Section: Community Medicine

Original Research Article

BREAKING THE BARRIER OF VACCINE HESITANCY: A STUDY OF ACCEPTANCE AND DENIAL OF COVID-19 VACCINE AMONG UNDERGRADUATE MEDICAL STUDENTS OF BIHAR

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ABSTRACT

Background: On 16th January 2021, India began the world's largest vaccination program for COVID-19. Healthcare workers were the first group to be offered the vaccine, however, vaccine hesitancy emerged as a barrier. Vaccine hesitancy refers to a delay in acceptance or refusal of vaccination despite the availability of vaccination services. It was listed as one of the ten threats to global health by WHO. The aim of this study was to determine the rate of vaccine acceptance and reasons for vaccine hesitancy among UG (undergraduate) medical students of Bihar. Our study was necessary because UG medical students do not contribute directly to the frontline of healthcare but are exposed to multiple cases of COVID-19 during clinical teachings and they are also the future of any country's healthcare system.

Material and Methods: A cross-sectional study was carried out on the UG medical students of Bihar using an anonymous online survey. The survey link was sent electronically via WhatsApp. All the questions of the survey were closed-ended, in the form of multiple-choice questions and tick boxes. The data was analyzed on SPSS software.

Results: Out of 394 responses received, 205 (52.03%) were males, 384 (97.46%) belonged to the age group of 18-25 years. In the bivariate model, attributes like the male sex, being well informed about the vaccines, being at high risk of exposure, and the belief that vaccination can overcome the pandemic were associated with a higher likelihood of accepting the vaccine. Participation of professors in vaccination was the most common source of motivation (209/357; 58.5%) in vaccine acceptors, while insecurity about the efficacy of the vaccines (16/37; 43.2%) was the most common reason among vaccine deniers.

Conclusion: We recorded a high vaccine acceptance rate of 90.6% in our study. Further, 78.4% of vaccine deniers believed that they would have accepted the vaccine if they were provided appropriate information on the vaccines prior to the vaccination. Therefore, we reach a conclusion that pre-vaccination orientation sessions aimed at UG medical students will significantly help in addressing their vaccine hesitancy.

Keywords: COVID-19, COVID-19 vaccine, Medical students, Vaccine Hesitancy.

INTRODUCTION

Vaccination is a highly effective method of preventing certain infectious diseases.[1] The need for a vaccine against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was realized soon enough and the first of the COVID-19 vaccines were in preclinical stages as early as

February 2020.[2] Fast forward to January 2021, two COVID-19 vaccines were given restricted emergency approval in India, COVAXINTM, and COVISHIELDTM by the Drug Controller General of India (DCGI) on 3rd January 2021.[3] On 16th January 2021, India began the world's largest vaccination program for COVID-19.[4]

Healthcare workers were the first group to be offered the vaccine, however, vaccine hesitancy emerged as a barrier. "Vaccine hesitancy refers to delay in acceptance or refusal of vaccination despite the availability of vaccination services. Vaccine hesitancy is complex and context-specific, varying across time, place, and vaccines. It is influenced by factors such as complacency, convenience, and confidence." as defined by the SAGE Working Group on Vaccine Hesitancy. The phenomenon occurs on the continuum between high vaccine demand and complete vaccine refusal.[5] Vaccine hesitancy was listed by the WHO among the ten threats to global health in 2019.[6]

The purpose of this study is to assess the vaccine uptake among undergraduate medical students (UGMS) of Bihar and determine the reasons for vaccine hesitancy. The results obtained will be invaluable in planning vaccination programs in the future and counseling medical students and the general population, as a whole, to ensure increased participation and decreased vaccine hesitancy.

Our study is the first of its kind to be done in the state of Bihar among UGMS to address the threat of vaccine hesitancy.

MATERIAL AND METHODS

Study Design and Setting

Our cross-sectional study was conducted by the means of an online self-administered survey (in English), which was designed on Google Forms, during the month of March 2021. Participation in the survey was voluntary and anonymous.

