participants who were hesitant about the role of vaccine in immunity, afraid of side effects, doubtful about effectiveness and protection and who doubt about the production involving cost and supply have showed unwillingness to vaccination ($P < 0.05$). **Conclusion:** A quarter of the present study population showed unwillingness to take COVID vaccine, and evidence of uncertainty about the vaccine safety and production was exposed in the study. The results should be looked upon gravely as the issues appeared here can be maximized when the vaccine rollout happens in public.

Keywords: Attitude, COVID-19 vaccine, health-care personnel, perspective

INTRODUCTION

“Necessity is the mother of invention.” As the ancient proverb rightly states, great discoveries happened only following the desperate need and vaccine is one among them. At olden times, many people suffered and died due to epidemics and pandemics resulted from communicable infectious diseases. Vaccines were born out of this desperate need, to find a permanent cure from those infectious diseases.^[1]

According to CDC, vaccine is defined as “A product that stimulates a person's immune system to produce immunity to a specific disease, protecting the person from that disease. Vaccines are usually administered through needle injections but can also be administered by mouth or sprayed into the nose.”^[2]

As the time passed, many epidemics and pandemics kept emerging. COVID-19 which initially started as atypical

pneumonia has affected many millions of people in the world at present and emerged as one of the biggest pandemics in human history. The virus is continuing to affect many and this led to the desperate need for the cure against COVID-19.^[3,4]

Many clinical and experimental studies were started all over the world to understand disease epidemiology and pathogenesis. In late 2020, when the SARS-COV-2 strain was identified, many world nationals started research for finding a vaccine against COVID-19. There are currently more than 50 COVID-19 vaccine candidates in trials. As of January 2021, around 4 vaccines are in the clinical trials, and India's indigenous COVID-19 vaccine, COVAXIN™ is in Phase 3 human clinical

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trials before it can be administered to people.^[5] However, the number of COVID-19 cases has significantly dropped low in the past few months, and many discrepancies and controversies are rising against the need for COVID-19 vaccination.

The hastiness of policymakers and the officials made it demandable that the COVID vaccines should be made public even during the lowering of cases in the pandemic. The vaccination production and implementation which usually happen after decades of research have made fast due to the increasing demands of the officials. This made the improper or uncompleted phases of vaccine trials which are viewed cautiously by the public as well as by health professionals. Furthermore, a recent survey showed that even many health-care professionals are up against COVID-19 vaccination, which is an eye opening.^[6] Vaccine hesitancy should be carefully viewed as the controversies regarding approved vaccine are rolling up among the public and health-care providers. Careful measures in rolling out a fast-track vaccine should be done as it would be influenced by broader political, religious, social, and historical factors.^[7]

The study tried to identify the attitude of health-care professionals in the administration of the vaccine and the COVID profile among them. The attitude of health-care workers should be taken into account while rolling out the vaccine initiative and issues which ponder the personnel should be considered before providing vaccines to the public.

Objectives

1. To assess the attitude of health-care personnel toward COVID-19 vaccination using online survey
2. To assess the willingness of COVID-19 vaccination and factors affecting it among health-care personnel.

MATERIALS AND METHODS

We conducted a cross-sectional study using web-based platforms among health-care personnel's within a period of a month (December 2020–January 2021). The data were collected from among the health-care providers whom can be contacted through social media platforms and e-mail facilities. The study was rolled out and completed before the initial vaccination drive happened in India. Ethics committee approval (IECHS/IRCHS no: 80 February 23, 2021-Dhanalakshmi Srinivasan Medical College Hospital) and informed consent were taken before the start of the study. This clinical research was done following the ethical principles for medical research involving human participants in accordance with the Declaration of Helsinki 2013.

The sample size was calculated using the anticipated 50% positive willingness toward vaccine and after applying the formula, $n = Z\alpha^2 PQ/d^2$ ($Z\alpha=1.96$, $P=50$, $Q=50$, $d=5$), the sample size came up to 384. The study collected data from 471 participants. The questionnaire was pretested on 15 health-care professionals who were later on excluded from the study and analysis. The internal consistency of the study questionnaire

was evaluated by calculating Cronbach's alpha. The values were 0.81 for attitude section of the study.

