RESEARCH ARTICLE

COVID-19 Vaccination Status in Bogura District in Bangladesh

Subrina Jesmin[1,2]*, Adil Maqbool[3,4], Farzana Sohael[5], Md. Majedul Islam[2,6], Yujiro Matsuishi[2], Takeru Shima[7], Nobutake Shimojo[6], Satoru Kawano[8], Md. Arifur Rahman[9], Naoto Yamaguchi[8] and Masao Moroi[1]

[1]Faculty of Medicine, Toho University Graduate School of Medicine, Tokyo, Japan
[2]Health & Disease Research Centre for Rural Peoples (HDRCRP), Mohammadpur, Dhaka-1207, Bangladesh
[3]Allama Iqbal Medical College, University of Health Sciences (UHS) Lahore, Pakistan
[4]Jinnah Hospital, Lahore, Pakistan
[5]Department of Gynecology, Dhaka Medical College, Dhaka, Bangladesh
[6]Department of Emergency and Critical Care Medicine, Faculty of Medicine, University of Tsukuba, Tsukuba, Ibaraki, Japan
[7]Department of Health and Physical Education, Cooperative Faculty of Education, Gunma University, Gunma, Japan
[8]Ibaraki Prefectural University of Health Sciences, Ami, Japan
[9]Shaheed Ziaur Rahman Medical College, Bogura, Bangladesh

ABSTRACT

Background: Coronavirus Disease (COVID-19) vaccines have been licensed for usage and have been delivered over the globe in various regions. There is a lack of public awareness and understanding of COVID-19 vaccinations, however. As a result, researchers conducted a survey to see what Bangladeshis had to say about COVID-19 vaccinations.

Methods: This cross-sectional study, conducted among the general population of Bangladesh, asked a series of questions about the KAP of the population with regard to COVID-19 vaccination, and the demographic characteristics of participants and the source of information with regard to the COVID-19 vaccine were recorded and analyzed.

Results: A total of 386 complete surveys were included in the final analysis. 35.2% of people, who took part in it, said that everyone in Bangladesh should get the COVID-19 vaccine, while 64.8% said no to this idea. As a result of our survey, 73.6% of respondents believed that the new COVID-19 vaccination, which is now used in Bangladesh, may cause negative effects. Although a large number of the population was illiterate (44.6%), our study indicated that those with higher levels of education had a better understanding of the COVID-19 vaccination. This research indicated that those who had previously received a vaccination had a better understanding of the COVID-19 vaccine. For this to be successful, people must have had positive vaccination experiences in the past. There is a far greater awareness about COVID-19 vaccinations in urban areas compared to rural places. However, when multiple regressions were used, this association did not hold up.

Conclusion: In Bangladesh, many are unfamiliar with the COVID-19 vaccination, but they have a positive attitude toward it. Before mass vaccines are planned in the near future, health education campaigns must begin immediately to assist people in better understanding their health.

INTRODUCTION

COVID-19 has spread to practically every nation since it was discovered in Wuhan City, China, in December 2019 [1]. The disease is still spreading at a breakneck pace. As of September 29, 2021, 232 million individuals had been verified to have the sickness, and 4.7 million had perished from it [2]. Without universal vaccination, social isolation and the wearing of masks are the only options to halt the spread of diseases [3]. These defensive measures have had a profound effect on our social life and economy in a number of nations [4].

As a result, the COVID-19 virus has become a primary cause of mortality in the United States, owing to the country's failure to take adequate measures to prevent the virus's spread [5]. The severity of the pandemic and the increase in morbidity and death indicate that widespread vaccination is necessary [6]. Thus, vaccination is the primary means of combating the COVID-19 pandemic [7]. At least 13 different vaccinations are being administered to individuals worldwide to protect them against COVID-19 [8]. Scientists developed effective vaccinations via a combination of old and novel approaches. They employed a variety of various technologies to create a novel vaccine, including mRNA, viral vectors, inactivated, and protein subunits. Most vaccine candidates targeted the viral spike protein and the portion of it that interacts with receptors. This domain, in conjunction with the human angiotensin-converting enzyme-2 receptor, allows the virus to enter human epithelial cells.

COVID-19 vaccine hesitancy has been studied in countries all over the world. The studies found that different socioeconomic and demographic factors, different constructs of the Health Belief Model (HBM) [9], level of knowledge [10] about the vaccine, attitudes toward COVID-19 vaccination [11], conspiracy beliefs about the origin, effectiveness, and consequences of vaccines, and other factors all play a role in vaccine hesitancy [12,13].

METHODS

This was a long-term, community-based study that took place in Bogura Sadar Upazila (sub-district) in Bogura, Bangladesh. We had 386 people from both rural and urban areas take part in our study at the same time.

It took place from November 16 to December 27 in 2021. Table 1 shows the demographics of the people who took the survey. In the survey, there were four groups of questions: demographics, knowledge, attitudes, and behaviors. The first part of the survey asked about the respondent's job, age, and current place of residence. COVID-19 vaccine side effects, routes of infection, and prevention methods were all looked at in the second part of the study. The third part of the survey was about how afraid people were of the virus. There was a fourth part that talked about where you can get more information about COVID-19. When a person was asked the fourth question, they could only choose one answer. The other questions (side effects, COVID-19 vaccines are safe in the long term, daily life difficulties, symptoms time of COVID-19 side effects, knowledge sources, suffer from any chronic disease) were multiple-choice questions in which a person could choose more than one answer.

