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Quick Response Code:



Website:

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DOI:

10.4103/jehp.jehp_642_21

Vaccine hesitancy and coronavirus disease-19: Where do we stand?

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Abstract:

BACKGROUND: Vaccine hesitancy is seen, globally, as a major factor that will determine future coronavirus disease-19 (COVID-19) spread and its effective management. This study aimed to identify COVID-19 vaccine perception, acceptance, confidence, hesitancy, and barriers among the general population.

MATERIALS AND METHODS: This was an online survey which was developed and shared through social media platforms among the general population of Kashmir. The survey captured demographic data and used a validated hesitancy measurement tool. We analyzed the data using descriptive statistics and multivariable logistic regression using Stata 15 (Stata Corp. 2017. Stata Statistical Software: Release 15. College Station, TX, USA: Stata Corp LLC).

RESULTS: A total of 835 responses were received. Most participants were males, with females comprising of 19.5% participants. 65.1% of participants were in the age group of 30–50, whereas 19.2% were below 30 years of age. 52.70% of respondents were willing to take the vaccine when available, while 32.5% of respondents were unsure about their decision of inoculation. The most cited reason for willingness to get vaccinated was an understanding of the disease and vaccination. 41.70% felt that the vaccines developed against COVID-19 have not been fully tested; therefore, concerns around the safety and its longer-term side effects were the reasons cited. Public health messaging should be tailored to address these concerns.

CONCLUSIONS: Vaccine hesitancy is a global threat undermining the control of preventable infections. The government should take proactive steps to address the factors that may potentially impact the benefits expected from the introduction of a COVID-19 vaccine in the union territory.

Keywords:

Coronavirus disease-19, coronavirus disease-19 vaccine, mistrust, participants, side effects, vaccine acceptance, vaccine hesitancy

Introduction

The coronavirus disease-19 (COVID-19) emerged from China and rapidly spread to many other countries worldwide.^[1] Since the time COVID-19 was declared a pandemic by the World Health Organization (WHO),^[2] pharmaceutical companies and governments worldwide have been trying to develop effective vaccinations against it to bring back normalcy. With the emergence of reliable vaccines from pharmaceutical companies

like, Pfizer-BioNTech collaboration and Moderna, among many others, the world is bracing itself for a full-scale vaccination drive, which has already begun in countries such as Israel and the United States.^[3]

Despite this, the reluctance of people in getting vaccinated becomes a primary determinant in how effective this drive and in turn, the control over COVID-19 as a global pandemic will be. "Vaccine hesitancy" is defined by the WHO as delay in vaccination or a refusal to take the

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How to cite this article: Khan Z, Khursheed SQ, Dar SA, Shah NN, Reagu S, Alabdulla M, *et al.* Vaccine hesitancy and coronavirus disease-19: Where do we stand?. J Edu Health Promot 2022;11:59.

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Received: 07-05-2021

Accepted: 25-06-2021

Published: 26-02-2022

vaccine, even when available.^[4] Vaccine hesitancy as an observable attitude within groups is complex and varies on a multitude of factors such as complacency, convenience, and confidence.^[4] Vaccine hesitancy – the reluctance or, refusal to take the vaccine, is an old phenomenon that threatens global health. The WHO has declared vaccine hesitancy as one of the planet's biggest health threats in 2019.^[5]

Vaccine hesitancy toward a newer vaccination program can be high even in communities with traditionally high acceptance for other vaccines. Indian states of Tamil Nadu and Karnataka, which had high acceptance toward other vaccination programs showed high hesitance toward the measles-rubella vaccine at the time of its introduction. The factors such as misinformation about the vaccine regarding its adverse effects played a central part in this observes hesitancy.^[6] Even today, the message of the discredited study in 1998 by Andrew Wakefield, who linked the measles, mumps, and rubella vaccine with autism, is used in spreading vaccine doubts and conspiracy theories.^[7]

By making use of the Vaccination Attitudes Examination (VAX),^[8] this study aims to identify the major factors of vaccine hesitance within the general population of the Jammu and Kashmir region of India, to implement countermeasures to ensure that the majority of the population develops acceptance toward COVID-19 vaccination programs.

