

ORIGINAL ARTICLE

The dilemma of COVID-19 vaccination among Health Care Workers (HCWs) of Uttar Pradesh

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Abstract

Background: Immediately after the outbreak of COVID-19 pandemic, with an unprecedented cooperation between biomedical, pharmaceutical, technological, and political sectors, new vaccines were developed and approved in record times. However, doubts were raised on their efficacy and adverse effects. Globally, it was agreed that the first recipients for vaccines would be the health care workers (HCWs). Logically, it was bound to raise some concerns and result in hesitancy among the HCWs. **Aims:** The current study was planned to study the proportion of HCWs having hesitancy towards COVID-19 vaccination and factors effecting it. **Settings and Design:** Cross-sectional study conducted among HCWs of Uttar Pradesh. **Methods and Material:** The survey was conducted both in online and offline mode and attempted by 254 HCWs eligible for receiving COVID-19 vaccine. **Statistical analysis used:** t-test, chi-square test, proportion, mean, SD **Results:** Vaccine hesitancy was present in 35.8% HCWs. Only social factors like caste ($p=0.023$) and religion ($p<0.001$) were found to be significantly associated with vaccine hesitancy. Gender, type of health worker, fear of COVID-19 infection, fear of lethality or pre-existing diseases did not affect vaccine hesitancy. The maximum number of HCWs (71.4%) were hesitant because they were unsure of the side-effects followed by the reason of being unsure about its effect on their own health (53.8%). When asked about their attitude towards compulsory COVID-19 vaccination for HCWs, should it be made mandatory by the government, 42.9% were in favour and 40.6% were against any such mandate. **Conclusions:** The study concluded that social factors like religion and caste are more deterministic for vaccine hesitancy.

Keywords

COVID-19 Vaccines; Vaccines; Health Personnel; Drug-Related Side Effects and Adverse Reactions; Vaccination, Attitude.

Introduction

As the disease caused by SARS-CoV-2 has involved the entire globe and different countries are already experiencing second and third peaks, various strategy have been undertaken by the agencies (government) for control of the spread of the disease.(1) Among these strategies, vaccination against COVID-19 is being regarded as the cornerstone strategy for long term disease control.(2) Vaccine development was started as soon as the genome sequence of the causative organism was

identified after the disease outbreak. There were around 100 candidate vaccines from the start which deploy different ways to activate the immune system. Vaccine development was boosted by various measures such as relaxing regulatory framework and giving emergency approvals by governments of various countries and international health organizations. It resulted in development of vaccines in a record time and many of them got approvals on interim results of phase 3 trials.(3,4) In India, two candidate vaccines were given approval for emergency use, which included adeno virus-

based AstraZeneca (AZD1222) also known as Covishield and Inactivated vaccine developed by ICMR and Bharat Biotech also known as Covaxin in January 2021. Currently only these two vaccines are being used for vaccinations across the country.(4,5)

Countries across the globe have given the first share of their COVID-19 vaccines to their Healthcare Workers (HCWs) in an attempt to protect their healthcare systems. HCWs account for a large number of infected people since they come in closer contact to potentially infected people at hospitals. HCWs are both potential victims of COVID-19 and efficient spreaders; hence vaccination of HCWs may not only provide a fear-free environment amongst HCWs while dealing with patients, but also protect further infections among patients reporting in hospitals.(6) WHO has also listed HCWs as a priority group for COVID-19 vaccination.(7) India also followed this strategy have vaccinated their HCWs on priority.

As the plans for vaccination of HCWs against COVID-19 sets in, the debate on whether it should be mandatory for all HCWs has kicked in. In 2019, WHO had identified a list of ten threats for global health and it included vaccine hesitancy as one of them.(8) Vaccine hesitancy has been defined as a delay in acceptance or refusal of vaccines despite availability of vaccination services and is affected by complex factors that vary across time, place and vaccine.(9) As global vaccination for all HCWs is a new event in our country, vaccine hesitancy among HCWs would also be a new phenomenon in our country. However, globally, in 2009, vaccine coverage against H1N1 influenza in HCWs also remained low owing to vaccine hesitancy.(10)

