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Original Research Article

COVID-19 vaccine hesitancy among health care workers amidst ongoing pandemic

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ABSTRACT

Background: Beyond the current pandemic of COVID-19 disease, development and subsequently global access of vaccines against SARS-CoV-2 is vital. However, concern about vaccine hesitancy (delay in acceptance or refusal of vaccination despite availability of vaccination services) is a growing issue. With limited literature, this study aims to explore vaccine hesitancy for COVID-19 disease among health care workers.
Methods: We conducted a cross-sectional anonymous online survey on heath care workers of medical college, Agra from 1 to 15 January 2021. Survey consisted of questions on demographic background, health status, and willingness for vaccination, reasons for unwillingness and items related to information about COVID-19 vaccination.
Results: The study received responses from 400 health care workers. In present study, 233 (58.25%) responded that they are very likely to get COVID-19 vaccine (vaccine acceptance). 33.50% of HCWs were uncertain about being vaccinated (vaccine hesitant) and 8.25% HCWs reported that they are very unlikely to get vaccinated (vaccine resistant). Females were less willing for vaccination and significant gender wise difference was found. Majority of participants cited side effects (56%) and fast moving clinical trials (45%) as reasons for not going for vaccination. In context of COVID appropriate behavior, 93%, 77% and 70% responded that they will wear mask, practice social distancing and avoid social gatherings respectively even after vaccination.
Conclusions: Our study finds that COVID-19 vaccine hesitancy and resistance in HCWs is 41.75%. Governments, public health officials and advocacy groups must be prepared to address hesitancy and build vaccine literacy so that the public will accept vaccine.

Keywords: COVID-19, Health care workers, Vaccination, Vaccine hesitancy, Side effects

INTRODUCTION

The world health organization declared corona virus disease 2019 (COVID-19) as a pandemic on March 11, 2020. As of 30 May 2021, the COVID-19 pandemic has caused more than 169,597,415 confirmed cases and 3,530,582 deaths worldwide.[1] After witnessing massive second wave, India's daily new cases decline to 1.65 lakh cases on 30 May 2021 and continue to decline.[2] Since one and half year, worldwide population has been in long cycles of lockdowns, restrictions and face coverings. The COVID-19 pandemic has caused huge social and economic disruption across societies.[3,4] Beyond the current outbreak, to get over this pandemic, development and subsequently global access of vaccines against SARS-CoV-2 is vital.[4] Governments and organizations globally are committed for large-scale production, equitable access and distribution of a COVID-19 vaccine.[3,4,6] On March 16, 2020, the first COVID-19 vaccine candidate, an mRNA-based vaccine developed by Moderna Inc, entered a Phase 1 clinical trial in the US.[7] Subsequently, vaccine trials have reported encouraging results indicating that a COVID-19 vaccine is safe and produces a good immune response.[3,4]

From 7 COVID-19 candidate vaccines in the clinical evaluation phase and 82 more in the preclinical evaluation phase (April 26, WHO) to roll out of vaccine in November 2020 stresses extraordinary efforts in this unprecedented crisis.[8] Timeliness, availability and people's acceptability of a vaccine are important issues in any vaccination program. The willingness for vaccination is influenced by doubts and worries that exist in the population about the safety and appropriateness of vaccines.[9] In 2015, the world health organization (WHO) strategic advisory group of experts on immunization defined vaccine hesitancy as a 'delay in acceptance or refusal of vaccination despite availability of vaccination services.[3] Vaccine hesitancy which can vary in form and intensity based on when and where it occurs and what vaccine is involved, as has been confirmed in multiple studies.[10,11] Concern about vaccine hesitancy is growing worldwide in fact, WHO identified it as one of the top ten global health threats in 2019. In many countries, vaccine hesitancy and misinformation present substantial obstacles to achieving coverage and community immunity.[12-15]