Materials and Methods

Study design and setting

After approval from the Institutional Ethics Committee, a cross-sectional study using the Survey Monkey platform was conducted among the general population of Kashmir.

Study participants and sampling

The survey was shared through social media platforms and was designed in such a manner that a single response can be filled using in one device. The survey was shared using exponential nondiscriminative snowball sampling technique in which the respondents were requested to complete the survey and forward the link as much as possible among close contacts. On clicking the link, the respondents would get auto-directed to the survey. The first page of the survey consisted of information regarding the purpose and how the data collected will be utilized. Respondents were asked to give consent and confirm which was followed by a set of questions used in the survey.

Data collection tool and technique

Respondents more than 18 years old, having sufficient knowledge of the English language and internet access

took part in the survey. The data collection was done for 10 days from February 10, 2021, to February 20, 2021.

Information regarding demography, health, various beliefs toward vaccines, in general, and COVID-19 vaccine, in specific, among various other questions regarding immunity and other beliefs and fears, was asked. This was done using a validated vaccine hesitancy measurement tool – The Vaccine Attitudes Examination Scale (VAX)^[8] after due permission was sought.

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” in one of five ways – “definitely,” “probably,” “not sure,” “probably not,” or “definitely not.” We classified any of the latter three responses as “vaccine hesitancy.” We recorded beliefs about the COVID-19 vaccine and immunity on a six-point Likert scale ranging from “strongly disagree” to “strongly agree.”

Ethical consideration

The research protocols were approved under CDSCO U/P No: ECR/1422/Inst/JK/2020 by the institutional ethics committee of Govt. Medical College, Srinagar.

Statistical analysis

We summarized the categorical variables as percentages. Logistic regression was used to identify variables significantly associated with vaccine hesitancy. Variables that 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. We used Stata version 15 (StataCorp. 2017. Stata Statistical Software: Release 15. College Station, TX, USA: StataCorp LLC) for data analysis. Statistical significance was set at a 5% level.

Results

A total of 1114 responses were received, of which 835 respondents were from Jammu and Kashmir and hence were evaluated.

Most of the participants were males, with females comprising of 19.5% subjects. 65.1% of participants were in the age group of 30–50, while 19.2% were below 30 years of age. 53.1% of participants were postgraduates and 78.3% of participants were married. Basic demographic data and other descriptive statistics are listed in Table 1.

A majority of participants (91.9%) had received childhood vaccinations but only 50.3% of participants had received any influenza vaccination in the past 3 years [Table 1].

34.6% of participants had at least one person in the family already been tested positive for COVID-19. Self-reported history of chronic medical illness was present in 19.2% of participants of which 38.2% had hypertension, 24.8% were diabetic and 15.9% had asthma [Table 1]. 6.1% of participants reported that they were suffering from at least one mental illness, among whom 3.6% reported anxiety while 1.9% of participants said they had depression [Table 1].

52.7% of participants were willing to take the vaccine when available, while 6.1% said that they would not take the vaccine when available. 32.5% of participants were unsure about their decision [Table 2].

The most cited reason for willingness to get vaccinated was an understanding of the disease and vaccination, reported 62.9% of those willing to take the vaccine [Table 2].

People who had previously been inoculated, at least once, for influenza in the past 3 years were twice more unlikely of getting vaccinated for COVID-19 [Table 1]. Interestingly, willingness to take the medicine notwithstanding, 54.4% of people didn't feel safe even after getting vaccinated [Table 3].

41.70% of participants felt that the vaccines developed against COVID-19 have not been fully tested yet, and hence, not safe [Table 4]. 43.80% of participants did not rely on vaccines to stop infectious diseases [Table 3].

