Acceptance of COVID-19 Vaccination Among Health Care Workers in India

Nitin Tiwari[1], Ankita Goyal[2], Mukesh Sharma[3], Devendra Kumar[4*], Chandramani Yadav[5], Amol Gite[6]

[1-5]Department of Community Medicine, Autonomous State Medical College, Firozabad, Uttar Pradesh, India
[6]Department of Community Medicine, National Institute of Medical Sciences, Jaipur, Rajasthan, India

Abstract

Background: The coronavirus disease 2019 has been spread almost all over the world in the last two years, including in India. Vaccines are a critical tool in the battle against COVID-19, and India has flagged the largest vaccination drive on 16 January 2021. Although public acceptance was varying, which can lead to non-acceptance.

Aim & Objective: To estimate an acceptance of the COVID-19 vaccine and its associated factors.

Settings and Design: An analytical cross-sectional study among health care workers in India

Methods & Material: It was conducted using a validated, self-administrated online survey questionnaire, and data were analyzed using SPSS 23 version. The outcome variable was healthcare workers' acceptance of a COVID-19 vaccine.

Results: A total of 450 HCWs participated, including 205(45.6%) women and 245(54.4%) men. A total of 270 (60%) subjects will accept vaccines, while 33.3% were unwilling to accept and wait for vaccines. Male gender (OR=3.14), being married and experienced (OR=11.49), vaccine effectiveness (OR=6.4), vaccine safety (OR=3.4), and past history (OR=2.28) were significantly associated. On applying logistic regression for associated factors, gender (B= -1.145, S.E.= 0.200, Wald 32.748), being married (B= -1.482, S.E.= 0.216, Wald 46.937), for experienced (B= -0.865, S.E.= 0.200, effectiveness (B= -1.856, S.E.= 0.245, wald 57.431), Safety (B= -1.224, S.E.= 0.202, Wald 36.633) and past history (B= -0.357, S.E.= 0.248, Wald 2.071) found significant.

Recommendation: Proper information is crucial and healthcare workers' attitudes about vaccines are an important factor for acceptance and recommendation of the vaccine to the public for population-wide coverage.

Keywords: COVID-19 Vaccines, COVID-19, Vaccine acceptability.

INTRODUCTION

A new type of coronavirus (severe acute respiratory syndrome coronavirus 2: SARS- CoV-2) that began in Wuhan, China in late 2019 has spread across the world. On 30 January 2020, WHO declared the outbreak a Public Health Emergency of International Concern (PHEIC) and on 11 March 2020, a pandemic.[1]

Leaving in its wake more than 12 million infections, over 5,50, 000 deaths, and economic loss of trillions of dollars to date. The SARS-CoV-2 pandemic has devastated the most vulnerable in our society- adults 65 years or older, a person with underlying conditions, and the economically deprived. The threat is ongoing, as several locally mutated variants have been identified. The disease burden is still increasing, and new variants have been found to demonstrate high virulence and severity. As vaccines are a critical tool in the battle against COVID-19 and thereby stem complications and deaths resulting from the transmission of the disease. More than 200 COVID-19 vaccines are in development worldwide out of which access is the only issue.[2,3]

Address for correspondence: Devendra Kumar,
Department of Community Medicine, Autonomous State Medical College,
Firozabad, Uttar Pradesh, India
E-mail: devendrakumar224224@gmail.com

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Table 1: Sociodemographic factors of healthcare workers

Variables		Frequency	Percentage (%)
Gender	Male	245	54.6
	Female	205	45.4
Age (years)	18–30	180	40
	30–40	220	48.9
	40 and above	50	11.1
Marital status	Married	270	60
	Unmarried	180	40
Institution	Medical Institution and Hospitals	390	86.7
	Private hospitals and others	60	13.3
Experience	More than 5 Years	280	62.2
	Less than 5 Years	170	37.8

