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Assessing vaccine hesitancy among health-care workers in Jammu and Kashmir: A cross-sectional study

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Abstract:

BACKGROUND: The World Health Organization declared vaccine hesitancy as one of the planet's top 10 global health threats in 2019. With the rollout of the coronavirus disease-19 (COVID-19) vaccines, a survey was conducted to find out the hesitancy and the apprehensions that come along with taking COVID-19 vaccines among health-care workers (HCWs).

MATERIALS AND METHODS: This was an online cross-sectional survey which was developed and shared through social media platforms among the HCWs of Kashmir. The survey captured demographic data and used a validated hesitancy measurement tool from January 2021 to February 2021. The data were analyzed by descriptive statistics and multivariable logistic regression using Stata 15 (Stata Corp. 2017. Stata Statistical Software: Release 15. College Station, TX: Stata Corp LLC).

RESULTS: Willingness to take the COVID-19 vaccine when available was seen in 67.7% of the HCWs. Overall, 9.59% of respondents reported unwillingness to receive a vaccine for COVID-19, while 22.7% were unsure. The most commonly cited reason for willingness to get vaccinated was an understanding of the disease and vaccination, as reported by 81.5%. Being single was significantly related to an increased risk of vaccine hesitancy (adjusted odds ratio = 5.27, 95% confidence interval: 2.07–13.40). Among vaccine attitudes, concerns about the safety of the vaccine, unforeseen problems in children, and possible unknown future adverse effects of the vaccine were the most important determinants of unwillingness.

CONCLUSIONS: A significant proportion of the HCWs showed vaccine hesitancy to the COVID‐19 vaccine. Hesitancy attitudes were almost always driven by concern around the vaccine safety. States and health-care authorities need to recognize the massive trust deficit around the Covid-19 vaccine and use the popular media used by people to share credible and reliable information.

Keywords:

COVID-19, COVID-19 vaccine, health-care workers, safety, survey, vaccine acceptance, vaccine hesitancy

Introduction

Since the emergence of coronavirus disease-19 (COVID-19), lockdowns, loss of life, and economic slowdowns have affected communities and nations globally. Disruptions and threats to daily life are significant because this disease is highly contagious, and the mortality rate has been estimated to be much higher than seasonal flu.[1] The most reliable means to ensure control over this pandemic is developing effective vaccines to control spread.

Vaccines developed against COVID-19 by Pfizer-BioNTech and Moderna have been authorized and recommended by the Centers for Disease Control and Prevention, among a few others, in recent times. Large-scale

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clinical trials of vaccines from AstraZeneca, Janssen, and Novavax have also been in the later stages of their clinical trials, as of December 2020.[2] Covaxin, developed by Bharat Biotech in collaboration with the Indian Council of Medical Research (ICMR), has been approved by the Drugs Controller General of India. In addition, Covishield by the Serum Institute of India and ICMR has also been approved. Another vaccine is being developed by Cadila Healthcare and is undergoing later clinical trials.[3]

The success of this immunization campaign ultimately relies on individuals' acceptance of novel vaccines, but the actual level of acceptance among HCWs remains poorly understood. The World Health Organization declared "vaccine hesitancy", which had been defined as either refusal or delay in taking a vaccine despite its availability, as one of the biggest health threats.[4] Vaccine hesitancy has been reported in more than 90% of countries in the world.[5] Some communities that, traditionally, saw large uptake of vaccinations showed reluctance when a new vaccine was introduced. This was also seen in places like Karnataka and Tamil Nadu when vaccine against measles–rubella was introduced in 2017.[6] The reasons being misinformation, religious propaganda, social media being used in stirring fear in people, and vaccine-derived diseases. As a December 2018 study points out, vaccine hesitancy continues to be a huge challenge for India. The study found that nearly a quarter of parents did not vaccinate their children out of fear of adverse events.[6]

Furthermore, vaccine hesitancy varies across time, context, and for different vaccines. Determinants of acceptance of other vaccines (for example, the influenza vaccine) among HCWs may thus not be directly applicable to the new COVID-19 vaccines.[7]

Some of the previous studies suggest that vaccine hesitancy is expected to be high as soon as the new COVID-19 vaccine is rolled out. One such survey was carried out among more than 1400 HCWs in Chennai, where 55% of respondents were hesitant to COVID-19 vaccination. Interestingly, 869 of these participants worked in COVID-19-related health-care units.[8]

Given the paucity of data regarding vaccine acceptance among HCWs, this survey was conducted across multiple health-care institutions in Kashmir to measure their willingness to accept and schedule receiving the first dose of a COVID-19 vaccine, as well as to understand the reasons underlying vaccine hesitancy or refusal.

