Original Article

Acceptance of COVID-19 vaccine among healthcare workers before the launch of vaccine in India: An online survey

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Abstract:

BACKGROUND: COVID-19 has led to significant morbidity and mortality globally in addition to unprecedented disruption in economic activities. Vaccination against it is considered to be the only sustainable way out of this pandemic. The study was conducted to estimate vaccine acceptance among doctors in India using an online survey.

MATERIALS AND METHODS: A cross-sectional study using a purposive sampling method was conducted two weeks before vaccine rollout. A pretested questionnaire developed using Google forms was shared by social media groups targeting doctors only.The questions collected information regarding socio-demographic details, knowledge, attitude and practices towards COVID-19 vaccination. Data was downloaded and analysed using SPSS-v23. Chi-square test and fisher exact test was used and $P < 0.05$ was considered significant.

RESULTS: A total of 511 records were included in the final analysis of which 340 (66.53%) reported to be either definitely or probably willing to accept COVID-19 vaccine. One third of respondents were working in COVID-19 designated hospitals (37.2%), 30% were posted in non COVID-19 hospitals, 25.1% had no direct contact with COVID-19 patients while 7.7% doctors were involved in testing COVID-19 diagnosis. Subjects who perceived a higher risk of contracting COVID-19, those who perceived that vaccine would be effective against COVID-19 and those who felt that vaccine will not have any serious side effects were more likely to accept the vaccine.

CONCLUSION: There is an urgent need to address any apprehensions regarding COVID-19 vaccines. A tailored and intensified advocacy program for doctors is needed before the launch of vaccine.

Keywords:
Anti-vaccination movement, COVID-19, COVID-19 vaccines, vaccination refusal, vaccine safety

Introduction

The previous year saw COVID-19 transforming from an unknown entity which was first detected in Wuhan area of China to a disease which has claimed 2.6 million lives globally by March 2021 and the numbers are still on the rise.[1] In addition to the direct morbidity and mortality, COVID-19 is associated with a huge economic impact.[2,3] It undermined decades of economic growth and also slowed the global progress towards achieving Sustainable Developmental Goals SDGs.[4] As it began to spread globally, countries employed multiple strategies to mitigate its effects. These ranged from enforced lockdowns to ensuring community participation in use of face masks and hand hygiene, although these interventions helped to slowdown the spread but not to a greater extent.[5] Earlier in the course of the pandemic, it was understood that

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having an effective and affordable COVID-19 vaccine would be one of the most important tool in fighting this pandemic. Multiple organisations started working on the development of the vaccine as early as January 2020 when China shared the genomic sequence of the virus globally. By the end of 2020, 52 vaccines were in clinical evaluation and an additional 162 were in the preclinical evaluation phase and eight countries had granted emergency use authorisation to COVID-19 vaccines.[6] India has also provided emergency use authorisation to two COVID-19 vaccines which include the COVISHIELD vaccine by Serum Institute of India and COVAXIN by Bharat Biotech.[7] India had put in an elaborate mechanism for rollout of the vaccines. Health care workers were given first priority for the vaccine and followed by frontline workers And then individuals aged 60 years and above.[7,8] As with any new vaccine, its rejection may be a threat to overall effectiveness of any vaccination campaign. It is important to have an estimate of vaccine acceptance among potential beneficiaries and also have an understanding regarding factors which determine vaccine acceptance or reluctance. This study was conceptualised to estimate the vaccine acceptance among doctors in India one month before the launch of vaccine and to identify factors which influence acceptance among doctors in India.

Materials and Methods

Study design/setting
The study had a cross-sectional study design and data was collected using an online questionnaire through Google Forms. The target population for the study were doctors currently residing and working in India.

Study participants
To ensure that only the specific group of healthcare workers is reached, we used social media groups of doctors specifically. The target survey participants were doctors who had completed either allopathic or alternative system of medicine. The questionnaire was shared via social media applications such as Facebook and WhatsApp to reach the study population. Region specific groups were identified, and the questionnaire was shared with the group members. Data were collected for a total of 7 days and a total of 511 responses were recorded.