Vaccination against COVID-19 has flagged by the government of India on 16 January, 2021, with the vaccination of healthcare workers (HCWs) and planning to be immunized all of its citizens in a phase-wise manner. India has approved two vaccines, Covaxin and Oxford/AstraZeneca-Covishield.[4] However, to achieve the desired coverage, vaccine acceptance is crucial. Considering the novelty of the disease and the very short duration invested in vaccine development, vaccine refusal and delay were expected. Vaccine hesitancy, an old social phenomenon, is defined by the WHO as the delay in acceptance or refusal of vaccination despite the availability of vaccination services. The phenomenon is widely prevalent in all groups of the population including HCWs.[5]

Bhondve *et al.'s* study addressed the determinants of vaccine acceptance among HCWs and non-HCWs. The variables such as presence of any comorbidity, lower age, history of SARS-COV2, and relatives affected with SARS-COV2 in the past, did not affect the decision of acceptance or non-acceptance of COVID vaccine. It found that female gender, paramedical workers and medical professionals who did not do any COVID ward duties exhibited non-acceptance.[6] while Jeffrey V *et al.*'s study observed that Men in were less likely than women to accept vaccines.[7] In terms of gender, Kabamba Nzaji *et al.* study observed that more men accepted getting vaccinated compared to women.[8]

Although, healthcare workers have played a vital role as front-line warriors with the highest direct exposure and risk of getting infected. Their attitude toward vaccine acceptance plays a major role in public responses as they rely on HCWs' recommendations to guide their decisions. Additionally, their knowledge about vaccination lays the pavement for public acceptance of vaccination and reduced hesitancy. With this background, this study has been planned among healthcare workers with the objectives. To estimate an acceptance of the COVID-19 vaccine among healthcare workers and its associated factors.
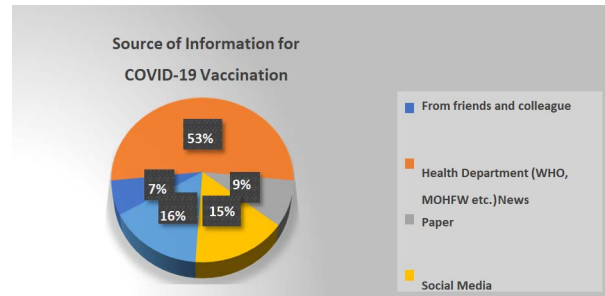

Figure 1: Distribution of Source of information for COVID-19 vaccination

MATERIALS AND METHODS

An analytical cross-sectional study was conducted among healthcare workers aged 18 years or older who were willing to participate, working in various medical institutions and hospitals across India from 15 January 2021 to 30 March 2021. Data were collected by using a validated, self-administrated online survey questionnaire prepared in Google form for determining the knowledge and acceptance of COVID-19 vaccination and various factors determining it. The questionnaire consisted of two parts. First part was comprised of demographic variables, including age, gender, marital status, years of working experience, and the source of information related to COVID-19. The second part included questions about vaccination knowledge, acceptance of vaccines, and the unwillingness with reasons.

Data were retrieved in the form of a Google Sheet and analyzed by using frequency tables and proportions. The main outcome variable was healthcare workers' acceptance of a COVID-19 vaccine. Statistical analyses have been conducted with SPSS software version 23.0 (Chicago, IL, USA). The Chi-square test and odds ratio has been used to test the statistical significance of the association. Odds ratios (OR) have been calculated for sociodemographic and vaccine-related factors with their respective 95% confidence intervals (CIs) to obtain the strength of association between them. Further, the associated factors affecting acceptance were identified through logistic regression analysis.

RESULTS

All respondents who have completed the study questionnaire were included in the study. A total of 450 HCWs participated were selected randomly using computer-generated numbers, including 205(45.4%) women and 245(54.6%) men. The average age was 32.7 years[standard deviation [SD]: 5.6] and most of the participants were between 30–40 years of age 220 (48.9%). The majority of participants (86.7%) were from medical institutes and hospitals and about 62% had over 5 years of experience (Table 1). Most of the study subjects (95.5%), had responded that they heard about the launch of COVID-19 vaccination in India and most of them have got information from health officials like WHO & MoHFW, etc. 239 [53.1%] followed by social media and television [15.1% each] (Figure 1).