Sample Population

The study was conducted on UGMS of various government and private medical colleges in the state of Bihar, India. All participants were above the age of 18 years. The UGMS from the colleges where the vaccination program did not begin during the time frame of our study were excluded.

Procedure

The survey link was sent electronically to primary contacts of the investigators and to various college representatives, who were then asked to forward the same to their respective college WhatsApp groups. The first section of the survey was a request for consent of the participants where we explained the aim and method of the study. Choosing to proceed to the next section by clicking on the "Next" button was considered as consent granted.

All the questions of the survey were closed-ended, in the form of multiple-choice questions and tick boxes. The survey was designed to be short and included only the questions which were applicable to the sample population under study. At no point in the survey were the participants asked a subjective question. All the above-mentioned steps were taken to ensure minimum reluctance/refusal by the participants to complete the survey.

The participants were directed to different sets of questions based on their answer to the question "*Have you taken the vaccine for COVID-19?*", to seek out the reason for the same.

Sample Size Calculation

The sample size for our study was calculated using the Raosoft sample size calculator.[7] Following values were entered: margin of error as 5%, confidence interval as 95%, response distribution as 50%, population size as 4800 (estimated number of all UGMS in Bihar). This gave us a sample size of 356.

Ethical Approval

The Institutional Ethical Committee of Jawahar Lal Nehru Medical College granted clearance for our study.

Data Analysis

The form responses were recorded in Google Sheets and the data was exported to IBM SPSS ver. 28.00 for analysis. COVID-19 vaccine acceptance was the dependent variable and various other variables recorded in our study were the independent variables. We used chi-square test for bivariate analysis of association between variables and vaccine acceptance, and logistic regression analysis to determine the odds ratio and 95% confidence intervals. Z-test for two proportions was performed to assess the difference between the vaccine acceptors and deniers on their sources of information for the COVID-19 vaccines.

RESULTS

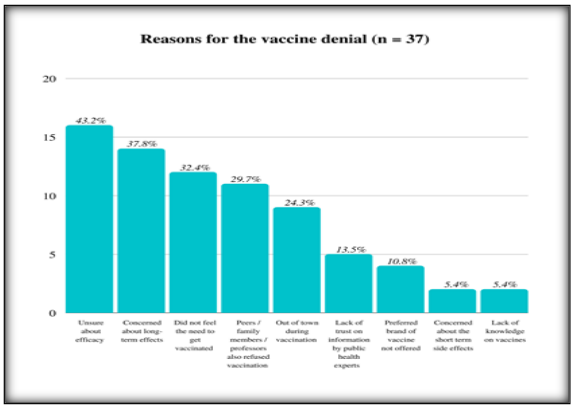

Figure 1: Reasons for the vaccine denial (n=37)

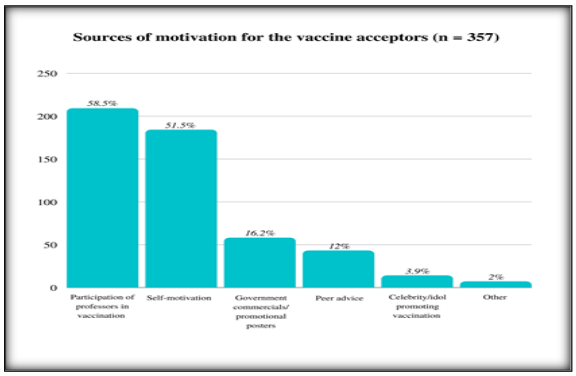

Figure 2: Sources of motivation for the vaccine acceptors (n=357)

