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Knowledge and perceptions towards candidate COVID-19 vaccines among practicing physicians of Tamil Nadu: a cross-sectional pilot study

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ABSTRACT

Background: The world is in the midst of a COVID-19 pandemic and WHO is working in collaboration with scientists, business and global health organizations to speed up the pandemic response and they are racing to find a vaccine. COVAX the largest and most diverse COVID-19 vaccine portfolio in the world launched by WHO. There are currently over 189 COVID-19 vaccine candidates under development, with 40 of these in the human trial phase. This study was done to assess the knowledge and perceptions towards candidate COVID-19 vaccines among practicing physicians.

Methods: A cross-sectional study were done among 129 practicing physicians using a semi-structured, validated, questionnaire through online Google forms after obtaining the informed consent. The data was analyzed using SPSS version 20.

Results: The study was done among 129 practicing physicians of which 65 (50.4%) were males and 64 (49.6%) were females and majority of them in the age group of 21-40 years (77.5%) with a mean age of 34.89±9.906 years. 82.2% of the participants were working with the clinical specialty of which 95 (73.6%) with 10 years of professional experience and 23 (17.8%) had 10-20 years of professional experience. Majority of the practicing physicians 92 (72.3%) have average knowledge towards COVID-19 vaccines. Overall, the physicians showed positive attitude towards COVID-19 vaccines and 107 (82.9%) said that COVID-19 vaccine was really needed to control the pandemic.

Conclusions: The study recommends promoting all precautionary and preventive measures of COVID-19 with a comprehensive training program for the practicing physicians before the implementation of COVID-19 vaccines which will support public engagement strategies and help to build preparedness for potential vaccine introduction.

Keywords: COVID-19 vaccines, Perceptions, Physicians

INTRODUCTION

Beginning of the end

COVID-19 vaccines will hopefully end the threatening SARS-CoV-2, the severe acute respiratory syndrome. The disease was first reported in December 2019 Wuhan,

China.¹ Corona virus have a large single standard positive sense RNA genome encased by helical nucleocapsid and an outer envelope comprise of envelope proteins and spike protein(s).² The spike protein is responsible for binding onto the angiotensin converting enzyme-2 receptors and entry into the cell. Spike proteins were

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found to elicit neutralizing antibodies and it is a major target antigen for vaccine development.^{3,4}

There is urgent need to advance safe and effective vaccine. Such vaccine relies on proven recombinant protein-based vaccine. The COVID-19 is turned into a global human strategy and economic devastation. The teams of researchers face big challenges in both scientific and logistic approach. There are currently over 189 COVID-19 vaccine candidates under development, with 40 of these in the human trial phase.⁵ The DGCI (drug controller general of India) permitted two vaccines, Bharat biotech international in collaboration with ICMR and ZydusCadila health care. They are named as COVAXIN and ZYCOV-D respectively. Both have undergone successful toxicity studies in rats, mice and rabbits. Some of other vaccines names Moderna, Inovio, Pfizer, Sinovac, Sinopharm, university of Oxford in England, university of Queensland in Australia. Nature of vaccine are as follows: recombinant vaccine, inactivated vaccine, live attenuated vaccine, protein subunit vaccine, virus like particle, RNA, DNA.6 Two early phase COVID-19 trials were Oxford university UK and Casino Biological Wuhan. Both were adenovirus viral vectorbased vaccines and both reported vaccines achieved humoral response to SARS-CoV-2 spike glycoprotein receptor binding domain by day 28 as T-cell response.7 Emergence of antigenic drift and antibody dependent enhancement (ADE) remains greater challenge in developing a vaccine. Safest dose of vaccine found to be 5×10 viral particles after human trials.^{8,10} In this global pandemic, there was also a pandemic of misinformation regarding COVID-19; a serious concern might lead to xenophobia in the world as already warned by scientists and WHO officials.9

