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Knowledge, Attitudes and Apprehension Regarding COVID-19 Vaccination in Healthcare Workers

Lalwani, Kajol[1], Regi, Jennie. K.[2], Doke, Purwa[3*], Pawar, Sunita[4]

[1] Pharm.D., Bharati Vidyapeeth (Deemed to be) University, Poona College of Pharmacy, Department of Clinical Pharmacy, Pune, Maharashtra, India

[2]Pharm.D., Bharati Vidyapeeth (Deemed to be) University, Poona College of Pharmacy, Department of Clinical Pharmacy, Pune, Maharashtra, India

[3]MD, Department of Medicine, Bharati Vidyapeeth (Deemed to be) University and Medical College, Pune, Maharashtra, India

[4]M.Pharm., Assistant Professor, Department of Clinical Pharmacy, Bharati Vidyapeeth (Deemed to be) University, Pune, Maharashtra, India

****Corresponding Author***

E-mail ID: purwadoke@gmail.com; sunita.reva@gmail.com

ABSTRACT

Background: *Coronavirus disease 2019 (COVID-19) is a highly infectious disease caused by the newly discovered coronavirus strain SARS-CoV-2. The COVID-19 vaccination drive was launched in India on January 16, 2021. From 16th January 2021 to 9th September 2021, 68,75,41,762 individuals have been vaccinated so far. The study's aim is to raise awareness of COVID-19 vaccines and provide a better understanding of the healthcare workers' knowledge, attitudes, and apprehension resulting in a successful vaccine roll-out.*

Methods: *From the 25th of January 2021 to the 5th of February 2021(before the beginning of second wave), a cross-sectional observational study was conducted in an Indian tertiary care hospital to assess healthcare workers' knowledge, attitudes, and apprehension regarding COVID-19 vaccination. The participants were required to complete a questionnaire in the language best understood by them. It concentrated on their basic vaccine understanding, attitudes, and apprehension.*

Results*: Out of total respondents, 46.26% had good knowledge about the COVID-19 vaccine. After receiving their first dose of vaccine, 78.6% of respondents showed positive attitude. About 91.3% professionals and semi-professionals were very apprehensive towards COVID-19 vaccine, especially regarding unrecognized side effects.*

Conclusion: *The authorities in charge of vaccine development should provide appropriate health education about the COVID-19 vaccines in order to increase population awareness, render a positive attitude, and reduce their apprehension. Gaining public confidence in the COVID-19 vaccine's safety and effectiveness will maximize the success of this roll out.*

Keywords*: COVID-19 vaccine, India, healthcare workers, vaccine roll out*

INTRODUCTION:

Coronavirus disease 2019 (COVID-19) is caused by SARS-CoV-2, first detected in December 2019, in Wuhan, China. Vaccines are important and an effective tool to protect the population from COVID-19 [1]. On 16th January 2021, COVID-19 vaccine drive was launched in India. From 16th January 2021 to 9th September 2021, 68,75,41,762 individuals have been vaccinated so far [2]. Frontline workers are the priority group for vaccination as they were at higher risks to COVID-19.Vaccine hesitancy arises due to rapid development and safety concerns about vaccine. Therefore, the study aims to

assess the knowledge, attitudes and apprehensions regarding COVID-19 vaccine in healthcare workers.

OBJECTIVES

The study's objective is to evaluate healthcare workers' knowledge, attitudes, and apprehension concerning COVID 19 vaccination.

METHODS

Study Design

A cross-sectional survey of healthcare workers was conducted.

Setting

The study was conducted in January 2021 at an 850 bedded tertiary care hospital in Pune, India on vaccinated health care workers between January 16th2021 and February 5th, 2021 (three weeks) before the beginning of the second wave. These individuals were contacted by phone from 28th January 2021 to 5th February 2021 (two weeks). The data was analyzed in the month of February 2021.

Participants

A list of health care staff who received their first dose of vaccine between January 16th and February 5th, 2021, (three weeks), along with their personal contact details was regularly obtained from the records section after administrative approval.

Inclusion criteria:

1) These were healthcare workers working in tertiary care hospital where the study was conducted.
2) Those who received the first dose of COVID-19 vaccine were included in the study.

