Awareness, acceptance, and hesitancy about COVID-19 vaccine among residents of urban and rural health training center field practice area of a medical college at Kolkata: A cross-sectional survey



Sonali Sain¹, Amitabha Chattopadhyay², Dibakar Haldar³

- ¹Associate Professor, Department of Community Medicine, Bankura Sammilani Medical College and Hospital, Bankura,
- ²Associate Professor, Department of Community Medicine, Medinipur Medical College and Hospital, Medinipur,
- ³Professor, Department of Community Medicine, NRS Medical College and Hospital, Kolkata, West Bengal, India

ABSTRACT

Background: Effective vaccination is a successful tool for controlling COVID-19 pandemic, along with other preventive measures. Both intention to get vaccinated and barrier to vaccination played important role in COVID vaccination drive. Aims and Objectives: The present study was conducted to assess awareness, acceptance, and hesitancy about COVID-19 vaccine among the residents of rural and urban area and to assess the factors related to their attitude. Materials and Methods: A descriptive cross-sectional survey was conducted among the adult residents of urban and rural area over 6 months. Total sample size was 400. Simple random sampling technique was adopted to recruit the study participants after obtaining informed verbal consent. This process was continued until the desired number of sample size was attained. Data were compiled after collection and analysis was done. Results: Rural population had significantly higher knowledge of coronavirus and urban population knew prevention of coronavirus infection more. Correct knowledge of COVID vaccine availability was higher among rural people but higher knowledge of vaccine related information was among urban population. Sources of information were mainly from mass media. Vaccine acceptance was more among urban population, but apprehension was significantly higher among urban residents. Higher proportion of urban people was motivated significantly by the healthcare workers as well as self-motivated than their rural counterpart. Conclusion: Targeted interventions could be developed for increasing awareness of disease and availability of COVID-19 vaccines. Population-based vaccination program can decline the trend of the pandemic in long term.

Access this article online

Website:

http://nepjol.info/index.php/AJMS **DOI:** 10.3126/ajms.v14i9.54891

E-ISSN: 2091-0576 P-ISSN: 2467-9100

Copyright (c) 2023 Asian Journal of Medical Sciences



This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

Key words: Knowledge; Attitude; COVID-19 vaccine

INTRODUCTION

Effective vaccination is a successful tool for controlling COVID-19 pandemic, along with other preventive measures such as use of mask, hand washing, and social distancing. Both intention to get vaccinated and barrier to vaccination due to fear play important role in any vaccination drive. Thus, it is essential to find out the different positive and

negative findings related to this issue. Knowledge regarding the barriers to communication helps to identify strategies for the targeted intervention.

COVID-19 pandemic changed every aspect of life throughout the world. It resulted into million cases and million deaths till 2022. Preventive measures such as vaccination, personal and hand hygiene, social distancing,

Address for Correspondence:

Dr. Sonali Sain, Associate Professor, Department of Community Medicine, Bankura Sammilani Medical College and Hospital, Bankura, West Bengal, India. **Mobile:** 9433493466. **E-mail:** drsonalisain@rediffmail.com

