Assessing the knowledge, determinants and coverage of COVID-19 vaccination among medical students in Greater Noida: A cross-sectional study

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ABSTRACT

Introduction
The second wave of the coronavirus disease (COVID-19) pandemic, in 2021, was associated with substantial morbidity and mortality and has impacted the lives of the global populations. Human behavior and knowledge assessment during the crisis was critical in the overall efforts to contain the outbreak.

Methods
This was a cross-sectional web-based study conducted from June 2021 to July 2021 to estimate the coverage, knowledge and determinants of COVID-19 behaviour among medical students in Greater Noida, Uttar Pradesh, India. An online questionnaire was posted to online platforms including Whatsapp and Telegram consisting of four main sections: sociodemographic information, sources of information on COVID-19, knowledge of COVID-19 and COVID-19 vaccination status.

Results
The coverage of COVID-19 vaccination within the study population was 74%, of whom 30% were fully vaccinated (two doses) and 70% were partially vaccinated (one dose). Gender, family type and history of previous infection were significant factors in vaccination status.

Conclusion
This study evaluated COVID-19 vaccine status among medical students of India and highlighted the need for medical programmes to emphasize the benefits of COVID-19 vaccination for the protection of healthcare workers and patient safety. Education, awareness campaigns, and regulation of vaccine trials could further increase COVID-19 vaccination rate among medical students.

Keywords: COVID-19, Medical Students, Vaccine Coverage, Knowledge, Determinants

INTRODUCTION

On January 30, 2020, the World Health Organization (WHO) declared COVID-19 a public health emergency of international concern and later, on March 11, 2020, the outbreak was declared a global pandemic. The causative agent is Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), a novel zoonotic coronavirus that was first recorded in Wuhan, China.[1] Considering the high mortality it causes and its rapid spread, an effective vaccine was urgently needed to help control the pandemic.[2] As of March 25 2021, two vaccines were licensed by the Central Drugs Standard Control Organization (CDSCO) in India for use within the country, Covishield™ (manufactured by Serum Institute of India) and Covaxin™ (manufactured by Bharat Biotech Limited). The Russian-developed vaccine Sputnik V has also been granted Emergency Use Authorization (EUA), as of April 2021, for use in India. Other vaccines such as Moderna and Pfizer are also available globally. However, these vaccines have some – mostly mild – side effects such as pain, redness and swelling around the insertion site, headache, fever and chills, caused by the immune response. Nonetheless, the benefits of COVID-19 vaccines far outweigh the risks[3] and many vaccines have been launched into the market for the prevention of COVID-19.[4] Also important in containing the pandemic is the observation of standard safety measures to prevent infection, as issued by statutory bodies such as the World Health Organization (WHO), which include maintaining hand hygiene, social distancing, wearing a mask, covering mouth and nose when coughing or sneezing and avoiding close contact with humans showing symptoms of respiratory illness.[4]

The second wave of the disease started in India in the middle of March 2021. On April 09, the highest number of cases (144,829) was identified in India. This proved to be an emergency that brought death to many.[5]

The COVID-19 pandemic requires a great deal of discussion about vaccination, especially among healthcare workers (HCWs). Medical students also play a key role.[6] To prevent the healthcare system from being overwhelmed, some countries have decided to involve medical students as volunteers or to carry out their practical training in hospitals.[7] HCWs and medical students are at high risk for COVID-19 exposure. Educating medical students on vaccination issues is very important for their subsequent employment. Their attitudes and opinions can significantly influence family and friends, as they are considered competent persons and important sources of information for the general public.[8]

The vaccine is considered the most valuable solution for controlling the pandemic. COVID-19 vaccination programmes help bring down the severity of the disease. However, the outcome is dependent on public acceptance, which in turn is reliant on people's beliefs and perception towards the vaccine.[9] With the consequent reopening of medical institutions, medical students are among the group of frontline healthcare providers likely to be exposed to COVID-19 patients. High vaccination coverage among medical students is needed as they may be expected to provide COVID-19 care in high-burden situations. As medical students are the future healthcare providers, they need to advocate for vaccination and counsel patients who are reluctant to get vaccinated.[9] It is therefore important to understand the beliefs and perceptions of vaccination amongst this group. Our study aimed to estimate the coverage, determinants and knowledge about COVID-19 vaccines among medical students.

METHODS AND MATERIALS

A web based cross-sectional study was conducted over a two-month period from June 2021 to July 2021 at the School of Medical Sciences and Research, Sharda University, Greater Noida City, Uttar Pradesh, India. The study aimed to assess the coverage of COVID-19 vaccination among medical students at the university between 18 and 29 years of age. All medical undergraduate students and interns were included in the study, recruited by purposive sampling. A total of

798 students and interns were sent a questionnaire through Google Forms. Of these, 6% did not give consent or did not responded, giving 750 students and interns who participated in the study.