Exclusion criteria:

1) Those who did not respond to telephone calls about COVID-19 vaccine awareness after 3 successive attempts
2) Those who had volunteered for COVID-19 vaccine clinical trials

Variables

The independent variables were age, gender, education, occupation.
The dependent variables were knowledge, attitudes and apprehension. The questionnaire had 4 sections: socio-demographics, knowledge, attitudes and apprehension. The socio-demographic variables included the participants age, gender, educational qualification, occupation and date of receiving the first dose of COVID-19 vaccine.

The scoring and interpretations categories were as follows: For knowledge, those who scored up to 3 were graded as having “poor” knowledge, those who scored4-7 were graded as having “average” knowledge and those who scored 8-10 were graded as having “good” knowledge. The attitudes were taken as positive or negative. The answers for apprehension were taken as “not at all”, “low” or “highly apprehensive”. The subjects giving a negative or neutral (maybe or don’t know) reply were considered to have a negative attitude or apprehensive. The participating subjects’ educational qualifications were divided into 5 categories: Primary (up to 4th standard), Secondary (up to 10th standard),

Higher secondary (11th, 12th standard and diploma courses), Graduation (MBBS, B.com, B.Sc., B.A.) and Post-Graduation (M.D., M.Sc., M. Com, MBA). The participants’ occupation was divided into the following standard categories: Professional, Semi-professional, clerical and allied, skilled and unskilled workers.

The analysis was carried out in a hospital setting. Participants were approached on a regular basis and asked to fill out a Google form.

Data Sources/Measurement

An online platform which is the Google form survey was used to assess the knowledge, attitudes and apprehension regarding COVID-19 vaccines. A structured questionnaire was prepared and validated from a subject expert. Then it was pre-tested. Following their verbal consent, they were requested to answer a Google form, which was sent to them through WhatsApp or email. Staff members who did not have WhatsApp or email accounts were interviewed over the telephone. It was written in the language best understood by the participants (English or Marathi). It included questions about the knowledge, attitudes, and apprehensions regarding the COVID-19 vaccines. In total, there were 20 questions (10 about knowledge, 5 about attitudes, 5 about apprehension). The participants were graded on a scale of one to ten. One point was awarded for each correct answer. Each incorrect answer, as well as "maybe" and "don't know" responses, earned a score of zero. As a result, the total scores were given from 0-10 for the knowledge category. After obtaining all responses, the participants were told of their scores and given the correct answers over a second phone call and their vaccination-related questions were answered. The questionnaire was first put to the test on five individuals. After the pilot analysis, any discrepancies were addressed.

The study was conducted following the approval of the Institutional Ethics Committee. Throughout the process, the volunteers' privacy was protected to the fullest extent possible. A total of 201 participants completed the entire survey.

Study Size

Considering the mean value of knowledge as 2.83/5 and SD 1.48 with 95% confidence limits and difference of 0.3, the estimated size was 97. But as the participants were not randomly selected we intended to take about double the estimated number to compensate for effect size. However, we enrolled vaccinated beneficiaries within three weeks.

Statistical Methods

The data was coded and entered into an excel spreadsheet. Tables, graphs, and pie diagrams were used to display the qualitative results, which were calculated as percentages. Statistical analysis was done using the SPSS software version 25.0. The effects of continuous variables were shown using descriptive statistics, while categorical variables were represented using frequency and percentages. The Chi-square test was used. The findings were seen with a 95% confidence level.

P-value<0.05 was considered significant.

RESULTS

Participants

A total of 600 healthcare employees were vaccinated against COVID-19 for the first time. All 600 of them were contacted via email, WhatsApp, or phone. However, only 201 people replied to the survey, and the others either declined to take part or did not receive the phone call after three attempts.

Descriptive Data

A total of 201 participants took part in the research. The participants' mean age was 29.26 years (SD =8.69) and ranged from 20 to 76 years. Of the total, 77 (38.30%) were men and 124 (61.69%) were women.

Around 37.31% of respondents had a graduate degree, while 5.47% had only undergone primary school. Semi-professionals (nurses, dieticians) made up 43.78% of the workforce, while unskilled employees made up 13.43% (housekeeping, ward boys).

