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Acceptance of COVID-19 Vaccine Among Residents of South India: A Cross-sectional Survey

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ABSTRACT

Background

COVID-19 vaccines provide concrete hope of mitigating the spread of the virus and enabling countries worldwide to resume financial and social activities disrupted by the pandemic. Several COVID 19 vaccines have already received approval from regulatory bodies across the world, the vaccine roll out has started and many countries are implementing mass vaccination campaigns. This study aims to evaluate the acceptability of COVID-19 vaccines and its predictors, along with the attitudes towards the vaccines among the general population of South India.

Materials and Methods

This study was conducted as an online survey during December 2020 and January 2021. A Self-administered pretested questionnaire was used for the survey. Excel 2019 and SPPS 24 were used for statistical analysis. Descriptive statistics were used, and a Chi-square test was performed.

Results

A total of 686 people have participated in this study, with a mean age of 30.4 years. 30.9% of study participants have already been infected with COVID-19. 76.2% responded 'yes' for accepting the COVID-19 vaccine, 69% responded to prefer 'routine' administration of the vaccine, and 50.1% were likely to take the COVID-19 vaccine 'as soon as possible' once available.

Conclusion

Public health authorities and policymakers need to streamline systematic interventions and awareness campaigns to improve the acceptance of COVID 19 vaccines and reduce vaccine hesitancy levels. Vaccination strategy should be targeted at the specific needs and attitudes of the concerned population. Reviving the trust in the vaccination procedures and outcomes and offering transparent information regarding the vaccines' efficacy and safety seem to be particularly importance for the population of our study.

KEYWORDS: Acceptance, COVID-19, Vaccines, India, Vaccination, Pandemic, SARS-CoV-2

INTRODUCTION

The ongoing 2019 coronavirus disease (COVID-19) pandemic, caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has put a considerable burden of morbidity, mortality, political, financial and social dysfunction worldwide. [1] The mortality of the COVID 19 disease is higher among vulnerable groups, including the elderly, and the individuals with comorbidities such as diabetes, malignancies, cardiovascular disease, chronic obstructive pulmonary disease and chronic kidney disease. [2, 3] To date, there is no curative treatment for COVID 19, although some drugs are being approved and used to manage COVID-19 patients. [4–6]Therefore, COVID 19 vaccines consist of one of the most promising and effective strategies to control and mitigate the COVID 19 crisis. [7]

Vaccines have proven to be one of the most effective ways to prevent and control infectious diseases over the last 200 years. They have a tremendous potential in saving lives and preventing hospitalization and long-term complications of several infections from poliomyelitis to influenza and beyond. High immunization rates and population — wide compliance to vaccination strategies are prerequisites for the containment, and in some cases the extinction, of particular communicable diseases. [8]With the COVID-19 pandemic being expected to impose a considerable burden

during the next months, governments are bracing for quick vaccine roll out, in order to build immunity at national and international level. So, it is necessary to investigate the populations' perceptions towards vaccine acceptance. [7, 8]

Evidence suggests that vaccine-hesitancy is related with negative past experiences with vaccination, fear of injections, mistrust of modern/western medicine, traditional and religious practices/beliefs, lack of access to healthcare services and credible information sources. Also, the lack of trust on the COVID-19 vaccines may be attributed to accelerated procedures of drug discovery, approval and production. The use of novel biotechnology such as m RNA, the timeline of clinical trials and the speed of the authorization procedures have created an iota of suspicion, enlarged by misinformation in social and mainstream media.

In India, the low level of understanding of vaccines science and the misinterpretation of medical concepts and terminology in local languages are likely to fuel incorrect beliefs on vaccine effectiveness and duration, leading to future distrust of vaccines and providers, contributing to reduced acceptance rates. [9] Previous studies identified the need for further community education and transparency on vaccines to reduce hesitancy, encouraging and educating influencers such as elders and religious leaders in improving the acceptance of vaccines. [8, 9] Hence, it is crucial to evaluate the acceptance of the upcoming COVID 19 vaccines among the general population for framing the programs and strategies towards effective vaccination delivery by the governments.

Nevertheless, the general public's vaccine demand and attitudes towards vaccination in the low- and middle-income countries (LMICs) are not well-studied. There could exist different considerations and discrepancies among the population of LMICs compared to high-income countries. [10, 11] Hence, vaccines can replenish hope and become game-changers in the struggle against COVID-19, as long as their acceptance rate grows. [12]

In this study, the authors attempt to evaluate the acceptance of the COVID-19 vaccine among the general population of South India. To the authors' knowledge, there is no study conducted on COVID-19 vaccine acceptance in this region to date. The implications of this study could be important and can guide the government in formulating better approaches for implementing mass vaccination programs and vaccination drives for COVID-19 in South India.