Data collection tool and technique
The questionnaire was developed on google forms and was titled "survey regarding prospective COVID-19 vaccine among Indian doctors". The word vaccine hesitancy was deliberately omitted to avoid and response bias. The questionnaire had four sections to collect data regarding socio-demographic details, knowledge regarding COVID-19 vaccination, and attitude-and practicebased questions. English version was used as it is the medium of education in medical schools in India. Face validity of the questionnaire was checked by two independent researchers, one of which was a psychologist with experience in research. After this the questionnaire was pretested on 20 doctors and further changes related to language, style was done based on feedback from participants. The responses to vaccine acceptance were recorded on a 4-point Likert scale which were later dichotomized for analysis. The subjects were also asked to rate the impact of COVID-19 on daily life, physical health, mental health and financial wellbeing. All these responses were recorded on a 4-point Likert scale with no, minimal, moderate and severe as options. The responses were then dichotomized for analysis. The questionnaire had a userfriendly design and layout to avoid multiple responses.

Sample size calculation
Sample size was calculated using the formula for prevalence studies $n = (t^2 \times p[1 − p])/m^2$. The proportion of subjects (p) with vaccine acceptance was estimated to be 50%. The desired precision (m) and confidence level (t) was estimated at 0.05 and 0.95 respectively. The minimum sample size required was estimated to be 385.

Statistical methods
The data file in Microsoft Excel was downloaded from Google Drive. Variables were summarized as frequency and percentage. Odds ratio was calculated for relevant variables. Chi-square and Fischer Exact test was used to test for significance in categorical variables. $P < 0.05$ was considered statistically significant. All analyses were done using Microsoft Excel 2016 and SPSS version 23 (IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp.).

Ethical consideration
All information regarding the study, participants' rights, and researcher's contact details were provided on the first page of the survey questionnaire. Permission to conduct the study was taken from the institutional ethics committee.

Results

A total of 511 records were included in the final analysis of which 340 (66.53%) reported to be either definitely or probably willing to accept COVID-19 vaccine. The socio-demographic profile of participants is described in Table 1. A total of 108 (21.13%) doctors had a previous history of COVID-19 disease and 325 (63.60%) doctors had someone among the family members diagnosed as COVID-19 positive. COVID-19 IgG antibodies were done by 235 (45.99%) doctors among which 62 (12.14%) had at least one positive test for COVID-19 antibodies.

In our study, 67 (13.11%) doctors had some underlying health and medical conditions and majority 365 (71.43%) didn't have any health insurance. In our study, one third of the doctors were working in COVID-19 designated hospitals (37.2%), 30% were posted in non COVID-19 hospitals, 25.1% had no direct contact with COVID-19 patients and 7.7% doctors were involved in testing of COVID-19 specimens. The participants were asked to rate the impact of COVID-19 on daily life, physical health, mental health and financial wellbeing on a 4-point Likert scale. More than 96% participants reported moderate to severe impact of COVID-19 on daily life. Half of the participants reported a moderate to severe impact of COVID-19 on physical health, with 51% and 46% participants reporting more than moderate impact on mental health and financial stability [Figure 1].

Gender, age, marital status and educational qualification did not have any significant relation with vaccine acceptance. Religion had a significant relation with vaccine hesitancy with higher proportion of Muslim respondents exhibiting hesitancy towards the vaccines [Table 2].

A total of 254 (49.7%) subjects believed that these vaccines can have serious AEFIs and these subjects had a significantly lower vaccine acceptance than subjects who did not believe that the vaccine can cause serious AEFIs. Although 84.3% subjects believed that the vaccine can have minor AEFIs but it did not have any significant relation with vaccine acceptance.