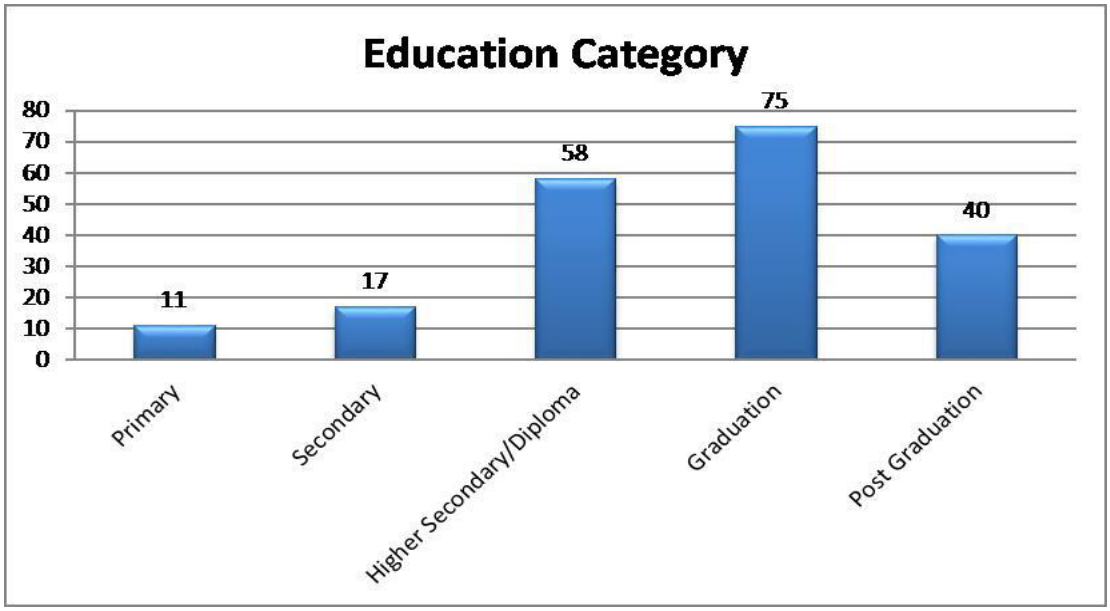

Fig. 1: Education Category of Healthcare Workers Regarding COVID-19 Vaccination

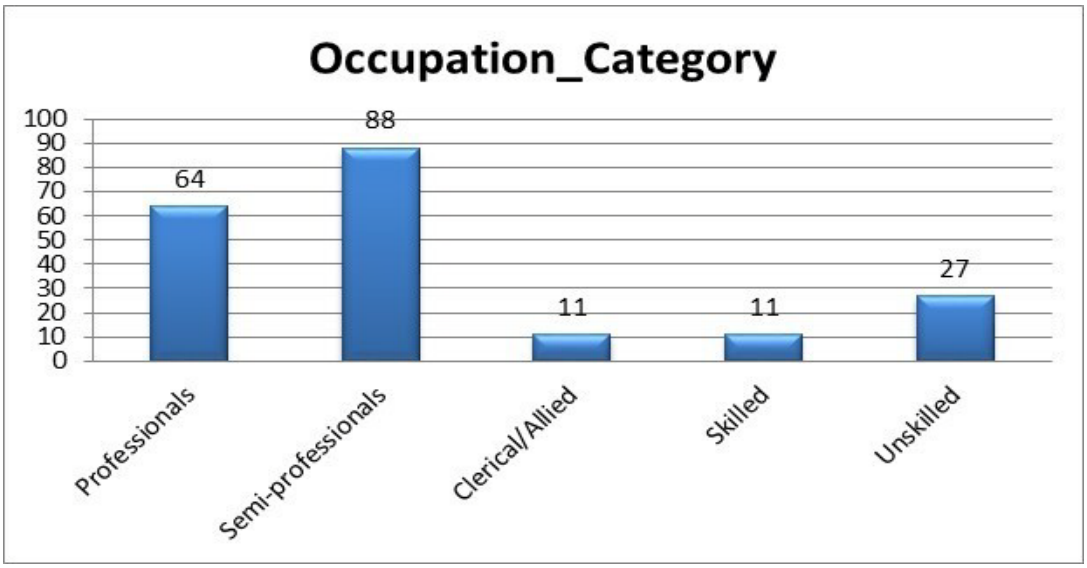

Fig. 2: Occupation Category of Healthcare Workers Regarding COVID-19 Vaccination

MAIN RESULTS

Knowledge about the COVID-19 vaccine: Out of 201 respondents, 46.26% (n=93) of healthcare workers had a good knowledge of COVID-19 vaccine. There was no discernible association between gender and information. The educational qualification and knowledge had a significant relationship. 84.9% (n=79) of professionally qualified doctors had good knowledge, (Chi square=80.39; P<0.001). In addition, there was a clear correlation between occupation and knowledge. Doctors had the most accurate expertise, while semi-professional and clerical staff had the least (chi square=99.89; P<0.001). There was no correlation between the respondents' attitudes and their knowledge. The respondents' apprehension and their knowledge were found to have a significant relationship. (Chi square=19.37; P=0.001) Respondents with good knowledge were seen to be very apprehensive, which was 55.9 % (n=52) and only 3.22 % (n=3) were not apprehensive at all. Respondents with minimal knowledge were found to be less apprehensive, which was 61.5% (n=24).

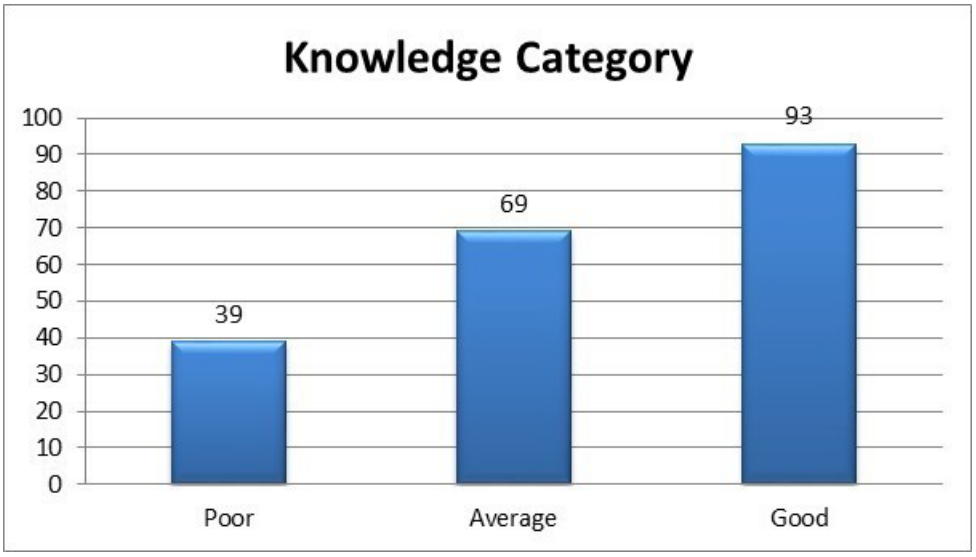

Fig. 3: Knowledge of healthcare workers regarding COVID-19 vaccination

Knowledge Questionnaire about COVID-19 Vaccine