Materials and Methods

Study design and setting

An online cross-sectional survey was designed using a web-based, self-administered composite questionnaire and rolled out among the HCWs in Jammu and Kashmir.

Study participants and sampling

The link was shared among the HCWs of Jammu and Kashmir through various social media platforms using the exponential nondiscriminative snowball sampling method. The data collection was done from January 2021 to February 2021, and the link was designed in such a way that only 1 response could be generated using one device.

Data collection tool and technique

The survey collected information about participant demographics, health history, and reasons for willingness/hesitancy to take the vaccine and included the vaccine attitudes examination (VAX) to assess beliefs toward the COVID-19 vaccine and immunity.

VAX is a validated tool to measure vaccine attitude.[9] Due permission was obtained to use VAX before designing the study. The selection of VAX and the design of the composite questionnaire were guided by the SAGE group recommendations in assessing vaccine hesitancy.

The main outcome variable was vaccine hesitancy. Participants responded to the question "Will you take the COVID-19 vaccine when it becomes available" on a 5-point Likert scale (definitely: 5, probably: 4, not sure: 3, probably not: 2, or "definitely not: 1). Any of the latter three responses were classified as "vaccine hesitancy." The beliefs about the COVID-19 vaccine and immunity were recorded on a six-point Likert scale (strongly disagree: 1 to strongly agree: 6).

The main reason for choosing the online method over paper-based data collection was its efficiency in reaching a large and geographically dispersed population and the ease of accessibility to online methods. The reliability of the composite questionnaire was ascertained; the Cronbach's α was found to be 0.93 (meaning an excellent consistency).

Ethical consideration

The study was granted exemption from ethical approval by the Institutional Ethics Committee, Government Medical College, Srinagar (CDSCO U/P No: ECR/1422/Inst/JK/2020) vide Ref. no IEC-GMC-Sgr/27.

Statistical analysis

Categorical variables were summarized as percentages. Logistic regression was used to identify variables significantly associated with vaccine hesitancy. Variables which were associated with vaccine hesitancy at 10%

level in univariable analysis were used to build the multivariable logistic regression model. Responses to questions in the VAX questionnaire were dichotomized as "disagree" or "agree" prior to analysis. Stata version 15 (StataCorp. 2017. Stata Statistical Software: Release 15. College Station, TX: StataCorp LLC) was used for data analysis. Statistical significance was set at a 5% level.

Results

A total of 511 responses were received from HCWs from Jammu and Kashmir. In addition, 289 HCWs from other Indian states and 29 foreign residents also responded to the online survey and were excluded from primary analysis.

Participants were mostly males (77.3%), between 30 and 50 years of age (67.1%). 3.3% of participants had received education up to senior secondary school only; the rest of participants were at least graduates. Only 19.4% (99/511) of participants were single/never married [Table 1].

A majority (93.0%) of participants reported to have received childhood vaccinations and almost one-third (166/511) reported to have received influenza vaccination annually during the last three years. History of COVID-19 infection was reported by 26.6% (136/511) and history of COVID-19 infection in any other family member was reported by 35.4% (181/511) of participants. Self-reported history of chronic medical illness was present in 22.5% (115/511) of participants. Hypertension (11.5%) and diabetes mellitus (3.7%) were the most commonly reported chronic medical illnesses. Twenty-five participants reported a current history of mental health illness [Table 1].

Willingness to take the COVID-19 vaccine when available was seen in 67.7% (346/511) of the HCWs. While 49 of HCWs responded that they will definitely/probably not take the vaccine, 116/511 (22.7%) were not sure about their willingness to get vaccinated [Table 2].

The most commonly cited reason for willingness to get vaccinated was an understanding of the disease and vaccination, reported by 81.5% of those willing to take the vaccine [Table 2].