Data was collected using a semi-structured questionnaire prepared on Google Forms. Participants were asked to submit only one response. The questionnaire contained 37 items in the English language, and was divided into five sections. Each section contained items related to a specific category: sociodemographic characteristics (age, sex, religion, address, type of family, household income); vaccination status; determinants of vaccination (vaccination status, when/where/which vaccine, number of doses administered, reasons of not being vaccinated (if not vaccinated)); health (any recent diagnosis of COVID-19, or symptoms); and knowledge regarding COVID-19 vaccination. The form link was distributed via various media platforms including WhatsApp, Gmail and Telegram. Informed electronic consent was taken before filling the Google Form.

Statistical analysis of data was performed using IBM SPSS software for MacOs version 21.0. Descriptive statistics were applied to calculate the frequency and percentages. Odds ratio and 95% confidence interval was calculated to examine the association between the sociodemographic variables and vaccination status.

RESULTS

A total of 750 medical students participated in the study. The majority of them (76%) were in the age group of 21-23 years (with a full range from 18-29 years) with a mean age of 21.23+3.7 years. More of the study participants were female than male (463, 62%). A little more than two thirds (73%) of study subjects lived in a nuclear family, followed by 19% in joint families. Most belonged to the Hindu religion as depicted in Table 1.

Table 1 Association Between Sociodemographic Characteristics and Vaccination Status (n=750)

Variables	Vaccination Status		Total N (%)	Odds Ratio	95% Confidence Interval
	Yes [n(%)]	No [n(%)]			
Age					
21-23	316(76%)	100(24%)	416(100%)	0.698	0.375-1.299
24-26	35(65%)	19(35%)	54(100%)	1.895	0.533-6.740
27-29	15(83%)	3(17%)	18(100%)		Ref
Gender					
Male	200 (70%)	87 (30%)	287(100%)		Ref
Female	356 (77%)	107 (23%)	463(100%)	1.447	1.039-2.017
Religion					
Hindu	508 (75%)	166 (25%)	674 (100%)	1.161	0.567-2.375
Muslim	19 (53%)	17 (47%)	36 (100%)	0.423	0.163-1.100
Others	29 (56%)	11(44%)	40(100%)		Ref
Type of Family					
Nuclear	393 (72%)	152(28%)	545 (100%)		Ref
Joint	102 (72%)	39(28%)	141(100%)	1.012	0.669-1.530
Three generations	61 (95%)	3 (5%)	64 (100%)	7.864	2.431-25.44
History of Previous COVID-19 Infection					
Present	426 (80%)	106 (20%)	532 (100%)	0.368	0.261-0.519
Absent	130 (60%)	88 (40%)	218(100%)		Ref

Table 1 also shows the association of sociodemographic variables with COVID-19 vaccination status. The likelihood of unvaccinated status is 1.5 times higher among female students as compared to male students [OR=1.44, 95% CI = 1.039-2.017]. The likelihood of being vaccinated was 7.8 times higher among the students who were residing in three generation families, compared to those who were residing in nuclear families [OR= 7.864, 95% CI = 2.431-25.44]. The likelihood of being vaccinated was 0.36 times higher in those who had a previous history of COVID-19 infection, which was statistically significant [OR=0.368, 95% CI = 0.261-0.519]. Those who had a previous history of COVID-19 infection experienced a reduction of 63% in the odds of being vaccinated compared to those who had not been infected with COVID-19 in the past. However, no association was found between age group (OR:0.698, 95% CI =0.375-1.299) or religion (OR:1.161, 95% CI =0.567-2.375) and vaccination status.

Table 2 shows that 71% of the participants did not record having a history of COVID-19 infection, while 29% had a positive past history. Among the 29% who had a known previous history of infection, two–third cases had been asymptomatic while rest had showed symptoms of COVID-19 infection.

Table 2 History of COVID-19 Infection During the Second Wave of Pandemic

HISTORY OF COVID-19	Frequency (n) [n=750]	Percentage (%)
Yes	218	29
No	532	71
Total	750	100
COVID-19 SYMPTOMS	Frequency (n) [n=218]	Percentage (%)
Yes	76	35
No	142	65
Total	218	100

Table 3- Distribution of Vaccinated Participants as per the Type of Vaccine, Age Group and Gender (n=556)

Type of Covid-19 vaccine	Frequency (n)	Percentage (%)
Covaxin	102	18.4%
Covishield	454	81.6%
Age Group (in years)		
18-20	190	34.2
21-23	316	55.5
24-26	35	7.2
27-29	15	2.4
Gender		
Male	200	36
Female	356	64
Religion		
Hindu	508	91.4
Muslim	19	3.4
Others	29	5.4

Table 3 shows the distribution of vaccinated participants as per the type of vaccine, age group, gender and religion. The most common vaccine received by the study participants was Covishield™ (82%) followed by Covaxin™ (18%). Just over half (55.5%) of the vaccinated study participants belonged to the age group of 21-23 years. About two thirds (64%) of them were females. The majority (91%) of those vaccinated belonged to the Hindu religion, reflecting the large majority of Hindus in the study (Table 2).