Table 2: Association of sociodemographic factors with acceptance of COVID-19 vaccine

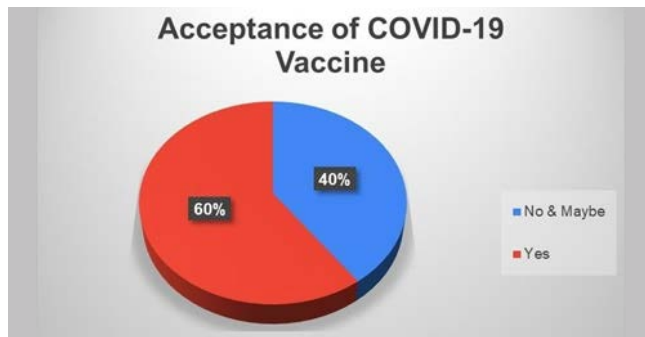| Variables	Acceptance of covid-19 vaccine		OR (CI 95%)	p-value
	Yes	No		
Gender				
Male	180	65	3.14	
Female	90	115	(2.12–4.65)	0.0055
Age				
<35	180	130	0.76	
More than 35	90	50	(0.51–1.16)	1.3615
Marital status married unmarried	190 80	80 100	0.22 (0.14–0.34)	0.001
Institution Medical institutions Hospitals, clinics & others	230 40	160 20	0.71 (0.40–1.27)	0.4870
Experience >5 Years <5 Years	190 80	90 90	1.42 0.48–1.62	0.001

Figure 2: Distribution of acceptance of COVID-19 vaccination among study subjects

Vaccine Acceptance and Associated Factors

Our study's main outcome variable was healthcare workers' acceptance of a COVID-19 vaccine. Out of total study subjects, 60% has been responded that they would take a COVID-19 vaccine as recommended by the government of India while the remaining 40% were either unwilling to accept or wait for the vaccine to be generally available. (Figure 2**)**.

Further, respondents had asked about the reasons for their non-acceptance or unwillingness of the vaccines. The vaccine effectiveness 340 (75.6%) was the leading factor, followed by the safety of the vaccine 230 (51.1%), 320 (71.1%) possible side effects, 150 (33.3%) myths or misconceptions, and history were 80 (17.7%) [multiple responses] (Figure. 3).

The association of various factors of vaccination acceptance has been identified by odds ratio. Male gender (OR=3.14, 95% CI: 2.12–4.65), being married and being experienced healthcare workers (OR=11.49; 95% CI: 5.88–

Table 3: Association of main reasons with acceptance of COVID-19 vaccine

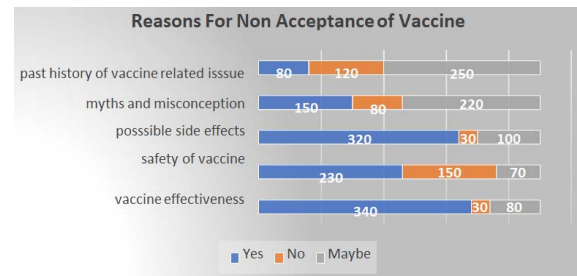| Variables	Acceptance of COVID-19 Vaccine		OR (CI 95%)	p-value
	Yes	No		
Effectiveness				
Yes	240	30	6.4	
No	100	80	(3.95–10.34)	0.0001
Safety				
Yes	170	100	3.4	
No	100	120	(2.25–5.05)	0.0001
Side effects				
Yes	190	130	0.91	
No	80	50	(0.60–1.38)	0.6712
Past History				
Yes	60	20	2.28	
No	210	160		0.003
			(1.32–3.94)	
Myths				
Yes	40	30	0.86	
No	230	150	(0.51–1.45)	0.5956

Figure 3: Reasons for non-acceptance of COVID-19 vaccination

22.46) were significantly associated with vaccineacceptance (Table 2). On analysis of association with the main reason for vaccination acceptance, effectiveness (OR=6.4, 95% CI: 3.95–10.34), vaccine safety (OR=3.4, 95% CI:2.25–5.05) and past history (OR=2.28; 95% CI: 1.32–3.94) were significantly associated (Table 3). The associated factors of vaccination acceptance have been identified through logistic regression analysis. The logistic regression predicted the associated factors for the acceptance and non-acceptance of COVID-19 vaccines.

