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COVID-19 vaccine hesitancy among health care workers in a tertiary care hospital in Imphal, Manipur - A cross sectional study

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Abstract

Background: Health care workers being at frontline are one of the most vulnerable groups amidst COVID-19 pandemic. Even minimal vaccine hesitancy among health care workers might lead to a much worrisome situation in general population.

Objectives: This study aimed to determine COVID 19 vaccine hesitancy among the health care workers in Imphal, Manipur and to assess associated factors

Methods: A cross sectional study was conducted among all the health care providers of tertiary care institute in Imphal, Manipur during December-March, 2021. A self-administered structured questionnaire was used to collect data. Univariate analysis was carried out using Chi-square test and multivariable logistic regression was performed to determine the factors significantly associated with vaccine acceptance.

Results: Out of 1750 participants approached, 1312 completed the questionnaire. About 79% participants were vaccine hesitant. Multiple logistic regression indicated that years of experience of >5 to ≤10 years (0.42, P=0.003), willingness to pay for the COVID-19 vaccine (1.67, P=0.007), neutral to no longer needing COVID-19 vaccine (1.49, P=0.019) and perceiving that

vaccine was safe (2.48, P = 0.007) were significant predictors of vaccine acceptance.

Conclusion: Vaccine hesitancy is high among the health care workers**.** They should be informed about safety and efficacy of COVID-19 vaccine through information, education and communication to encourage vaccine uptake as a whole.

Keywords: COVID-19 vaccine, Vaccine hesitancy, Health care workers

Introduction

Vaccine hesitancy was identified as one of top ten global health threats in 2019 by World Health Organization which results in under immunisation and reduces herd immunity towards a disease thereby increasing the risk of outbreaks. [1][2][3] Complacency, inconvenience in accessing vaccines, and lack of confidence are key reasons underlying hesitancy. [4] In the midst of COVID-19 pandemic, information on the new COVID-19 vaccine, vaccine hesitancy, vaccine eagerness and COVID appropriate behaviours have been identified as four key areas to address COVID-19 vaccine acceptance. [4] Vaccination for COVID-19 had been launched in India from 16th January, 2021 with the first phase giving priority to all the health care workers. Studies have shown variability in the acceptance of COVID-19 vaccine across countries. [5] [6]

Differences in acceptance rates ranged from almost 90% (in China) to less than 55% (in Russia). [7] In India, Tamil Nadu, Punjab, Jammu and Kashmir, Haryana and Andhra Pradesh were top five states in terms of vaccine hesitancy among general population while it was lower in Kerala, Chhattisgarh and Odisha. [8] In Manipur, 69% of general population were willing to be vaccinated. [8]

Among health care workers globally, intention to get vaccinated has been seen ranging from 28% in Congo to 76.9% in France, 78% in Israel and 91% in Germany.[9] [10] [11] [12] In a study among medical students across 22 states of India, vaccine hesitancy was seen among 10.6%.[13] In Middle East region, 60% health workers were hesitant to get vaccinated.[14] Lack of information, concern of safety, efficacy, lack of trust in authorities and fast track development of the vaccine were some of the major reasons for hesitancy.[12] [13] [14] [15] [16]

Health workers are considered the most trusted sources of guidance about COVID-19 vaccine choice. [5] For acceptability of vaccination against COVID-19 among others, assessing the intention to get vaccinated among health care workers is crucial as they influence vaccination decisions in the general population. These frontline workers being at greater risk amidst this pandemic, it is also important to determine their own uptake of vaccine. Given the paucity of data, this study was conducted with aim to determine COVID-19 vaccine hesitancy among health care workers in Imphal, Manipur and to assess the association between COVID-19 vaccine hesitancy and variables of interest.

Materials and methods

A cross-sectional study was conducted among the health care workers in a tertiary care health facility of Imphal West district in Manipur from December, 2020 to March, 2021. The institute employs 1494 staffs in various departments and there are roughly 1204 students in fields of medicine, nursing and dentistry.