Table.1 Knowledge of healthcare workers regarding COVID-19 vaccination

	Scores:	Frequency	Percentage
1) How many vaccines have been authorized for vaccination against COVID-19 in India as on 16th January 2021?	**0** **1**	**89** **112**	**44.27** **55.72**
2) Are the COVID-19 vaccines authorized by the Government of India being manufactured in India	**0** **1**	**18** **183**	**8.95** **91.0**
3) Are you aware about the side effects of the Covid-19 vaccines?	**0** **1**	**69** **132**	**34.32** **65.67**
4) Is a past history of suffering from COVID-19 disease, a contraindication for this vaccine?	**0** **1**	**101** **100**	**50.24** **49.75**
5) Which is NOT a priority group for Covid-19 vaccination as on 16th January,2021?	**0** **1**	**72** **129**	**35.82** **64.17**
6) Will the vaccinated patients receive information on the status of their second dose after the completion of their first dose?	**0** **1**	**102** **99**	**50.74** **49.25**
7) How many doses of these vaccines are required?	**0** **1**	**61** **140**	**30.34** **69.65**
8) During the storage and transportation, at what temperatures should the vaccines be?	**0** **1**	**146** **55**	**72.63** **27.36**
9) What is the route of vaccination for these vaccines?	**0** **1**	**83** **118**	**41.29** **58.7**
10) How many weeks apart should the second dose of vaccine be taken?	**0** **1**	**54** **147**	**26.86** **73.13**

