

COVID-19 Vaccine Hesitancy in the Adult General Population of India

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ABSTRACT

Aim and background: Two vaccines for coronavirus disease-2019 (COVID-19), by Bharat Biotech and Serum Institute of India, have been approved by the Indian Government for administration. This study attempts to analyze vaccine hesitancy in the general adult population of India.

Materials and methods: A pan-India cross-sectional survey, adapted for GoogleForms®, was circulated before the rollout of vaccines to assess vaccine hesitancy. Continuous variables are expressed as mean \pm SD and categorical variables as a percentage. The Chi-square test was used for associations.

Results: Seven hundred and sixty-two responses were analyzed. 27.2% of respondents demonstrated vaccine hesitancy. 59.4% of vaccine acceptors preferred getting the vaccine from government healthcare establishments over private-sector establishments. No significant associations were observed between vaccine acceptance and age or gender. Those who accepted the vaccine were more likely to believe that it should be compulsory ($p = 0.00001$) and safety measures should be continued even after vaccine administration ($p = 0.043$). IT-related professionals showed 82.6% vaccine acceptance, healthcare professionals displayed 73.5%, while lawyers showed 53.3% acceptance. There was no association between vaccine acceptance and being a frontline worker, previously having COVID-19, or having a family member who suffered from COVID-19. Despite Delhi and Maharashtra being the highest COVID-19 burden areas, the general population of these two states was more likely to refuse the vaccine than the residents of other states ($p = 0.027$).

Conclusion: This study identified the prevalence of vaccine hesitancy in the Indian population. Consistent dialogue between the government and the public is essential for trust-building. Educational intervention through an evidenced-based approach by government authorities is the need of the hour.

Keywords: Coronavirus disease-2019, Infection, Pandemic, Vaccination refusal, Vaccine.

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INTRODUCTION

Originating from Wuhan, China in December 2019, SARS-CoV-2 has been responsible for 107 million cases and 2.36 million deaths as of February 12, 2021.^{1,2}

As of today, India has the highest number of coronavirus disease-2019 (COVID-19) cases (10.9 million), second only to the United States of America, and has seen a total of 155,000 deaths due to COVID-19.²

Though wearing masks and maintenance of social distancing are the recommended methods to halt and prevent the spread of COVID-19, India faces a unique challenge with its huge population of 136.64 crores.^{3,4} Approximately 35% of the population lives in urban slums which are cramped and poorly ventilated, making social distancing practically impossible.⁵

Though this pandemic has affected the elderly and those with co-morbidities to a greater extent, no age-group has been spared by this disease. The clinical manifestations of COVID-19 are very protean, ranging from asymptomatic infection to fatal ARDS and multiorgan failure. Despite the availability of therapeutic options, no singular treatment is effective against SARS-CoV-2. The affected may experience prolonged side effects of COVID-19, even after recovery, causing considerable morbidity.

In this scenario, vaccines offer only hope. Two vaccines (manufactured by Bharat Biotech and Serum Institute of India) have recently been approved by the Government of India for their administration.⁶ We attempted to study the acceptance of these vaccines in the general adult population of India. Vaccine hesitancy, if any, along with reasons for the same were also analyzed.

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MATERIALS AND METHODS

This nationwide, cross-sectional study was conducted using a survey designed for analyzing the acceptance of the COVID-19 vaccine in the general population of India. In lieu of the ongoing pandemic, this survey was adapted for GoogleForms®. The survey was circulated before the rollout of vaccines in the country, to avoid any bias.

As prior prevalence studies for COVID-19 vaccine hesitancy were unavailable, P was taken to be 50% to arrive at the maximum possible sample size. Precision = 4%, $\alpha = 0.05$, and a 95% confidence interval were taken and the minimum required sample size was concluded to be 601.

Demographic parameters like age, gender, education, profession, state of residence, weight, and height were recorded.