An early result from studies done in some countries and global surveys of COVID-19 vaccine acceptability suggests that vaccine hesitancy is a global problem.[5,16] Research on COVID-19 vaccine hesitancy from United States (31 per cent were not willing), United Kingdom (25-27 per cent were hesitant), Canada (14 per cent unlikely to get vaccine), and Australia (9 per cent were hesitant and vaccine resistance in 5 per cent) highlights that it is critical issue.[6,8,9] A growing anti-vaccination movement threatens efforts for vaccination in the United States, Europe and Asia.[7,15,18,19] As countries increasingly face varied issues of vaccine hesitancy and sometimes refusal, more in-depth understanding of this required. In journey of COVID-19 vaccine, India launched the world's largest vaccination drive on 16 January 2021 to vaccinate 10 million frontline health care workers in first phase with Covishield (by Serum institute) and Covaxin (by Bharat Biotech) and subsequently more than 21 crore vaccine doses have been administered. The World health organization welcomed the India's decision in a fight against the ongoing pandemic. However, with limited research on this crucial topic, this study may be first of few studies being carried out for COVID-19 vaccine hesitancy among health care workers and factors associated with it.

METHODS

A cross-sectional anonymous online survey was conducted on health care workers of medical college, Agra from 1 to 15 January 2021 by Google forms. Survey consisted of questions on demographic background, health status, and willingness for vaccination, reasons for unwillingness and items related to information about covid-19 vaccination. Participants of study were faculty members of college, senior residents, junior residents, non-PG JRs, interns, nurses, lab technicians, pharmacists and clerical staff. Some definitions used while interpreting results of vaccine acceptability are as follows; Willingness to get a COVID-19 vaccine (i.e., vaccine acceptability), those who may get the vaccine but are not sure (vaccine hesitant) and those who will not get the vaccine (vaccine resistant).[5] Data was compiled from Google forms in Microsoft Excel and all statistical analyses were performed using statistical software. All participants gave informed consent for the study.

RESULTS

The study received responses from 400 health care workers (HCWs). Almost equal response from females (51.25%) and males (48.75%) in this online survey. Majority of the study participants belonged to age group of 18-29 years and have either post graduate degree (42.25%) or graduate degree (42%). Around 22% of HCWs were faculty members (professors, associate and assistant professor), 65% of participants were residents, non-PG JRs and interns while 13.5% comprised nurses, lab technicians, pharmacists, clerical staff. Most of them had heard about COVID-19 vaccine (97.25%). 18.50% of study participants were ever diagnosed with COVID-19 and 22% of participants responded that one of their family member had COVID-19 disease. Most of the participants (90.50%) were not suffering from any underlying medical co-morbidities (Table 1).

Table 1: Relationship between participant's characteristics and covid-19 vaccine willingness (n=400).

Variables	Willingness to receive COVID-19 vaccine				
	Very likely to get vaccinated (N=233)	Very unlikely to get vaccinated (N=33)	Uncertain about being vaccinated (N=134)	Total (N=400)	P value
Gender					
Female	105 (51.2)	15 (7.3)	85 (41.5)	205 (51.3)	0.0025
Male	128 (65.6)	18 (9.2)	49 (25.1)	195 (48.7)	
Age (in years)					
18-29	130(54.4)	20(8.4)	89(37.2)	239 (60)	0.4581
30-49	97(63.0)	13(8.4)	44(28.6)	154(38.5)	
50-64	5(83.3)	0(0)	1(16.7)	6(1.5)	
65 & above	1(100.0)	0(0.0)	0(0.0)	1(0.0)	

Continued.