Being single was significantly related to an increased risk of vaccine hesitancy (adjusted odds ratio = 5.27, 95% confidence interval: 2.07–13.40). Concerns about the safety of the vaccine, unforeseen problems in children, possible unknown future adverse effects of the vaccine, and a perception that vaccine manufacturers and country administrators make money from vaccine manufacture and usage advocacy were significant risk factors for

Table 1: Participant demographic and clinical characteristics

	Frequency, *n* (%)
Age group	
≤30	94 (18.4)
30-50	343 (67.1)
>50	74 (14.5)
Sex	
Female	116 (22.7)
Male	395 (77.3)
Education	
Up to SSE	17 (3.3)
Graduate	179 (35.0)
Postgraduate	243 (47.6)
Postdoctoral	72 (14.1)
Marital status	
Single or never married	99 (19.4)
Married	406 (79.5)
Separated	1 (0.2)
Divorced	3 (0.6)
Widowed	2 (0.4)
Suffered from COVID-19 infection in the past?	
Yes	136 (26.6)
No	375 (73.4)
Number of people in the house	
1-2	15 (2.9)
3-4	164 (32.1)
5-6	198 (38.7)
≥7	134 (26.2)
Pregnant or breastfeeding (*n*=116)	
Yes	9 (7.8)
No	107 (92.2)
Completed childhood vaccinations	
Yes	475 (93.0)
No	36 (7.0)
Received influenza vaccination in past 3 years	
Never	178 (34.8)
Annually	166 (32.5)
Once	93 (18.2)
Twice	74 (14.5)
Suffering from any CMI	
Yes	115 (22.5)
No	396 (77.5)
Type of CMI suffering from	
Diabetes	19 (3.7)
Hypertension	59 (11.5)
Dyslipidemia	8 (1.6)
Asthma	7 (1.4)
Thyroid disease	5 (1.0)
Others	16 (3.1)
None/no response	397 (77.7)
Suffering from any MHI	
Yes	25 (4.9)
No	486 (95.1)
Type of MHI suffering from	
No answer	486 (95.1)
Depression	6 (1.2)

Contd...

Table 1: Contd...

	Frequency, *n* (%)
Anxiety	16 (3.1)
Bipolar illness	1 (.2)
Others	2 (.4)
On any regular medications	
Yes	136 (26.6)
No	375 (73.4)
Have you or any family member had COVID-19 in the past?	
Yes	181 (35.4)
No	330 (64.6)

COVID-19=Coronavirus disease-2019, MHI=Mental health illness, CMI=Chronic medical illness, SSE=Secondary school education

Table 2: Vaccine hesitancy among study participants

	Frequency, *n* (%)
Will you take the COVID-19 vaccination, when available?	
Definitely	245 (47.9)
Probably	101 (19.8)
Not sure	116 (22.7)
Probably not	31 (6.1)
Definitely not	18 (3.5)
Will you take the COVID-19 vaccination, when available?	
Yes	346 (67.7)
No	165 (32.3)
Will you recommend COVID-19 vaccine to elderly or members with chronic medical conditions?	
Definitely	234 (45.8)
Probably	96 (18.8)
Not sure	126 (24.7)
Probably not	36 (7.0)
Definitely not	19 (3.7)
If you have children, will you get your children vaccinated?	
Definitely	189 (37.0)
Probably	95 (18.6)
Not sure	132 (25.8)
Probably not	50 (9.8)
Definitely not	32 (6.3)
No answer/don't have children	13 (2.5)
If you want to travel and the country of destination will waive the 2-weeks quarantine period for those who got the COVID-19 vaccine, would you take the vaccine?	
I would definitely take the vaccine	252 (49.3)
I would probably take the vaccine	158 (30.9)
I would not take the vaccine and prefer to go through the quarantine requirements	101 (19.8)
Reason for willingness to take vaccine	
My understanding of the disease and vaccination	282 (81.5)
Information from my doctor/hospital	47 (13.6)
Information from social media	4 (1.2)
Information from news	8 (2.3)
Information from family/friends	1 (0.3)
No answer	6 (1.7)

COVID-19=Coronavirus disease-2019

hesitancy [Table 3].