Being vaccinated ($P = 0.026$), natural immunity lasts longer than a vaccination ($P = 0.001$), natural exposure to viruses and germs gave the safest protection ($P = 0.026$), and being exposed to disease naturally ($P = 0.030$) was safer for immune system than being exposed through vaccination was significantly reported by those living in India but outside J and K and those living outside India [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 the nonhealthcare workers in India. This study shows a moderate degree of hesitancy at 14.8% to COVID-19 vaccination among the respondents. However, when combined with those that are unsure of the vaccination, hesitancy is present in around 47.3% of the respondents. Research on similar

Table 1: Participant characteristics and related clinical characteristics

	Frequency (%)
Age group	
≤30	160 (19.2)
30-50	544 (65.1)
>50	131 (15.7)
Sex	
Female	163 (19.5)
Male	672 (80.5)
Occupation	
Government sector	266 (31.9)
Private sector	227 (27.2)
Business	164 (19.6)
Student	18 (2.2)
Retired	13 (1.6)
Unemployed	66 (7.9)
Others	24 (2.9)
Prefer not to say	57 (6.8)
Education	
Less than graduate	52 (6.2)
Graduate	340 (40.7)
Postgraduate and above	443 (53.1)
Marital status	
Single or, never married	158 (18.9)
Married	654 (78.3)
Separated	3 (0.4)
Divorced	4 (0.5)
Widowed	2 (0.2)
Prefer not to say	14 (1.7)
Suffered from COVID-19 infection in the past?	
Yes	201 (24.1)
No	634 (75.9)
Number of people in the house	
1-2	21 (2.5)
3-4	260 (31.1)
5-6	332 (39.8)
≥7	222 (26.6)
Pregnant or, breastfeeding	
Yes	10 (6.1)
No	153 (93.9)
Completed childhood vaccinations	
Yes	767 (91.9)
No	68 (8.1)
Received influenza vaccination in past three years	
Never	413 (49.5)
Annually	152 (18.2)
Once	193 (23.1)
Twice	75 (9.0)
Don't know	2 (0.2)
Suffering from any CMI	
Yes	160 (19.2)
No	675 (80.8)
Type of CMI suffering from	
DM	39 (24.8)
HTN	60 (38.2)
Dyslipidemia	2 (1.3)

Contd...

Table 1: Contd...

	Frequency (%)
Asthma	25 (15.9)
Ischemic heart disease	5 (3.2)
Thyroid disorder	3 (1.9)
Others	23 (14.6)
Suffering from any MHI	
Yes	51 (6.1)
No	784 (93.9)
Type of MHI suffering form	
No answer	784 (93.9)
Depression	16 (1.9)
Anxiety	30 (3.6)
Bipolar illness	1 (0.1)
Others	4 (0.5)
On any regular medications	
Yes	254 (30.4)
No	581 (69.6)
Have you or any family member had COVID-19 in the past?	
Yes	289 (34.6)
No	546 (65.4)
Worried about self-becoming infected	
Yes	571 (68.4)
No	264 (31.6)
Worried about family becoming infected	
Yes	348 (41.7)
No	487 (58.3)
Financial worries	
Yes	758 (90.8)
No	77 (9.2)
Job related worries	
Yes	774 (92.7)
No	61 (7.3)
Worried that vaccine not available yet	
Yes	678 (81.2)
No	157 (18.8)
Somewhat worried	
Yes	733 (87.8)
No	102 (12.2)
Not worried at all	
Yes	736 (88.1)
No	99 (11.9)

COVID-19=Coronavirus disease-2019, CMI=Chronic medical illness, HTN=Hypertension, MHI=Mental health illness, DM=Diabetes mellitus

lines across the world found a vaccine hesitancy of 25% in Canada,^[9] 20% in the U. S,^[10] 20% in Qatar,^[11] while it was determined to be around 9% in Britain.^[12] When we compare the COVID-19 vaccine hesitancy in healthcare workers, the lowest acceptance rates were reported from DRC (27.7%).^[13]

