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Original Research Article

Willingness to receive COVID-19 vaccine booster among general population of India: an online cross sectional study

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ABSTRACT

Background: Booster dose for COVID-19 vaccine is being administered by many countries and has recently been started by India for special groups. Hence, it is important to understand the willingness of people to receive the booster dose and factors associated with it.
Methods: The present study was a community based Online Cross-sectional study done by using internet based social media applications for a period of 10 days from 6th January to 15th January 2022.
Results: Out of which 70.6% were willing to receive the booster, 7.6% were not willing and 21.8% were undecided. Reasons for willingness were the belief to boost immunity (61.3%), protection from new variants (45.9%), reduced severity of infection (43.2%) or hospitalization (42.8%).
Conclusions: The main reasons for unwillingness were, being unsure about its benefits (59.7%), fear of side effects (26.5%) and no trust on vaccine for protection against new variants (26.5%). People with higher education, history of COVID-19 infection or hospitalization among family and those perceiving more severe infections by new variants were more willing to get the booster.

Keywords: COVID-19 vaccine, booster, Willingness, Hesitancy, General population, India

INTRODUCTION

Coronavirus disease 2019 (COVID-19) has emerged as the greatest public health crisis the world faced in over a century. Of significance to pandemic control, many vaccines have been developed and are now available for use.[1] The vaccines have demonstrated protection against infection, hospitalizations and deaths. Therefore, mass vaccination is a public health priority to mitigate the pandemic.[2-4]

In India, the vaccination drive began on 16th January 2021 and it has managed to achieve a remarkable landmark of delivering 1.5 billion vaccinations in a years' time. However, several studies have shown that the protection offered by vaccines declines after a few months of initial vaccination.[5-7] Along with this, emergence of new virus variants with increased transmissibility also raises concern of breakthrough infections and brings out the need for booster doses of COVID-19 vaccines.[8] Booster doses are already being administered in many countries. India has also started to administer vaccine booster to health care workers and population above 60 years of age with co-morbidities. It will be available for rest of the population in a phased manner. However, the public's acceptance of a booster dose emerges as a potential concern. Our previous experience shows that COVID-19 vaccination efforts have been hampered by hesitancy and mistrust, so COVID-19 booster shot initiatives are also likely to face similar challenges.[9-11] Thus, it becomes important to quantify the baseline acceptance levels of general population towards the booster dose which may help in proposing interventions in order to increase uptake of booster. Therefore, this study aims to

investigate level of acceptance for future booster doses among general population of India and also explore the reasons associated with their willingness.

METHODS

The present study was a community based Online Cross-sectional study done by using internet based social media applications. In view of on-going COVID-19 wave in India and resultant restrictions and precautions, data collection was done by online survey, which was conducted for a period of 10 days from 6 January to 15 January 2022. No similar study estimating the willingness to receive COVID-19 booster vaccine among Indian population is available. Therefore, for calculating sample size, an estimated level of willingness was taken as 50%. Using 0.05 as precision and 95% confidence interval, sample size came out to be 385, using the formula:

$$n = \frac{z^2_{1-\alpha/2} * p\,(1-p)}{\varepsilon^2}$$

Adding 50% due to probable nonresponse, we chose to collect a sample of 578. Considering a low response rate in web-based surveys, we circulated the study instrument to 1000 people, out of which complete responses were obtained from 702, thereby amounting to a response rate of 70%. The study population were the general public of age group >15 years who had access to internet using social media applications or any other messaging platform and who were literate and can understand English. Study subjects were enrolled by direct recruitment by using convenience sampling. Study participants were contacted through phone contacts other than those associated with the investigators, messaging apps and other social media platforms and groups. It was used as a platform to send the Google form link consisting of Participant Information sheet and a mandatory consent check box. It mentioned the purpose of study and only those who gave their consent were included in the study. Data collection was done anonymously and every effort was made to maintain confidentiality of the study participants.

An online pre designed, pre tested, self-administered questionnaire was designed in Google forms which contained information about demographic profile of participants like age, sex, level of education and occupation etc. They were asked about the history of COVID-19 infection among themselves or in the family. Any history of hospitalization or death in the family because of COVID-19 was also asked. It also included questions related to COVID-19 vaccination status, place of getting vaccinated and willingness to get a booster dose. The reasons for willingness or unwillingness were also enquired.