Current vaccine status by WHO¹⁰

The first mass vaccination programme started in early December 2020 and the number of vaccination doses administered was updated on a daily basis. At least 13 different vaccines (across 4 platforms) have been administered. The Pfizer/BioNtechComirnaty vaccine was listed for WHO emergency use listing (EUL) on 31 December The SII/Covishield 2020. and AstraZeneca/AZD1222 (developed vaccines AstraZeneca/Oxford and manufactured by the serum institute of India and SK Bio respectively) were given EUL on 16 February. The Janssen/Ad26.COV 2.S developed by Johnson and Johnson was listed for EUL on 12 March 2021. The Moderna COVID-19 vaccine (mRNA 1273) was listed for EUL on 30 April 2021 and the Sinopharm COVID-19 vaccine was listed for EUL on 7 May 2021. The Sinopharm vaccine was produced by Beijing bio-institute of biological products ltd, subsidiary of China national biotec group Co Ltd (CNBG). The products and progress in regulatory review by WHO was provided and updated regularly by WHO. Once vaccines were demonstrated to be safe and efficacious, they must be authorized by national regulators, manufactured to

exacting standards and distributed. WHO was working with partners around the world to help coordinate key steps in this process including to facilitate equitable access to safe and effective COVID-19 vaccines for the billions of people who will need them. Equitable access to safe and effective vaccines was critical to ending the COVID-19 pandemic, so it was hugely encouraging to see so many vaccines proving and going into development. WHO was working tirelessly with partners to develop, manufacture and deploy safe and effective vaccines. Safe and effective vaccines were a gamechanging tool, but for the foreseeable future we must continue wearing masks, cleaning our hands, ensuring good ventilation indoors, physically distancing and avoiding crowds. Being vaccinated does not mean that we can throw caution to the wind and put ourselves and others at risk, particularly because research was still ongoing into how much vaccines protect not only against disease but also against infection and transmission. The success of any new immunization campaign ultimately relies on individuals' acceptance of novel vaccines, but the actual level of acceptance among HCWs and doctors remains poorly understood. With the above background, this study was done to assess the knowledge and perceptions towards candidate COVID-19 vaccines among practicing physicians.

Aims and objectives

The aims and objectives were to assess the knowledge and perceptions on candidate COVID-19 vaccines among physicians and to analyze the knowledge and perceptions towards candidate COVID-19 vaccine among physicians with socio demographic and professional characteristics.

METHODS

Study design and area

A cross-sectional study was done among 129 practicing physicians in Tamil Nadu who have completed MBBS, MD/MS and diploma courses. The study was conducted during November 2020 for the period of 1 month after obtaining permission from institutional ethics committee.

Study population and sampling

This study was done among the practicing physicians from various specialties selected by snow ball method of sampling.

Study tool

A semi structured, content validated questionnaire containing questions related to socio-demographic profile, knowledge and perceptions towards candidate COVID-19 vaccine was used.

The Questionnaire had two sections. Section 1 was socio demographic profile, highest qualification, professional experience of the study participant. Section 2 was perception of the COVID-19 vaccines on need of the vaccine, acceptance, adverse events, antibody efficacy, reasons for acceptance or hesitance to get vaccinated.

Data collection method

The questionnaire was converted in a Google form with the informed consent as the first page and the followed by the later parts of the questionnaire. The Google form link was sent through mails and whatsapp groups through doctors friends and groups. The data was collected through online Google forms and the Informed consent was obtained in the first page of form.

Outcome measure

The knowledge and perceptions component with 15 questions for which scoring was given. The knowledge was assessed by scoring such as 1-5=poor, 6-10=average, 11-15=good. The questionnaire was sent to study participants through google link and responses were recorded.

Data analysis

Data was entered and analyzed using SPSS software 21 version. The results were expressed in percentages and chi-square test was done to test the significance. Chi-square tests were applied to find difference in knowledge and perceptions with social, demographic and professional characteristics of the physicians.

Ethics statement

The study was presented to the institutional ethics committee at TMCH and obtained approval before the start of the study.