Ethics and informed consent

Prior to survey participant recruitment, the study was authorized by the review board of our institution's research committee. Each participant was provided with full access to all research materials and was assured of total secrecy. The research included only individuals who consented.

Statistical analysis

We utilized the chi-square test to evaluate all categorical comparisons between the two groups (IBM SPSS Statistics, version 20 and STATA, version 10). The statistics in the Tables and Figures are expressed as percentage (%). For all factors in this investigation, a p-value of 0.05 was deemed statistically significant.

RESULTS

The 386 full questionnaires were included in the final analysis. Rural areas had 44.8% of the people who took part in the research, while cities had 55.2%. Male respondents made up 50.8% of the sample, while female respondents made up 49.2% of the sample. The mean age of the group was 38.8 ± 13.1. Almost half of the people were not able to read or write (44.6 %). The majority of people who took part in the survey (85.0%) are married, while the rest are single (13.2%). 34.2% of the people who took part in the study are housewives. The rest are self-employed (0.3%), work for the government (4.2%), or own a business (20.8%). People who

Table 1: Sociodemographic characteristics of study subjects (n = 386).

Variables	Percentage (%)
Age in years	
< 20	4.7
20-40	56.5
41-60	31.9
≥ 61	7.0
Gender (%)	
Male	50.8
Female	49.2
Residence	
Rural	44.8
Urban	55.2
Education	
No education	44.6
Primary education	8.7
Secondary education	20.5
Higher education	26.2
Marital status	
Unmarried	13.2
Married	85.0
Divorce	0.5
Widow	1.3
Occupation	
House Wife	34.2
Self-Employment	0.3
Government Job	4.2
Non-Government Job	7.7
Business	20.8
Others	32.7
Monthly income (BDT.)	
TK.< 10000	52.8
TK. > = 10000	47.2

Values are presented as percentage (%). Based on pearson Chi-square test.

make less than 10,000 BDT a month (52.8 %). As for the rest, it's more than or equal to ten thousand BDT (Table 1).

In the adverse effects of the COVID-19 vaccine in comparison to those who were not immunized, there was a significant difference in swelling ($p = 0.002$), redness ($p < 0.001$), itching ($p < 0.001$), fever ($p = 0.007$), and headache ($p = 0.033$) between those who were not vaccinated and those who were vaccinated (completed). There was no statistically significant difference in muscular discomfort, fatigue, coughing, diarrhea, nausea and vomiting, shortness of breath, joint pain, or fainting (Table 2).

When it comes to the association between the study subjects' side effects of the COVID-19 vaccine and their gender (male *vs.* female) in the COVID-19 general population, there was no statistically significant result in swelling ($p = 0.092$), redness ($p = 0.530$), itching ($p = 0.572$), fever ($p = 0.079$), headache ($p = 0.843$), muscle pain, tiredness, coughing, diarrhea, nausea and vomiting, breathlessness, joint pain, and fainting using Chi-square (Table 3).

Table 4 Binary Logistic Regression study of patients with COVID-19 vaccine-related side effects by age in the general population [Odds Ratio (CI), 0.29 (0.22-0.39), redness 0.27 (0.19-0.39)].

The adverse events experienced by various kinds of COVID-19 vaccines. The findings indicated a significant relationship between vaccination type and a variety of adverse reactions, including swelling ($p = 0.400$), redness ($p < 0.001$), itching ($p < 0.001$), fever ($p = 0.703$), and headache ($p = 0.069$) (Table 5).

Additionally, almost a third of instances (31.3%) reported that these adverse effects lasted one to three days, and 65.6

Table 2: **The side effects of the COVID-19 vaccine are based on with or without vaccinated.**

Side effects	No vaccinated (*n* = 130, 33.7%)	Vaccinated (*n* = 256, 66.3%)	*p-value*
Swelling	4.9	15.3	0.002*
Redness	35.7	64.3	< 0.001*
Itching	31.4	55.8	< 0.001*
Fever	6.3	15.0	0.007*
Headache	1.3	5.2	0.033*
Muscle pain	5.4	6.0	0.802
Tiredness	4.5	9.0	0.089
Coughing	1.3	3.0	0.274
Diarrhea	1.3	4.5	0.068
Nausea and vomiting	1.5	4.2	0.208
Breathlessness	3.1	5.8	0.288
Joint pain	2.2	1.5	0.627
Fainted	3.1	7.6	0.112

Values are presented as percentages (%). Based on the Pearson Chi-square test. Significant at p < 0.05*.
COVID-19: Coronavirus Disease-2019.

Table 3: The side effects of the COVID-19 vaccine are based on gender among the general population.