The objective was assessed using a questionnaire made up through the G suite application and disseminated through social media platforms and other applications. The questionnaire contains 3 parts – sociodemographic profile, COVID profile, and attitude toward vaccination. The sociodemographic detail included age, gender, occupation, religion, and education qualification. The COVID profile section collected information about the occurrence of disease and other relevant information. The third section included questions which reveal the beliefs and attitude toward vaccination particularly COVID-19. The answer of every item was based on Likert scale. The data collection was made anonymous without collecting any link to the respondent such as name, E-mail, or work organization, and participants provided informed consent to participate.

The data collected was entered in Microsoft Excel and analyzed using SPSS version 16 software (SPSS Inc. Released 2007. SPSS for Windows, Version 16.0. Chicago, SPSS Inc.). The descriptive analysis was analyzed using frequencies, mean, standard deviation, and proportions. Tests of association were performed using appropriate tests such as Chi-square test and one-way ANOVA test for the bivariate analysis. Variables which were found statistically significant in bivariate analysis were considered for binary logistic regression to expose the definitive predictor factors.

RESULTS

A total of 471 responses were obtained in the study duration. The majority of participants 293 (62.21%) were females and 243 (51.59%) belonged to the age group of 20–29 years. The mean (standard deviation) age was 30.07 (10.09) years.

The participants were from different states in India – Andhra Pradesh, Tamil Nadu, Karnataka, Kerala, of which 340 (72.19%) comprised from Tamil Nadu state. Most of the participants 205 (43.52%) were by professional doctors and 206 (43.74%) had highest education as postgraduation degree. Among the participants, 236 (50.11%) were single and comorbidities were present in 90 (19.11%) of the participants. The most common comorbidities were diabetes 23 (4.88%), hypertension 15 (3.18%), and rheumatoid arthritis 6 (1.27%). The complete sociodemographic profile of the participants is shown in Table 1. Among the participants, 56 (11.9%) were diagnosed with COVID-19, 114 (24.2%) had their family members diagnosed with COVID-19, and 17 (3.6%) had occurrence of death in your family. Other description about COVID-19 was given in Figure 1. Figure 2 shows the attitude among participants toward COVID-19-related practices and responses toward the reliable source of COVID-19-related information according to the participants. The participants were asked to express their opinion about the various modalities of treatment against COVID-19. According to population, 269 participants had strongly agreed that allopathy is a better treatment for COVID-19. Figure 3 shows the opinion about various systems of treatment.

Table 1: Sociodemographic profile

Variables	Categories	Total (n=471), n (%)
Age groups (years)	20-29	243 (51.59)
	30-39	158 (33.55)
	40-49	40 (8.49)
	50-59	23 (4.88)
	>60	7 (1.49)
Gender	Female	293 (62.21)
	Male	178 (37.79)
Religion	Hindu	368 (78.13)
	Christian	62 (13.16)
	Muslim	32 (6.8)
	Others	9 (1.91)
Occupation	Doctor	205 (43.52)
	MBBS student	191 (40.56)
	MSW	3 (0.64)
	Nurse	22 (4.67)
	Medical postgraduate students	50 (10.61)
Education	Higher secondary	191 (40.56)
	Under-graduate	50 (43.31)
	Postgraduate	206 (43.74)
	Super-specialty	24 (5.09)
State	Tamil Nadu	340 (72.19)
	Kerala	62 (13.16)
	Karnataka	26 (5.52)
	Andhra Pradesh	2 (0.42)
	Pondicherry	4 (0.85)
	Others	37 (7.86)
Marital status	Married	226 (47.98)
	Divorced	6 (1.27)
	Separated	2 (0.43)
	Single	236 (50.11)
	Widow	1 (0.21)
Co-morbidities	None	381 (80.89)
	Asthma	24 (5.1)
	Diabetes	23 (4.88)
	Hypertension	15 (3.18)
	Rheumatoid arthritis	6 (1.27)
	Thyroid-related problems	4 (0.86)
	Dust allergy	3 (0.64)
	Dyslipidemia	3 (0.64)
	Gynecological problems	3 (0.64)
	Heart-related problems	3 (0.64)
	Autoimmune disease	2 (0.42)
	Malignancy	2 (0.42)
	Lung-related problems	1 (0.21)
	Nephropathy	1 (0.21)