Clearance from the Institutional Ethics Committee was obtained before the circulation of the survey. Informed consent and approval of anonymized use of data for research purposes were taken from all participants. The survey consisted of 15 questions and was circulated for a duration of 3 weeks, from December 21, 2020, to January 12, 2021.

Statistical analysis was performed on the IBM statistical package for the social sciences (SPSS) for Window, Version 24.0 (Armonk, NY: IBM Corp). Continuous data are expressed as mean \pm standard deviation (SD). Categorical variables are expressed as a percentage. Categorical variables were compared using a Chi-square test and odds ratios were calculated. A p value of <0.05 was taken to be statistically significant.

RESULTS

The present study was conducted by analyzing the responses of 762 participants, regarding the acceptance of the COVID-19 vaccine in the general adult population of India. 72.8% (555/762) individuals responded in favor of acceptance of the vaccine while 27.2% (207/762) demonstrated vaccine hesitancy.

The age range of the participants was from 18 to 91 years (mean age: 35.3 ± 15.8). 77.3% of respondents were in the group of 18–50 years of age and 22.7% of respondents were in the age-group of >50 years. The vaccine hesitancy displayed by age-groups 18–25,

25–30, and >50 years was 27.7, 29.3, and 23.1%, sequentially. The mean age for vaccine deniers and acceptors was 34.6 ± 15.3 and 35.5 ± 16.0 , respectively. There was no association between age and vaccine acceptance ($p = 0.422$).

Our study included 399 (52.4%) males and 363 (47.6%) females.

36.6% of our respondents were undergraduates, 36% were postgraduates, and 27.4% of respondents had completed high school, vocational training, or were diploma holders. There was no association between education and vaccine acceptance ($\chi^2 = 0.405$, $p = 0.817$).

The maximum number of participants were students (31.4%), followed by doctors and healthcare professionals (17.8%), self-employed professionals (12.5%), educators (7.5%), professionals at an MNC (6.4%), IT-related professionals (6%), homemakers (5%), lawyers (2%), and other professionals like pilots, bankers, etc. (11.4%).

Of all respondents, 33.5% of individuals had an associated comorbid condition like hypertension, diabetes mellitus, chronic kidney disease, etc. Of these individuals, 9.2% of participants were obese.

High COVID-19 burden states such as Maharashtra and New Delhi constituted 49.5% of the total respondents.

Associations of the categorical variables with acceptance or rejection of the vaccine are shown in Table 1.

Responses to acceptable pricing of the vaccine, responses to an entity of choice for dispensing the vaccine (government vs private