Table 4 shows participants' knowledge regarding COVID-19 vaccination. The majority of the respondents (93%) considered all the COVID-19 vaccines to be safe and 91% considered them to be effective in protection against COVID-19. Some (13%) did not trust the vaccines, however, as they felt they had been developed too quickly. The majority (75%) of participants disagreed that only those at risk of becoming seriously ill from COVID-19 need to be vaccinated, and only 11% felt that those who have already had COVID-19 do not need to be vaccinated. Most participants (90%) agreed that by being vaccinated against COVID-19, they were helping to protect the health of others in the community as well as themselves.

Table 4 Knowledge about COVID-19 Vaccination among the Study Participants (n=750)

Knowledge about Covid-19 vaccination	AGREE	NEUTRAL	DISAGREE
Vaccines are safe	92.5%	6.5%	1%
Vaccines are effective in protecting people from disease	91%	7.5%	1.5%
I am confident that India's regulation process approves vaccines only if they are safe and effective	80%	17%	3%
I distrust COVID-19 vaccines because they were developed too quickly	13%	24%	63%
Only those at risk of becoming seriously ill from COVID19 need to be vaccinated	13%	11%	76%
Those who have had COVID-19 do not need to be vaccinated	11%	17%	72%
By being vaccinated against COVID-19, I am helping to protect the health of others in my community	90%	9%	1%

DISCUSSION

This study examines attitudes regarding COVID-19 vaccination among medical students in India since the vaccination drive for adults was started. A study conducted in China among medical students at a similar stage of vaccine roll-out found coverage to be low (34%) compared to the present study.[10] In contrast to this, a study conducted in England reported a high COVID-19 vaccination coverage rate of 89% among healthcare workers.

Our study showed that only 13% of the study participants found it hard to trust the COVID-19 vaccines as they were developed so quickly; a study conducted in China reported an even higher rate of 69% distrust.[10] This difference may be attributed to different sample sizes and different time at which the research studies were conducted; in India the vaccine was first open to the elderly and healthcare workers, meaning that students had time to observe the side effects before the vaccine became available to them and thus were more able to observe its safety.

In our study, the vaccination rate is more in females is statistically significantly higher than in the male students. A similar study conducted in China found an almost equal rate of vaccination coverage among males and females.[7]

In our study the vaccination coverage is statistically significantly higher in participants who were residing in three generation families. This is in contrast to a

similar study done in England, which reported that vaccination coverage was higher in those participants who were residing in a nuclear family.[11] In our study, the vaccination status increases in those who have previous history of COVID-19 infection and this was significantly associated on univariate regression analysis [OR=0.261-0.519]. In contrast, to this, a study from England reported that vaccination coverage was less in those who had previously been infected with COVID-19, for which the association was significant.[11] This may be due to the assumption that they already had natural immunity due to prior infection with Covid-19.

In the present study, 92.5% of the study participants believe that vaccines are safe and 91% believe that the COVID-19 vaccines are effective. However, in another study conducted in India among medical school students, 82% study participants opined that the vaccines were safe but only 28% believed them to be effective. This difference could be due to the involvement of study participants from different states.[12] This suggests that there needs to be targeted education and trust building by regulatory agencies and medical colleges among medical students so that their trust in vaccine safety and effectiveness can be improved.

CONCLUSION

This study shows that vaccination coverage and knowledge about COVID-19 vaccine are affected by the sociodemographic characteristics of participants, and can affect people's willingness to receive the COVID-19 vaccine. The significant determinants associated with vaccination status were identified as gender (OR=1.447, CI=1.039-2.017) type of family (OR=7.864, CI= 2.431-25.44) and history of previous infection (OR=0.368, CI= 0.261-0.519). This suggests it is necessary to provide accurate and timely education on COVID-19 vaccines targeted at specific groups and to adopt comprehensive measures to improve the willingness and confidence surrounding COVID-19 vaccines and vaccination to some medical students. Medical students represent the future generation of healthcare providers, the doctors of tomorrow, and their attitude towards vaccines is highly important. With profound knowledge of vaccines and confidence of their benefits, they will be able to better advise the rest of the population. However, it does need be highlighted that vaccination alone is insufficient to stop the pandemic; further efforts are needed not only to increase vaccination coverage but also to maintain non-pharmacological prevention strategies.

This study is limited as it is an online cross-sectional survey which may have recall bias in information. It is also possible that the students may have looked up the answers to some of the questions before answering.

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