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 state governments as compared

Table 2: Vaccine hesitancy among study participants

Variable	Frequency (%)
Will you take the COVID-19 vaccination, when available?	
Definitely	264 (31.6)
Probably	176 (21.1)
Not sure	271 (32.5)
Probably not	73 (8.7)
Definitely not	51 (6.1)
Will you take the COVID-19 vaccination, when available?	
Yes	440 (52.7)
No	395 (47.3)
Will you recommend COVID-19 vaccine to elderly or, members with chronic medical conditions?	
Definitely	302 (36.2)
Probably	185 (22.2)
Not Sure	241 (28.9)
Probably not	56 (6.7)
Definitely not	51 (6.1)
If you have children, will you get your children vaccinated?	
Definitely	255 (30.5)
Probably	162 (19.4)
Not sure	238 (28.5)
Probably not	79 (9.5)
Definitely not	67 (8.0)
No answer/don't have	34 (4.1)
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	310 (37.1)
I would probably take the vaccine	271 (32.5)
I would not take the vaccine and prefer to go through the quarantine requirements	254 (30.4)
Reason for willingness to take vaccine	
My understanding of the disease and vaccination	291 (34.85)
Information from my doctor/hospital	108 (12.93)
Information from social media	23 (2.75)
Information from news	27 (3.23)
Information from family/friends	6 (0.72)
No answer	7 (0.84)

COVID-19=Coronavirus disease-2019

to higher-income countries. Similar trends were seen in South Asia and Eastern Africa.^[14]

It is important to understand that the healthcare workers remain the key figures in vaccination programs and they are generally the most trusted by general public in recommending vaccination.^[15]

In East and Southeast Asia, the overall acceptance rates among the general public were relatively high. This includes more than 90% acceptance rates in Indonesia, Malaysia, and China, Thus contradicting

Table 3: Beliefs about coronavirus disease-2019 vaccine and immunity

	Frequency (%)
COVID-19 is not a real disease	
Strongly disagree	555 (66.5)
Disagree	46 (5.5)
Slightly disagree	56 (6.7)
Slightly agree	48 (5.7)
Agree	21 (2.5)
Strongly agree	109 (13.1)
COVID-19 is a new disease, and vaccines against it have not been fully tested and will not be safe	
Strongly disagree	179 (21.4)
Disagree	107 (12.8)
Slightly disagree	118 (14.1)
Slightly agree	101 (12.1)
Agree	69 (8.3)
Strongly agree	261 (31.3)
I feel safe after being vaccinated	
Strongly disagree	197 (23.6)
Disagree	93 (11.1)
Slightly disagree	164 (19.6)
Slightly agree	124 (14.9)
Agree	74 (8.9)
Strongly agree	183 (21.9)
I can rely on vaccines to stop serious infectious diseases	
Strongly disagree	153 (18.3)
Disagree	68 (8.1)
Slightly disagree	145 (17.4)
Slightly agree	102 (12.2)
Agree	92 (11.0)
Strongly agree	275 (32.9)
Although most vaccines appear to be safe, there may be problems that we haven't yet discovered	
Strongly disagree	54 (6.5)
Disagree	62 (7.4)
Slightly disagree	96 (11.5)
Slightly agree	102 (12.2)
Agree	130 (15.6)
Strongly agree	391 (46.8)
Vaccines can cause unforeseen problems in children	
Strongly disagree	139 (16.6)
Disagree	93 (11.1)
Slightly disagree	167 (20.0)
Slightly agree	139 (16.6)
Agree	94 (11.3)
Strongly agree	203 (24.3)
I worry about the unknown effects of vaccine in the future	
Strongly disagree	85 (10.2)
Disagree	63 (7.5)
Slightly disagree	113 (13.5)
Slightly agree	101 (12.1)
Agree	97 (11.6)
Strongly agree	376 (45.0)

Table 3: Contd...