Variables	Willingness to receive COVID-19 vaccine				
	Very likely to get vaccinated (N=233)	Very unlikely to get vaccinated (N=33)	Uncertain about being vaccinated (N=134)	Total (N=400)	P value
Religion					
Hinduism	221(59.7)	30(8.1)	119(32.2)	370(92.5)	
Muslim	5(31.3)	2(12.5)	9(56.2)	16(4.00)	
Christianity	3(60.0)	1(20.0)	1(20.0)	5(1.3)	
Others	4(44.4)	0(0)	5(55.6)	9(2.3)	
Marital status					
Married	99(62.7)	16(10.1)	43(27.2)	158(39.5)	
Unmarried	132(55.0)	17(7.1)	91(37.9)	240(60.0)	0.1510
Divorced/Widowed/Separated	2(100.0)	0	0	2(0.5)	
Education					
Higher Secondary	2(50.0)	0(0.0)	2(50.0)	4(1.0)	
Graduation	93(55.4)	16(9.5)	59(35.1)	168(42.0)	0.5704
Post-graduation/Diploma	104(61.5)	15(8.9)	50(29.6)	169(42.3)	
Doctoral or above	34(57.6)	2(3.4)	23(39.0)	59(14.8)	
Job/Clinical role					
Professor	15(71.4)	0(0.0)	6(28.6)	21(5.3)	
Associate Professor	15(68.2)	1(4.5)	6(27.3)	22(5.5)	
Assistant Professor	32(72.7)	2(4.5)	10(22.7)	44(11.0)	
Senior Resident	4(57.1)	0(0.0)	3(42.9)	7(1.8)	0.0017
Junior Resident	54(45.4)	17(14.3)	48(40.3)	119(29.7)	
Non Pg JR/Intern	76(57.1)	7(5.3)	50(37.6)	133(33.3)	
Others #	37(68.5)	7(13.0)	10(18.5)	54(13.5)	
Ever diagnosed with COVID-19					
Yes	51 (68.9)	6 (8.1)	17 (23.0)	74 (18.5)	0.09162
No	182 (55.8)	27 (8.3)	117 (35.9)	326 (81.5)	
Family members ever diagnosed with COVID-19					
Yes	49 (55.7)	7 (8)	32 (36.4)	88 (22)	0.8122
No	184 (59.0)	26 (8.3)	102 (32.7)	312 (78)	
Underlying medical condition Present					
Yes	25 (65.8)	1 (2.6)	12 (31.6)	38 (9.5)	0.3565
No	208 (57.5)	32 (8.9)	122 (33.7)	362 (90.5)	
Heard about COVID-19 vaccine					
Yes	134 (34.5)	224 (57.6)	31 (7.9)	389 (97.3)	0.0445
No	0(0)	9(81.8)	2(18.2)	11(2.8)	

Others (Nurse, Lab Technicians, Pharmacists, clerical staff); (Figures in parentheses indicate percentages)

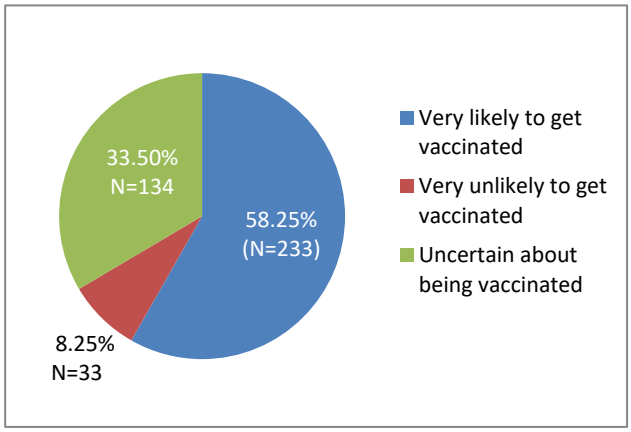

Figure 1: Relationship between participant's characteristics and covid-19 vaccine willingness (n=400).

Regarding willingness for vaccination against COVID-19 disease, in present study, 233 (58.25%) responded that they are very likely to get vaccinated (vaccine acceptance). 33.50% of HCWs were uncertain about being vaccinated (vaccine hesitant) and 8.25% HCWs of reported that they are very unlikely to get vaccinated (vaccine resistant) (Figure 1).