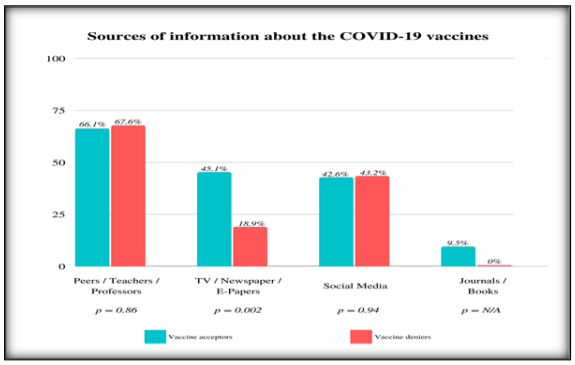

Figure 2: Sources of information about the COVID-19 vaccines

We recorded 394 responses out of which 219 (55.58%) were males [Table 1] who were 2.22 times more likely to be vaccine acceptors (OR: 2.22; 95%CI: 1.1-4.45; P = 0.022). Most of the participants belonged to the age group of 18-25 years (n = 384; 97.46%). Among the vaccine acceptors, 323 (81.97%) participants believed that appropriate vaccination coverage can overcome the pandemic, this group showed a 4.02 times greater likelihood to accept the vaccine (OR: 4.02; 95%CI: 1.83-8.84; P = 0.0002). A total of 303 (84.8%) from the vaccine acceptors and 25 (67.6%) from the vaccine deniers' group claimed to be well informed about the vaccines, a trait which was associated with 2.69 times greater likelihood of being a vaccine acceptor (OR: 2.69; 95%CI: 1.28-5.68; P = 0.007).

Among the vaccine deniers (n = 37), the most common reasons for denying the vaccine were insecurity about the efficacy of the vaccines (16/37; 43.2%), concern about long-term side effects (14/37; 37.8%) [Figure 1].

The participation of professors/teachers in the vaccination process (209/357; 58.5%) and self-motivation (184/357; 51.5%) were the most common sources of motivation among vaccine acceptors (n = 357) [Figure 2].

Table 1: Logistic regression analysis for COVID-19 vaccine acceptance

Variables	Vaccine acceptors (n=357)	Vaccine deniers (n=37)	chi-square	*P*-value	OR	95% CI
Gender						
Male	205 (93.6%)	14 (6.4%)	5.208	0.022	2.22	(1.1 , 4.45)
Female	152 (86.9%)	23 (13.1%)				
Age						
18-25 years	348 (90.6%)	36 (9.4%)	0.004	0.947	0.93	(0.12 , 7.56)
26-45 years	9 (90.0%)	1 (10.0%)				
Suffers from comorbidities						
Yes	12 (80.0%)	3 (20.0%)	2.063	0.151	0.39	(0.11 , 1.47)
No	345 (91.0%)	34 (9.0%)				
Is at high risk of exposure						
Yes	118 (84.3%)	22 (15.7%)	10.205	0.001	0.34	(0.17 , 0.67)
No	239 (94.1%)	15 (5.9%)				
Lives with someone having comorbidities						
Yes	71 (84.5%)	13 (15.5%)	4.646	0.031	0.46	(0.22 , 0.94)
No	286 (92.3%)	24 (7.7%)				
Have tested positive for COVID-19 once						
Yes	34 (89.5%)	4 (10.5%)	0.064	0.800	0.87	(0.29 , 2.6)
No	323 (90.7%)	33 (9.3%)				
Believes that appropriate vaccination coverage can overcome the pandemic						
Yes	323 (92.6%)	26 (7.4%)	13.530	0.0002	4.02	(1.83 , 8.84)
No	34 (75.6%)	11 (24.4%)				
Were well informed about the vaccines for COVID-19						
Yes	303 (92.4%)	25 (7.6%)	7.200	0.007	2.69	(1.28 , 5.68)
No	54 (81.8%)	12 (18.2%)				