MATERIALS AND METHODS

Study design: An Observational Cross-sectional study by means of an online questionnaire.

Study Target Population: Adult residents of South India of states Andhra Pradesh, Telangana, Tamilnadu, Kerala, Karnataka, Pondicherry.

Sampling method: Random sampling method

Study tool : Self-administered pre-tested questionnaire (10 item questionnaire)

Inclusion Criteria: All Residents of South India aged 18 and above who are willing to participate in this study.

Exclusion Criteria: Health care workers/students, North India Residents, people aged below 18 and people who are unwilling to participate in this study.

Study Period: December 2020 and January 2021 (2 months)

The questionnaire was provided in English and consent of participation was obtained at the beginning of the questionnaire following a thorough explanation of the design, the purpose of the study and the action taken by the researchers to protect confidentiality. The initial questions focused on socio-demographic and background information, (age, gender, state, educational status, occupation) followed by questions regarding the views of the participants on vaccines and their acceptance. The study was conducted through an online survey with Google questionnaire forms. Google form containing questionnaire was circulated among the family groups, general groups of south Indian states in WhatsApp, Instagram, Facebook. The title, objectives, voluntary participation and confidentiality declaration about their information was attached to the survey form. This study was approved by the Prathima Institute of Medical Sciences (Ref no — IEC/PIMS/2020-003-01112020).

Statistical Analysis

Data were entered into Excel spreadsheets 2019, and statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) version 24.0 (SPSS, Inc., Chicago, IL, USA) and was presented by using mean and standard deviation. Data was presented by using frequency and percentage. Descriptive statistics were used, and the Chi-square test was used to determine the role of socio-demographic characteristics on questions. The statistical significance level was set at $p < 0.05$ (two-sided).

RESULT

A total of 686 people have participated in this study, and the mean age was 30.40 + 10.55 (mean + SD). 51.6% of the study participants were male, and 67.2% (most of the study participants) belong to the age group 18-30. 51.4% were from Telugu states (Andhra and Telangana),17.6% were from Karnataka, and 16.9% were from Tamil Nadu. 25.8% of the study participants were graduates, and 36.9% were still students. 56.8% belonged to the middle class, and 68.2% of study participants were unmarried. The socio-demographic characteristics of study participants (n=686) were described in **Table 1.**

Among the study participants, 27% were family members of healthcare workers/student. 30.9% of participants were already infected with COVID-19 before filling this study form. In 25.8% of the participants, any one of their family members

Variable	Sub-variable	No. (n=686)	Percent %
Age	18-30	461	67.2%
	31-45	149	21.7%
	46 and above	76	11.1%
Gender	Male	354	51.6%
	Female	313	45.6%
	I prefer not to say	19	2.8%
State	Andhra Pradesh	187	27.3%
	Telangana	165	24.1%
	Tamilnadu	116	16.9%
	Kerala	74	10.7%
	Karnataka	121	17.6%
	Puducherry	23	3.4%
Religion	Hindu	542	79%
	Christian	77	11.2%
	Muslim	41	6%
	Others	26	3.8%
Education	Illiterate	36	5.2%
	Primary School	62	9%
	Middle School	71	10.3%
	High School	106	15.5%
	Plus II/Diploma	140	20.4%
	Graduate	177	25.8%
	Postgraduate	94	13.7%
Occupation	Student	253	36.9%
	Self-Employed	92	13.4%
	Government	143	20.8%
	Private	130	18.9%
	Unemployed	68	10%
Economic Status	Lower	52	7.6%
	Upper Lower	123	17.9%
	Lower Middle	178	25.9%
	Upper Middle	212	30.9%
	Upper	121	17.6%
Marital Status	Unmarried	468	68.2%
	Married	218	31.8%

has infected with COVID-19. 89.9 of the respondents don't have any comorbidities. Study participants' background and clinical profile (n=686) were described in Table 2.