In hindsight, we compared the vaccine hesitancy rate and responses to the VAX questionnaire across the three groups of health-care workers (HCWs): those from Jammu and Kashmir, other states in India, and foreign. Interestingly, vaccine hesitancy appeared to be significantly less among those who worked in foreign countries ($P = 0.017$). HCWs from countries other than India also appeared to have an overall more positive notion about COVID-19 disease and the vaccine in comparison to participants working in India [Table 4]. The beliefs about COVID-19 vaccination and immunity among HCWs are shown in Table 5.

Discussion

This is one of the first studies, that we are aware of, that utilizes a validated vaccine hesitancy tool to measure the degree of hesitancy to COVID-19 vaccination and its main attitudinal determinants among HCWs in India. This study showed that 10% of the study population hesitated to get their children vaccinated against COVID-19. However, when combined with those that are unsure of the vaccination, the hesitancy was present in around 32.3% of the respondents. It was observed in a research conducted in Canada that around 25% of Canadians were hesitant,[10] in France, 26% showed hesitancy,[11] whereas it was observed to be around 20% in the U.S., where 31% were also unsure.[12] Qatar was found to have a hesitancy of 20%,[13] while Britain had a hesitancy of 9%.[14] Our data reveal that 32% of HCWs in Jammu and Kashmir were hesitant, while hesitancy in the general population was exceptionally high, with 47% people showing lack of faith, and it was 38% in rest of India. These figures appear to be in keeping with the variance in the hesitancy rates across different countries and population groups. Emerging evidence suggests that vaccine hesitancy is lower in lower income countries with higher trust in the governments as compared to higher income countries. It is important to understand that the HCWs remain the key figures in vaccination programs and they are generally the most trusted by general public in recommending vaccination. Therefore, any hesitancy or lack of trust among this population group can have far reaching impact on success of any vaccination programs.

Determinants of vaccine hesitancy

This study highlighted that the factors most significantly associated with COVID-19 vaccine hesitancy were (1) belief that new vaccine was not fully tested; (2) belief that it can cause problems in children; (3) worry about unknown effects of the vaccine; and (4) belief that vaccines make a lot of money for pharmaceutical companies and that authorities promote vaccines mainly for financial gains. Interestingly, even though the degree

Table 3: Univariable and multivariable logistic regression analysis for health-care workers

	Univariable logistic regression analysis			Multivariable logistic regression analysis		
	OR	*P*	95% CI (lower limit-upper limit)	OR	*P*	95% CI (lower limit-upper limit)
Age group						
≤30	3.47	<0.001	1.75-6.89	1.61	0.290	0.67-3.90
31-50	1.56	0.149	0.85-2.83	1.28	0.51	0.61-2.71
>50	Ref			Ref		
Female	1.68	0.018	1.09-2.57	1.45	0.188	0.83-2.52
Single or never married	3.27	<0.001	2.08-5.14	5.27	<0.001	2.07-13.40
Not taken influenza vaccine annually in the last 3 years	2.16	<0.001	1.40-3.31	1.61	0.079	0.94-2.75
No history of chronic medical illness	2.39	0.001	1.44-3.97	1.96	0.041	1.027-3.76
New vaccine not fully tested and will not be safe	6.86	<0.001	4.52-10.41	4.16	<0.001	2.56-6.74
I do not feel safe after being vaccinated	5.35	<0.001	3.57-8.01	3.71	<0.001	2.24-6.17
I do not rely on vaccines to stop serious infectious diseases	2.45	<0.001	1.66-3.62	1.20	0.50	0.70-2.03
Vaccines can cause unforeseen problems in children	2.53	<0.001	1.72-3.73	1.51	0.12	0.90-2.53
I worry about the unknown effects of vaccines in the future	3.88	<0.001	2.45-6.14	1.80	0.053	0.99-3.28
Vaccines make lot of money for pharma companies	1.70	0.005	1.17-2.48	1.717	0.059	0.98-3.01
Authorities promote vaccination for financial gain not for proper health	3.78	<0.001	2.47-5.79	1.92	0.036	1.04-3.54
Vaccination programs are a big con	1.69	0.008	1.14-2.49	0.087	0.63	0.512-1.50
Natural immunity lasts longer than vaccination	2.07	<0.001	1.40-3.07	1.21	0.47	0.70-2.13
Natural exposure to viruses and germs gives safest protection	1.93	0.001	1.31-2.84	0.94	0.83	0.511-1.72
Being exposed to disease naturally is safer for immune system	1.95	0.001	1.34-2.84	1.22	0.49	0.69-2.15