	Frequency (%)
Vaccines make a lot of money for the pharmaceutical companies, but don't do much for regular people	
Strongly disagree	200 (24.0)
Disagree	97 (11.6)
Slightly disagree	112 (13.4)
Slightly agree	116 (13.9)
Agree	59 (7.1)
Strongly agree	251 (30.1)
Authorities promote vaccination for financial gain, not for people's health	
Strongly disagree	337 (40.4)
Disagree	117 (14.0)
Slightly disagree	118 (14.1)
Slightly agree	73 (8.7)
Agree	56 (6.7)
Strongly agree	134 (16.0)
Vaccination programs are a big com	
Strongly disagree	193 (23.1)
Disagree	109 (13.1)
Slightly disagree	188 (22.5)
Slightly agree	114 (13.7)
Agree	56 (6.7)
Strongly agree	175 (21.0)
Natural immunity lasts longer than a vaccination	
Strongly disagree	93 (11.1)
Disagree	62 (7.4)
Slightly disagree	116 (13.9)
Slightly agree	95 (11.4)
Agree	101 (12.1)
Strongly agree	368 (44.1)
Natural exposure to viruses and germs give you the safest protection	
Strongly disagree	155 (18.6)
Disagree	91 (10.9)
Slightly disagree	134 (16.0)
Slightly agree	124 (14.9)
Agree	101 (12.1)
Strongly agree	230 (27.5)
Being exposed to disease naturally is safer for immune system than being exposed through vaccination	
Strongly disagree	174 (20.8)
Disagree	94 (11.3)
Slightly disagree	157 (18.8)
Slightly agree	115 (13.8)
Agree	68 (8.1)
Strongly agree	227 (27.2)

COVID-19=Coronavirus disease-2019

our study results.^[16-18] Therefore, low rates of vaccine acceptability can be explained by the widespread embrace of conspiratorial beliefs in the region. Therefore, any hesitancy or lack of trust among this population group can have a far-reaching impact on success of any vaccination programs.

Contd...

Table 4: Univariable and multivariable logistic regression analysis

	Univariable logistic regression analysis				Multivariable logistic regression analysis			
	OR	P	95% CI		OR	P	95% CI	
			Lower limit	Upper limit			Lower limit	Upper limit
Age (years)								
≤30	2.83	0.00	1.93	4.17	0.905	0.752	0.489	1.67
31-50	1.45	0.023	1.05	2.01	1.26	0.263	0.838	1.90
>50	0.45	0.0	0.33	0.609	Ref			
Female	0.73	0.021	0.561	0.954	0.82	0.26	0.586	1.16
Single or never married	2.213	0.0	1.69	2.88	1.90	0.006	1.20	3.20
Not taken influenza vaccine annually in the last 3 years	2.308	0.00	1.75	3.04	1.76	0.002	1.239	2.50
No history of regular medication	1.32	0.067	0.98	1.78	0.80	0.269	0.53	1.19
Not worried at all	0.45	<0.001	0.29	0.69	2.38	0.004	1.31	4.33
COVID-19 is not a real disease	0.94	0.62	0.73	1.20	1.039	0.829	0.732	1.473
New vaccine not fully tested and will not be safe	6.08	0	4.78	7.74	3.76	0	2.821	5.023
I do not feel safe after being vaccinated	0.16	0	0.12	0.20	3.818	0	2.813	5.183
I do not rely on vaccines to stop serious infectious diseases	3.11	0	2.47	3.90	1.46	0.016	1.074	1.995
Although most vaccines appear to be safe, there may be problems we haven't yet discovered	1.37	0.051	1.00	1.88	0.862	0.425	0.6006	1.239
Vaccines can cause unforeseen problems in children	2.73	0	2.18	3.42	1.600	0.003	1.17	2.17
I worry about the unknown effects of vaccines in the future	3.66	0.00	2.83	4.75	1.84	0.001	1.289	2.629
Vaccines make lot of money for pharma companies	2.10	0	1.68	2.62	0.687	0.023	0.497	0.949
Authorities promote vaccination for financial gain not for proper health	4.09	0	3.18	5.25	1.82	0.001	1.28	2.60
Vaccination programs are a big con	2.10	0	1.67	2.63	1.31	0.457	0.816	1.56
Natural immunity lasts longer than vaccination	2.21	0	1.74	2.80	1.200	0.279	0.861	1.673
Natural exposure to viruses and germs gives safest protection	1.84	0	1.47	2.29	0.987	0.940	0.703	1.385
Being exposed to disease naturally is safer for immune system	2.12	0	1.70	2.65	1.20	0.276	0.863	1.673