Sample size: Taking a COVID-19 vaccine hesitance rate of 41.8% among health care workers of Agra, with an absolute allowable error of 5%, a sample size of 389 was required at 5% significance. [15]

However, in this study, it was intended to cover all the health care workers of the tertiary care facility. Health care workers eligible for this study were doctors, nurses,

students, paramedical staff, support staff, clerical and administrative staff and other staffs of the tertiary health facility. Those who were not available even after three attempts of visit were excluded from the study.

Study tool: A structured questionnaire was prepared by the researchers after thorough review of literature, and it contained three sections; 'socio demo graphic characteristics', 'Vaccine hesitancy 'and 'Perception of COVID-19 and its vaccination'. Vaccine hesitancy was assessed by asking "If vaccine against COVID-19 was available for use, would you take it?" on a five-point Likert scale from 'definitely no' to 'definitely yes'. Those who responded 'definitely no', 'probably no', 'undecided' and 'probably yes' were categorized as vaccine hesitant and those responding 'definitely yes' were categorized as vaccine acceptant. Perception of COVID-19 and its vaccination was assessed under four domains of 'perceived susceptibility', 'perceived severity', 'perceived benefits' and 'perceived barriers' based on a three - point Likert scale (agree/ neutral/ disagree).

Data Collection and analysis

Informed written consent was taken from each participant. The questionnaires were self-administered and collected on the same day by the researchers. Data was collected till 15th January, 2021 before the start of vaccination drive. Privacy of the participants was maintained by collecting data in a separate space and confidentiality was ensured by not taking identifiers like name, department, address etc. The results were presented and analysed cumulatively so no individual information was revealed.

After checking for completeness and consistency, data was entered into IBM SPSS 26. It was then summarized using descriptive statistics of mean, standard deviation, frequency and percentage. Univariate analysis was carried out using Chi-square test.

The variables with P value < 0.2 in univariate analysis was further assessed using multiple logistic regression to find out the independent predictors of vaccine acceptance. P values of less than 0.05 was considered to be statistically significant.

Ethical Issues

Ethical approval was obtained from the Research Ethics Board, Regional Institute of Medical Sciences, Imphal with reference no. REB No. A/206/REB/Prop (SP)137/112/2021.

Results

Out of 1750 health care workers who were approached, 1312 responded. When the health care workers were asked whether they were willing to get vaccinated for COVID-19, if the vaccine was available for use, 66 (5.0%) responded 'definitely no', 122 (9.3%) said 'probably no', 417 (31.8%) were 'undecided', 431 (32.9%) said 'probably yes' and 276 (21.0%) responded 'definitely yes'. In this study thus, 79% were vaccine hesitant and 21% were vaccine acceptant.

Univariate analysis done in Table 1 showed that gender, years of work experience and willingness to pay for COVID-19 had significant association with vaccine acceptance. Females, 587 (81.5%) were significantly more vaccine hesitant compared to males. Those who were willing to pay for the vaccine, 190 (25.6%) were significantly more vaccine hesitant compared to those who were unwilling to pay. Table 2 indicated that 461 (35.1%) participants felt that 'their chance of getting COVID-19 in next few months was low' but majority, 755(57.5%) disagreed to 'no longer needing COVID-19 vaccination'. Majority of participants agreed to the severity of COVID-19, perceived benefits of COVID-19

vaccine but were also concerned for its safety (75.2%) and efficacy (77.7%). Univariate analysis showed that perceived susceptibility of COVID-19 had significant association with vaccine acceptance. Perceived severity of 'getting very sick if they get COVID-19' had significant association with vaccine acceptance. Both perceived barriers and perceived benefits OF COVID-19 vaccine also had significant association with vaccine acceptance. Table 3 on application of multiple logistic regression showed that those having five to ten years of work experience had 58% significantly lower vaccine acceptance compared to those having greater than ten years of experience. Those who were willing to pay for COVID-19 vaccine per dose, had 1.67 times higher chance of vaccine acceptance. Those who had 'neutral' opinion of no longer needing COVID-19 vaccine, had 58% lower vaccine acceptance. Those who disagreed that 'vaccination decreased their chance of getting COVID-19 or its complications', had 84% lower vaccine acceptance. Those who did not have concern for safety of COVID-19 vaccination, had 2.48 times higher odds of being vaccine acceptant. In this study, gender, presence of living children, having elderly family member and perceived severity of COVID-19 were not significant predictors of vaccine acceptance.