Females were less willing for vaccination and significant gender wise difference was found. Majority of participants cited side effects (56%) and fast moving clinical trials (45%) as reasons for not going for vaccination. 37% reported that because COVID-19 vaccine is a new vaccine, so they are not confident (Figure 2). Other reasons were that vaccine is not effective, perceived risk of getting COVID-19 is low, afraid of injections and religion. HCWs trust health professionals (63%) and scientific papers (51%) as most

reliable source of information (Figure 3). 21.75% of participants responded that they will get vaccinated immediately after the COVID-19 vaccine is available while 38.5%, 13.25% and 26.5% reported that will get vaccinated within 6 months, one year and not sure of timing respectively. Regarding, vaccine should be mandatory or compulsory, almost equal responses from HCWs (55% and 45% reported yes & no respectively). Almost 64% of participants reported that there is no adequate safety information about COVID-19 vaccine in public and 56% are confident in system of tracking adverse reactions or side effects to vaccinations in country (Table 2). Seventy eight percent of HCWs responded that they are satisfied with government's response in handling COVID-19 pandemic. In context of COVID appropriate behavior 93%, 77% and 70% responded that they will wear mask, practice social distancing and avoid social gatherings respectively even after vaccination.

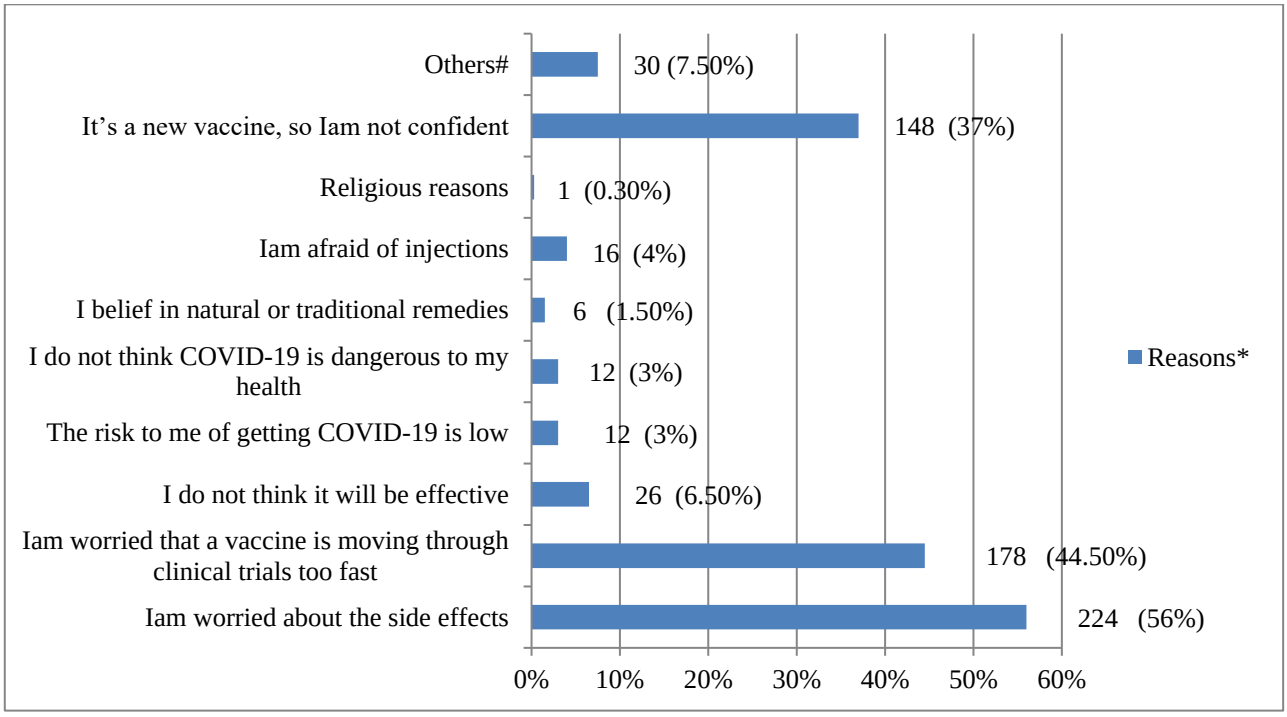

Figure 2: Reasons for not vaccinating with COVID-19 vaccine.