0=Incorrect answer, including “don’t know” and “maybe”
1=Correct answer, including “yes”

0-3= Poor knowledge
4-7= Average knowledge
8-10= Good knowledge

Attitudes about the COVID-19 vaccine:

Out of all respondents, 78.6% (n=158) had a positive attitude towards COVID-19 vaccine as shown in Figure 4. There was no important correlation between gender and attitudes. There was a significant association between educational qualifications and attitudes. However, among doctors, only 55.6% had a positive attitude, while 58.1% had a negative attitude. Respondents of secondary education revealed that 37.3% had a positive outlook, while 37.2% had a negative outlook. (Chi square=1.79; P<0.001) There was an important correlation between occupation and attitudes. Professionals (doctors) and semi-professionals (nurses, dieticians) were more optimistic about COVID-19 vaccine, which was shown to be 78.4%, although only 13.9% of respondents who were unskilled staff were hopeful (Chi square=10.83; P=0.03). There was no significant relationship between gender and attitudes among respondents.

There was a strong correlation between attitudes and apprehension in which respondents with a positive attitude (48.1% (n=76)) and respondents with a negative attitude (65.1% (n=28)) were shown to be less apprehensive (Chi square=17.50; P<0.001). Post-vaccination health complaints were registered by 67.14% of respondents. There is a substantial association between healthcare workers' attitudes and health concerns following vaccination, with 72.59% (n=98) having health complaints while having a positive attitude toward the vaccine. (Chi square=8.84; P=0.003).