Amandine et.al. conducted an online survey on intention to get vaccination against COVID-19 in France. They have reported that about 75% of HCWs were ready to accept COVID-19 vaccine. Age, gender and fear of COVID-19 were factors associated with readiness to receive vaccine. Acceptance of vaccine was lower in paramedical workers.(11) Detoc et. al. have reported that women were less likely to give consent for vaccination against COVID-19 during initial trials of vaccine.(12) Dror et.al. have also reported higher reluctance among women to receive COVID-19 vaccine.(13) As already stated above, this is the first time such an emergency usage of newly developed vaccine is being used on HCWs in the country; hence data on vaccine hesitancy, if any, among HCWs is missing. This study was planned immediately after the decision of rollout of COVID-19 vaccination drive for HCWs. The results of this study would not only provide an insight into the reasons for vaccine hesitancy, if any, among HCWs for COVID-19 vaccination, but would also provide data which may be utilized for removal of hesitancy against any new intervention being planned for any other disease or health condition in future.

Aim & Objective

The objectives were to find the proportion of HCWs who had hesitancy towards COVID-19 vaccination and the factors effecting it along with the attitude towards mandatory vaccination for HCWs, should it be made mandatory by the government.

Material & Methods

A cross-sectional study was conducted anonymously among HCWs of Uttar Pradesh. The survey was circulated among closed group of HCWs chosen randomly from selected medical institutes of Uttar Pradesh preferably in form of online questionnaire; for those who were not comfortable attempting online survey, printed copies of questionnaire were provided. The period of data collection was January 2021, immediately after the government announced its plan to rollout COVID-19 vaccination plan for HCWs. The minimum sample size required for survey was calculated assuming 14% HCWs would have hesitancy for COVID-19 vaccination at 95% confidence interval and precision of 5% and was found to be 185. However, we decided to circulate it to a higher number of participants to account for no consent. Sample was withdrawn from all HCWs due for receiving COVID-19 vaccine. HCWs with any systemic disease that bars him/her from receiving vaccines were excluded. Data was collected using a pre-designed and pre-tested semi-open questionnaire consisting of a mix of open and closed ended questions.

Statistical analysis: The data collected was entered on a spreadsheet. Continuous variables were summarized as mean \pm SD. Nominal variables were presented as proportions or percentage. Comparisons between continuous variables were made using t-tests. Associations between nominal variables were assessed using chi-squared test/ Fisher test.

Ethical issues in the study and plans to address these issues: Informed consent was obtained from all participants at the beginning of the survey. To maintain anonymity of participants, only the first two letters of their names and their father's names were asked. A line list was drawn comprising of first two letters of participants name, followed by first two letters of their father's name, followed by their age in completed years and followed by first three letters of their organization name. Such a line listing was done to maintain anonymity while identifying any duplicated entries in online data filing. The study was approved by Ethics Committee of Dr Ram Manohar Lohia Institute of Medical Sciences, Lucknow vide IEC No. 130/20.

Results

A total of 254 HCWs participated in the study in which 172 (67.7%) were doctors and 82 (32.3%) were paramedical workers. The flow chart of study process is shown in [\(Figure 1\)](#). Of these, 176 (69.3%) were male, 72 (28.3%)

were female and 6 (2.4%) preferred not to disclose their gender. The maximum number of participants were Hindus (223; 87.8%), and 31 (12.2%) belonged to other religions (Islam, Sikhs, Christians, etc). Maximum number of participants (144; 56.7%) belonged to unreserved category while 110 (43.3%) belonged to other categories (backward castes, scheduled castes, etc).

Readiness for COVID-19 vaccination: We questioned the readiness of HCWs for COVID-19 vaccination on a Likert scale. The responses are depicted in (Figure 2).

Vaccine hesitancy and its factors: Hesitancy for COVID-19 vaccination was present in 91 (35.8%; 95% CI 29.9%-41.1%) HCWs. The mean age of participants who had vaccine hesitancy was 33.7±8.7 years compared to 35.2±10.1 years for participants who were willing to take COVID-19 vaccine ($p=0.235$). Other demographic factors and attitude towards COVID-19 disease with vaccine hesitancy are depicted in (Table 1). The factors found significantly associated with vaccine hesitancy were religion ($p<0.001$) and caste ($p=0.023$). Gender, type of health worker, fear of COVID-19 infection, fear of lethality or pre-existing diseases did not affect vaccine hesitancy.

Reasons for vaccine hesitancy: The reasons for vaccine hesitancy described by HCWs are depicted in (Table 2). The maximum number of HCWs were hesitant because they were unsure about the side-effects of these vaccines (71.4%) followed by being unsure about its effect on their health (53.8%). Both these reasons were ranked highest among paramedical HCWs, while among medical HCWs, "unsure about side-effects" was followed by "unsure about effect on health" and "unsure of efficiency" (both 59.7%).