Table 1: Association of vaccine acceptance with other categorical variables

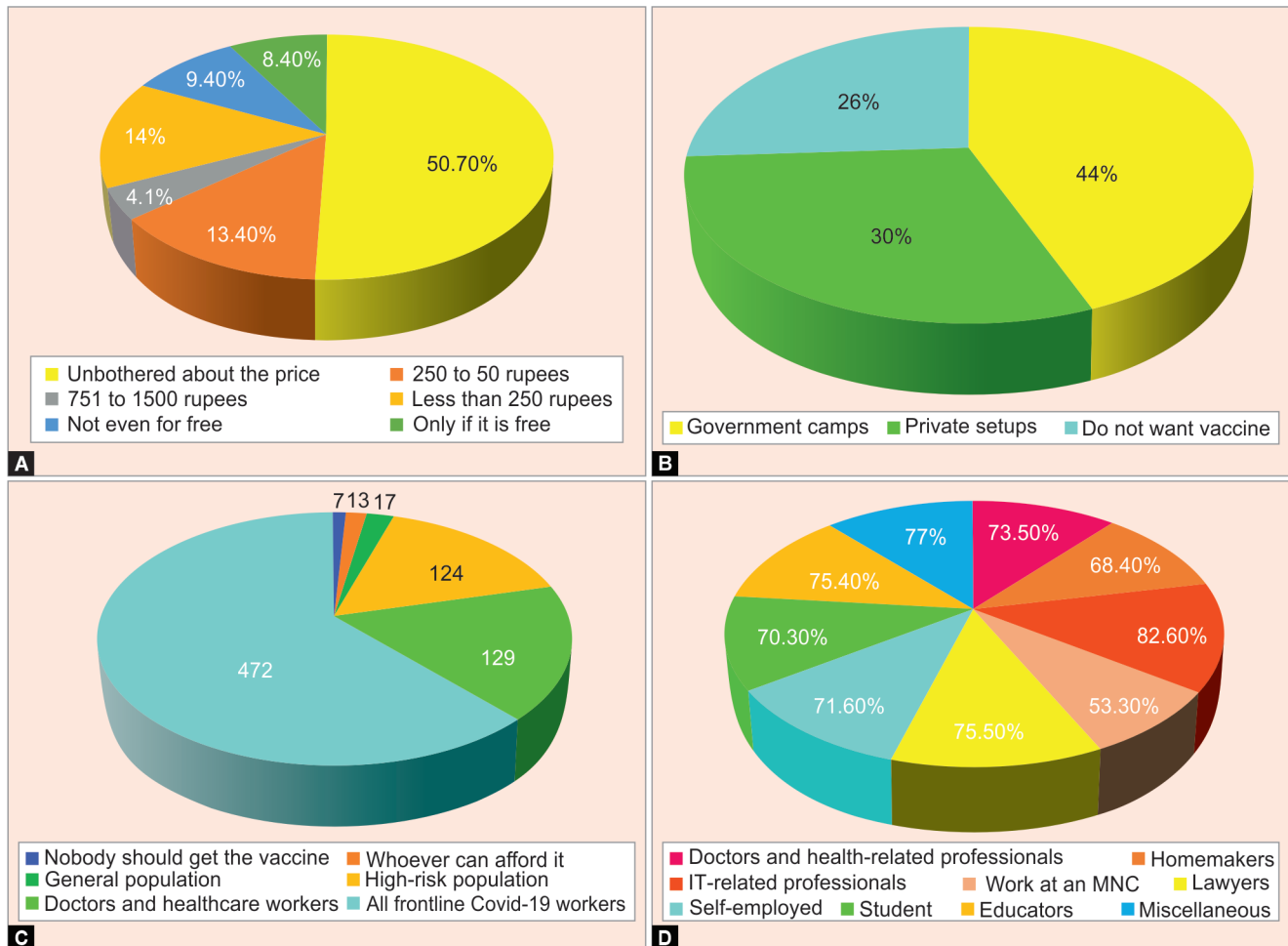
		Acceptance of vaccine		χ^2	Odds ratio	95% confidence interval		p value
		No ($n = 207$)	Yes ($n = 555$)			Lower	Upper	
Should the vaccine be optional/compulsory?	Optional	173 (44.8%)	213 (55.2%)	123.212	0.122	0.082	0.184	0.00001
	Compulsory	34 (9.0%)	342 (91.0%)					
Should safety measures be continued?	Yes	169 (25.8%)	485 (74.2%)	4.091	0.642	0.417	0.989	0.043
	No	38 (35.2%)	70 (64.8%)					
State	Delhi and Maharashtra	116 (30.8%)	261 (69.2%)	4.898	1.436	1.042	1.980	0.027
	Other states	91 (23.6%)	294 (76.4%)					
Sex	Female	109 (30.0%)	254 (70.0%)	2.87	1.318	0.957	1.815	0.090
	Male	98 (24.6%)	301 (75.4%)					
Are you a frontline COVID-19 worker?	No	188 (27.4%)	498 (72.6%)	0.200	1.13	0.656	1.954	0.655
	Yes	19 (25.0%)	57 (75.0%)					
Have you ever suffered from COVID-19?	No	186 (26.9%)	505 (73.1%)	0.230	0.877	0.513	1.500	0.631
	Yes	21 (29.6%)	50 (70.4%)					
Has any of your family members suffered from COVID-19?	No	158 (27.1%)	426 (72.9%)	0.015	0.976	0.670	1.422	0.901
	Yes	49 (27.5%)	129 (72.5%)					
Has any of your family members passed away due to COVID-19?	No	178 (26.8%)	485 (73.2%)	0.260	0.865	0.546	1.371	0.610
	Yes	29 (29.3%)	70 (70.7%)					
Are you aware of the side effects associated with a vaccine?	No	130 (28.8%)	321 (71.2%)	1.538	1.231	0.886	1.709	0.215
	Yes	77 (24.8%)	234 (75.2%)					