and avoiding mass gathering can prevent spread of the disease. Herd immunity can only be achieved if 67-80% of the population can be vaccinated. Vaccine acceptance played very important role in successful control of any pandemic.1 Vaccine hesitancy is defined as delay in acceptance, reluctance, or refusal of vaccination in spite of availability of safe and effective vaccine. Vaccine hesitancy is influenced by various factors such as race, ethnicity, age, gender, socioeconomic status, religions, educational level, and mistrust to vaccine efficacy. Female person with minimum or no education and lower socioeconomic status were found to be prone to vaccine hesitancy.²⁻⁵ Several studies showed vaccine hesitancy ranged from as low as 18% to as high as 64.9%. This had an impact on success of prevention strategies of COVID-19 pandemic.^{6,7} The study conducted among the high-risk group like healthcare workers in Kuwait found that vaccine acceptance rate was as high as 83.3%.8 A nationally representative study conducted in Bangladesh among 1134 adult population revealed that 32.5% experienced hesitancy toward COVID-19 vaccination. Hesitancy was more prevalent among unemployed, males, geriatric population, and addicted to tobacco and also those were uncertain about vaccine efficacy.9 A descriptive study conducted among 735 university students of European countries found that 13.9% had low intention to get vaccinated. 10 A nationally representative data on COVID-19 vaccine hesitancy among the adult residents of Ireland and United Kingdom found that vaccine hesitancy or resistance was evident in 35% and 31% population, respectively. These findings were dependent on number of sociodemographic and health-related variables.¹¹ A systematic review conducted to assess worldwide COVID-19 vaccine acceptance rate. The review found that highest resistance was found in Kuwait (76.4%) and least in Ecuador (3%). Other countries showed hesitancy rates as 71.4%, 46.3%, 45.1%, 43.7%, 43.1%, and 41.1%, in Jordan, Italy, Russia, Poland, US, and France, respectively. Thus, average hesitancy rate was found to be 52.44%. There was sparse literature on vaccine hesitancy in eastern India. Thus, it seemed relevant to find out the barriers to vaccine acceptance and factors related to this. The finding would help to address the issues regarding vaccine hesitancy and alleviate fear of vaccine safety. Thus, with this background, the present study was conducted to assess awareness, acceptance, and hesitancy about COVID-19 vaccine among the residents of rural and urban health training center (UHTC) field practice area and also to assess the factors related to their attitudes.

Aims and objectives

The present study was conducted to assess awareness, acceptance, and hesitancy about COVID-19 vaccine among the residents of rural and urban health training center (UHTC) field practice area and also to assess the factors related to their attitudes.

MATERIALS AND METHODS

A descriptive cross-sectional survey was conducted among the adult residents of field practice area of UHTC, located in ward no: 54 in Kolkata Municipal area and Rural Health Training Center, located in Mallikpur, South 24 Parganas over 6 months (January–June 2022).

Sample size was estimated using formula n=Z²PQ/L², taking prevalence (P) of 52.44% as prevalence of average hesitancy among the adult population, ¹² with significance level (α)=0.05, and allowable error (L) of 7(absolute). Sample size was estimated to be 196. Thus, total sample size of 200 was considered for the present study. For comparison purpose, sample size of 200 was considered for each of urban and rural field practice area. Simple random sampling technique using computer generated random numbers was adopted to recruit the desired number of study participants. Participants were included randomly after selecting their house-hold numbers from family register in the field practice areas and interviewing the adult residents of those houses after obtaining informed verbal consent. This process was continued until the desired number of sample size was attained. Those who did not give consent to participate in the study and who are very sick at the time of interview were excluded from the study. A predesigned pretested semi-structured questionnaire having two parts was used for data collection. First part contained the information regarding sociodemographic profile, and personal history; second part contained the questions on their knowledge, their perception, health seeking behavior, at risk behavior, their attitudes regarding the acceptance, and hesitancy about vaccine.

The data confidentiality was assured. Vaccine acceptance was considered by affirmative responses if offered at free of cost and/or those who have already received vaccination. Vaccine hesitancy was considered by negative responses if offered at free of cost and/or who have refused vaccination.

Data were compiled after collection and analysis was done with help of Microsoft Excel and Epi Info: Version: 7.2.2.6/February 02, 2018. Ethical permission was obtained from the Institution Ethics Committee, NRS Medical College, Kolkata (NRSMC/IEC/71/2021).

Operational definition

- Vaccine acceptance those who received one or both doses of vaccine or ready to accept vaccine if offered
- Vaccine hesitance if respondent denied or refused get vaccinated if offered and if agreed to any of the following option like – There is no corona, it is a rumor for marketing vaccines by the pharmaceutical

companies'/corona vaccine may be harmful for the body'/COVID-19 vaccine cannot be 100% of protective, so it is useless to get vaccinated'/Corona is a destiny, so taking preventive measures/vaccine is futile'/poor people who work hard would not get Corona'.