Discussion

In this facility-based study, 79% of the health care workers were vaccine hesitant which is comparable to the study conducted by MK Nzaji et al in Congo (72.3%) but much higher than studies conducted in India (10.6%), Pakistan (29.7%), Germany (8.3%), Canada (19%), United Kingdom (23%), Israel (22%), France (27%), Saudi Arabia (35%), Malta (48%) among health care workers.[9][10][11][12][13][17][18][19][20] In our study, hesitancy is higher compared to general population globally (28.5%) which may be because of study setting variation across nineteen countries.[7]

Our study had higher vaccine hesitancy probably because data was collected before the vaccination drive started on 16th January, 2021 when there was little information on efficacy and safety of both the vaccines which had been approved for restricted emergency use by World Health Organization in India. Study at Congo was also done during March-April when their vaccination drive was yet to start thus showing high vaccine hesitancy.[9] Nation-wide survey in India among undergraduate medical students was done during February to March, 2021 when 64.5% of participants in the study were already vaccinated which might not be purely voluntary.[13] Vaccination had already started in December of 2020 for Germany, Israel, Saudi Arabia, France, United States, Canada and United Kingdom when more information on the effectiveness of COVID-19 vaccines were available leading to higher vaccine acceptance. Further our study had a stricter definition of hesitancy based on five-point Likert scale which could also be one of the reasons for high hesitancy.

In our study, majority of health care workers were concerned about efficacy and safety of the vaccine which might be the cause for high hesitancy. Side effects of the vaccine, lack of confidence and fast development were some of the major concerns in study by Geetu Singh et al. [15] Effectiveness, adverse events, lack of rigorous testing, lack of trust were major concerns among vaccine hesitant group of health care workers. [6] [7] [9] [10] [12] [16] [17] [18] [19] In our study, those with five to ten years of work experience had higher acceptability of COVID-19 vaccine. They might have more experience with vaccines and vaccination in general. Further with more experience, they might know where to access

correct information regarding COVID-19 and its vaccine thereby reducing Infodemic. Further it was seen, higher the experience, more poor was their self-rating of overall health in this study which might be the probable cause of more vaccine acceptance to prevent from development of complications.

Higher educational qualification (Spearman's correlation coefficient= 0.164, p= 0.000), high perceived severity of COVID-19 (Spearman's correlation coefficient= 0.071, p= 0.010) and low perceived barriers (Spearman's correlation coefficient= -0.086, P= 0.002) was correlated with willingness to pay in our study which was similar to other studies.[21] [22] [23] Other variables like gender, presence of living children and elderly family member were not significant predictors of vaccine acceptance as this study was a single facility-based study compared to other studies which were mostly multi-centre, nationwide or large scale studies.[12] [13] [16] [17]

Those who perceived that vaccination was good because they would feel less worried about contracting COVID-19, had 6.18 times higher vaccine acceptance (P=0.007). Having positive attitude towards COVID-19 vaccine was seen to be a significant predictor for vaccine acceptance in other studies as well. [9] [12] [24] This highlights the need to disseminate tailored interventions for development of positive attitude towards the benefits for the vaccine.