Table 2: Bivariate association between variables and vaccine acceptance

Variables	Vaccine acceptors (n=357)	Vaccine deniers (n=37)	chi-square	*P*-value
Childhood immunization status				
Complete	256 (90.1%)	28 (9.9%)	8.387	0.015
Incomplete	15 (75.0%)	5 (25.0%)		
Do not remember	86 (95.6%)	4 (4.4%)		
Level of perceived seriousness of the pandemic				
Very serious	163 (92.1%)	14 (7.9%)	1.923	0.589
Serious	124 (89.2%)	15 (10.8%)		
Moderately serious	67 (90.5%)	7 (9.5%)		
Not serious at all	3 (75.0%)	1 (25.0%)		
Brand of vaccine offered, Brand of vaccine preferred				
Offered COVAXIN, preferred COVAXIN	163 (88.6%)	21 (11.4%)	7.057	0.070
Offered COVAXIN, preferred COVISHIELD	112 (96.6%)	4 (3.4%)		
Offered COVISHIELD, preferred COVAXIN	9 (90.0%)	1 (10.0%)		
Offered COVISHIELD, preferred COVISHIELD	73 (86.9%)	11 (13.1%)		

DISCUSSION

UGMS are not in the frontline of healthcare but they are exposed to multiple cases of COVID-19 during clinical teachings. They are the future of any country's healthcare system and therefore it is important to address vaccine hesitancy among them to ensure their increased participation and promotion of vaccination programs in the future.

In our study, we report a very high acceptance (90.6%) of the COVID-19 vaccines by UGMS of Bihar. This finding is similar to other studies done around the world to assess vaccine hesitancy in UGMS and healthcare workers.[8–12] Sources like "TV / Newspaper / E-Papers" were cited more often (P = 0.0022) by vaccine acceptors (45.09%) than vaccine deniers (18.91%).

We also found that many vaccine deniers (43.2%) derived their knowledge of vaccines from social media, which is in line with other studies.8,12,13 As reported by previous studies, concerns regarding the efficacy and long term side effects of the vaccines were the most common reasons for vaccine hesitancy.[8,9,11,12,14]

Our study was unique in that it explored the motivation behind the acceptance of vaccines by UGMS. Participation of teachers and professors in vaccination, and self-motivation which came from one's own understanding of the situation were the strongest sources of motivation for vaccine acceptance.

A history of complete childhood immunization was a strong predictor of vaccine uptake (P = 0.015), which concurs with the findings from Poland and Qatar, where the history of uptake of recommended vaccines and regular medication increased vaccine uptake.[9,14]

We also found that UGMS who took the vaccine themselves were more likely to recommend vaccination to others with 95% of them answering affirmatively to the survey question "After having taken the vaccine will you advise your peers to get vaccinated too?", this is also what Paterson et al. concluded in their study.[15]

Unlike, the findings of Jain et al., the choice of vaccines did not influence vaccine uptake in our study.

Limitations

Our study had the following limitations. First, our study was cross-sectional. It gives us a picture of the current status of vaccine hesitancy and acceptance among UG's, however, it cannot be used to predict future trends of the same. Since our study was anonymous and survey-based, reporting bias may have occurred. A question from the survey "As a child, were you vaccinated according to the immunization schedule?" required the participants to recall and answer and therefore, may have invited some recall bias. Lastly, our sample population was very specific and did not obtain information from postgraduate medical students, doctors, and nurses.

CONCLUSION

Our finding of high vaccine acceptance is similar to various other studies assessing vaccine hesitancy in UGMS and healthcare workers. UGMS are open to change their habits and their professors have an important role to play to address their vaccine hesitancy as they were the most common source of information on COVID-19 vaccines for them, as well as their participation in vaccination was the most common source of motivation for vaccine uptake. Further, 78.3% of the vaccine deniers, in our study believed that they would have chosen to get vaccinated had they been given more information on the vaccine and its development, which further reinforces the idea of individual-level interventions to train and educate, as highlighted by Finney Rutten et al.[13]

Conflict of interest

The authors declare no conflict of interest.

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