RESULTS

The study was done among 129 practicing physicians of which 65 (50.4%) were males and 64 (49.6%) were females and majority of them in the age group of 21-40 years (77.5%) with a mean age of 34.89±9.906 years. More than 50% of the participants have done postgraduation (54.3%). 82.2% of the participants were working with the clinical specialty. Among them 95 (73.6%) with 10 years of professional experience and 23 (17.8%) had 10-20 years of professional experience. More than 50% of the physician's 73 (56.6%) were working in government institutions, 47 (36.4%) in private institutions and only 9 (7%) work in clinic or nursing home. Of them 41 (31.8%) have been working in COVID-19 wards whereas 88 (68.2%) have never encountered COVID-19 patients (Table 1).

Majority of the practicing physicians 92 (71.3%) have average knowledge towards COVID-19 vaccines. Only 13 (10.1%) have good knowledge and 24 (18.6%) have poor knowledge towards COVID-19 vaccines among the physicians. The overall knowledge score indicated average knowledge among practicing physicians on COVID-19 vaccines (Figure 1).

Table 1: Frequency distribution of the study population.

Variables		Frequency (N=129)	Percentage
Age group (in years)	21-40	100	77.5
	41-60	24	18.6
	>61	5	3.9
	Total	129	100.0
Gender	Male	65	50.4
	Female	64	49.6
	Total	129	100.0
Education	Undergraduate	47	36.4
	Postgraduate	70	54.3
	Diploma	12	9.3
	Total	129	100.0
Professional experience (in years)	<20	118	91.5
	>20	11	8.5
	Total	129	100.0
Work place	Government	73	56.6
	Private	56	43.4
	Total	129	100.0

Table 2: Perception toward COVID-19 vaccine and its variables.

Variables	Perceptions towards COVID-19 vaccine			Chi gayaya	
	Agree; N (%) N=36	Disagree; N (%) N=93	Total; N (%) N=129	Chi-square value	P value
Volunteer for vaccine trials					
Age (in years)					
<40	23 (64)	77 (83)	100 (77.5)	5.323	0.02*
>40	13 (36)	16 (17)	29 (22.5)	5.323	0.02**
Volunteer for vaccine trials					
Work place					
Government	21 (35.5)	52 (74)	73 (56.5)	19.5	0.00001*
Private	38 (64.5)	18 (26)	56 (43.5)	19.3	
Vaccine will end pandemic					
Work place					
Government	36 (48)	37 (68.5)	73	£ 20	0.02*
Private	39 (52)	17 (31.5)	56	5.38	

^{*}indicates significant statistical association.

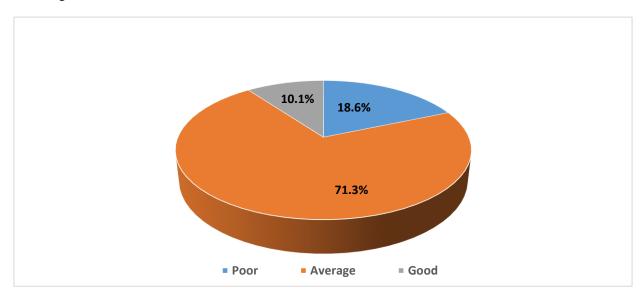


Figure 1: Knowledge assessment among the study participants based on score.

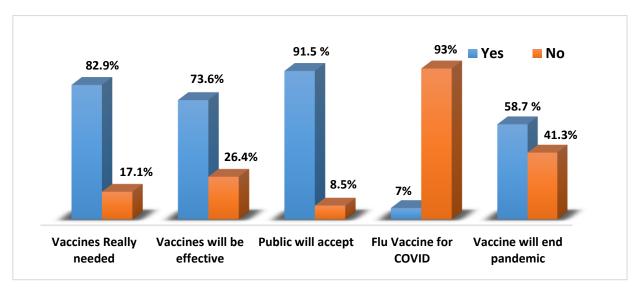


Figure 2: Perceptions regarding COVID-19 vaccines.

The perceptions towards COVID-19 vaccines among the practicing physicians were 107 (82.9%) said that COVID-19 vaccine was really needed to control the pandemic at the same time 95 (73.6%) ponder that the vaccine will be effective against COVID-19. Majority 118 (91.5%) of the doctors opine that the public will accept the vaccine once it's introduced. 93% of the physicians thought that the flu vaccine was not sufficient and 75 (58.7%) perceive that COVID-19 vaccine will end the pandemic. Overall, the physicians showed positive attitude towards COVID-19 vaccines (Figure 2).