CI=Confidence interval

of hesitancy has some variance across the globe, the themes determining the attitudes to refusing COVID-19 vaccination are somewhat similar. There appears to be a consistent theme of distrust in the safety of the COVID-19 vaccines with concerns that it was rushed through and not fully tested for long-term side effects. The presence of such mistrust among HCWs who traditionally have more access to reliable health-care information underlining the deficit of trust and informs the task ahead for health-care policymakers.

The vaccine hesitancy was present even among HCWs who traditionally took the annual flu vaccines highlighting concerns specifically around the COVID-19 vaccination. As expected, people who had not taken influenza vaccine in the past three years were two times more likely to not take COVID-19 vaccine. Given a choice, 30% of people were not willing to take vaccination even before traveling abroad and were ready to quarantine instead again highlighting anxieties around the vaccine and choosing personal discomfort over possible side effects. It was also seen that people who were single or never married were five times more likely to take the vaccine than those who had been married before. This is coherent with VAX questionnaire results that showed higher hesitancy in respondents who had children.[10]

The trends observed in this study show that lack of awareness and information regarding COVID-19 and its vaccine, coupled with mistrust in the system, are the biggest contributors to vaccine hesitancy in a population. These findings are in line with findings from other surveys carried out globally.[15,16]

The aforementioned factors, clearly, point out that there is an immediate requirement in terms of trust-building among people across all backgrounds. This has to be done in two ways- (1) clearing misconceptions circulating in popular media, especially social media regarding vaccination and, the disease itself and (2) spreading awareness and building trust about COVID-19 and its vaccination actively and innovatively, on all available platforms.[11]

Among the general population, this study also found that the number of people who were willing to take the vaccine citing their understanding of the disease and the vaccine itself as the primary reason were three-folds more than those who trusted the advice of their doctor or hospital. This reliance on personal research was much higher in health-care professionals, with six-folds over advice from their doctor or hospital.

Sixty percent of people from rest of India, as opposed to 43%, in Jammu and Kashmir, think that COVID-19 vaccines are not safe yet. Sixty-nine percent of people from rest of India, as opposed to 50%, in Jammu and Kashmir, think that vaccines can cause unforeseen problems in children. 43% of people from rest of India, as opposed to 23%, in Jammu and Kashmir, believe that authorities promote vaccination for financial gain. 54% of people from rest of India, as opposed to 32%, in Jammu

Table 4: Comparison of vaccination attitudes examination questionnaire across the three groups of health-care workers