The data collection was carried out through online survey after taking informed consent and participant anonymity and confidentiality was maintained. Data was transferred to MS-Excel and analysed using SPSS version 22. Qualitative data was expressed in proportions or percentages and quantitative data was expressed in mean and standard deviation. Chi square test was used to check the association of various clinico-socio demographic variables with willingness to receive a booster dose. The level of significance was taken as 0.05.

RESULTS

During the study period, a total of 702 subjects gave consent and completed the study questionnaire.

Table 1: Socio-demographic and clinical profile of study participants (N=702).

Characteristic Feature		N	%
Age group (years)	15-30	190	27.1
	31-45	287	40.9
	46-60	130	18.5
	>60	95	13.5
Gender	Male	348	49.6
	Female	354	50.4
Educational status	Higher professional degrees	164	23.4
	Post-graduation	267	38.0
	Graduation	197	28.1
	Upto secondary school	58	8.2
	Upto primary school	16	2.3
Occupation of the study participants	Medical and Paramedical Professionals	179	25.5
	Public sector/Govt job/ private sector job	268	38.2
	Student	96	13.7
	Housewife	47	6.7
	Retired	35	5.0
	Others	77	10.9
History of comorbidities	No existing disease	527	75.1
	Diabetes mellitus	69	9.8
	Hypertension	105	15
	Cardio-vascular disease	25	3.6
	Others	48	6.9
History of COVID-19 infection	History of COVID-19 infection	214	30.5
	History of COVID-19 infection in family	367	52.3
	History of hospitalization of family members due to COVID-9 infection	152	21.7
Status of COVID-19 Vaccination	Fully vaccinated	634	90.3
	Partially vaccinated	32	4.6
	Not vaccinated	36	5.1

The mean age of the participants was 39.9 (SD±14.9) years. The largest proportion of respondents (40.9%) belonged to the age group of 31-45 years. Almost 50% participants were females and almost 90% had education up to a minimum level of graduation (Table 1).

As far as occupation is concerned, 179 (25.5%) were medical or paramedical professionals, 179 (25.5%) were working in private sector, 89 (12.7%) were working in Government sector, 96 (13.7%) were students. 26.1% had history of co-morbidities associated with COVID-19 (Table 1). Out of the total respondents, 214 (30.5%) reported a past history of COVID-19 infection while 367 (52.3%) had history of COVID-19 infection in family members and 152 (21.7%) gave prior history of hospital admission of a family member because of COVID-19. A majority of subjects (90.3%) were fully vaccinated against COVID-19 as described in (Table 1).

In the present study, 36 (5.1%) were not vaccinated. Hence, willingness for getting a booster dose was asked from rest of the 666 subjects. Out of those, 470 (70.6%) were willing to receive it, 51 (7.6%) were not willing and 145 (21.8%) were undecided about it. 88.1% of those willing were found to be eager to get it soon. Reasons for willingness were asked from those who were willing to receive a booster. 61.3% gave the reason that it would boost their immunity. Other reasons were quoted as belief of being protected from new variants (45.9%), reduced severity of infection (43.2%), reduced risk of hospitalization (42.8%) and because of recommendation of the Government (19.4%) (Table 2).

Reasons for unwillingness were asked from those not willing as well as those who were yet to decide. The main reason for unwillingness for receiving booster dose was stated as being unsure about its benefits (59.7%). A slightly greater than one fourth respondents (26.5%) were scared about the long term/unknown side effects of the vaccine and a similar proportion believed that a booster wouldn't protect them from newer variants while 22.4% wanted to get it after they observe that others taking it are fine (Table 2).

Further analysis was carried out to find the association of various factors with willingness to receive a booster. The participants who were undecided about receiving booster were excluded from this analysis. It was seen that neither age nor gender was significantly found to be associated with willingness. However, a significantly larger proportion of subjects with level of education graduation or higher were willing to get a booster as compared to those having lower level of education ($p<0.05$). No association was found between present occupation and presence of co-morbid conditions with willingness to get a booster (Table 3).