The participants were asked about the attitude toward COVID-19 vaccine and were asked to respond in Likert scale. The negative questions were reversely coded and given a score of 1 – for negative agreement to 5 – for positive agreement. For the categorization, responses were clubbed into three as agree, disagree, and neutral. Table 2 represents the response among participants about attitude toward COVID-19 vaccine. The

response for willingness of administering COVID-19 vaccine was shown in Figure 4. The association of age, gender, religion, occupation, education, and marital status was not related to the willingness to take vaccine (independent *t*-test and Chi-square test, $P > 0.05$). The previous history of COVID diagnosis and willingness of vaccine was not significantly associated with each other. 17 (30.4%) of participants who had positive COVID diagnosis showed unwillingness for COVID vaccine. The relation of attitude to vaccine and willingness is shown in Table 3. Table 3 shows that participants who were hesitant about the role of vaccine in immunity, afraid of side effects, doubtful about effectiveness, and protection and who doubt about the production involving cost and supply have showed unwillingness to vaccination ($P < 0.05$).

The binary logistic regression of the above significant variables showed that participants who had a positive attitude about importance of vaccine, belief in acquired immunity, nil hesitance about side effects, about postvaccination sickness, confident about effectiveness of vaccine, and lifelong protection had 5.6, 2.86, 2.37, 2.39, 3.59, and 5.21 times chance of willingness to vaccinate in compared to participants who are unwilling ($P < 0.05$, Cox and Snell R^2 : 21.8%, Hosmer–Lemeshow Goodness of Fit test— χ^2 : 8.21, df 8, $P = 0.413$). Table 4 shows the association of attitude questions and occupation. Nurses and MBBS students were agreeing more toward natural immunity, lifelong protection of COVID vaccine, more effectiveness of COVID drugs, and manufacturing issues. The disagreement was pronounced in doctors about the lifelong protection and essentiality only at the second wave.

DISCUSSION

The study is done to assess the attitude of health-care professionals toward COVID-19 vaccination. In the study, 56 (11.9%) were diagnosed with COVID-19. In a study done in central part of India, 11% was the prevalence among health-care workers.^[8] Other studies from various parts of the world showed a seroprevalence ranging from 1 to 17% among health-care workers.^[9-12]

In our study, 90.7%, 85.99%, and 87.69% of health-care professionals perceived mask usage, social distancing, and handwashing were very important in preventing COVID-19. In a study done in Saudi Arabia, 97.2% agreement was obtained for social distancing, 77.8% for wearing masks, and 96.6% for handwashing practices as effective method to prevent transmission of COVID-19.^[13] A study done in Uganda^[14] showed that 55% of health-care workers were in a perception that face mask would help in preventing disease transmission, and also previous initial studies during pandemic showed that decreasing contact and practicing social distancing can prevent the transmission of disease.^[15,16]

In the study, 37.4% perceived that comedical fraternity was the most reliable source for COVID-19-related information, 25.3% from internet/journals, 17.2% from social media,