VAX	Residence			*P*
	JK frequency, *n* (%)	Rest of India frequency, *n* (%)	Outside India frequency, *n* (%)	
COVID-19 is not a real disease				
Disagree	438 (85.7)	251 (86.9)	27 (93.1)	0.507
Agree	73 (14.3)	38 (13.1)	2 (6.9)	
COVID-19 is a new disease, and vaccines against it have not been fully tested and will not be safe				
Disagree	291 (56.9)	116 (40.1)	26 (89.7)	<0.001
Agree	220 (43.1)	173 (59.9)	3 (10.3)	
I feel safe after being vaccinated				
Disagree	219 (42.9)	132 (45.7)	5 (17.2)	0.013
Agree	292 (57.1)	157 (54.3)	24 (82.8)	
I can rely on vaccines to stop serious infectious diseases				
Disagree	168 (32.9)	134 (46.9)	4 (13.8)	<0.001
Agree	343 (67.1)	152 (53.1)	25 (86.2)	
Although most vaccines appear to be safe, there may be problems that we haven't yet discovered				
Disagree	109 (21.3)	46 (16.0)	10 (34.5)	0.027
Agree	402 (78.7)	241 (84.0)	19 (65.5)	
Vaccines can cause unforeseen problems in children				
Disagree	255 (49.9)	88 (30.8)	17 (58.6)	<0.001
Agree	256 (50.1)	198 (69.2)	12 (41.4)	
I worry about the unknown effects of vaccine in the future				
Disagree	181 (35.4)	74 (25.6)	19 (65.5)	<0.001
Agree	330 (64.6)	215 (74.4)	10 (34.5)	
Vaccines make a lot of money for the pharmaceutical companies, but don't do much for regular people				
Disagree	305 (59.7)	143 (49.5)	25 (86.2)	<0.001
Agree	206 (40.3)	146 (50.5)	4 (13.8)	
Authorities promote vaccination for financial gain, not for people's health				
Disagree	391 (76.5)	162 (57.0)	28 (96.6)	<0.001
Agree	120 (23.5)	122 (43.0)	1 (3.4)	
Vaccination programs are a big con				
Disagree	347 (67.9)	133 (46.0)	24 (82.8)	<0.001
Agree	164 (32.1)	156 (54.0)	5 (17.2)	
Natural immunity lasts longer than a vaccination				
Disagree	214 (41.9)	77 (26.6)	18 (62.1)	<0.001
Agree	297 (58.1)	212 (73.4)	11 (37.9)	
Natural exposure to viruses and germs gives you the safest protection				
Disagree	225 (44.0)	86 (29.9)	18 (62.1)	<0.001
Agree	286 (56.0)	202 (70.1)	11 (37.9)	
Being exposed to disease naturally is safer foe immune system than being exposed through vaccination				
Disagree	277 (54.2)	159 (55.0)	24 (82.8)	0.011
Agree	234 (45.8)	130 (45.0)	5 (17.2)	

COVID-19=Coronavirus disease-2019, JK=Jammu and Kashmir, VAX=Vaccine attitude examination

and Kashmir, believe that vaccination programs are a big con. 73% of people from rest of India, as opposed to 58%, in Jammu and Kashmir, think that natural immunity lasts longer than vaccination. 70% of people from rest of India, as opposed to 56%, in Jammu and Kashmir, think that natural exposure to viruses gives the safest protection; thus, our results are concordant with other studies.[17]

To our knowledge, our study is among the first to investigate COVID-19 vaccine acceptance among HCWs. In addition, our study provides insight on the reasons for refusing COVID-19 vaccines among HCWs who are hesitant. HCWs are not only among the first to be vaccinated in most jurisdictions, but they are also role models for the general public; therefore, their acceptance and recommendation may influence hesitant members of the general population to eventually accept vaccination. It is thus crucial that we address barriers to vaccine

Table 5: Beliefs about coronavirus disease-2019 vaccine and immunity

Belief about COVID-19 vaccine and immunity	Response	Frequency, *n* (%)
COVID-19 is not a real disease	Strongly disagree	400 (78.3)
	Disagree	19 (3.7)
	Slightly disagree	19 (3.7)
	Slightly agree	13 (2.5)
	Agree	9 (1.8)
	Strongly agree	51 (10.0)
COVID-19 is a new disease, and vaccines against it have not been fully tested and will not be safe	Strongly disagree	126 (24.7)
	Disagree	81 (15.9)
	Slightly disagree	84 (16.4)
	Slightly agree	64 (12.5)
	Agree	52 (10.2)
	Strongly agree	104 (20.4)
I feel safe after being vaccinated	Strongly disagree	75 (14.7)
	Disagree	51 (10.0)
	Slightly disagree	93 (18.2)
	Slightly agree	93 (18.2)
	Agree	60 (11.7)
	Strongly agree	139 (27.2)
I can rely on vaccines to stop serious infectious diseases	Strongly disagree	49 (9.6)
	Disagree	44 (8.6)
	Slightly disagree	75 (14.7)
	Slightly agree	62 (12.1)
	Agree	73 (14.3)
	Strongly agree	208 (40.7)
Although most vaccines appear to be safe, there may be problems that we haven't yet discovered	Strongly disagree	28 (5.5)
	Disagree	29 (5.7)
	Slightly disagree	52 (10.2)
	Slightly agree	59 (11.5)
	Agree	94 (18.4)
	Strongly agree	249 (48.7)
Vaccines can cause unforeseen problems in children	Strongly disagree	93 (18.2)
	Disagree	62 (12.1)
	Slightly disagree	100 (19.6)
	Slightly agree	90 (17.6)
	Agree	53 (10.4)
	Strongly agree	113 (22.1)
I worry about the unknown effects of vaccine in the future	Strongly disagree	66 (12.9)
	Disagree	45 (8.8)
	Slightly disagree	70 (13.7)
	Slightly agree	72 (14.1)
	Agree	73 (14.3)
	Strongly agree	185 (36.2)
Vaccines make a lot of money for the pharmaceutical companies, but don't do much for regular people	Strongly disagree	168 (32.9)
	Disagree	71 (13.9)
	Slightly disagree	66 (12.9)
	Slightly agree	62 (12.1)
	Agree	36 (7.0)
	Strongly agree	108 (21.1)
Authorities promote vaccination for financial gain, not for people's health	Strongly disagree	255 (49.9)
	Disagree	84 (16.4)
	Slightly disagree	52 (10.2)
	Slightly agree	43 (8.4)
	Agree	17 (3.3)
	Strongly agree	60 (11.7)