*Multiple responses; N=400

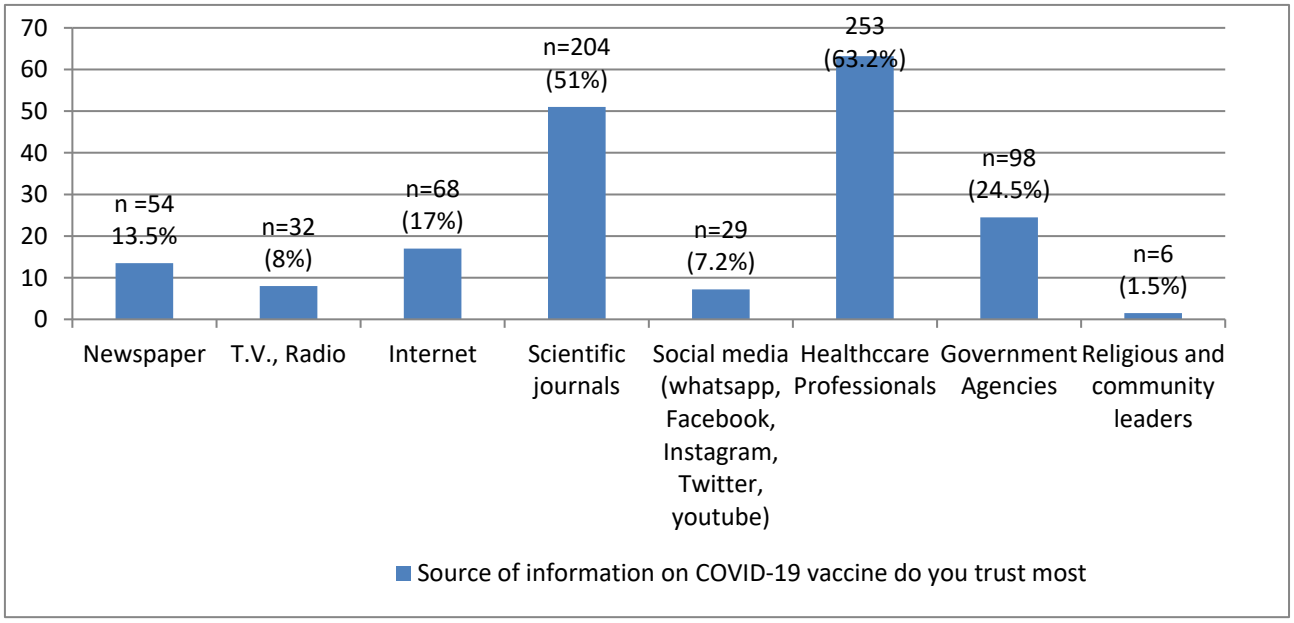

Figure 3: Source of information on COVID-19 vaccine which participant's trust most (N=400).

Table 2: Perception of participant's regarding newly introduced COVID-19 vaccine (N=400)

Item/Question	Yes (%)	No (%)
Vaccine should be compulsory/mandatory	220 (55)	180 (45)
There is adequate safety information about COVID-19 vaccine in Public	147 (36.8)	253 (63.3)
Confident in system of tracking adverse reactions or side effects to vaccinations in your country	225 (56.3)	175 (43.8)
Satisfied with government response in handling COVID-19 in your country	310 (77.5)	90 (22.5)