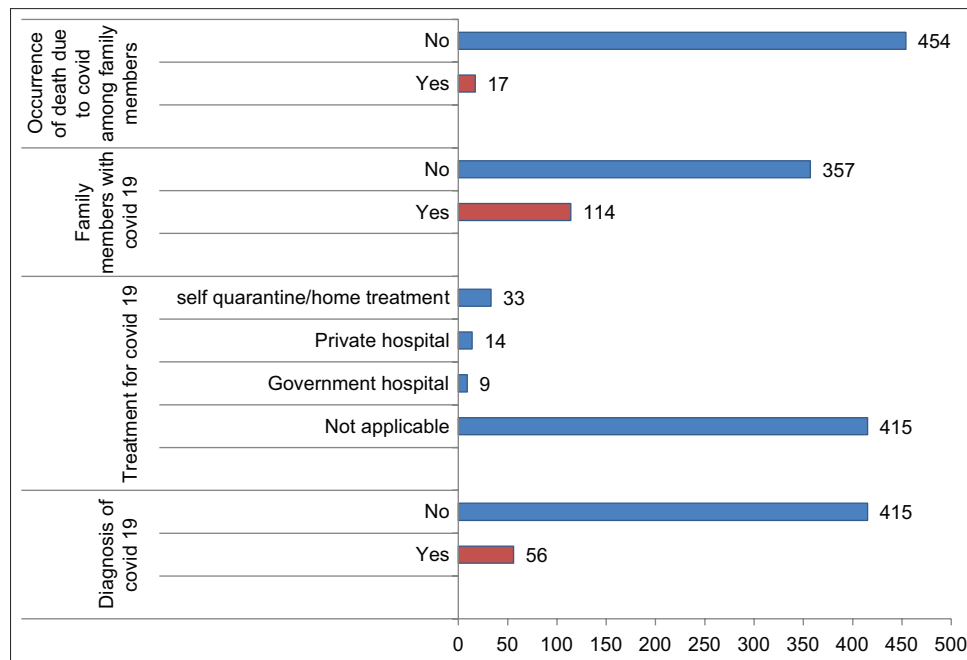


Figure 1: COVID profile among the participants

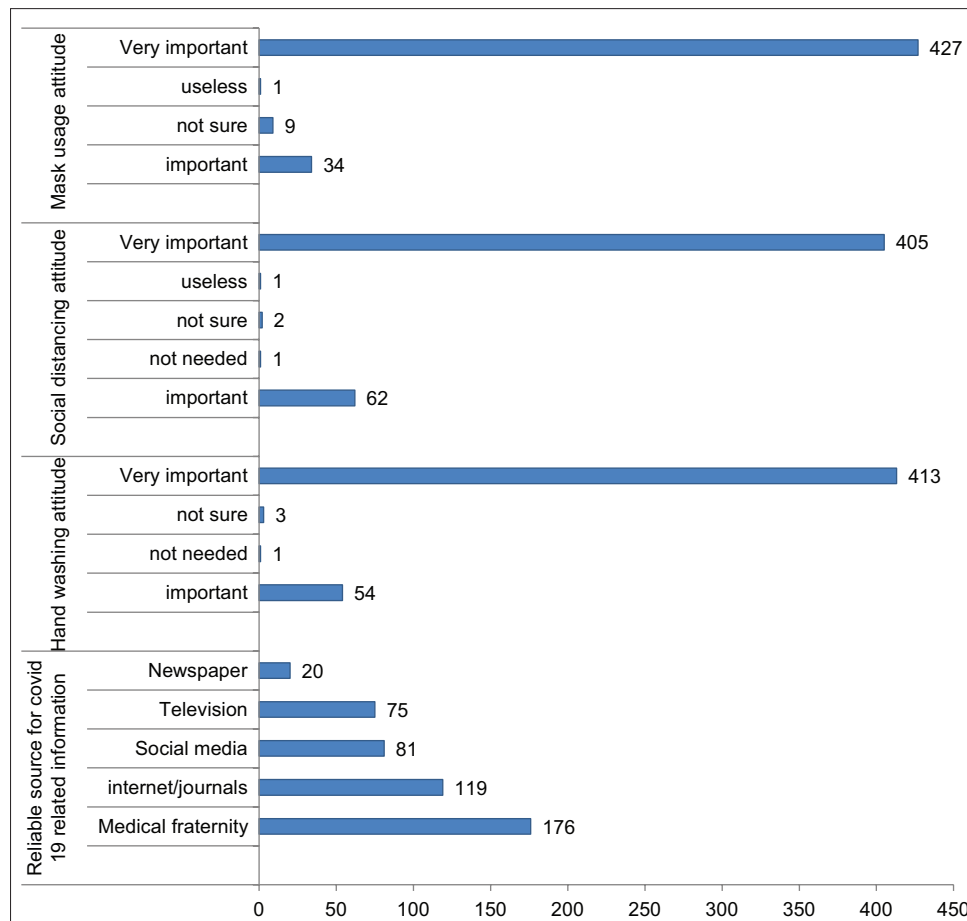


Figure 2: Attitude of COVID-related practices

and 15.9% from television. A study done at the United Arab Emirates showed that most participants had taken information

from government websites and social media. Furthermore, the study showed that discussion used to be done among family