Concern for safety of the vaccine was a significant predictor of low vaccine acceptance which is comparable to other studies. [6] [17] [22] Vaccine confidence that vaccines are safe, effective and important has been seen to be a significant determinant for vaccine uptake globally. In India, confidence that vaccines are safe has increased from 70-79.9% in 2015 to 80-89.9% in 2018. [25] In most of the studies health care workers were the most trusted source of information for COVID-19 and its vaccination making the need to address the concerns of health care workers regarding safety of the vaccine all the more important. [7] [19] [22] [25]

Willingness to pay for the vaccine was another significant predictor of vaccine acceptance which is consistent with the findings of AC Cerda et al, Wen Qin et al and Tamam El-Elimat et al. [21] [22] [23] Our study was conducted amidst the first wave of pandemic when there was more fear and apprehension of becoming infected with COVID-19 which might be the probable reason that they were even willing to pay to get vaccinated. But this study did not look into other factors which might influence willingness to pay like income and health insurance. In this study, 912 (78.8%) vaccine hesitant individuals would only get vaccinated if given adequate information about it and 700 (80.0%) would take vaccine if taken by many. This indicates the need to provide adequate and correct information to encourage more health care workers to get vaccinated at the earliest. As more people gets vaccinated, vaccine acceptance might increase.

Study was a single facility-based study which might affect its generalizability. Nevertheless, sample size was large and comprised of all categories of health care workers of the facility including students and other staffs. Hesitancy of health workers might have changed from the time when this study was conducted before the initiation of vaccination drive in India. None the less, this study gives a fair idea about the situation. Further study can be done to follow up and see the change in hesitancy on a larger scale.

Conclusion

In this study, every 4 out of 5 health care workers were vaccine hesitant. Greater years of work experience, willingness to pay and low concern of vaccine safety

were significant predictors of high vaccine acceptance. It is important to address the high vaccine hesitancy among the health care workers as it might influence vaccine acceptance in the general public.

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Table 1: Association between variables of interest and COVID-19 vaccine acceptance (N=1312)

Variables of interest	Total n (%)	Vaccine hesitant (N=1036) n (%)	Vaccine acceptant (N=276) n (%)	P
Age (years)				
≤25	472 (36.0)	375 (79.4)	97 (20.6)	0.217
26-35	465 (35.4)	376 (80.9)	89 (19.1)	
>35	375 (28.6)	285 (76.0)	90 (24.0)	
Gender				
Male	592 (45.1)	449 (75.8)	143 (24.2)	0.012
Female	720 (54.9)	587 (81.5)	133 (18.5)	

Marital status				
Married	531 (40.5)	412 (77.6)	119 (22.4)	0.314
Unmarried	781 (59.5)	624 (79.9)	157 (20.1)	
Educational status				
< Class XII	628 (47.9)	499 (79.5)	129 (20.5)	0.733
Class XII to Graduate	453 (34.5)	359 (79.2)	94 (20.8)	
≥ Post Graduate	231 (17.6)	178 (77.1)	53 (22.9)	
Occupation				
Doctors	442 (33.7)	348 (78.7)	94 (21.3)	0.879
Nurses	106 (8.1)	87 (82.1)	19 (17.9)	
Students	431 (32.9)	339 (78.7)	92 (21.3)	
Others*	333 (25.4)	262 (78.7)	71 (21.3)	
Living children				
Present	546 (41.6)	441 (80.8)	105 (19.2)	0.175
Absent	766 (58.4)	595 (77.7)	171 (22.3)	
Elderly family member				
Present	769	617 (77.5)	179 (22.5)	0.109
Absent	516	419 (81.2)	97 (18.8)	
Years of work experience				
≤5	529	421 (79.6)	108 (20.4)	0.024
>5 to ≤10	199	169 (84.9)	30 (15.1)	
>10	212	157 (74.1)	55 (25.9)	
History of contracting Covid-19				
Yes	192 (14.6)	155 (80.7)	37 (19.3)	0.516
No	1120 (85.4)	881 (78.7)	239 (21.3)	
COVID-19 duty				
Present	456 (34.8)	360 (78.9)	96 (21.1)	0.992
Absent	856 (65.2)	676 (79.0)	180 (21.0)	
Presence of any chronic diseases				
Present	99 (7.5)	78 (78.8)	21 (21.2)	0.964
Absent	1213 (92.5)	958 (79.0)	255 (21.0)	
Self-rating of overall health				
Good	996 (75.9)	780 (78.3)	216 (21.7)	0.501