RESULTS

In the present study, 200 adults from each field practice areas of rural and (RHTC and UHTC) of Nilratan Sircar Medical College, Kolkata were interviewed using a predesigned questionnaire for collecting information pertaining to awareness, acceptance, and hesitancy of COVID-19 vaccine. In study population, 291 (72.75%) were from age group 18-45 years, 82 (20.5%) from 45 to 60 years, and 27 (6.75%) from \geq 60 years age group. Male predominance was noted, that is, 253 (63.25%). Hindu population comprised 190 (47.50%) and 210 (52.50%) were Muslim population. Among the study subjects, 67 (16.75%) were illiterate, 107 (26.75%) educated up to primary level, 166 (41.5%) up to secondary level, and 60 (15%) were educated graduate and above. It was found that 252 (63%) participants were from nuclear family and rest 148 (37%) from joint family. Profession of 156 (39%) study subjects were service, 116 (29%) were homemaker, 64 (16%) business, 40 (10%) students, 13 (3.25%) retired, and 5 (1.25%) both skilled and unskilled worker. No addiction was found among 222 (55.5%) study subjects, 130 (32.5%) addicted to smoking tobacco, and 48 (12.0%) to smokeless tobacco.

In the present study, rural population had significantly higher knowledge of coronavirus compared to urban population. However, urban population had significantly higher knowledge regarding prevention of coronavirus infection (Table 1).

Correct knowledge regarding availability of COVID vaccine was found to be higher among rural people, but the difference was not found to be statistically robust so

far as the risk was concerned. However, significantly higher knowledge of names of vaccine and dose of vaccine were found among urban population (Table 2).

Sources of information were mainly from mass media and health-care facility.

Vaccine acceptance was more among urban population, compared to rural population but to the extent of statistically significant (Table 3).

Although vaccination was more among urban population, but apprehension before vaccination was significantly higher among urban study subjects. As per omnibus the Chi-square test, a difference was found to exist in regard to the source of motivation for COVID-19 vaccination. Pair wise the Chi-square test revealed that significantly higher proportion of urban people was motivated by the healthcare workers (χ^2 =4.505, at df 1 with P=0.033 and OR=1.539 [1.033–2.292]) as well as self-motivated than their rural counterpart (χ^2 =13.784, at df 1 with P=0.000 and OR=3.755 [1.796–7.849]) (Table 4).

In vaccination related information, expenditure incurred for vaccination ranged from 0 to Rs. 2000. Mean expenditure was Rs. 156.48 with a standard deviation of Rs. 339.71.

DISCUSSION

Despite being recognized as one of the most successful public health measures, vaccination is perceived as unsafe and unnecessary by a number of individuals. Lack of confidence in vaccines is now considered a threat to the success of vaccination programs. Vaccine hesitancy is believed to be responsible for decreasing vaccine coverage and an increasing risk of vaccine-preventable disease outbreaks and epidemics. The goal of this study was to find out the awareness and acceptance/hesitancy rate of the COVID-19 vaccination in two varied settings in West Bengal.

Awareness about COVID-19 infection	Urban (n ₁ =200), n (%)	Rural (n ₂ =200), n (%)	Total (n=400), n (%)	χ^2 , df, P	OR (95% CI)
Knowledge about coronavirus					
Correct	182 (91)	197 (98.5)	379 (94.75)	11.308, 1, 0.000	6.495 (1.882-22.415
Spread of coronavirus					
Correct	184 (92)	184 (92)	368 (92)	0, 1, 1.000	NA*
Vulnerability to coronavirus infection					
Correct	135 (67.5)	140 (70)	275 (68.75)	0.2909, 1, 0.589	NA
Prevention of coronavirus infection					
Correct	194 (97)	183 (91.5)	377 (94.25)	5.5818, 1, 0.018	3.004 (1.159-7.785)

Table 2: Distribution of participants according to knowledge regarding COVID 19 vaccine (n=400) Correct knowledge about Urban Rural Total χ^2 , df, P OR (95% CI) COVID-19 vaccine (n₁=200), n (%) (n₂=200), n (%) (n=400), n (%) 191 (95.5) Availability of vaccine 198 (99) 389 (97.25) 4.5805, 1, 0.032 4.665 (0.995-21.870) 129 (64.5) Names of available vaccine 149 (74.5) 278 (69.5) 4.7175, 1, 0.298 NA* Name and dose of available vaccines 349 (87.25) 185 (92.5) 164 (82) 9.9107, 1, 0.001 2.707 (1.430-5.124) Interval between doses of vaccine 36 (18) 88 (44) 3.7296, 1, 0.053 52 (26)