Attitude towards compulsory vaccination: We asked the participants their attitude towards government's decision, if any, to make COVID-19 vaccination compulsory for all HCWs. Their responses are depicted in (Figure 3). For statistical analysis, we merged "totally against" with "somewhat against" as "for" and merged "totally for" with "somewhat favour" as "against". The attitude of HCWs towards compulsory vaccination, if any, and its association with various factors is depicted in (Table 3). Only religion ($p=0.003$) and category of health worker ($p=0.015$) were found significantly associated with the attitude towards compulsory vaccination.

Discussion

Vaccine hesitancy was present in 35.8% of the study participants. It is similar to findings on vaccine hesitancy among nurses (31%) in Israel and HCWs of France (23%).(11,13) However, the study by Dror et. al. have shown less hesitancy for COVID-19 vaccination among doctors (8%) than in our study (36.1%).(11) The difference might be due to the timing of study; while the study in Israel was done when most candidate vaccines were in early phases of development, the current study was conducted after approval of vaccine for emergency usage.

Another study by Verger et. al. has shown the acceptance of other vaccines (approved vaccines) in general practitioners to be 86% which is more than the acceptance of COVID-19 vaccine by doctors in the current study.(14) The difference may be attributable to "being unsure of efficacy" and "being unsure of side-effects" for new COVID-19 vaccines, which is not a case with approved vaccines. In an unpublished study conducted in India and reported in a newspaper, 45% of HCWs had expressed desire to immediately get COVID-19 vaccine and the remaining were undecided or had absolute vaccine hesitancy.(15)

Various factors which could be associated with vaccine hesitancy were studied. It was interesting to find that social factors like religion and caste were significantly associated with hesitancy for COVID-19 vaccination ($p<0.05$). As no studies assessing role of social factors in hesitancy for COVID-19 vaccine were available, we made a comparison with polio vaccination campaign in India. The role of social mobilization in improving polio vaccine acceptance indirectly states that social factors have an important role in vaccine acceptance/ hesitancy in India.(16) Other factors like fear of contracting COVID-19 disease or the fear of lethality of COVID-19 infection, etc were found to be not associated with the acceptance. This is contrary to the findings by Dror et. al. who have found self-perception of high risk for severe COVID-19 infection to be a positive predicting factor for COVID-19 vaccine acceptance.(13) Dror et. al. have also reported that being a male HCW had more chances of accepting COVID-19 vaccine, but the current study found no difference in vaccine acceptance based on gender ($p>0.05$). They also found a significant association of vaccine acceptance with age, but the current study did not find a difference based on age of participants.(13)

The most important reason for vaccine hesitancy in the current study was concern about vaccine safety (71.4%) followed by concern about effect on own health and efficacy (53.8% and 44.0% respectively). This is similar to findings in study by Dror et. al. who have expressed that 76% of the participants had concerns about vaccine safety, 13% had issues with efficacy of the vaccines and rest (11%) thought COVID-19 was a mild disease and hence did not care about vaccination.(13)

While assessing the attitude towards mandatory COVID-19 vaccination for HCWs, if any, almost an equal number of HCWs (both 41%) were in favour and against such mandate. It was observed that the attitude on any such possible mandate by government was independent of vaccine hesitancy among HCWs. It was also noted that doctors were more against any such mandate compared to paramedical workers. Religion was again significantly associated with attitude ($p<0.05$), where a greater number of Hindus were in favour of such a mandate. The

possible reason for such difference may be linked to higher influence of social factors on vaccine acceptance in India than other reasons.

Conclusion

The current study revealed a higher prevalence of vaccine hesitancy as compared to Israel and some European countries. The government of India is required to have a policy regarding more focussed behaviour change communication efforts for COVID-19 vaccination in general and towards certain religious and caste groups in specific.

Recommendation

The current study points towards a definite role of social factors in vaccine hesitancy. Hence, targeted approach towards behaviour change would help in improving vaccine acceptance.

Limitation of the study

The current study was conducted without coming face to face with all study participants owing to restrictions of physical distancing, time and travel. Also, the study could have been done in higher number of HCWs had the restrictions not been in place.