Fair	271 (20.7)	221 (81.5)	50 (18.5)	
Poor	45 (3.4)	35 (77.8)	10 (22.2)	
Willing to pay for COVID-19 vaccine				
Yes	743 (56.6)	553 (74.4)	190 (25.6)	0.000
No	569 (43.3)	483 (84.9)	86 (15.1)	

* Assistant, attendant, laboratory technician, multi-purpose worker, administrative, clerical staff etc.

Table 2: Association between perception of COVID-19 and its vaccination and COVID-19 vaccine acceptance (N=1312)

Perception	Response	Total n (%)	Vaccine hesitant (N=1036) n (%)	Vaccine acceptant (N=276) n (%)	P
Perceived susceptibility					
Chances of getting COVID-19 in the next few months is low	Agree	461 (35.1)	352 (76.4)	109 (23.6)	0.001
	Neutral	430 (32.8)	365 (84.9)	65 (15.1)	
	Disagree	421 (32.1)	319 (75.8)	102 (24.2)	
No longer need COVID-19 vaccination	Agree	198 (15.1)	170 (85.9)	28 (14.1)	0.000
	Neutral	359 (27.4)	330 (91.9)	29 (8.1)	
	Disagree	755 (57.5)	536 (71.0)	219 (29.0)	
Perceived severity					
Afraid of getting COVID-19	Agree	875 (66.7)	695 (79.4)	180 (20.6)	0.073
	Neutral	150 (11.4)	126 (84.0)	24 (16.0)	
	Disagree	287 (21.9)	215 (74.9)	72 (25.1)	
Would be very sick on getting COVID-19	Agree	526 (40.1)	427 (81.2)	99 (18.8)	0.025
	Neutral	366 (27.9)	296 (80.9)	70 (19.1)	
	Disagree	420 (32.0)	313 (74.5)	107 (25.5)	
Complications from COVID-19 are serious	Agree	957 (72.9)	758 (79.2)	199 (20.8)	0.107
	Neutral	207 (15.8)	170 (82.1)	37 (17.9)	
	Disagree	148 (11.3)	108 (73.0)	40 (27.0)	
Perceived benefits					
Vaccination is a good idea because I would feel less worried about contracting COVID-19	Agree	988 (75.3)	738 (74.7)	250 (25.3)	0.000
	Neutral	215 (16.4)	200 (93.0)	15 (7.0)	
	Disagree	109 (8.3)	98 (89.9)	11 (10.1)	
Vaccination decreases chance of getting COVID-19 or its complications	Agree	918 (70.0)	671 (73.1)	247 (26.9)	0.000
	Neutral	298 (22.7)	273 (91.6)	25 (8.4)	
	Disagree	96 (7.3)	92 (95.8)	4 (4.2)	

Vaccination is the only way in absence of drugs for COVID-19	Agree	836 (63.7)	624 (74.6)	212 (25.4)	0.000
	Neutral	262 (20.0)	232 (88.5)	30 (11.5)	
	Disagree	214 (16.3)	180 (84.1)	34 (15.9)	
Perceived barriers					
Concerned about the efficacy of the COVID-19 vaccination	Agree	986 (75.2)	791 (80.2)	195 (19.8)	0.000
	Neutral	242 (18.4)	203 (83.9)	39 (16.1)	
	Disagree	84 (6.4)	42 (50.0)	42 (50.0)	
Concerned about the safety of COVID-19 vaccination	Agree	1019(77.7)	823 (80.8)	196 (19.2)	0.000
	Neutral	192 (14.6)	162 (84.4)	30 (15.6)	
	Disagree	101 (7.7)	51 (50.5)	50 (49.5)	

Table 3: Multiple logistic regression for association between variables of interest and vaccine acceptance (N=1312)