^{*}NA (as Chi-square was not significant). NA: Not applicable, OR: Odds ratio, CI: Confidence interval

Table 3: Distribution of participants according to attitude toward COVID-19 vaccine (n=400)							
Attitude regarding COVID 19 vaccine	Urban (n ₁ =200), n (%)	Rural (n ₂ =200), n (%)	Total (n=400), n (%)	χ², df, P	OR (95% CI)		
Acceptant Hesitant	169 (84.5) 31 (15.5)	156 (78.0) 44 (22.0)	325 (81.25) 75 (18.75)	2.7733, 1, 0.095	NA*		

^{*}NA (as Chi-square was not significant). NA: Not applicable, OR: Odds ratio, CI: Confidence interval

Table 4: Distribution of participants according to vaccine acceptance (n=400)							
COVID-19 vaccine acceptance	Urban (n ₁ =200), n (%)	Rural (n ₂ =200), n (%)	Total (n=400), n (%)	χ², df, P	OR (95% CI)		
COVID-19 Vaccine							
Received	157 (78.5)	143 (71.5)	300 (75)	2.6133, 1, 0.105	NA [#]		
Not received	43 (21.5)	57 (28.5)	100 (25)				
Vaccine dose received							
Single	116 (58)	111 (55.5)	227 (56.75)	0.568, 1, 0.451	0.816 (0.479-1.387)		
Both	41 (20.5)	32 (16)	73 (18.25)				
None	43 (21.5)	57 (28.5)	100 (25)	NA**	NA**		
Source of vaccine							
Government	154 (77.0)	141 (70.5)	295 (73.75)	0.119, 1, 0.729	0.728 (0.119-4.422)		
Private	3 (1.50)	2 (1.00)	5 (1.25)		,		
NA	43 (21.5)	57 (28.5)	100 (25)	NA**	NA**		
Motivated by							
Family member	49 (24.5)	37 (18.5)	86 (21.5)	18.781, 2, 0.000	NA		
Healthcare worker	75 (37.5)	96 (48)	171 (42.75)				
Own decision	33 (16.5)	10 (5.00)	43 (10.75)				
NA	43 (21.50)	57 (28.5)	100 (25.00)	NA**	NA**		
Any apprehension before vaccination							
Present	133 (66.50)	102 (51.00)	235 (58.75)	7.899, 1, 0.005	2.228 (1.265-3.923)		
Absent	24 (12.00)	41 (20.50)	65 (16.25)				
NA	43 (21.50)	57 (28.50)	100 (25.00)	NA**	NA**		
Prime reason for delayed 2 nd dose of							
COVID-19 vaccine							
Busy work schedule	8 (36.37)	4 (36.37)	12 (36.36)	0.4831, 5, 0.975	NA [#]		
Comorbidity	5 (22.72)	2 (18.18)	7 (21.22)				
Non-availability of vaccine	3 (13.64)	1 (9.09)	4 (12.12)				
Fear	2 (9.09)	1 (9.09)	3 (9.09)				
Lack of knowledge	3 (13.64)	1 (9.09)	4 (12.12)				
Others*	1 (4.54)	2 (18.18)	3 (9.09)				

*Others include ARV schedule, lack of transport, #NA (as Chi-square was not significant or **OR was not really applicable). ARV: Anti rabies vaccine, NA: Not applicable, OR: Odds ratio, CI: Confidence interval

In the present study, 94.75% of the population were aware that SARS-CoV-2 causes COVID-19 disease. Rural population had slightly better awareness regarding this issue. More than nine out of ten (92.0%) of the population was aware of the method of spread, but awareness regarding vulnerability factors regarding COVID-19 infection was generally lesser among the population (68.75%). Methods of prevention of coronavirus infection were known to majority of the population (94.25%), with urban population

being more aware than the rural. Sources of information were mainly from mass media and health-care facility. A study on awareness regarding COVID infection in Puducherry found awareness level to be about 62.0% with higher percentage in urban area.¹³