Around 55.2% doctors had gone through the literature regarding different vaccines in various stages of development. Most (69.4%) doctors responded that given a choice they would prefer Pfizer/Biontech vaccine. The numbers were 39.3% for Oxford/Covishield and 13.4% for Covaxin.

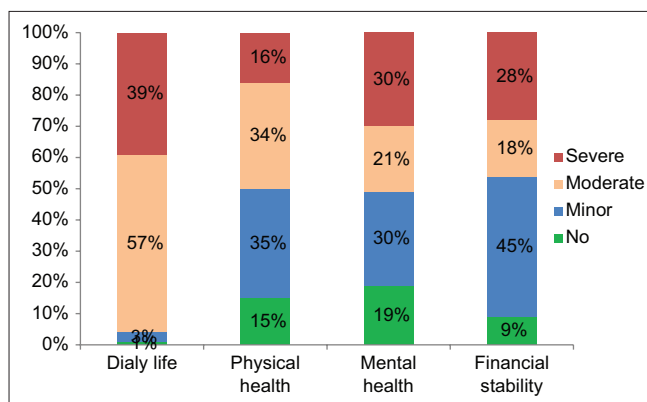## Discussion

The study is a cross sectional study among doctors

Figure 1: Reported impact of COVID-19 on life and health

Table 1: Sociodemographic characteristics of the participants

Characteristic	*n* (%)
Gender	
Male	196 (38.35)
Female	315 (61.65)
Age group	
18-29	156 (30.53)
30-45	327 (63.99)
46-60	18 (3.53)
60 and above	10 (1.95)
Religion	
Islam	357 (69.87)
Hindu	98 (19.17)
Sikh/Christian/others	56 (10.96)
Marital status	
Never married	192 (37.57)
Currently married	315 (61.65)
Separated/widowed	4 (0.78)
Education qualification	
MBBS	114 (22.31)
MS/MD/DNB	341 (66.73)
MCH/DM/DNB (SS)	12 (2.34)
AYUSH	44 (8.62)
Department working in	
Government job	169 (33.08)
Private job	44 (8.62)
Residency	226 (44.22)
NGOs	32 (6.26)
Internship	40 (7.82)
Residence	
North India	383 (74.95)
Eastern India	6 (1.17)
Western India	16 (3.14)
Southern India	6 (1.17)
Central India	20 (3.91)
North - East India	80 (15.66)
Personal history of COVID-19	
Yes	108 (21.13)
No	403 (78.87)
Family history of COVID-19	
Yes	325 (63.60)
No	186 (36.40)
IgG antibodies	
Positive for IgG	62 (12.13)
Negative for IgG	173 (33.85)
Never done	276 (54.02)
Underlying medical condition	
Yes	67 (13.12)
No	444 (86.88)
Health insurance	
Yes	146 (28.57)
No	365 (71.43)
Willing to purchase vaccine	
Yes	299 (58.51)
No	212 (41.49)