Contd...

Table 5: Contd...

Belief about COVID-19 vaccine and immunity	Response	Frequency, *n* (%)
Vaccination programs are a big com	Strongly disagree	173 (33.9)
	Disagree	84 (16.4)
	Slightly disagree	90 (17.6)
	Slightly agree	46 (9.0)
	Agree	34 (6.7)
	Strongly agree	84 (16.4)
Natural immunity lasts longer than a vaccination	Strongly disagree	86 (16.8)
	Disagree	55 (10.8)
	Slightly disagree	73 (14.3)
	Slightly agree	54 (10.6)
	Agree	50 (9.8)
	Strongly agree	193 (37.8)
Natural exposure to viruses and germs gives you the safest protection	Strongly disagree	88 (17.2)
	Disagree	55 (10.8)
	Slightly disagree	82 (16.0)
	Slightly agree	60 (11.7)
	Agree	70 (13.7)
	Strongly agree	156 (30.5)
Being exposed to disease naturally is safer foe immune system than being exposed through vaccination	Strongly disagree	139 (27.2)
	Disagree	72 (14.1)
	Slightly disagree	66 (12.9)
	Slightly agree	57 (11.2)
	Agree	55 (10.8)
	Strongly agree	122 (23.9)

COVID-19=Coronavirus disease-2019

acceptance in this group. Our findings suggest that providing more information on the safety and efficacy of the new vaccines and promoting positive peer influence could be key in addressing the major concerns of the HCWs who hesitate to be vaccinated.

Limitation and recommendation

Since a large representative sample of all kinds of HCWs were surveyed which allowed a degree of generalizability of the results. This study was conducted at the time when the front runners for COVID-19 vaccine were publishing efficiency results and states across the world were discussing mass immunization strategies and at the sometimes social media was a buzz with myths about the vaccine which created hesitancy not only among the general population but also the HCWs. A validated vaccine hesitancy tool was used, and outcome measures were based on internationally established vaccine hesitancy parameters.

Conclusions

Vaccine hesitancy has obvious repercussions for the success of planned immunization initiatives and has been recognized as a threat to universal immunization programs and across the globe.

The results of this study show that a significant proportion of the HCWs are hesitant to the COVID‑19 vaccine. Hesitancy attitudes were almost always driven by concern around the vaccine safety. The reliance on personal research to seek information underlines the role of social media in playing a significant part in influencing people's attitudes toward vaccine uptake. States and health-care authorities need to recognize the massive trust deficit around the vaccine and use the popular media used by people to share credible and reliable information.

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Conflicts of interest

There are no conflicts of interest.

References

1. Rume T, Islam SM. Environmental effects of COVID-19 pandemic and potential strategies of sustainability. Heliyon 2020;6:e04965.
2. Different COVID-19 Vaccines Updated Jan. 15, 2021 – Centers for Disease Control and Prevention. Available from: https://www.cdc.gov/coronavirus/2019-ncov/vaccines/different-vaccines.html#:~:text=Authorized%20and%20Recommended%20

Vaccines&text=Currently%2C%20two%20vaccines%20are%20authorized, COVID%2D19%20vaccine%E2%80%8B%E2%80%8B. [last accessed on 2021 Jun 05].