set-up), responses to “whom should the vaccine be administered first?” and percentage-wise distribution of vaccine acceptance among various occupations are shown in Figure 1.

Reasons for vaccine hesitancy among respondents are depicted in Figure 2.

DISCUSSION

Vaccine hesitancy is the delay in acceptance or refusal of vaccination despite the availability of vaccination services.⁷ In 2019, WHO identified it as one of the top 10 global threats.⁸



Figs 1A to D: (A) Responses to acceptable pricing of the vaccine ($n = 772$); (B) Responses to an entity of choice for dispensing the vaccine (government vs private set-up) ($n = 772$); (C) Responses to “whom should the vaccine be administered first?” ($n = 772$); (D) Percentage-wise distribution of vaccine acceptance among various occupations

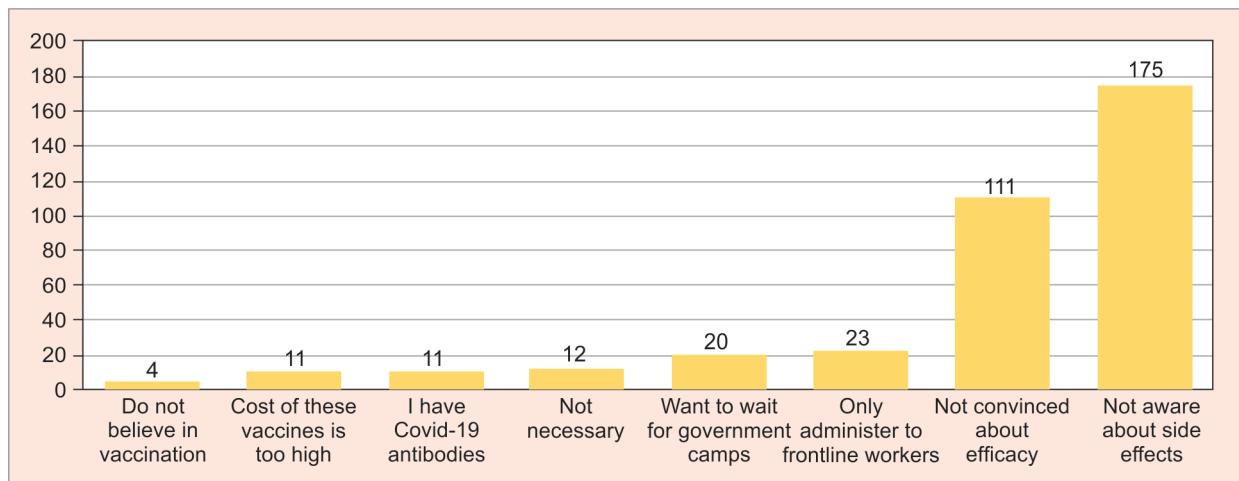


Fig. 2: Reasons for vaccine hesitancy among respondents

This survey on acceptance of COVID-19 vaccine conducted among 762 adult participants in India, before the rollout of vaccines revealed a vaccine hesitancy of 27.2%. The decision of which was not affected by age, gender, or level of education (Table 1). This was in contrast to the findings of a global survey, which reported that postgraduates and individuals above the age of 25 years were more likely to accept the vaccine when compared with those with lower levels of education and those in the group of 18 to 25 years, respectively.⁹ A previously conducted study showed greater vaccine acceptance among the males, reflecting a higher risk-taking behavior by this gender.¹⁰

Our study did not find any impact of being a frontline worker or prior infection with COVID-19 a family member on acceptance of the vaccine. This was in contrast with other studies where frontline workers were more likely to accept the vaccine, whereas individuals who had a family member infected with COVID-19 previously showed greater hesitancy in accepting the vaccine¹¹ (Table 1).