Respondents having a history of COVID-19 infection in the family or hospitalization of family member because of COVID-19 were found to be more willing to receive booster dose of vaccine ($p<0.05$). Similarly, the subjects who perceived that newer variants are not severe were less willing to get the booster ($p<0.05$).

Table 2: Willingness to take COVID-19 vaccine booster and associated reasons.

Characteristic feature		N=666	%
Willingness to take COVID-19 vaccine booster (n=666)	Yes	470	70.6
	No	51	7.6
	Undecided	145	21.8
Eagerness to take booster (n=470)	Eager to take (as soon as possible)	414	88.1
	Not eager (need more time to think, want to observe others, etc.)	56	11.9
Reasons for willingness* (n=470)	Belief of being protected from future variants	258	45.9
	Reduce severity of infection	203	43.2
	Boosting of immunity	288	61.3
	Reduce hospitalization	201	42.8
	Recommended by Government	91	19.4
	Encouraged by friends/ colleagues/relatives	17	3.6
	Others	2	0.4
Reason for unwillingness* (n=196)	Unsure of its benefits	117	59.7
	Scared about the long term/unknown/rare side-effects	52	26.5
	Booster won't protect from future variants	52	26.5
	Want to be sure by observing others	44	22.4
	Still got infected after two doses	17	8.7
	Rush at the vaccination centre	19	9.7
	Others	12	6.1

* Multiple options possible

DISCUSSION

The results of this study show that 470 (70.6%) respondents from general population of India were willing to take a booster shot of COVID-19 vaccine and 88% of them were very eager to get it as soon as possible. This shows a good rate of acceptance for COVID-19

vaccine booster among general population. Following the recent authorisation of COVID-19 vaccine booster for healthcare workers as well as for vulnerable older population, it becomes important to assess the level of acceptance for booster shot, which may help in knowing the reasons for hesitancy and planning appropriate interventions to address it.

Table 3: Association between the willingness to take COVID-19 vaccine booster with socio-demographic variables and COVID-19 infection.

Characteristics	Willingness to take COVID-19 vaccine booster		Statistical significance
	Yes (%)	No (%)	
Age (years)			
15-30 (n=118)	107 (90.7)	11 (9.3)	$\chi2$=0.364 p=0.948
31-45 (n=217)	194 (89.4)	23 (10.6)	
46-60 (n=103)	93 (90.3)	10 (9.7)	
>60 (n=83)	76 (91.6)	7 (8.4)	
Gender			
Males (n=275)	248 (90.2)	27 (9.8)	$\chi2$=0.001 p = 0.981
Females (n=246)	222 (90.2)	24 (9.8)	
Education (maximum level attained)			
Graduate and higher (n=492)	448 (91.1)	44 (8.9)	$\chi2$=7.160 p= 0.007
Primary and secondary school (n=29)	22 (75.9)	7 (24.1)	
Occupation			
Medical and paramedical professionals (n=148)	138 (93.2)	10 (6.8)	$\chi2$=4.848 p=0.433
Pubic/Govt./Pvt. Sector jobs (n=207)	183 (88.4)	24 (11.6)	
Housewives (n=32)	29 (90.6)	3 (9.4)	
Student (n=48)	44 (91.7)	4 (8.3)	
Retired (n=34)	32 (94.1)	2 (5.9)	
Others (n=52)	44 (84.6)	8 (15.4)	
Presence of co-morbidity			
No existing disease (n=379)	340 (89.7)	39 (10.3)	$\chi2$=0.396 p=0.529
Presence of disease / comorbidity (n=142)	130 (91.5)	12 (8.5)	
History of COVID-19 Infection in the family			
Yes (n=285)	264 (92.6)	21 (7.4)	$\chi2$=4.174 p=0.04
No (n=236)	206 (87.3)	30 (12.7)	
History of hospitalization of family member(s) due to COVID-19 Infection			
Yes (n=122)	118 (96.7)	4 (3.3)	$\chi2$=7.64 p=0.006
No (n=399)	352 (88.2)	47 (11.8)	
Perception of severity of new variants of corona virus			
Not severe (n=95)	73 (76.8)	22 (23.2)	$\chi2$=23.516 p=0.001
Severe (n=426)	397 (93.2)	29 (6.8)	