3. Press Statement by the Drugs Controller General of India (DCGI) on Restricted Emergency Approval of COVID-19 Virus Vaccine – Posted On: 03 JAN 2021 11:23 AM by PIB Delhi. Available from: https://pib.gov.in/PressReleseDetail.aspx?PRID=1685761#:~:text=The%20Subject%20Expert%20Committee%20of, III%20clinical%20trial%20of%20M. [last accessed on 2021 Jun 05].
4. Reluctance to Vaccinate Named a Top Global Health Threat in 2019 – United Nations Foundation. Available from: https://unfoundation.org/blog/post/anti-vaxxers-named-top-global-health-threat-in-2019/. [last accessed on 2021 Jun 05].
5. Lane S, MacDonald NE, Marti M, Dumolard L. Vaccine hesitancy around the globe: Analysis of three years of WHO/UNICEF joint reporting form data-2015-2017. Vaccine 2018;36:3861-7.
6. An Unwanted Booster dose for Vaccine Hesitancy – By R. Prasad – Updated; November 07, 2019. Available from: https://www.thehindu.com/opinion/lead/an-unwanted-booster-dose-for-vaccine-hesitancy/article29902812.ece. [last accessed on 2021 Jun 05].
7. Roller-Wirnsberger R, Lindner S, Kolosovski L, Platzer E, Dovjak P, Flick H, *et al*. The role of health determinants in the influenza vaccination uptake among older adults (65+): A scope review. Aging Clin Exp Res 2021;33:2123-32.
8. Coronavirus | Study Warns of COVID-19 Vaccine Hesitancy – By Ramya Kannan-Updated; December 16, 2020. Available from: https://www.thehindu.com/news/national/coronavirus-study-warns-of-covid-19-vaccine-hesitancy/article33348861.ece. [last accessed on 2021 Jun 05].
9. Martin LR, Petrie KJ. Understanding the dimensions of anti-vaccination attitudes: The vaccination attitudes examination (VAX) scale. Ann Behav Med 2017;51:652-60.
10. Taylor S, Landry CA, Paluszek MM, Groenewoud R, Rachor GS, Asmundson GJ. A proactive approach for managing COVID-19: The importance of understanding the motivational roots of vaccination hesitancy for SARS-CoV2. Front Psychol 2020;11:2890.
11. COCONEL Group. A future vaccination campaign against COVID-19 at risk of vaccine hesitancy and politicisation. Lancet Infect Dis 2020;20:769-70.
12. AP-NORC Poll: Half of Americans Would Get a COVID-19 Vaccine – By Lauran Neergaard and Hannah Fingerhut; May 28, 2020. Available from: https://apnews.com/article/dacdc8bc428dd4df6511bfa259cfec44. [last accessed on 2021 Jun 06].
13. Alabdulla M, Reagu SM, Al-Khal A, Elzain M, Jones RM. COVID-19 vaccine hesitancy and attitudes in Qatar: A national cross-sectional survey of a migrant-majority population. Influenza Other Respir Viruses 2021;15:361-70.
14. Sherman SM, Smith LE, Sim J, Amlôt R, Cutts M, Dasch H, *et al*. COVID-19 vaccination intention in the UK: results from the COVID-19 vaccination acceptability study (CoVAccS), a nationally representative cross-sectional survey. Human vaccines & immunotherapeutics. 2021 Jun 3;17(6):1612-21.
15. Paul E, Steptoe A, Fancourt D. Attitudes towards vaccines and intention to vaccinate against COVID-19: Implications for public health communications. Lancet Reg Health Eur 2021;1:100012.
16. Measuring the Impact of Exposure to COVID-19 Vaccine Misinformation on Vaccine Intent in the UK and US; 2020. Available from: https://www.medrxiv.org/content/10.1101/2020.10.22.20217513v1. [Last accessed on 2020 Nov 12].
17. Neumann-Böhme S, Varghese NE, Sabat I, Barros PP, Brouwer W, van Exel J, *et al*. Once we have it, will we use it? A European survey on willingness to be vaccinated against COVID-19. Eur J Health Econ 2020;21:977-82.