The participants strongly agreed that the need for additional information on COVID-19 vaccines and majority of the physicians, 70.5% agreed that their knowledge on COVID-19 vaccine was inadequate. 48.8% of the participants were worried about the safety of COVID-19 vaccine. Only 27.9% of the physicians were willing to volunteer to participate in the vaccine trial.

Chi-square tests were applied to find difference in knowledge status by demographic characteristics, it was observed that the physicians with undergraduate degree had more knowledge on COVID-19 vaccines were found to be significant (p<0.05) compared to the doctors with postgraduation.

On the contrary, the doctors with undergraduate degree strongly agreed that they need additional information on COVID-19 vaccines and it was found to be significant. (p=0.002) compared to the others (Table 2).

Majority of the physicians think that an effective COVID-19 vaccine was really needed to end the pandemic and it was found to be highly significant (p=0.000). The perceptions of doctors working in government institutions were found to be highly significant that an effective vaccine was really needed to end the pandemic (p=0.02). They showed willingness to participate in the vaccine trial compared to the doctors working in private institutions. The doctors aged <40 years were ready to participate in the trial compared to other participants (p=0.02).

DISCUSSION

In spite of extensive search on Pubmed, Scopus and other search engines on the COVID-19 vaccine related knowledge, attitude and perceptions there were no such studies conducted in India among the physicians. Few studies done among health care workers in India on COVID-19 virus and disease knowledge and awareness with one or two questions generally on COVID-19 vaccine, so we were comparing the studies conducted elsewhere in the world. A study done on COVID-19 vaccine acceptance, hesitancy and refusal among Canadian healthcare workers: a multicenter survey, by Dzieciolowska et al, among 17 health care institutions reviewed the following results. Among 2761 respondents (72% female, average age, 44), 2233 (80.9%)

accepted the vaccine. Physicians, environmental services workers and healthcare managers were more likely to accept vaccination compared to nurses. Male sex, age over 50, rehabilitation center workers and occupational COVID-19 exposure were independently associated with vaccine acceptance by multivariate analysis. Factors for refusal included vaccine novelty, wanting others to receive it first and insufficient time for decision-making. Among those who declined, 74% reported they may accept future vaccination. Vaccine firm refusers were more likely than vaccine hesitants to distrust pharmaceutical companies and to prefer developing a natural immunity by getting COVID-19. The refusal reasons for COVID-19 vaccines wanted other to receive it first so that the others can feel safer to get vaccinated later.

In October and November 2020, Verger et al12 conducted a survey of 2,678 healthcare workers (HCWs) involved in general population immunization in France, Frenchspeaking Belgium and Quebec, Canada to assess acceptance of future COVID-19 vaccines (willingness to receive or recommend these) and its determinants. Of the HCWs, 48.6% (N=1,302) showed high acceptance, 23.0% (N=616) moderate acceptance and 28.4% (N=760) hesitancy/reluctance. Hesitancy was mostly driven by vaccine safety concerns. These must be addressed before/during upcoming vaccination campaigns. Our study results demonstrated that the perceptions of doctors working in government institutions were found to be highly significant that an effective vaccine was really needed to end the pandemic (p=0.002). They showed willingness to participate in the vaccine trial compared to the doctors working in private institutions. Many studies conducted in other countries included all the health care workers whereas our study has included only the physicians. But the attitudes were similar and especially regarding the safety of the vaccine were big concerns among our study physicians. Similarly regarding HCWs, past experience with pandemic influenza vaccination suggests that not all of them will agree to be vaccinated against COVID-19.13 For several months now, a number of studies in several countries have indicated negative attitudes towards future vaccines against COVID-19, in proportions of up to or exceeding 30-40% of the general population.^{14,15} A principal reason for such attitudes may be due to the concern that the new vaccines will not be safe. However, currently, there were only few publications about HCWs' acceptance to get vaccinated with COVID-19 vaccines and to our knowledge, none about their intention to recommended these vaccines to their patients. Previous reports suggested that willingness to get vaccinated lied between 60% and 90% among physicians in Greece (February 2020) and France (March-July 2020) and between 40% and 60% among nurses in Hong Kong, China (February-March 2020) and France. 16-¹⁸ In a study done by Padureanuet al among health care professionals differences in accepting the vaccination against COVID-19 coverage by profession (p=0.011) were found.¹⁹ In particular, physicians and medical