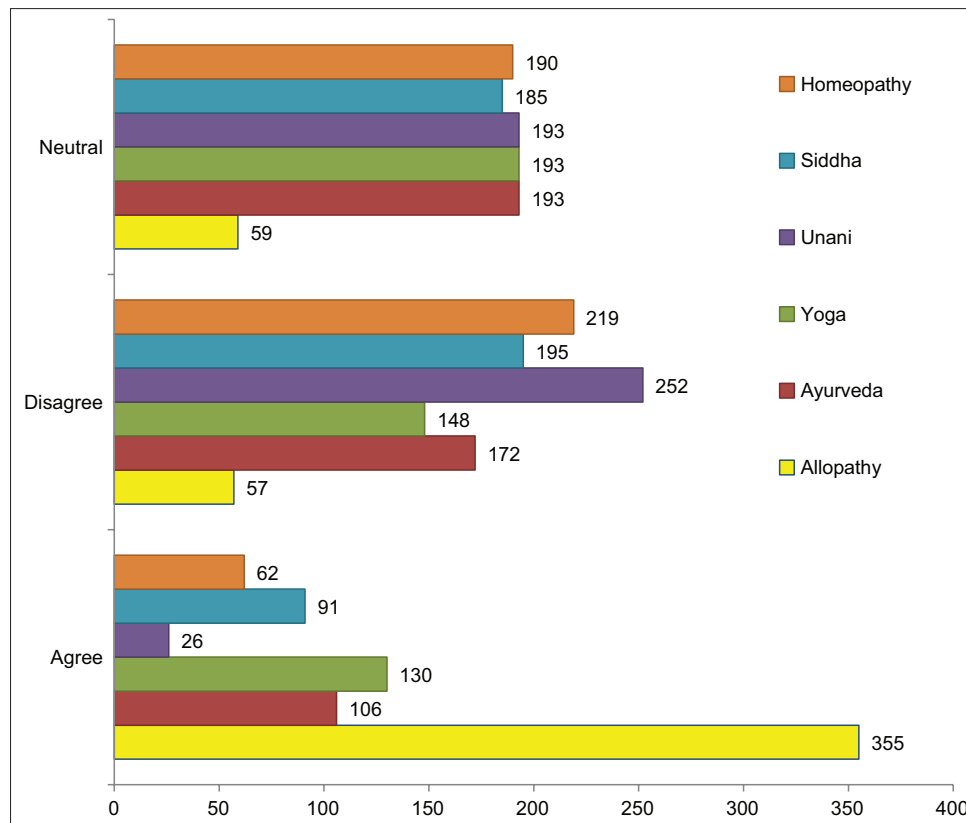


Figure 3: Opinion of participants about COVID-19 treatment system

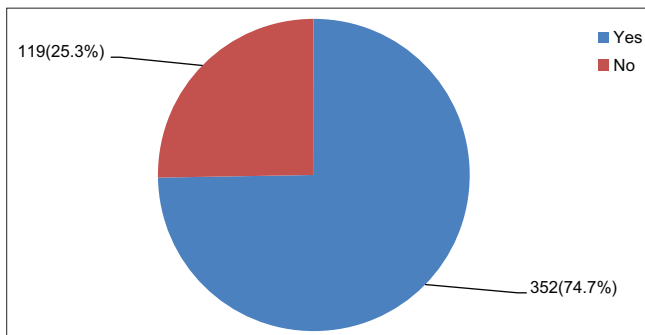


Figure 4: Willingness of administering COVID-19 vaccine

and friends.^[17] Nigerian study showed that health-care workers were getting information from television and social media.^[18] Our study had a major amount of doctors as participants which made the data source more reliable from internet/journals. However, the increased extraction of information from social media which did not have peer review and high chance of manipulation should be prevented so to avoid panic and spread of hypocritical data.^[19-25]

In our study, most of the participants (75.37%) agreed for the allopathy system of medicine as the preferred treatment for COVID-19 and 27.6% on Yoga, 22.51% on Ayurveda, and 19.32% on Siddha system as preferred one. Furthermore, in the study, 53.5% had disagreed on Unani, 46.5% on Unani, and 41.4% on Siddha. The result showed an increased deviation

toward allopathy as the study majorly covered practicing physicians. The disagreement on treatment system should have been based on the information reached through social media and newspapers. The proper documentation of each system on the cure and reduced infectivity rate among the COVID-19 patients would make valuable addition to the existing management.

The general questions about the vaccine indicating the confidence about the use of it to reduce or eliminate disease, acquired immunity, effectiveness, and benefit were viewed positively among 77.3%, 39.5%, 68.8%, and 60.5% participants. The interference of religious beliefs and confidence of not getting any infectious disease were present among 2.3% and 12.1% of the participants. The fear for side effects and postvaccination infection was found among 42.9% and 28.9% of the participants. The introduction of vaccine to health-care workers and dependable were viewed by 55.4% and 68.8% participants. In the study, 13.2% inclined more toward foreign COVID vaccine than an indigenous one and 8.7% felt that drugs would be more effective than vaccine. Need for waiving of cost, involvement of pharmaceutical companies, and corruption was agreed by 70.1%, 25.7%, and 55.4% among the participants.