OR=Odds ratio, CI=Confidence interval, COVID-19=Coronavirus disease-2019

Determinants of vaccine hesitancy

The most significant determinants of vaccine hesitancy were: (1) Worry about unknown effects of the vaccine and (2) belief that natural immunity lasts longer than an immunity attained through vaccination. Interestingly, even though the degree of hesitancy has some variance across the globe, the themes that determine 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 longer-term side effects. The presence of such mistrust among health-care workers who traditionally have more access to reliable healthcare information underlining the deficit of trust and informs the task ahead for health care policy-makers. In the published studies described above, a more or less consistent theme of concerns around the safety of the vaccine itself is emerging as the most prominent. This concern cuts across demographic variables and countries. The possible safety concerns reported by the published data included unexplored side effects of the vaccine, beliefs about the COVID-19 disease, public perception of vaccine trials being rushed through, pharmaceutical

companies profiteering from the vaccine, and preferred reliance on natural immunity-thus matching our study results.^[19-22]

Participants who believed that vaccines have not been fully tested yet were more than three times more likely to reject being vaccinated when available. This points out the immediate need for awareness drives and transparency regarding vaccination development from the side of governments as well as the pharmaceutical companies that are in process of rolling out vaccines for the public. People who had not been administered with influenza vaccination were also more apprehensive about the COVID-19 vaccination and were twice more likely to reject the vaccination when available, than those participants who had been vaccinated against influenza at least once in the last 3 years.

Nearly half of the participants were, at least, not sure about getting elderly members vaccinated, while almost half of participants were, at least, not sure about getting their children vaccinated. These figures seem to be in line with the vaccine hesitancy rate of 47%, and people who did not show willingness toward having themselves

Table 5: Comparison-J and K versus others

	Residence						P
	JK		Rest of India		Outside India		
	Count	Column N (%)	Count	Column N (%)	Count	Column N (%)	
COVID-19 is not a real disease							
Disagree	657	78.7	206	80.5	20	87.0	0.542
Agree	178	21.3	50	19.5	3	13.0	
COVID-19 is a new disease and vaccines against it have not been fully tested and will not be safe							
Disagree	404	48.4	124	48.4	16	69.6	0.133
Agree	431	51.6	132	51.6	7	30.4	
I feel safe after being vaccinated							
Disagree	454	54.4	120	46.9	8	34.8	0.026*
Agree	381	45.6	136	53.1	15	65.2	
I can rely on vaccines to stop serious infectious diseases							
Disagree	366	43.8	94	36.7	7	30.4	0.069
Agree	469	56.2	162	63.3	16	69.6	
Although most vaccines appear to be safe, there may be problems that we haven't yet discovered							
Disagree	212	25.4	62	24.2	7	30.4	0.786
Agree	623	74.6	194	75.8	16	69.6	
Vaccines can cause unforeseen problems in children							
Disagree	399	47.8	132	51.6	15	65.2	0.166
Agree	436	52.2	124	48.4	8	34.8	
I worry about the unknown effects of vaccine in the future							
Disagree	261	31.3	76	29.7	11	47.8	0.199
Agree	574	68.7	180	70.3	12	52.2	
Vaccines make a lot of money for the pharmaceutical companies, but don't do much for regular people							
Disagree	409	49.0	129	50.4	11	47.8	0.916
Agree	426	51.0	127	49.6	12	52.2	
Authorities promote vaccination for financial gain, not for people's health							
Disagree	572	68.5	175	68.4	17	73.9	0.856
Agree	263	31.5	81	31.6	6	26.1	
Vaccination programs are a big com							
Disagree	490	58.7	152	59.4	17	73.9	0.340
Agree	345	41.3	104	40.6	6	26.1	
Natural immunity lasts longer than a vaccination							
Disagree	271	32.5	95	37.1	16	69.6	0.001*
Agree	564	67.5	161	62.9	7	30.4	
Natural exposure to viruses and germs give you the safest protection							
Disagree	380	45.5	105	41.0	16	69.6	0.026*
Agree	455	54.5	151	59.0	7	30.4	
Being exposed to disease naturally is safer for immune system than being exposed through vaccination							
Disagree	425	50.9	137	53.5	18	78.3	0.030*
Agree	410	49.1	119	46.5	5	21.7	