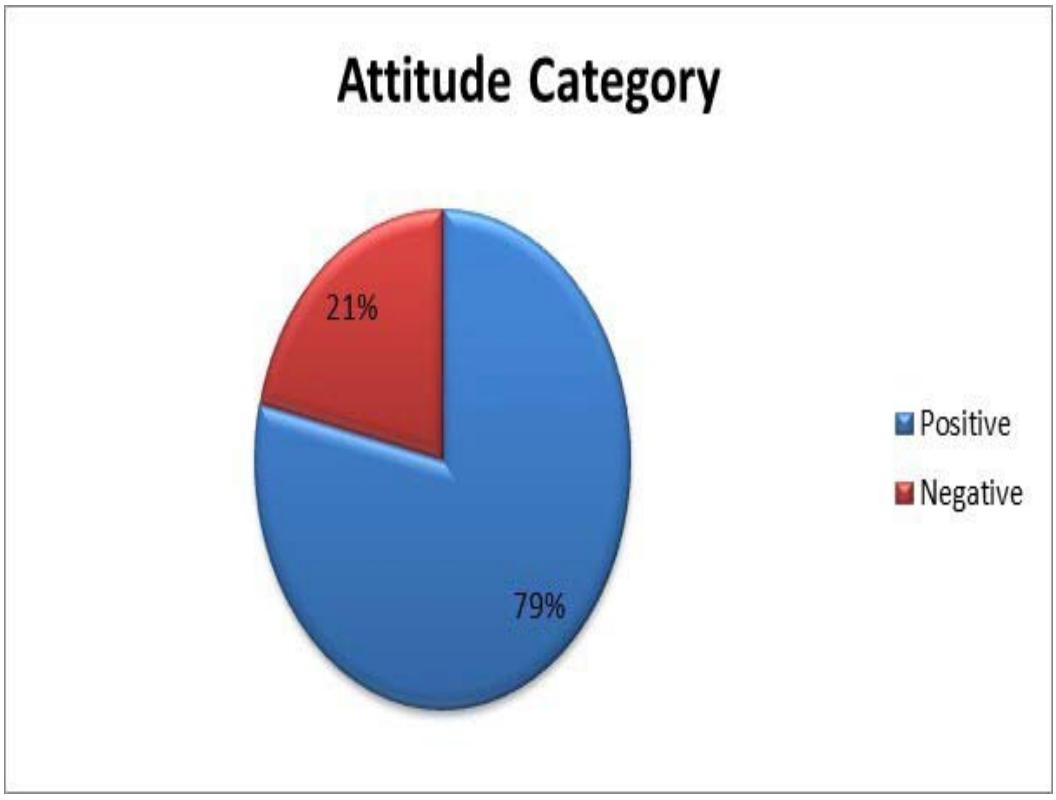

Fig. 4: Attitudes of healthcare workers regarding COVID-19 vaccination

Attitude questionnaire about the COVID-19 vaccine

Table.2: Attitudes of healthcare workers regarding COVID-19 vaccination

	Scores	Frequency	Percentage
1) Do you think that the vaccines manufactured in India will be successful?	0 1	26 175	12.93 87.06
2) Do you feel that India will be able to vaccinate its entire population in the next few months?	0 1	103 98	51.24 48.75
3) Has your frequency of wearing masks been affected after the vaccination?	0 1	14 187	6.96 93.03
4) Has your frequency of hand washing been affected post COVID-19 vaccination?	0 1	23 178	11.44 88.55
5) Will you be taking the next dose of vaccine?	0 1	26 175	12.93 87.06

0-2=Negative attitude, including" don't know" and "maybe"
3-5=Positive attitude

Apprehension about the COVID-19 Vaccine

As shown in Figure 5, only 7.96% were not apprehensive at all. There was no significant relationship between gender and apprehension. There has been a significant correlation between educational qualification and apprehension. Among trained physicians, 59.2% (n=48) of respondents were shown to be very apprehensive and among secondary school, just 39.5% of respondents were very apprehensive (Chi square=18.58; P=0.02). There has been a strong correlation between the profession and the apprehension of respondents. Professionals (doctors) and semi-professionals (nurses, dieticians) were very apprehensive towards COVID-19 vaccine, which was seen to be 91.3%, although just 8.6% of respondents who were unskilled staff were very apprehensive. (Chi square=22.28; P=0.004). There was no significant association found between respondents' apprehension and post-vaccination health complaints.