Relevance of the study

The current study is one of its kind conducted in India studying vaccine hesitancy for COVID-19 among HCWs. The results of this study may be used by policy makers to focus on Behaviour Change among stakeholders in future for any such interventions. The timing of the study was immediately after the government announced its plan to vaccinate all HCWs for COVID-19 and before the actual vaccination campaign begun. We believe that it was the time when all HCWs were most sensitive for the same.

Scope for future study: Although COVID-19 vaccination had already been completed among HCWs, it still leaves a scope for further study with a larger sample size among HCWs who did not get vaccinated. Also, a comparative study may be planned on attitude and behaviour change in HCWs towards COVID-19 vaccination after start of campaign and efforts made by government towards reducing the vaccine hesitancy.

Authors Contribution

The concept of paper was developed by AKS. All authors contributed equally to designing, definitions, literature search, data acquisition/analysis and manuscript preparation/ editing/ review. Statistical analysis was performed by AKS and AK. Guarantor of the paper is AK.

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We would like to thank our study participants who contributed to this survey during pandemic time which

was a time of great stress and they did not have enough time even for their families.

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Tables

TABLE 1 FACTORS ASSOCIATED WITH VACCINE HESITANCY

Factors	Vaccine Hesitancy		p-value
	Yes (n=91)	No (n=163)	
Gender [@]			
Male (n=176)	64 (36.4%)	112 (63.6%)	p = 0.690
Female (n=72)	24 (33.3%)	48 (66.7%)	
Religion			
Hinduism (n=223)	70 (31.4%)	153 (68.6%)	p < 0.001*
Others (n=31)	21 (67.7%)	10 (32.3%)	
Caste			
General/ Others (n=144)	43 (29.9%)	101 (70.1%)	p = 0.023*
Others (n=110)	48 (43.0%)	62 (57.0%)	
Category of health care worker			
Medical (n=172)	62 (36.1%)	110 (63.9%)	p = 0.916
Paramedical (n=82)	29 (35.4%)	53 (64.6%)	
Fear of COVID-19 infection owing to job profile?			
Present (n=142)	56 (39.4%)	86 (60.6%)	p = 0.177
Absent (n=112)	35 (31.3%)	77 (68.7%)	
Fear of COVID-19 as a deadly disease?			
Not deadly disease (n=29)	11 (37.9%)	18 (62.1%)	p = 0.063
Deadly disease (n=225)	80 (35.6%)	145 (64.4%)	
Pre-existing diseases			
Present (HT, DM, Heart ds, Kidney ds) (n=48)	17 (35.4%)	31 (64.6%)	p = 0.948
No pre-existing disease (n=206)	74 (35.9%)	132 (64.1%)	

@ - The 6 participants who preferred not to disclose their gender were excluded from the statistical analysis. 3 (50.0%) of them had vaccine hesitancy.

TABLE 2 REASONS FOR VACCINE HESITANCY BY CATEGORY OF HCWS

Reason for vaccine hesitancy*	Medical worker (n=62)	Paramedical worker (n=29)	TOTAL (n=91)
Unsure of efficiency of vaccine	37 (59.7%)	3 (10.3%)	40 (44.0%)
Unsure about side effects of vaccine	48 (77.4%)	17 (58.6%)	65 (71.4%)
Unsure about effect of vaccine on my health	37 (59.7%)	12 (41.4%)	49 (53.8%)
Already infected; think I do not need vaccine	9 (14.5%)	0 (0)	9 (10.0%)
Other	3 (4.8%)	0 (0)	3 (3.3%)

* Multiple responses.

TABLE 3 ATTITUDE TOWARDS COMPULSORY VACCINATION FOR HCWS, IF ANY

Factors	Attitude towards mandatory vaccination for HCWs			p-value
	Against (n=109)	For (n=103)	Undecided (n=42)	
Gender [§]				
Male (n=176)	72 (40.9%)	71 (40.3%)	33 (18.8%)	p = 0.474
Female (n=72)	33 (45.8%)	30 (41.7%)	9 (12.5%)	
Religion				
Hinduism (n=223)	89 (39.9%)	99 (44.4%)	35 (15.7%)	p = 0.003*
Others (n=31)	20 (64.5%)	4 (12.9%)	7 (22.6%)	
Caste				
General/ Others (n=144)	58 (40.3%)	66 (45.8%)	20 (13.9%)	p = 0.141
Others (n=110)	51 (46.4%)	37 (33.6%)	22 (20.0%)	
Category of health care worker				
Medical (n=172)	83 (48.3%)	67 (39.0%)	22 (12.8%)	p = 0.015*