Only 27.1% responded 'yes' for participating in a vaccine trial, while 42% responded 'maybe' for the same. 44.4% 'agreed' and 37.6% felt 'neutral' about COVID-19 vaccines protection against SARS-CoV-2 infection. For the question, COVID-19 vaccines are safe and effective — 36.6% 'agreed' and 46% felt 'neutral'. 75.5 % responded 'yes' for concern on side effects due to vaccine. 76.2% responded 'yes', and 20.7% responded 'may be' for accepting COVID-19 vaccine if it is successfully developed and approved for listing in the future. 58.75% responded 'no' for the cost of the vaccine affects the decision to take the vaccine, 69% preferred 'routine' administration for COVID-19, while 31% prefer 'emergency' administration only. 50.1% were likely to take the COVID19 vaccine 'as soon as possible' once available. 28.6% responded to prefer 'imported vaccine' and 54.2% responded as 'both are acceptable'. 75% responded that they would feel 'more confident' against COVID-19 if the vaccine was available for the public. Study participants' responses to questions regarding vaccine acceptance (n=686) are described in detail in Table 3.

For the question regarding accepting vaccine if the COVID-19 vaccine is successfully developed and approved in relation to occupation, there was a statistically significant difference with p< 0.001**Table 4.**

For the question, which type of COVID-19 vaccine you would prefer in relation to economic status, there was a statistically significant difference with a p=0.002 Table 4 was obtained**.** For the question, which type of immunization do you prefer for COVID-19 in relation to occupation, a P-value of 0.052 was obtained, which was not statistically significant.

DISCUSSION

To the authors' knowledge, this research project was one of the foremost studies conducted on vaccine acceptance in India. Being an observational cross-sectional online study, it explored the potential acceptance of COVID-19 vaccines among 686 voluntary study participants across the south Indian states. A relatively high tendency towards accepting the vaccine was observed among upper and lower-middle classes in our study. An important point to note is that 75.5 % of the respondents have concerns about the side effects due to the vaccine. An inclination for a routine vaccine against COVID 19 is seen, with 69% of the population choosing routine vaccination against emergency only vaccination 31% (213). The above data support the population's belief that the COVID 19 pandemic will not be ending soon in the near future.

Although vaccine acceptance is a cornerstone of mass vaccination, a small number of relevant studies have been reported worldwide so far. The authors compared the results with existing studies on acceptance of the COVID-

ipants

Questions	Options	No. (n=686)	%
Do you belong to a family of healthcare worker/medical student	Yes	185	27%
	No	501	73%
Did you suffer from COVID-19 before	Yes	212	30.9%
	No	474	69.1%
Did any of your family member/s suffered COVID-19	Yes	177	25.8%
	No	509	74.2%
Do you have any comorbidities	Only HTN	17	2.4%
	Only DM	18	2.6%
	Both DM & HTN	16	2.3%
	Asthma	7	1%
	Epilepsy	4	0.6%
	Other	7	1%
	None	617	89.9%

Table 2: Background and clinical profile of Study participants (n=686)

19 vaccine. In an online cross-sectional study by Harapan H et al. regarding COVID-19 vaccine acceptance in Indonesia, 1359 have participated.[13] Ninety-three (93.3%) of study participants would like to be vaccinated for a 95% effective vaccine. Still, this acceptance rate decreased to 67.0% for a vaccine with 50% effectiveness in that study. In contrast, 76.2% responded as 'yes' in our study, and 20.7% responded as 'may be' for accept vaccination if the COVID-19 vaccine is successfully developed and approved for listing in the future.[13] In a web-based cross-sectional study by Al-Mohaithef M et al. in Saudi Arabia, 992 people have participated in that study; 64.7% said 'Yes' to uptake the COVID-19 vaccine, which was less than our study.[14] In a study in China with 2058 study participants, 91.3% responded 'yes' to receive the vaccine, which was higher than our study. However, 49.4% preferred to take routine immunization, which was lower than our study (69%).[15] In a study in the United States by Malik A et al., involving 672 participants, 67% said 'Yes' to take COVID-19 vaccine, indicating a lower level of acceptance than in our study.[16] A study by Murphy J et al. analyzed the psychological characteristics of COVID-19 vaccine hesitancy and resistance in Ireland and the United Kingdom (UK). 2025 individuals from UK and 1041 from Ireland have participated in the study. Out of them, 69 % of the UK and 65% of the Irish participants accepted to take the vaccine. This finding was consistent with our study.[17] In our study, there was more preference for imported vaccines over the home-manufactured vaccines, indicating lack of trust in the protocols in place that were followed to release the vaccine samples out to the general public. Compared to various international agencies' approaches of revealing all the data and research papers regarding trials of their respective vaccine candidate, the Indian approach disclosed less information fueling distrust in COVID-19 vaccines among the general public. Identifying pharmaceutical companies for the restricted use of vaccines under the current pandemic has caused an increase in skepticism in the vaccine's effectiveness. Policymakers, governments and healthcare professionals could use this data to better address a vaccine candidate and create proper communication channels for the general public. Knowledge, attitude and practices towards COVID-19 and vaccines will also play a key role in making decisions regarding vaccine acceptance.[18] However, the rate of acceptance of vaccines has increased in the current studies when we compare with vaccination of past outbreaks of influenza.[19] The reasons could be increased awareness among the general public, advances in technology, and governments' steps to bring trust in vaccines among the people.[19] A communication strategy should be adopted for further phases of the ongoing vaccination to address misinformation and distrust campaigns better. The fact is that one's decision to get vaccinated is multi factorial and is subject to changes over time.