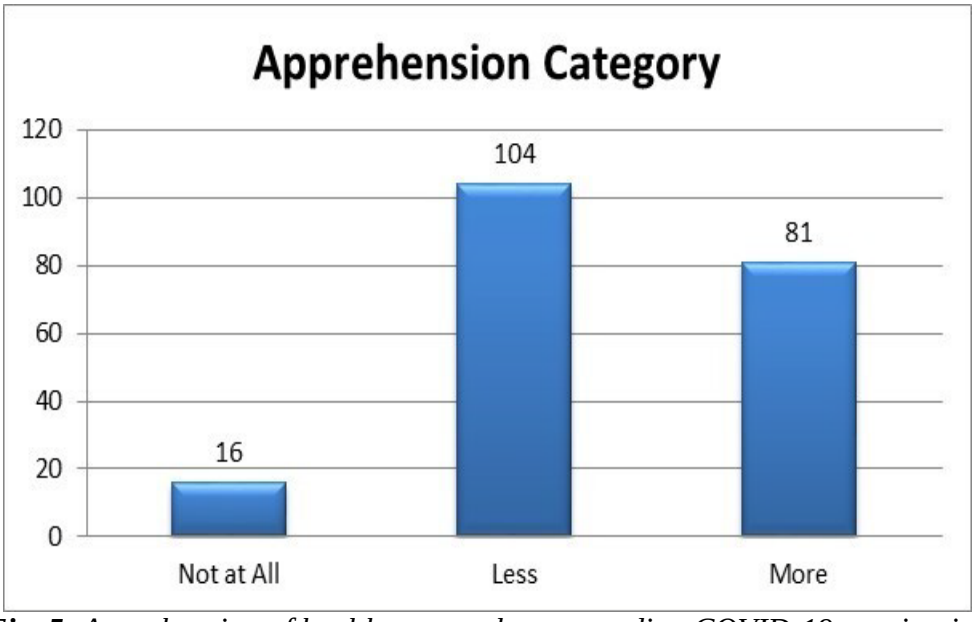

***Fig. 5**: Apprehension of healthcare workers regarding COVID-19 vaccination*

Apprehension of healthcare workers regarding COVID-19 Vaccination

Table.3 : **Apprehension Questionnaire about the COVID-19 Vaccine**

	Scores	Frequency	Percentage
1) Do the unpredicted adverse events with these vaccines scare you?	0 1	68 133	33.8 66.16
2) Are you stressed about the success of vaccination with absence of animal studies?	0 1	56 145	27.86 72.13
3) Are you worried about the authenticity of the vaccine given to you?	0 1	61 140	30.34 69.65
4)Are you worried about the costs incurred to the government due to this vaccine roll-out?	0 1	87 114	43.28 56.71
5) Are you concerned about the sufficient supply of the vaccines for the entire population?	0 1	152 49	75.62 24.37

0 - 1 Not apprehensive at all
2 - 3 Less apprehensive
4 - 5 Highly apprehensive

DISCUSSION

As the pandemic of COVID-19 progresses, production of the vaccine is crucial alongside non-pharmaceutical interventions. Most infected individuals experience mild to moderate respiratory symptoms and recover without any preferential treatment. A variety of vaccine candidates are being developed and several clinical trials have produced promising results, resulting in a number of countries authorizing new vaccines for use in vaccination programmers. In Pune district, a total of 1,802 healthcare workers comprising doctors, nurses, ward boys and other medical staff were administered their first dose of COVID-19 vaccine on January 16th2021. [3] The COVID-19 vaccine is the fastest developed vaccine in the history of medicine. Presently two vaccines are available in India, namely Covaxin, manufactured by Bharat Biotech and Covishield, developed by The University of Oxford, AstraZeneca. Although the coverage is increasing, it is probably the first vaccines showing both hesitancy and eagerness amongst two different subsets of population. The entire process of development and conduction of clinical trials of Covid-19 vaccination roll-out raises concerns about its uncertainty and acceptance. The single standard dose of Covishield was 76·0 percent (95% CI 59·3 to 85·9) in exploratory testing with no significant declines in the protection against symptomatic COVD-19 within the first 90 days after the vaccination. It is not clear how long a single dose can last as a follow-up is limited to the timescales described here and a second dose of a vaccine is therefore recommended.[4] Vaccine anxiety may jeopardize the effectiveness of COVID-19 vaccines once they become available worldwide. According to a report focused on a survey of 13,426 participants from 19 countries, global acceptance of the COVID-19 vaccine ranges from 54.8% in Russia to 88.6% in China.[5] Middle-income countries like Brazil, India, and South Africa have a relatively high acceptance rate of COVID-19 vaccine.[5]There is still a lot of hesitancy regarding COVID-19 vaccine in the rural areas. The acceptance of vaccines is often determined by several factors such as the seriousness of illness, prior vaccination background, lack of confidence in health care facilities, route of administration of the vaccine, individuals' economic and educational status, doctor recommendations, and cost of vaccine. This is the first study from

India about the knowledge, attitudes and apprehension towards COVID-19 vaccination to the best of the author's knowledge carried out just at the beginning of the second wave of the COVID-19 spread in India. At the current rate of immunization, using AstraZeneca shot and locally produced Covaxin, it will take India more than two years to cover 70% of its 1.35 billion people [6].

The authors found no correlation between the gender and the knowledge and attitudes. However, study done by Md. Saiful Islam et al from Bangladesh reports better attitudes in females [7]. This could be due to gender bias.