On applying logistic regression analysis, B= -1.145, S.E.= 0.200, Wald 32.748, *p-value*= 0.000 for gender (Female *vs* Male), B= -1.482, S.E.= 0.216, Wald 46.937, *p-value*= 0.000 for marital status (married vs unmarried) and B= -0.865, S.E.= 0.200, Wald 18.712, *p-value*= 0.000 for experience (> 5 years *vs* < 5 years) in associated sociodemographic factors (Table 4). On considering logistic regression analysis with associated main reason, B= -1.856, S.E.= 0.245, Wald 57.431, *p-value*= 0.000 for effectiveness, B= -1.224, S.E.= 0.202,

Table 4: Logistic Regression analysis for sociodemographic factors with acceptance of COVID-19 vaccine

Variable	B	S.E	Wald	DOF	p-value
Gender	- 1.145	0.200	32.748	1	0.000
Marital status	- 1.482	0.216	46.937	1	0.000
Experience	- 0.865	0.200	18.712	1	0.000

Wald 36.633, *p-value*= for safety and B= -0.357, S.E.= 0.248, Wald 2.071, *p-value*= 0.000 for past history (Table 5).

Table 5: Logistic Regression analysis for main reasons with acceptance of COVID-19 vaccine

Variable	B	S.E	Wald	DOF	p-value
Vaccine effectiveness	-1.856	0.245	57.431	1	0.000
Vaccine safety	-1.224	0.202	36.633	1	0.000
Past history	-0.357	0.248	2.071	1	0.000

DISCUSSION

Vaccination is one of the most important advances in public health and is responsible for tackling many infectious diseases around the world.[9] Amidst of COVID-19 pandemic and the threat of the second wave, India has flagged off the largest vaccination drive on 16 January 2021 with the vaccination of HCWs. Improving vaccine confidence amongst the people is prudent, and health care professionals play a crucial role in it. Although, many studies reported unwillingness or non-acceptance of COVID-19 vaccination.[10-14]

Our study has planned to estimate the acceptance of the COVID-19 vaccine among healthcare workers and had found that 60% while other respondents were either unwilling to accept or wait for the vaccine to be generally available. Similarly, in Bhondve *et al.*'s study only half of the study participants responded that they will get vaccinated.[6] In a global survey of potential acceptance of a COVID-19 vaccine by Jeffrey V *et al.* in 13,426 randomly selected individuals across 19 countries. Of these, 71.5% responded that they would take a vaccine if it were proven safe and effective. The simulation model results developed by the Tata Institute of Fundamental Research and the Indian Institute of Science have projected that the R0 of India has progressed to more than 4 during the second wave and at least 75% of the population is needed to be vaccinated.[15]

To achieve desired coverage, >75% of the population should be willing to get vaccinated. In China, South Korea, and Singapore, acceptance exceeded 80% with strong trust in central governments. Similarly, relatively high acceptance in middle-income countries, such as Brazil, India, and South Africa.[7] A higher proportion of acceptance has been found in the studies done by Verger P *et al*. and Dzieciolowska S *et al*.[16,17]

In our study, an estimate for unwillingness or non-acceptance was vaccine effectiveness, possible side effects, the safety of the vaccine, and myth or misconception.