DISCUSSION

On 16 January 2021, India rolls out mega COVID-19 vaccination program. Total number of HCWs vaccinated until 30 May 2021 is 67,72,792 with two doses across the country. India took 6 days (on 21 January) to vaccinate one million and eye on 300 million, perhaps fastest in world.[20] In present study, we received 400 responses on Google forms. Out of 400 health care workers, 233 (58.25%) responded that they are very likely to get vaccinated. This is comparable to findings of global survey where 54% Indians strongly agree, that they will get vaccinated while in other global survey 74.5% Indians showed positive response for COVID-19 vaccine. [3,21] Our findings revealed that 33.50% of HCWs were uncertain about being vaccinated (vaccine hesitant) and 8.25% HCWs said that they are very unlikely to get vaccinated (vaccine resistant). Two global surveys reflect vaccine hesitancy in India. Somewhat similar to present study findings, in June 2020, 25.5% of Indians were hesitant while in October 2020 34% of participants somewhat agreed and 13% disagreed for vaccination.[3,21] Few online surveys from country highlight willingness for COVID-19 vaccine. Survey by YouGov's COVID-19 trackers in December 2020 found that 67% Indians were willing for vaccination (acceptance), 16% and 17% said they did not know (hesitant) and 17% said no for vaccination (resistant).[22] A digital survey from West Bengal showed that 77.27% of respondents were very likely or likely to take a COVID-19 vaccine while 12.24% and 5.3% were hesitant and resistant respectively.[23] Delhi NCR Coronavirus telephone survey (23 December 2020 and 4 January 2021) from Delhi, Haryana, Rajasthan, and Uttar Pradesh found that 60% participants were willing to take vaccine and vaccine hesitancy was quite high (39%).[24]

Some preliminary reports post vaccination drive in country gives information about vaccine hesitancy. An online study on 1068 medical students across 22 states and union territories of India found vaccine hesitancy of 10.6%. Another study across India found 20.5% HCWs were hesitant for COVID-19 vaccine.[25,26] The coverage of vaccination reported to be much higher in rural and tribal areas at 80% as compared to 50% in urban districts of MP. All states have shown similar trend, which is contrary to belief that rural would have lower vaccination. The reason is a certain degree of distrust due to information flow in urban areas. Centers giving Covaxin in the state have noticed hesitancy more among non-doctors in certain places and across board in others.[27,28] Greater than 50% target met in Karnataka, Andhra, Odisha, Telangana major States lagging behind are Maharashtra, Tamil Nadu, Gujarat, Punjab. Variation in coverage between states may due different number of days and sites for vaccination.

Globally, 73% respondents agree that they would get a COVID-19 vaccine if available in June 2020.[21] Another global survey done in June from 19 countries showed, 71.5% of participants reported they are likely to take a COVID-19 vaccine.[3] In total, 73.9% of the 7664 participants from seven European countries (Denmark, France, Germany, Italy, Portugal, the Netherlands, and the UK) were willing for vaccination. A further 18.9% of respondents were not sure and 7.2% of them will not get vaccine.[8] Prior reports of vaccine hesitancy have been published from whole Europe and France.[29,30] In various studies, willingness for COVID-19 vaccine in United States ranged from 58 to 75%.[9,19,31,32] Another study in US highlights low acceptance (31 per cent of participants were not willing and 21 per cent were probably willing) for COVID-19 vaccination.[19] Canadians willingness varied from 57.5% to 66% in two surveys (between May and June 2020).[33,34] Data from United Kingdom is also somewhat similar; a survey found 25-26 per cent hesitancy and 6-9 per cent resistance in population.[4] 14%, 24.2% and 42% of Australians were hesitant and resistant for COVID-19 vaccine in April, June and August 2020 respectively.[6,35,36] The world health organization's director general said in August 2020, "no one is safe until everyone is safe". Vaccine hesitancy accounts for a more substantial share of the population who will not get vaccine than vaccine resistance. Unvaccinated individuals may be more often in contact with other unvaccinated individuals than with vaccinated ones.[8]