We couldn't find any study conducted in Indian population regarding the same making it a pioneer study. Our results are similar to those of another study conducted in general population of Poland which shows 71% willingness to receive a booster dose.[12] While other studies from The United States have reported this willingness for booster as 62% to 83.6% and a study from China has found 84.8% willingness to get the booster shot.[8,13,14]

The belief that the booster shot will boost immunity against COVID-19 infection was the most common reason for willingness to receive it (61.3%). The study subjects also believed that it will protect them from newer variants and will reduce the severity of infection and hospitalization. Research has shown that vaccines are effective against new variants but their protection wanes with time thereby emphasizing the role of booster shots to prevent the risk of breakthrough infections among vaccinated individuals.[15] These results are in accordance with those reported by Lai X et al showing that the belief of extension of previous protection and protection against new variants were major reasons for acceptance of a booster COVID-19 vaccine dose.[14] In the present study, almost one fifth participants (19.4%) were willing to take the booster because it is recommended by Government which shows a high level of trust on Government recommendations.

Among those not willing for a vaccine booster dose, more than half (59.7%) were not sure about benefits of vaccine.

Others were worried about long term or unknown side effects. These two are also the commonest reported reasons for non-acceptance of booster shots among general population of China[14] as well as Poland[12]. Other authors have also reported a lack of trust on vaccine and concern about safety as important reasons for vaccine hesitancy.[13,16-18]

To find out any statistical association between various factors and willingness for booster dose, chi square test was used. No significant association was found with age, gender, occupation or presence of any co-morbid condition. This reflects that a majority of people from all sections are willing for the booster dose. These findings are in contrast with those reported by Rzymski et al showing that women, older people and those with chronic diseases are more willing to receive the COVID-19 vaccine booster in Poland.[12] However, another research conducted on adult American population shows that women and young people are more hesitant for booster shot. The authors have mentioned the probable reason as widespread circulation of false message on social media about female infertility associated with COVID-19 vaccines.[8] No such factors were found in Indian population on which the present research was conducted. This study found that low level of education was significantly associated with booster hesitancy. It may affect uptake of vaccine booster and hence those with lower level of education should be targeted for educational measures in order to increase booster uptake. Previous research has shown that better educated people are in a favourable position to understand public health messages and access reliable information related to safety and efficacy of vaccines.[19] Low level of education has been consistently reported to be associated with non-acceptance of primary or booster vaccination against COVID-19.[1,8,13,16] The study results also show that those with history of COVID-19 infection in self or family and hospitalization because of it are more willing to receive the booster vaccine dose. The reason for this may be that they are more concerned about being protected from getting the infection as they have already gone through its consequences. Other authors have reported similar findings.[8,12] The subjects' perception about severity of newer variants also affect their willingness to get the booster dose. Those who think that new variant is not severe, are less concerned about infection and vaccination, as reported by other researchers as well.[16]

The major strength of this study is that it is the first study conducted on Indian population assessing for willingness to receive COVID-19 vaccine booster. The study was conceptualized and started before booster dose was rolled out for general population in India. The findings of this study may guide the policy makers about the areas to focus in order to increase acceptability of booster shot among population. There are certain limitations also. The study design was cross sectional and causality cannot be inferred from it. Further, people's attitudes are dynamic and ever changing with change of situation. But still, this study gives a fair idea about their willingness and reasons affecting it. Another limitation was the use of convenience sampling and online data collection, which may have affected the generalizability. However, because of widespread increase in the number of COVID-19 cases at the time of conducting this study, online survey was the most appropriate and feasible method of data collection. The study also reports a good response rate of almost 70%. It may pose a way for guiding future exploratory research on this topic.

CONCLUSION

More than 90% of study population is vaccinated against COVID-19. Almost 70% of Indian population is willing to receive a COVID-19 vaccine booster**.** The beliefs that a booster dose would help boost their immunity and protect them from severe disease and hospitalizations were the reasons for acceptance of booster. The main reasons for unwillingness were, being unsure about its benefits, fear of side effects and no trust on vaccine for protection against new variants**.** People with higher education, history of COVID-19 infection or hospitalization among family and those perceiving severe infections by new variants were more willing to get the booster.

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