Variables of interest	cOR* (95% CI)	P	Logistic Regression	
			aOR† (95% CI)	P
Gender				
Female	1	-	1	-
Male	1.41 (1.08, 1.83)	0.012	1.33 (0.93, 1.89)	0.116
Living children				
Absent	1	-	1	-
Present	0.83 (0.63, 1.09)	0.176	0.95 (0.66, 1.38)	0.799
Elderly family member				
Absent	1	-	1	-
Present	1.25 (0.95, 1.65)	0.110	1.15 (0.78, 1.69)	0.484
Years of work experience				
≤5	0.73 (0.50, 1.06)	0.101	0.68 (0.45, 1.03)	0.071
>5 to ≤10	0.51 (0.31, 0.83)	0.007	0.42 (0.24, 0.74)	0.003
>10	1	-	1	-
Willing to pay for COVID-19 vaccine per dose				
No	1	-	1	-
Yes	1.93 (1.46, 2.56)	0.000	1.67 (1.15, 2.41)	0.007
Perception of COVID-19 and its vaccination				
Chances of getting COVID-19 in the next few months is low				
Disagree	1.03 (0.76, 1.41)	0.839	0.85 (0.55, 1.31)	0.469
Neutral	0.58 (0.41, 0.81)	0.001	1.27 (0.76, 2.14)	0.358
Agree	1	-	1	-

No longer need COVID-19 vaccination				
Disagree	2.48 (1.61, 3.81)	0.000	1.49 (0.86, 2.56)	0.153
Neutral	0.53 (0.31, 0.93)	0.026	0.42 (0.21, 0.87)	0.019
Agree	1	-	1	-
Afraid of getting COVID-19				
Disagree	1.29 (0.95, 1.77)	0.108	1.11 (0.69, 1.79)	0.654
Neutral	0.74 (0.46, 1.17)	0.196	1.75 (0.89, 3.43)	0.106
Agree	1	-	1	-
Would be very sick on getting COVID-19				
Disagree	1.47 (1.08, 2.01)	0.014	1.49 (0.95, 2.34)	0.081
Neutral	1.02 (0.73, 1.43)	0.909	0.87 (0.51, 1.49)	0.603
Agree	1	-	1	-
Complications from COVID-19 are serious				
Disagree	1.41 (0.95, 2.09)	0.088	0.97 (0.55, 1.69)	0.915
Neutral	0.83 (0.56, 1.22)	0.344	1.34 (0.73, 2.46)	0.352
Agree	1	-	1	-
Vaccination is a good idea because I would feel less worried about contracting COVID-19				
Disagree	0.33 (0.18, 0.63)	0.001	0.48 (0.20, 1.15)	0.099
Neutral	0.22 (0.13, 0.38)	0.000	0.48 (0.23, 0.99)	0.050
Agree	1	-	1	-
Vaccination decreases my chance of getting COVID-19 or its complications				
Disagree	0.12 (0.04, 0.33)	0.000	0.16 (0.04, 0.60)	0.007
Neutral	0.25 (0.16, 0.38)	0.000	0.58 (0.29, 1.17)	0.130
Agree	1	-	1	-
Vaccination is the only way in absence of drugs for COVID-19				
Disagree	0.56 (0.37, 0.83)	0.004	1.22 (0.70, 2.12)	0.485
Neutral	0.38 (0.25, 0.57)	0.000	0.78 (0.39, 1.57)	0.487
Agree	1	-	1	-
Concerned about the efficacy of the COVID-19 vaccination				
Disagree	4.06 (2.57, 6.39)	0.000	1.81 (0.86, 3.81)	0.118
Neutral	0.78 (0.54, 1.14)	0.195	1.14 (0.65, 2.01)	0.647
Agree	1	-	1	-
Concerned about the safety of COVID-19 vaccination				
Disagree	4.12 (2.71, 6.27)	0.000	2.48 (1.28, 4.79)	0.007

Neutral	0.78 (0.51, 1.18)	0.240	0.83 (0.45, 1.54)	0.560
Agree	1	-	1	-