LIMITATIONS OF THE STUDY:

The major limitation of this study is it was only conducted in English, as the target population is the general adult residents of South India. There are decent chances of the selection bias and representativity of the survey to the general population, whom may not have internet access and cannot understand English may not be able to participate in this survey. People aged 65+ years are underrepresented in

Questions	Options	No. (n=686)	%
Will you participate in COVID-19 vaccine trial	Yes	186	27.1%
	No	212	30.9%
	May be	288	42%
Vaccine will protect against SARS-CoV-2 infection	Strongly agree	85	12.4%
	Agree	305	44.4%
	Neutral	258	37.6%
	Disagree	23	3.3%
	Strongly disagree	15	2.1%
COVID-19 vaccines are safe and effective	Strongly agree	38	5.5%
	Agree	251	36.6%
	Neutral	316	46%
	Disagree	68	10%
	Strongly disagree	13	1.9%
Do you have any concern about the side effects of vaccine	Yes	518	75.5%
	No	168	24.5%
Do you accept the approved COVID-19 vaccine	Yes	523	76.2%
	No	21	3.1%
	May be	142	20.7%
Does the cost of vaccine affect your decision to take vaccine	Yes	283	41.25%
	No	403	58.75%
Which type of immunization you prefer for COVID-19	Emergency only	213	31%
	Routine	473	69%
How quickly are you likely to take the COVID19 vaccine	Immediately	344	50.1%
	Within 3 months	165	24%
	Within 6 months	102	14.86%
	Within 1 year	55	8%
	Within 2 years	7	1%
	Within 3 years	3	0.43%
	Within 5 years	2	0.29%
	Depends on the trial results	8	1.16%
Prefer which type of COVID-19 vaccine	Make in India vaccine	118	17.2%
	Foriegn vaccine	196	28.6%
	Both are acceptable	372	54.2%
With the vaccine available, do you feel more confident against COVID19	Yes	514	75%
	No	172	25%

Table 3: Study Participants responses to questions regarding vaccine acceptance (n=686)

Question	Variable	Yes	No	May be	n=686	p-value
Accept the vaccine once it is developed and approved	Student	194	4	55	253	0.001*
	Self-Employed	78	5	9	92	
	Government	114	2	27	143	
	Private	98	4	28	130	
	Unemployed	39	6	23	68	
Question	**Economic Status**	**Domestic**	**Imported**	**Both**	**n=686**	**p-value**
Prefer which type of COVID-19 vaccine	Lower	1	21	30	52	0.002*
	Upper Lower	30	30	63	123	
	Lower Middle	20	57	101	178	
	Upper Middle	37	56	119	212	
	Upper	30	32	59	121	
Question	**COVID-19 infected family member**	**Yes**	**No**	**May be**	**n=686**	**p-value**
Will you participate in vaccine trial	Yes	62	50	65	177	0.022*
	No	124	162	223	509	

Table 4: Distribution of study population in relation to socio-demographic profile regarding particular questions related to vaccine acceptance (n=686)

the study. Due to the online nature of the survey, it could only reach people who have access to internet and electronic devices. This population group consists (mainly) of young people (reflected by the mean age, 30.4 years), literate, socioeconomically advantaged and mostly urban residents.

CONCLUSION:

The acceptance of the COVID-19 vaccine is expected to be influenced at a large scale in the coming months. Higher acceptance will depend on emerging data regarding the efficacy and safety of vaccines. Given that many countries have provided vaccines to front line workers and vulnerable populations, data on the potential adverse events must be collected and analyzed on case-by-case basis. Public health authorities and policymakers need to frame systematic interventions and awareness campaigns to improve the acceptance of COVID-19 vaccines and reduce the vaccine hesitancy levels. These campaigns and interventions ought to focus on reviving the trust in the vaccination procedures and outcomes, offering transparent information regarding the vaccines' efficacy and safety.

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