To halt the ongoing pandemic, the COVID-19 vaccine is considered to be an ideal solution. The COVID-19 pandemic has witnessed several healthcare agencies

adopting unprecedented infection prevention and control measures and fast-tracking the vaccine approvals to control the spread of the disease. The latter is the primary key to stop the escalating rise of COVID-19 and is the strategy of the hour. Awareness and attitude of the urban and rural population regarding COVID-19 vaccine is critical to understand with regard to the epidemiological dynamics of disease prevention control, adaptation, and success of the vaccination program. In the present study, correct knowledge regarding availability of COVID vaccine was about very high (97.25%) and was significantly more among rural people, but knowledge regarding the names of vaccines and their dosage interval was poor among both urban and rural population. According to one of the studies, knowledge regarding COVID vaccine was revealed to be high among urban than in rural population.¹⁴ According to the findings of this study, the targeted community had a low degree of vaccine hesitancy (18.75%), but lack of universal enthusiasm to embrace COVID-19 vaccination was a reason for worry. Asian countries with significant trust in central governments tended to have high levels of acceptance (China, South Korea, and Singapore). 15 This study demonstrated a higher rate of COVID-19 vaccine willingness among the selected population, which was similar to the findings of Gautam et al., which reported that 77.27% of the investigated populations were extremely likely to take the COVID-19 vaccination, with only 5.3% of those who did not wish to receive the vaccine and 12.24% of those who were unsure whether to take it or not. 16

Despite a high level of willingness to get the COVID-19 vaccinations (81.25%), we found that our study population had a relatively lower level of knowledge in relation to few aspects of COVID vaccine, which might be a significant cause of vaccine hesitation among those who do not want to accept the vaccine. In our study, although vaccination was more among urban population (78.5%), apprehension before vaccination was also significantly higher among urban study participants (66.5%). Healthcare workers motivated study subjects to get vaccinated and it was significantly higher among the rural population (48.0%). Source of vaccination was mainly Government Sector in both urban and rural population, while the prime reason for delayed 2nd dose of COVID -19 vaccine was less education as well as higher vaccination in rural area were due to motivation by healthcare workers.¹⁷ Reasons for hesitancy are different from person to person and therefore, a one-size-fits-all approach cannot be utilized to implement an effective intervention addressing vaccine hesitancy. In India, a significant proportion of the population needs to be vaccinated to minimize the public health threat of the COVID-19 pandemic. It is important to address vaccine hesitancy in both urban and rural parts of India with aggressive campaigns involving the whole community.

Limitations of the study

The study had some limitations. With cross-sectional design, the study was restricted only to one geographical setting and difficult to assess causal and effect relationships. Despite the above limitations, our study was among the few, to assess the urban-rural differences in COVID-19 vaccine acceptance in the Indian perspective.

CONCLUSION

The study aimed to assess the awareness about COVID-19 and its vaccine among the adult population of an urban slum and rural villages who were at risk of the disease. Awareness for COVID-19 infection and prevention of the disease was important contributory factors for the control of COVID-19 infection. Targeted interventions could be developed for with increasing awareness regarding the disease and availability of COVID-19 vaccines, population-based vaccination program which, in long term, can decline the trend of the pandemic.

ACKNOWLEDGMENT

NRS Medical College and Hospital.

REFERENCES

- Randolph HE and Barreiro LB. Herd immunity: Understanding COVID-19. Immunity. 2020;52(5):737-741.
 - https://doi.org/10.1016/j.immuni.2020.04.012
- MacDonald NE. Vaccine hesitancy: Definition, scope and determinants. Vaccine. 2015;33(34):4161-4164.
 - https://doi.org/10.1016/j.vaccine.2015.04.036
- Dubé E, Laberge C, Guay M, Bramadat P, Roy R and Bettinger J. Vaccine hesitancy: An overview. Hum Vaccin Immunother. 2013;9(8):1763-1773.
 - https://doi.org/10.4161/hv.24657
- Hildreth JE and Alcendor DJ. Targeting COVID-19 vaccine hesitancy in minority populations in the US: Implications for herd immunity. Vaccines (Basel). 2021;9(5):489.
 - https://doi.org/10.3390/vaccines9050489
- Soares P, Rocha JV, Moniz M, Gama A, Laires PA, Pedro AR, et al. Factors associated with COVID-19 vaccine hesitancy. Vaccines (Basel). 2021;9(3):300.
 - https://doi.org/10.3390/vaccines9030300
- Robertson E, Reeve KS, Niedzwiedz CL, Moore J, Blake M, Green M, et al. Predictors of COVID-19 vaccine hesitancy in the UK household longitudinal study. Brain Behav Immun. 2021;94:41-50.
 - https://doi.org/10.1016/j.bbi.2021.03.008
- Wang C, Han B, Zhao T, Liu H, Liu B, Chen L, et al. Vaccination willingness, vaccine hesitancy, and estimated coverage at the first round of COVID-19 vaccination in China: A national crosssectional study. Vaccine. 2021;39(21):2833-2832.
 - https://doi.org/10.1016/j.vaccine.2021.04.020
- 8. Al-Sanafi M and Sallam M. Psychological determinants of