In a study done in the USA, 46.0% agreed that a coronavirus vaccine would protect them from COVID-19 disease, and 27.8% stated that they were not confident in the production

Table 2: Attitude toward COVID-19 vaccine

Questions	Mean (SD) of the score	Agree, n (%)	Neutral, n (%)	Disagree, n (%)
I believe vaccines are important for reducing or eliminating serious diseases	4.07 (1.07)	364 (77.3)	70 (14.9)	37 (7.8)
I believe more in natural immunity acquired through disease than in vaccine	2.87 (1.17)	186 (39.5)	149 (31.6)	136 (28.9)
I think vaccine do more harm than good	3.80 (1)	40 (8.5)	146 (31)	285 (60.5)
I am afraid of the side effects of vaccination	2.83 (1.15)	202 (42.9)	139 (29.5)	130 (27.6)
My religious beliefs are against vaccinations	4.55 (0.81)	11 (2.3)	4 (8.9)	418 (88.8)
I do not think I'm at risk of contracting any infectious disease	3.89 (1.09)	57 (12.1)	93 (19.7)	321 (68.2)
I am afraid of getting sick after getting vaccinated	3.14 (1.05)	136 (28.9)	172 (36.5)	163 (34.6)
I believe vaccines are not effective	3.89 (0.93)	30 (6.4)	117 (24.8)	324 (68.8)
I believe vaccinations among HCWs are prerequisite for working in health-care sectors	3.55 (1.16)	261 (55.4)	135 (28.7)	75 (15.9)
Foreign COVID-19 vaccine is more effective than Indian COVID-19 vaccine	3.34 (0.99)	62 (13.2)	241 (51.2)	168 (35.6)
COVID-19 vaccine protects from COVID-19 lifelong	2.33 (0.93)	40 (8.5)	163 (34.6)	268 (56.9)
COVID-19 drugs are more effective than COVID-19 vaccines	3.59 (0.90)	41 (8.7)	188 (39.9)	242 (51.4)
Vaccination at present is necessary among elderly and co-morbid persons	3.83 (1.10)	324 (68.8)	108 (22.9)	39 (8.3)
I feel the government should provide vaccine free of cost to everyone	3.96 (1.10)	330 (70.1)	97 (20.6)	44 (9.3)
I feel the health-care providers should get it free of cost	4.09 (1.09)	351 (74.5)	81 (17.2)	39 (8.3)
COVID-19 cured persons doesn't need vaccination	3.64 (0.96)	51 (10.8)	129 (27.4)	291 (61.8)
The vaccine is essential only at the start of the second wave	2.17 (0.89)	36 (7.6)	109 (23.2)	326 (69.2)
The vaccine storage problems will affects the effectiveness	3.58 (1.04)	268 (56.9)	137 (29.1)	66 (14)
Pharmaceutical companies are promoting vaccines for profit even though it is unnecessary	2.82 (1.12)	121 (25.7)	174 (36.9)	176 (37.4)
Corruption (cost and supply) will be involved in providing vaccines	3.61 (1.08)	261 (55.4)	159 (33.8)	51 (10.8)

HCWs: Health-care workers, SD: Standard deviation

procedures. Furthermore, most participants had agreed on the usefulness, safety, and effectiveness of vaccine.^[26]

In the study, 25.3% were not willing for the COVID-19 vaccine. The participants were hesitant about the role of vaccine in immunity, afraid of side effects, doubtful about effectiveness, and protection and who doubt about the production involving cost and supply have shown unwillingness to vaccination. In the USA study, 47.3% were unwilling for COVID-19 vaccine. Among those unwilling, 49.9% would prefer to wait and see how the vaccine affects others first and 16.6% would not get it soon but indicated they might in the future; 1.31% never intend to get vaccinated. Participants with reduced patient contact had higher odds in refusing vaccine.^[26] The study did not show any gender or occupational differences in the willingness of vaccine. However, study has showed that nurses and female gender showed more hesitancy in accepting vaccine.^[26] The increased proportion of "neutral" responses in this context could indicate a lack of assuredness over the alleged safety of all vaccines or due to the wait and watch approach followed by them. In a study done in Congo, about 27% were willing to get vaccinated and the reason quoted due to lack of proper information and infodemic.^[27] Another study showed about 75% of the participants agree for vaccination.^[28] In a study done in the UK, 14% were willing to receive^[29] and a study in the USA showed 56% unsure about vaccination once it is available.^[30]

The inclusions of participant who have access to internet or gadgets favoring the response led to limiting the result. Nonprobability sampling and conduction of data collection within the networks of the researcher/s or networks accessible to the researcher/s made another limitation. The survey

was conducted at the time when the vaccine rollout created controversy with their limited period of experiment, and this attitude can change any time after that. The unequal distribution among the health-care personnel and also majority of the responses from the southern parts of India decreases the generalizability of results.