Being a past COVID-19 patient or the death of an immediate family member due to COVID-19 did not significantly affect the choices of the respondent (Table 1). In another study, past COVID-19 patients and individuals whose family members had passed due to COVID-19 were equally likely to accept the vaccine as anyone else.¹¹

The respondents were given options to choose from, regarding the potential price of the vaccine. The majority of the respondents (50.7%) stated that they were unbothered by the price of the vaccine and 73.6% of these respondents said that they would accept the vaccine (Fig. 1A).

A majority (44%) of respondents showed a preference in getting the vaccine from a government healthcare establishment, reflecting greater confidence in the large-scale efforts taken by the government to promote vaccine education (Fig. 1B).

Only 311 respondents were aware of the vaccine side effects, whereas 451 respondents were not (Table 1). However, no statistically significant difference was found in the acceptance or rejection of the vaccine.

The respondents were asked to choose if the vaccine should be made compulsory or optional among the general population of India. About half (49.3%) said that the vaccine should be made compulsory, while 50.7% said that it should optional (*p* value: 0.00001) (Table 1). Those who chose to accept the vaccine were only 0.122 times as likely to assert that the vaccine is optional.

85.8% of the participants were aware that general safety precautions against COVID-19 were to be continued even after vaccination and only 14.2% of the participants believed that precautions were unnecessary. Those who accepted the vaccine were also more likely to believe that safety measures should be continued even after the administration of the vaccine (*p* value: 0.043) (Table 1). This demonstrates a positive attitude of the respondents, associated with consideration for mass health and well-being.

Out of all the respondents, 61.9% agreed that all front-line COVID-19 workers be prioritized for the administration of the vaccine and only 2.2% of respondents opted for the general population to be the primary target for vaccination (Fig. 1C). It is important to highlight that many of these respondents, were a part of the general population itself.

Amidst all professions, doctors and healthcare-related professionals were not the highest acceptors of the vaccine (Fig. 1D). IT-related professionals showed 82.6% vaccine acceptance, while

doctors and healthcare-related professionals displayed only 73.5% vaccine acceptance. A similar study concluded that among all professions, doctors were most likely to accept the vaccine.¹⁰

Our study concluded that despite Delhi and Maharashtra being the highest COVID-19 burden areas, the general population of these two states were more likely to refuse the vaccine than the residents of other states (OR: 1.436, *p* value: 0.027) (Table 1).

No association was found between having comorbidity and acceptance of the vaccine.

The lack of awareness and knowledge of the long-term side effects of the vaccine as well as doubts regarding its efficacy were the major reasons observed for vaccine hesitancy in our study (Fig. 2). This finding was consistent with two previously conducted studies.^{8,9}

Vaccine hesitancy is a global public health problem. Previous research shows that approximately 60–72% herd immunity is required to effectively curb the spread of COVID-19.¹² The major challenge with vaccine hesitancy is that the unimmunized population disposes the immunized population to greater risk, as well.¹³ A multi-layered problem requires a multifaceted approach at a group, as well as an individual level. An interpersonal interaction between trained physicians and the general population is needed to curb this hesitancy. Consistent dialogue between the government and the public is also extremely essential for trust-building.⁹ Educational intervention and an evidenced-based approach by government authorities are the need of the hour. Mass media also plays an imperative role in reinforcing the need for immunization.¹³

LIMITATIONS

This survey was conducted before the availability of the vaccines to the general population. Since the narrative is dynamic and constantly evolving, the hesitancy could be higher than portrayed in our survey. Moreover, responses might vary over time. Going ahead the availability of nasal and a single dose vaccine may impact hesitancy. Due to the lack of access to smartphones by the elderly, this study does not include a significant number of elderly individuals.

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