students were more likely to accept COVID-19 vaccination than the other professions. The overall knowledge score indicated average knowledge among physicians, Chi-square tests were applied to find difference in knowledge status by demographic characteristics, it was observed that the physicians with undergraduate degree had more knowledge on COVID-19 vaccines were found to be significant (p<0.05) compared to the doctors with postgraduation. According to our results, the knowledge on other vaccines provided protection against COVID-19 was 43.4% of the participants responses were correct. In a study done by Muhammad et al more than 20% health care professionals had inaccurate knowledge that influenza vaccine provides protection against COVID-19.²⁰ In our study, the 72.1% physicians said that the vaccine should be given to all age groups and 16.3% said that the vaccine must be given to geriatric populations. A majority of vaccine trials had focused on healthy people between the ages of 18-65 years excluding the elderly, pregnant women and children. Given the disproportionate mortality rate in people over the age of 60, the elderly need to be considered in vaccine trials to ensure safety, immunogenicity and efficacy data was collected and were prioritized to receive COVID-19 vaccines in outbreak situations. The study participants strongly agreed that the need for additional information on COVID-19 vaccines and majority of the physicians 70.5% agreed that their knowledge on COVID-19 vaccine was inadequate. 48.8% of the participants were worried about the safety of COVID-19 vaccine. Only 27.9% of the physicians were willing to volunteer to participate in the vaccine trial. Only less than 50% of the physicians were ready to promote the vaccine.

A Poland study among residents on intentions to get COVID-19 vaccinations Konopińska et al revealed the following results. An online, self-administered, anonymous survey was distributed among Polish ophthalmology residents in early 2021. Of 126 residents who completed the survey, 71.4% indicated that they would get vaccinated, 17.5% were unsure and 11.1% would refuse vaccination. Married respondents with children and respondents living with their families were more likely to accept vaccination, believing that the vaccine is effective and fearing for themselves or their families getting infected. In conclusion, most ophthalmology residents expressed a willingness to get vaccinated. Marital status and cohabitants affect vaccination acceptance.

In a review on COVID-19 vaccines by Archana et al they mentioned that the safest and most controlled way for effective and sustainable prevention of COVID-19 in a population was to have an efficacious and safe vaccine and the majority of the population successfully vaccinated.²² Even if sustained immunity was attained after infection by SARS-CoV2, estimates were that 60-70% of a population would need to be immune to achieve herd immunity against SARS-CoV2. Further studies

providing insight into attitudes and perceptions toward the COVID-19 vaccination among different populations like health care workers, doctors, general public and other occupational groups were needed.

Strengths and limitations

Although participation rates were high for online surveys, generalizability of the results presented here requires caution, and confirmation in other countries among their own study population. High likely chances of subject bias was possible because the participating doctors and physicians subjective feeling and attitudes towards the questions and the pandemic situation would have immense influenced which would have under estimated or overestimated the issue behind the COVID-19 vaccines. These could potentially lead to over-reporting high COVID-19 vaccine acceptance, which would not change our conclusions. Causal inferences cannot be drawn from this cross-sectional and observational study.

CONCLUSION

The study findings have shown knowledge gap, so the study implies to promote training programs for the practicing physicians before the implementation of COVID-19 vaccines. So, the study recommends the ministry of health authorities to promote all precautionary and preventive measures of COVID-19 with a comprehensive training program for the practicing physicians before the implementation of COVID-19 vaccines. This will support public engagement strategies and help to build preparedness for potential vaccine introduction.

Despite efforts in fast tracking vaccine development, completion dates for early clinical trials are estimated to be late 2020 to mid-2021 and it may still take longer before a vaccine is licensed for use globally. This emphasizes the need for proven public health strategies such as physical distancing, early detection, self-isolation and outbreak control remain as important mitigation tools.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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