The study recommends a better substitute approach in rolling out vaccine to the public as a clear understanding among health professionals is lacking. The health-care professionals as primary beneficiaries of vaccine should be able to have a clear-cut understanding as high chance of replicating the same effect in public. The effectiveness, need, and safety should be exposed and made public to avoid any criticism against the fast-track trial phases without much long postmarketing surveillance. The policymakers and agencies should prioritize to clear the hesitation in public minds using the health-care professionals' experience and data. Subsequent study should be done among cohort of health-care professionals who had taken vaccination during the vaccine rollout to identify the effectiveness, safety, and adverse reactions.

CONCLUSION

The study showed that about 25% of the participants were not willing to vaccinate. The participants were skeptical about the effectiveness, side effects, postvaccination sickness, and influence of deciding agencies in vaccine distribution. The need of the vaccine to the public should be clearly defined and disseminated before its scheduling. The research results presented here can guide the governing agencies in reaching the public groups once it is rolled out.

Table 3: Association of attitude to COVID vaccine and willingness for vaccination

Willingness for vaccination	Agree	Neutral	Disagree	P
I believe vaccines are important for reducing or eliminating serious diseases				
Yes	289	43	20	<0.001*
No	75	27	17	
I believe more in natural immunity acquired through disease than in vaccine				
Yes	122	115	115	<0.001*
No	64	34	21	
I think vaccine do more harm than good				
Yes	23	92	237	<0.001*
No	17	54	48	
I am afraid of the side effects of vaccination				
Yes	126	112	114	<0.001*
No	76	27	16	
I am afraid of getting sick after getting vaccinated				
Yes	77	133	142	<0.001*
No	59	39	21	
I believe vaccines are not effective				
Yes	12	66	274	<0.001*
No	18	51	50	
COVID-19 vaccine protects from COVID-19 lifelong				
Yes	35	141	176	<0.001*
No	5	22	92	
Pharmaceutical companies are promoting vaccines for profit even though it is unnecessary				
Yes	77	120	155	<0.001*
No	44	54	21	
Corruption (cost and supply) will be involved in providing vaccines				
Yes	180	129	43	0.006*
No	81	30	8	

Chi-square tests. * $P < 0.05$ is significant**Table 4: Association of demographic variables occupation and attitude**

Questions	Doctor	MBBS students	MSW	Nurses	Postgraduate students	P
I believe more in natural immunity acquired through disease than in vaccine	2.70 (1.10)	3.01 (1.19)	3.00 (1)	3.3 (1.25)	2.84 (1.18)	0.034*
I do not think I'm at risk of contracting any infectious disease	3.65 (1.10)	4.15 (1.04)	3.33 (0.58)	4.09 (0.87)	3.76 (1.17)	<0.001*
COVID-19 vaccine protects from COVID-19 lifelong	2.61 (0.89)	2.04 (0.84)	2.67 (0.58)	2.05 (1.05)	2.40 (0.97)	<0.001*
COVID-19 drugs is more effective than COVID-19 vaccines	3.42 (0.81)	3.72 (0.94)	3.00 (0)	3.91 (0.97)	3.64 (1.03)	0.004*
Vaccination at present is necessary among elderly and co-morbid persons	3.88 (0.93)	3.90 (0.99)	3.33 (0.58)	3.14 (1.32)	3.72 (1.09)	0.01*
I feel the government should provide vaccine free of cost to everyone	4.05 (1.03)	3.92 (1.11)	4.33 (0.58)	3.27 (1.32)	4.02 (1.19)	0.03*
The vaccine is essential only at the start of second wave	2.26 (0.94)	2.17 (0.89)	2.67 (0.58)	1.82 (0.59)	1.88 (0.75)	0.02*
The vaccine storage problems will affects the effectiveness	3.43 (0.99)	3.75 (1.03)	3.67 (0.58)	3.3 (1.29)	3.58 (1.14)	0.03*

The values are represented as mean (SD). * $P < 0.05$ by one-way ANOVA test. SD: Standard deviation

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Conflicts of interest

There are no conflicts of interest.

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