Blonde, *et al.* in their study has concluded that vaccine hesitancy can be a major hindrance to achieving desired vaccination coverage in India. This hesitancy concerns vaccine safety, quality control, the novelty of the disease and vaccine efficacy, and the community's false belief of herd immunity. Among all the participants who doubt the vaccine efficacy and who think that vaccines are not necessary after COVID infection are hesitant to take vaccines.[6]

The reasons could be short-duration development and paucity of literature on vaccination as the study in the USA has reported that HCWs will wait for 3–6 months for the safety data of the vaccine to get published.[18] In our study, almost half of the participants got knowledge from health departments like WHO, and MoHFW followed by television and social media. The source of information about the vaccine also plays a major role in its acceptance and news channels, social media and newspapers are the common sources of vaccine information during this pandemic.[19] In the Study of Bhondve, *et al*., the medical literature was the single most common source of information for most HCW.[6] Lessons learned from previous infectious disease outbreaks and public health emergencies, including HIV, H1N1, SARS, MERS, and Ebola, remind us that trusted sources of information and guidance are fundamental to disease control.[20]

When compared with a study done in France, it was found that 77.6% (95% CI 76.2–79%) of participants "probably agreed" to get vaccinated.[21] The reasons for non-acceptance in our study have been explained by doubt of vaccine effectiveness and fear of side effects. Most Healthcare workers may have developed unwillingness after hearing about poor vaccine quality and the false information spread through mass media. The misinformation has spread across traditional media and social media, called by WHO an Infodemic (ie, excessive amounts of misinformation and rumors that make it difficult to identify reliable sources of information).[22-24]

CONCLUSION

For the acceptability of vaccination against COVID-19, proper education among healthcare workers is a need of hours. Their attitude plays a crucial role in vaccine acceptance and their likelihood of recommending the vaccine to others. Vanishing the misconception and providing the right information about the new vaccines could be key in addressing the population who are not acceptable to be vaccinated.

RECOMMENDATION

Effective campaigns and in-hand training should also aim at various factors influencing vaccine acceptance as explaining a vaccine's effectiveness and vaccine safety. This also helps governments and policymakers to sustain COVID-19 vaccination programs for wide population coverage. Developing faith in country-driven strategies will be the key to the success of upcoming vaccine programs and tackling situations like the COVID-19 pandemic in the future.

LIMITATION

It must be kept in mind this study was a snapshot taken at a point in time and not suitable to assess the causal relationship. Our study has addressed the middle-aged population (18–55 years) only and was conducted online with Google forms; hence only the literate participants with smartphones could participate and not represent the population. The questionnaire was self-reported, possibly causing reporting bias. The study's response rate is doubtful as the unwilling persons might have chosen not to participate. Despite the limitations, the study is crucial to assess the acceptance of newly introduced vaccines and identify acceptance determinants, allowing to design future strategies for policymakers and stakeholders.

RELEVANCE OF THE STUDY

The health care workers have played a vital role in the success of any vaccination drive and their attitude toward vaccine acceptance plays a major role in public responses as they rely on HCWs' recommendations. Effective campaigns and in-hand training should also aim at various factors influencing the vaccine acceptance as explaining a vaccine's effectiveness and safety.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