Present study found that females were less likely to get vaccinated and were more hesitant and resistant for vaccination. There was significant difference between willingness of females and males. Many similar studies found that women were less likely to get COVID-19 vaccine.[5,6,8,9,35,36] Like other surveys higher proportion of younger population was not willing for vaccination in our research.[5,6,36] In context of education, graduate and below had less intention for vaccination that postgraduates and HCWs with doctoral degree but this was not significantly associated. Research also shows that more willingness for COVID-19 vaccination is found in people who are more educated and older population but it is matter of concern that in some studies people older than 75 years and lower

socioeconomic status have shown less willingness.[3,6,9,33] There was little evidence that willingness to receive vaccination varied with religion even in present study. In policy designing for vaccine hesitancy, it is important to be thoughtful about which groups of population are hesitant and resistant for vaccine.[8,9] We found that more proportion of HCWs who were diagnosed with COVID-19 disease and have co-morbidities responded positively for vaccine and no significant difference. More willingness for vaccine in participants with greater perceived risk of COVID-19 disease and contact with case of COVID-19 disease while contrarily one global survey from 19 countries revealed that participants and family members who reported COVID-19 disease were not more willing for vaccination.[3,4,9]

Analysis of reasons by participants for unwillingness for COVID-19 vaccine quotes side effects of vaccine (56%) as most common concern by HCWs. In most studies on COVID-19 vaccines, adverse effects were one of major factors influencing intention for COVID-19 vaccination.[4,8,9,21,33-35] Study done by Neumann et al in Europe found women were more worried about side effects.[8] After vaccination program in India, reports mentioned that no case of serious/severe AEFI attributable to vaccination.[20] Meager 0.0005% people have recorded hospitalization against vaccination. Fast moving clinical trials, COVID-19 is a new vaccine and it will not be effective were other major apprehension for study participants. Other authors reported similar concerns for trials, efficacy and duration of protection of vaccine.[6,21,37-39] Sixty four percent of participants reported that there is no sufficient information about safety of COVID-19 vaccine in public. For high coverage of population and greater acceptance, clear communication about safety, and potential side effects of the vaccine is must.[5,6,40,41]

In present study, most of participants (>95%) replied that they would go to government health facility for vaccination when vaccine is available. Seventy eight percent of HCWs from medical college responded that they are satisfied with government's response in handling COVID-19 pandemic. A global survey found that more acceptance of vaccine by respondents who trust their government.[3] Experimental evidence suggests that individuals under specific conditions may be willing to support mandatory vaccination policies, but this support seems very sensitive to adverse events. Such a policy may be less appropriate in the context of COVID-19 disease.[8] Vaccine should be mandatory or compulsory, almost equal responses from health care workers (yes/no) in our research. It is good that high proportion of HCWs will follow COVID appropriate behaviors even after vaccination as poor compliance with COVID protective behaviors is associated with less willingness for vaccine.[6] Vaccine hesitancy is included in communication strategy of India's vaccination. India has prepared detailed communication strategy for COVID-19 vaccine before rollout of vaccine. India strong fight against COVID-19 pandemic from beginning gave clear and consistent message with community participation and Jan Bhagidari being one important pillar of vaccination drive.

The evidence suggests there is need to address multiple steps by policymakers to decrease vaccine hesitancy. One approach for vaccine advocacy suggests "vaccine adoption equals to access plus acceptance".[8] While intention is a key driver of the uptake of health behaviours and it reflects general vaccine beliefs and attitudes; vaccination intention is likely to be higher than actual vaccine uptake (called vaccination decision).[5,6,21] Campaigns and messaging about a COVID-19 vaccination should emphasize the risk of COVID-19 to others and necessity for everyone to be vaccinated.[4] UN chief appreciated India's move in supplying vaccine to other nations in fight against global health crisis. India is scaling up COVID-19 vaccination program while addressing technical issues, campaign to assure people that vaccine is safe, involving district administration to encourage vaccination, higher capacity and flexibility in selecting site.

CONCLUSION

Current study reveals that COVID-19 vaccine hesitancy and resistance in HCWs is 41.75%. Governments, public health officials and advocacy groups must be prepared to address hesitancy and build vaccine literacy so that the public will accept immunization when appropriate. There must be clear communication around misinformation and information about vaccine adverse effects and effectiveness. For the success of a vaccination program, it is imperative to prepare and develop effective policies, sufficient health system capacity, as well as strategies to enhance trust in and acceptance of the vaccine.

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