Table 2: Acceptance of COVID-19 vaccine and the associated factors

Characteristic	Total number	Willing to accept vaccine, *n* (%)	OR	95% CI
Gender				
Male	196	132 (67.3)	Reference	
Female	315	208 (66.0)	0.94	0.64-1.38
Age group				
<30	206	133 (64.6)	Reference	
31-45	276	189 (68.5)	1.19	0.81-1.74
45 and above	29	16 (61.5)	0.34	0.17-0.65
Religion				
Islam	357	216 (60.5)	Reference	
Hindu	98	74 (75.5)	2.01	1.21-3.34
Sikh/Christian	56	50 (89.3)	5.44	2.27-13.02
Marital status				
Never married	195	131 (67.2)	Reference	
Currently married	310	206 (66.4)	0.97	0.66-1.41
Separated/widowed	6	3 (50.0)	0.48	0.09-2.48
Educational qualification				
MBBS	119	68 (57.1)	Reference	
MS/MD/DNB	359	228 (69.1)	1.67	1.09-2.56
Indian system of medicine	33	24 (72.7)	2	0.85-4.67
Type of exposure with Covid patients				
No direct exposure	134	88 (64.7)	Reference	
Patient care in non-COVID-19 hospitals	154	113 (73.4)	1.44	0.86-2.38
COVID-19 designated hospital	185	118 (63.8)	0.92	0.57-1.46
Testing for COVID-19	38	21 (55.3)	0.64	0.31-1.34
Impact of COVID-19 on daily life				
No or minimal impact	14	3 (21.4)	0.11	0.03-0.4
Moderate impact	290	204 (70.3)	Reference	
Severe impact	207	133 (64.2)	0.76	0.51-1.1
Perceived risk of contracting COVID-19				
No and minor	97	97 (54.6%)	Reference	
Moderate and high	414	287 (69.3%)	1.87	1.19-2.94
Perceived threat to physical health by COVID-19				
No and minor	92	64 (69.6%)	Reference	
Moderate and high	419	276 (65.9%)	0.84	0.51-1.37
Perceived threat to mental health by COVID-19				
No and minor	105	71 (67.6%)	Reference	
Moderate and high	406	269 (66.2%)	0.94	0.59-1.49
Perceived threat to perform routine duties by COVID-19				
No and minor	85	51 (60%)	Reference	
Moderate and high	426	289 (67.8)	1.4	0.87-2.27
Perceived threat to financial safety by COVID-19				
No and minor	86	52 (60.4)	Reference	
Moderate and high	425	288 (67.8)	1.37	0.87-2.27
Personal history of COVID-19				
No	402	267 (66.4)	Reference	
Yes	109	73 (67.0)	1.02	0.65-1.61
How much would COVID-19 vaccine protect against COVID-19				
Not at all	13	0 (0.0)	0.01	0.001-0.4
Little or moderate	409	267 (65.3)	Reference	
A lot	89	73 (82.0)	2.42	1.36-4.32
COVID-19 vaccine might have minor adverse events				
Yes	434	283 (65.2)	Reference	
No	6	4 (66.7)	1.06	0.19-5.89
Not sure	71	53 (74.6)	1.57	0.88-2.77

Contd...

Table 2: Contd...

Characteristic	Total number	Willing to accept vaccine, *n* (%)	OR	95% CI
COVID-19 vaccine might have severe adverse events				
Yes	254	121 (47.6)	Reference	
No	55	49 (89)	8.98	3.71-21.7
Not sure	202	170 (84.1)	5.83	3.72-9.2

OR=Odds ratio, CI=Confidence interval

using an online questionnaire to assess acceptance to prospective COVID-19 vaccines being rolled out in India. As COVID-19 is a new disease, there is paucity of literature regarding the coverage which would be ideal for stopping transmission of COVID-19.[9] The overall vaccine acceptance among doctors was 66.53% (340). Similar studies have shown to have around 55.3%, 39.3%, 43% of vaccine acceptance among health care professionals which is less.[10-12] This could be attributed to concerns regarding safety data, potential side effects, unknown risk and efficacy, however the vaccine acceptance among physicians were shown to be as high as 82% in some studies.[10] One possible explanation could be the difference in the makeup of the study population as this is the first study in the ethnic group as the other study was conducted among healthcare workers in USA. The current evidence suggests that coverage rates of at least 70% for a vaccine more than 90% effective would be required for stopping transmission. The acceptance level estimated by the current study falls below the required coverage rates. Previous multiple studies have also found high levels of vaccine hesitancy which can be a threat in realising full benefits of immunization programme. Vaccine hesitancy to a newly introduced vaccine is not new and has been also present with previously introduced vaccines though the level of hesitancy found for COVID-19 vaccine is higher than that found for vaccines like HPV and MR.[13,14] Similar findings were seen in various studies conducted in different parts of the world.[15-21]