- COVID-19 vaccine acceptance among healthcare workers in Kuwait: A cross-sectional study using the 5C and vaccine conspiracy beliefs scales. Vaccines (Basel). 2021;9(7):701.
- https://doi.org/10.3390/vaccines9070701
- Ali M and Hossain A. What is the extent of COVID-19 vaccine hesitancy in Bangladesh? A cross-sectional rapid national survey. BMJ Open. 2021;11(8):e050303.
 - https://doi.org/10.1136/bmjopen-2021-050303
- Barello S, Nania T, Dellafiore F, Graffigna G and Caruso R. "Vaccine hesitancy" among university students in Italy during the COVID-19 pandemic. Eur J Epidemiol. 2020;35(8):781-783.
 - https://doi.org/10.1007/s10654-020-00670-z
- Murphy J, Vallières F, Bentall RP, Shevlin M, McBride O, Hartman TK, et al. Psychological characteristics associated with COVID-19 vaccine hesitancy and resistance in Ireland and the United Kingdom. Nat Commun. 2021;12(1):29.
 - https://doi.org/10.1038/s41467-020-20226-9
- Sallam M. COVID-19 vaccine hesitancy worldwide: A concise systematic review of vaccine acceptance rates. Vaccines (Basel). 2021;9(2):160.
 - https://doi.org/10.3390/vaccines9020160
- 13. Senthil R, Kunchithapathan B, Ramalingam S and Manivannan P.

- COVID-19 Awareness and its impact in rural and urban Puducherry--a community based cross sectional study. J Evol Med Dent Sci. 2020;9(51):3862-3868.
- Sinha A. Assessment of knowledge, attitude & perception towards COVID-19 vaccine among the rural and urban population of Navi Mumbai: An Alarming Scenario. Indian J Prevent Soc Med. 2022;53(3):184-192.
- Lazarus JV, Ratzan SC, Palayew A, Gostin LO, Larson HJ, Rabin K, et al. A global survey of potential acceptance of a COVID-19 vaccine. Nat Med. 2021;27(2):225-228.
 - https://doi.org/10.1038/s41591-020-1124-9
- Samanta S, Banerjee J, Kar SS, Ali KM, Giri B, Pal A, et al. Awareness, knowledge and acceptance of COVID-19 vaccine among the people of West Bengal, India: A web-based survey. Vacunas. 2022;23:S46-S54.
 - https://doi.org/10.1016/j.vacune.2022.08.004
- Joshi A, Surapaneni KM, Kaur M, Bhatt A, Nash D and El-Mohandes A. A cross sectional study to examine factors influencing COVID-19 vaccine acceptance, hesitancy and refusal in urban and rural settings in Tamil Nadu, India. PLoS One. 2022;17(6):e0269299.
 - https://doi.org/10.1371/journal.pone.0269299

Authors Contribution:

SS- Definition of intellectual content, literature survey, prepared first draft of manuscript, implementation of study protocol, data collection, data analysis, manuscript preparation, and submission of article; **AC**- Concept, design, study protocol, manuscript preparation, editing, and manuscript revision; **DH**- Concept, design, study protocol, manuscript preparation, editing, and manuscript revision.

Work attributed to:

NRS Medical College and Hospital, Kolkata, West Bengal, India.

Orcid ID:

Source of Funding: None, Conflicts of Interest: None.