In this study, 84.9% of the professionally qualified doctors had good knowledge while the proportion of good knowledge is 0.03% among the clerical and skilled staff. Good knowledge amongst the professional healthcare workers needs no comment. However, the poor knowledge amongst clerical and skilled staff is a cause of concern. This study's results will certainly be useful for improving the consciousness and mass education systems associated with COVID-19 vaccines prior to the implementation of mass vaccination programme in the general population. The vaccinated population lacks basic vaccine knowledge, such as the fact that two vaccine doses are needed to develop immunity. A similar cross-sectional community survey by Md. Saiful Islam et al indicates the influence of knowledge, attitudes and perceptions towards COVID-19 vaccine on numerous socio-economic and demographic characteristics. The mean score of knowledge was 2.83(SD=1.48) out of 5, with an overall correct rate of 57 [7]. It is very important to educate the general population regarding the developed vaccines in order to gain trust and have a successful vaccination drive. Early vaccine coverage is crucial for ensuring the health and safety of this vital workforce, which protects not only themselves but also their patients, families, neighborhoods, and the country's overall health.

We have observed that 87% of respondents said vaccines produced in India would be successful and 48% respondents thought that India could vaccinate the whole population in the next few months. In a similar study conducted by Tamam El-Elimat et al on Acceptance and Attitudes Toward COVID-19 Vaccines: A Cross-sectional Study from Jordan shows almost 65.5% participants agreed it is important to obtain a vaccine to protect against COVID-19. In contrast, fewer than 60% participants agreed to the development of a safe and effective COVID-19 vaccine by pharmaceutical companies [1].

In present study, 56.7% of participants are worried about the costs incurred to the government due the vaccine roll-out. Only 12.9% of participants were not willing to take the next dose of the COVID-19 vaccine. A resembling study conducted by Md. Saiful Islam et al showed that almost 95% of participants responded that the vaccine should be administered free of charge. [7]The concerns identified for intending not to receive COVID-19 vaccine include worries about the newness and safety of the vaccine as well as about potential side effects.

In a similar study by Elise Paul et al in the UK, they found 7.2% of the sample expressed high mistrust of vaccine safety. [8] These findings are similar to our study where the professionals (doctors) and the semi-professionals (nursing staff and dieticians) were very apprehensive with regards to the vaccination. Moreover, they also had a negative attitude towards vaccine roll out. Even after 4 months into the vaccine roll out, still many frontline workers are yet to complete their

vaccination. This is rather worrying; as front-line workers will play an important role in promoting the masses for vaccinations and alleviating fears, particularly for elderly people and patients with co-morbidities who frequently need to visit hospitals. This could be because at the time of data analysis, the complete and transparent data about the clinical trials was not available in the public domain. The study by Elise Paul et al clearly shows that the general population trusts their healthcare workers the most. [8] Hence, government authorities should take steps on priority basis to allay the fears of front line workers. Additionally, the former study dealt with attitudes and apprehension towards vaccination in general. The respondents in the study with a positive attitude were seen to be apprehensive as there was a concern on the sufficient vaccine supply for the entire population, which can be confirmed in the present scenario as there is a shortage of COVID-19 vaccine supply [6]. Our study's strength is that during the time the second wave of the pandemic probably started in India, we evaluated the knowledge, attitudes and apprehension of COVID-19 vaccines [9].

The WHO has recognized vaccine hesitancy as one of the major threats to global health. It has an impact not only on the individual who is hesitant to take the vaccine, but also on the entire community. [10] Understanding the reasons that render people unsure about getting vaccinated against COVID-19 is crucial, since people that are unsure about getting vaccinated are the most realistic targets for public health messaging [11].

LIMITATIONS

The drawbacks of the study include the fact that sample consists of healthcare workers and not the general population. Also a track of how these healthcare workers' attitudes toward vaccination shift over time was not assessed.

CONCLUSION

People with higher secondary education and unskilled employees need higher attention because they have poor knowledge of the disease which should be the target for mass education programs. Health awareness about COVID-19 vaccines must be implemented in order to improve knowledge. The top priorities for imparting COVID-19 vaccine awareness to healthcare professionals are providing information on the second dose of vaccine, temperature at which the vaccine should be stored and whether or not a medical history of COVID-19 becomes a contraindication for COVID-19 vaccine. To reduce vaccine apprehension fueled by misinformation in media, policymakers should take steps to ensure adequate understanding, optimistic attitudes, and fewer fears regarding COVID-19 vaccines' safety and efficacy which will be critical to the rollout's success.

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