REFERENCES

1. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/covid-19-vaccines (last assessed on 26.06.2021)
2. Rahman A, Sathi NJ; Knowledge, attitude, and preventive practices toward COVID-19 among Bangladeshi internet users; Electron J Gen Med. 2020;17(5).
3. https://www. mohfw.gov.in (Accessed on 20.12. 2021)
4. #IndiaFightsCorona COVID-19 in India, Vaccination, Dashboard, Corona Virus Tracker | mygov. in. Available from: https://www.mygov. in/covid-19/. (Accessed on 20.12. 2021)
5. MacDonald NE; SAGE Working Group on Vaccine Hesitancy. Vaccine hesitancy: Definition, scope, and determinants. Vaccine 2015; 33:4161-4.
6. Bhondve AS, Ingawale SM, Rajapurkar ND. COVID-19 vaccine hesitancy and its determinants among healthcare workers and non-health-care workers: An online survey in India. J Clin Sci Res 2021; 10:212-20.
7. Jeffrey V. Lazarus et al.; A global survey of potential acceptance of a COVID-19 vaccine; Nature Medicine;27; February 2021, 225–228
8. Kabamba Nzaji et al, Acceptability of Vaccination Against COVID-19 Among Healthcare Workers in the Democratic Republic of the Congo; Pragmatic and Observational Research 2020:11
9. Dubé E. Addressing vaccine hesitancy: the crucial role of healthcare providers. Clin Microbiol Infect. 2017;23(5):279–280.
10. Verger P, Scronias D, Dauby N, Adedzi KA, Gobert C, Berger M, et al. Attitudes of healthcare workers towards COVID-19 vaccination: A survey in France and French-speaking parts of Belgium and Canada, 2020. Euro Surveill 2021;26;2002047.
11. Al-Qerem WA, Jarab AS. COVID-19 Vaccination Acceptance and Its Associated Factors Among a Middle Eastern Population. Front Public Health 2021;9;632914.
12. Agyekum MW, Afrifa-Anane GF, Kyei-Arthur F, Addo B. Acceptability of COVID-19 Vaccination among health care workers in Ghana. Adv Public Heal 2021;2021.
13. Kukreti S, Lu MY, Lin YH, Strong C, Lin CY, Ko NY, et al. Willingness of Taiwan's healthcare workers and outpatients to vaccinate against COVID-19 during a period without community outbreaks. Vaccines (Basel) 2021;9:246.
14. Gautam A, Dhara B, Mukherjee D, Mukhopadhyay D, Roy S, Ganguly SS, et al. A Digital Survey on the Acceptance and Affordability of COVID 19 Vaccine among the People of West Bengal, India- A Survey Based Study. 2020;2020.11.13.20229534.
15. Juneja S, Mittal D. Modelling the Second Covid-19 Wave in Mumbai. 2021;1–34. Available from: http://arxiv.org/abs/2105.02144. [Last accessed on 09.10.2021].
16. Verger P, Scronias D, Dauby N, Adedzi KA, Gobert C, Berger M, et al. Attitudes of healthcare workers towards COVID-19 vaccination: A survey in France and French-speaking parts of Belgium and Canada, 2020. Euro Surveill 2021;26;2002047.
17. Dzieciolowska S, Hamel D, Gadio S, Dionne M, Gagnon D, Robitaille L, et al. Acceptance of a COVID-19 vaccine and its related determinants among the general adult population in Kuwait. Vaccines 2021;9:1-12. DOI: 10.1007/s10654-021-00728-6
18. Shekhar R, Sheikh AB, Upadhyay S, Singh M, Kottewar S, Mir H, et al. COVID-19 vaccine acceptance among health care workers in the United States. Vaccines 2021;9:1-18.
19. Loomba S, de Figueiredo A, Piatek SJ, de Graaf K, Larson HJ. Measuring the impact of COVID-19 vaccine misinformation on vaccination intent in the UK and USA. Nat Hum Behav 2021; 5:337-48.
20. Siegrist, M. & Zingg, A. Te role of public trust during pandemics: implications for crisis communication. Eur. Psychol. (2014) 19, 23–32
21. Detox M, Bruel S, Frappe P, Botelho-Nevers E, Gagneux-Brunon A. Intention to participate in a COVID-19 vaccine clinical trial and to get vaccinated against COVID-19 in France during the pandemic. medRxiv. 2020;1–14.
22. Garrett L. COVID-19 the medium is the message. Lancet. 2020;395;1:1–3. doi:10.1016/S0140-6736(20)30600-0
23. Quinn, S. C. et al. Exploring communication, trust in government, and vaccination intention later in the 2009 H1N1 pandemic: results of a national survey. Biosecurity Bioterrorism, (2013),11, 96–106.
24. Shore, D. A. Communicating in times of uncertainty: the need for trust. J. Health Commun. (2003), 8, 13–14.