Factors	Attitude towards mandatory vaccination for HCWs			p-value
	Against (n=109)	For (n=103)	Undecided (n=42)	
Paramedical (n=82)	26 (31.7%)	36 (43.9%)	20 (24.4%)	
Fear of COVID-19 infection owing to job profile?				
Present (n=142)	67 (47.2%)	51 (35.9%)	24 (16.9%)	p = 0.212
Absent (n=112)	42 (37.5%)	52 (46.4%)	18 (16.1%)	
Fear of COVID-19 as a deadly disease?				
Not deadly disease (n=29)	13 (44.8%)	10 (34.5%)	6 (20.7%)	p = 0.716
Deadly disease (n=225)	96 (42.7%)	93 (41.3%)	36 (16.0%)	
Pre-existing diseases				
Present (HT, DM, Heart ds, Kidney ds) (n=48)	24 (50.0%)	20 (41.7%)	4 (8.3%)	p = 0.210
No pre-existing disease (n=206)	85 (41.3%)	83 (40.3%)	38 (18.4%)	

\$ - The 6 participants who preferred not to disclose their gender were excluded from the statistical analysis. 4 (66.7%) them were for compulsory vaccination.

Figures

FIGURE 1 STUDY FLOW CHART

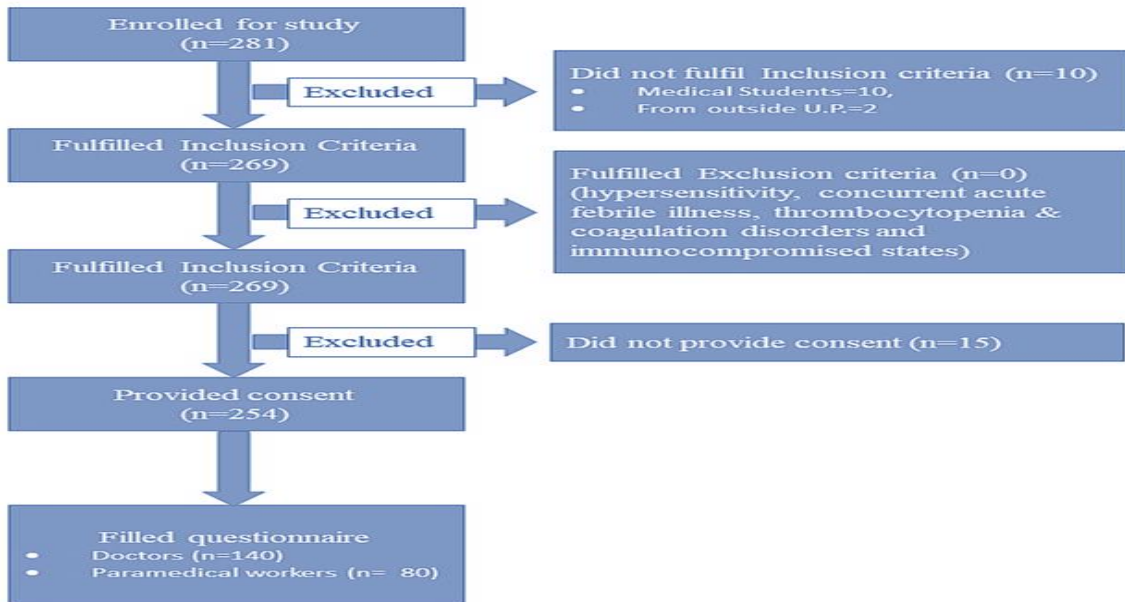


FIGURE 2 READINESS TO COVID-19 VACCINATION AMONG HCWS

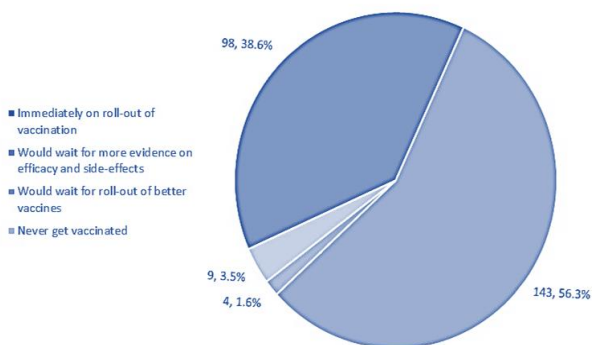


FIGURE 3 ATTITUDE TOWARDS COMPULSORY VACCINATION