Gender, age, marital status and educational qualification did not have any significant relation with vaccine acceptance. Only religion had significant relation with vaccine hesitancy with Muslim religion associated with significantly less odds of vaccine acceptance. The study did not have any questions which could further identify religious reasons behind vaccine hesitancy, though the same can be due to rumours related to use of pork in the manufacturing process and concern of infertility. Studies conducted in Middle East have also found relation between vaccine hesitancy and religious preferences with Muslims and Orthodox Jews having a higher degree of vaccine hesitancy.[22,23]

Risk of AEFI after vaccination is an inherent part of any vaccination program and the probability of having AEFI after vaccination is an important contributor to vaccine acceptance/hesitancy. Fear of AEFI has also been found

to be associated with lower vaccine acceptance in other Studies[10-12,24-26] as the vaccine were newly introduced within a short period of time. Health care professionals were willing to wait for more data with concerns of safety, efficacy, potential side effects before they could decide on whether to accept the vaccine. Whereas some studies showed very less concern with regard to adverse side effect (14.8%) in regard to vaccine acceptance. Health care workers who thought that the vaccine can have serious AEFI had high odds of vaccine hesitancy. Though there was not a significant difference in vaccine hesitancy among healthcare workers who believed that the vaccine can have minor AEFIs. The same has been the case for newer vaccines introduced previously in which fear of serious AEFI has been linked with poor vaccine acceptance. Though at the same time prospective vaccine recipients are more acceptable to minor AEFIs.

In our study, 108 (21.13%) doctors had a personal previous history of COVID-19 disease and 325 (63.60%) doctors had someone among the family members diagnosed as COVID-19 positive. Previous history of COVID-19 disease for self or family did not have any significant relation with Covid vaccine acceptance. In addition, the previous history of being positive for COVID-19 antibodies also did not have a significant impact on vaccine acceptance.

Future risk of contracting COVID-19 and perception of vaccine efficacy were significantly related with vaccine acceptance. As the numbers of cases in India were on decline when the study was being conducted, it could have contributed to low vaccine acceptance. Considering the fact that these are related to vaccine acceptance, it is imperative that these are included in IEC campaigns being conducted for vaccination. The campaigns should highlight the fact that a large proportion of the population is still susceptible and also highlight data related to vaccine efficacy.

There was no significant association between vaccine acceptance and perception of disease severity in terms of its impact on physical health, mental health, threat to financial stability and performance of routine work. Although 80% of doctors believed that COVID-19 had a moderate/severe impact on either health or ability to perform routine work, it was not found to have any impact of decision of vaccine acceptance.

More than half of the doctors had gone through literature regarding different vaccines in various stages of development. The respondents were asked to choose from three vaccines which had applied for emergency use authorisation at the time of study. Most (69.4%) doctors responded that given a choice they would prefer Pfizer/Biotech vaccine. The numbers were 39.3% for Oxford/Covishield and 13.4% for Covaxin.

Strengths and limitations

The strengths of the study lie in the fact that it was one of the first studies done to estimate vaccine hesitancy among doctors in India. The authors could not find any published research at the time of the study. One of the main limitations in this study is that because the study was conducted before emergency use authorization of any vaccine in India, this could have incorporated response bias as response may vary after actual vaccine approvals when the respondents would have been surer of the potential vaccine. This limitation though added the benefit of identifying vaccine hesitancy and its correlates before vaccine launch and could have been used in planning vaccine rollout.

Conclusion

The present study estimated acceptance to prospective COVID-19 vaccines among doctors in India. The overall acceptance is suboptimal and was particularly poor among Muslim doctors, and those who believed that the vaccine can have serious AEFIs. There is an urgent need to address any apprehensions regarding composition of vaccine as well rumours and also intensified education campaigns among doctors regarding the safety and efficacy data for COVID-19 vaccine. The institutional mechanisms set up to identify and Manage any AEFI needs to be highlighted.

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Conflicts of interest

There are no conflicts of interest.

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