COVID-19 = Coronavirus disease-2019

vaccinated also show hesitance towards getting the elderly and children vaccinated.^[11] Almost one-third of participants were not willing to get vaccinated due to risk of major bleeding^[23] even before traveling abroad and instead, accepted being quarantined for 2 weeks. This is again an indication of mistrust toward vaccination programs, in general, and COVID-19 vaccination, in specific. Misinformation through social media regarding

COVID-19, its management, and vaccination programs is common and accessible. On the other hand, there seems to be a lack of awareness programs and transparency about the disease and its vaccination development. Innovative and active management of this situation by using all available tools can go a long way in achieving a higher trust and acceptance towards COVID-19 vaccination programs, which is central to global pandemic management.

COVID-19 vaccine hesitancy can be the limiting step in the global efforts to control the current pandemic with its negative health and socioeconomic effects.^[24,25]

Findings of similar studies across the world are consistent with conclusions drawn from this survey, where mistrust and misinformation appear to be the biggest contributors to vaccine hesitancy.^[26]

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.

Thus, estimates of vaccine acceptance rates can be helpful to plan actions and intervention measures necessary to increase the awareness and assure people about the safety and benefits of vaccines, which in turn would help to control virus spread and alleviate the negative effects of this unprecedented pandemic.^[27,28]

Mistrust toward vaccines represent a significant challenge in achieving the vaccination coverage required for population immunity. Vaccine safety communication to increase public trust by the time a COVID-19 vaccine is available should begin now. Evaluation of attitudes and acceptance rates toward COVID-19 vaccines can help to initiate communication campaigns that are much needed to strengthen trust in health authorities.^[29]

Limitations and recommendations

This survey was conducted before the actual vaccination programs were rolled out when there were a lot of myths associated with the efficacy and safety of the vaccines available and the hesitancy rates and attitudes are likely to vary as the situation evolves. Lack of knowledge about the nonresponders may bias the results.

Offer tailored communication from trusted sources such as community representatives, health-care providers, and local authorities that is culturally relevant and accessible in multiple languages. Religious or traditional community leaders can engage key audiences through open discussions, advocacy, and integrated community activities. The need of hour is to engage masses in dialog about vaccine safety, efficacy and importance and discuss the risks and benefits of vaccination.

Conclusions

Vaccine hesitancy is a global threat undermining the control of preventable infections. It can be a decisive factor that would hinder the successful control of the current COVID-19 pandemic. It is recommended to build

COVID-19 vaccination trust among the General Public, via the spread of timely and clear messages through trusted channels advocating the safety and efficacy of currently available COVID-19 vaccines. Further, the government should take pro-active steps to address the factors that may potentially impact the benefits expected from the introduction of a COVID-19 vaccine in the union territory.

Acknowledgments

The authors would like to thank all the participants who participated in the survey. Special thanks to Prof. Leslie Martin for her kind permission to use the Vaccination Attitudes Examination (VAX) Scale.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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