Side effects	Male (*n* = 196)	Female (*n* = 190)	*p-value*
Swelling	6.3	11.9	0.092
Redness	45.8	49.3	0.530
Itching	42.1	39.2	0.572
Fever	12.1	6.6	0.079
Headache	2.6	3.0	0.843
Muscle pain	3.7	7.8	0.090
Tiredness	4.2	8.4	0.101
Coughing	2.6	1.2	0.333
Diarrhea	1.6	3.6	0.226
Nausea and vomiting	1.5	4.2	0.193
Breathlessness	3.8	5.1	0.618
Joint pain	2.1	1.8	0.840
Fainted	4.5	6.0	0.611

Values are presented as percentages (%). Based on the Pearson Chi-square test. Significant at p < 0.05*.
COVID-19: Coronavirus Disease-2019.

% said that they lasted less than one day (Figure 1).

The study's subjects reported contracting COVID-19 after vaccination. Following vaccination, the number of individuals (19.1%) expressed increased confidence and urged others to do the same (35.2%). The majority of participants (85.2%) also adhered to sterilization and social distancing measures, as well as wearing medical face masks after immunization, whereas 64.8% felt COVID-19 vaccinations were safe over the long term and 73.6% reported experiencing adverse effects (Figure 2). The majority of participants (77.4%) had received the Sinopharm vaccine (Figure 3). The research found that redness (47.5%) and itching (40.7%) were more likely to cause negative effects (Figure 4).

The participants learned about the COVID-19 vaccination, with the majority (49.0%) coming through friends and family, followed by government-owned media platforms (17.7%), social media (27.8%), and scientific and medical websites (1.4%) (Figure 5).

DISCUSSION

COVID-19 has become a worldwide health issue, and the world is waiting for a vaccine to end the epidemic. Some COVID-19 vaccines have been licensed for human use, while others are still in the development stage. Vaccination may be postponed for a variety of reasons, including a lack of awareness, fear, and other forms of reluctance. The introduction of a new vaccine might lead to a spike in vaccination hesitancy, and when it comes to vaccination hesitancy, people's views about vaccine safety and efficacy are the most relevant factors [14].

In early 2019, the World Health Organization ranked vaccination hesitancy among the top 10 dangers to public

Table 4: The association of side effects of the COVID-19 vaccine with age among the general population.

Side effects	Age ≥ 50	Age < 50	p-value	OR (95% CI)
Swelling	10.9	1.6	0.021*	0.29 (0.22-0.39)
Redness	47.2	48.5	0.841	0.27 (0.19-0.39)
Itching	39.9	44.0	0.516	0.24 (0.17-0.34)
Fever	9.9	8.2	0.664	0.26 (0.20-0.34)
Headache	3.5	0.0	0.105	0.27 (0.21-0.34)
Muscle pain	5.3	6.8	0.608	0.25 (0.19-0.33)
Tiredness	5.6	8.2	0.413	0.25 (0.19-0.33)
Coughing	1.8	2.7	0.593	0.26 (0.20-0.33)
Diarrhea	2.5	2.7	0.894	0.26 (0.20-0.33)
Nausea and vomiting	3.0	1.9	0.667	0.27 (0.20-0.36)
Breathlessness	5.1	1.9	0.328	0.27 (0.20-0.37)
Joint pain	1.8	2.7	0.593	0.26 (0.20-0.33)
Fainted	5.1	5.8	0.842	0.26 (0.19-0.36)

Values are presented as percentages (%). Based on binary logistic regression. Significant at $p < 0.05$*.
COVID-19: Coronavirus Disease-2019; OR: Odds Ratio; CI: Confidence Interval.

Table 5: The side effects according to different types of COVID-19 vaccine.

Side effects	Astra Zeneca/Oxford	Pfizer-BioNTech	Sinopharm	Moderna	p-value
Swelling	3.4	12.5	13.6	25.0	0.400
Redness	20.7	52.9	66.3	75.0	< 0.001*
Itching	19.4	40.0	59.9	66.7	< 0.001*
Fever	6.5	12.5	12.7	0.0	0.703
Headache	0.0	6.2	3.3	25.0	0.069
Muscle pain	9.7	6.2	5.5	0.0	0.802
Tiredness	9.7	11.8	7.7	0.0	0.874
Coughing	0.0	6.2	1.7	0.0	0.471
Diarrhea	0.0	0.0	3.8	0.0	0.576
Nausea and vomiting	14.3	0.0	3.6	0.0	0.464
Breathlessness	14.3	0.0	4.3	0.0	0.547
Joint pain	0.0	0.0	1.1	0.0	0.906
Fainted	14.3	10.0	5.0	0.0	0.689

Values are presented as percentages (%). Based on the Pearson Chi-square test. Significant at $p < 0.05$*.
COVID-19: Coronavirus Disease-2019.

health [15]. There are also concerns about the vaccine's ability to protect against novel COVID-19 mutations. People may be cautious with COVID-19 vaccinations; therefore, we need to find out what is making them hesitant. As a result, more individuals may be willing to try the COVID-19 vaccination.

When we conducted our survey, we interviewed people in Bangladesh about their thoughts, attitudes, and understanding of the COVID-19 vaccinations. COVID-19 vaccination knowledge, attitudes, and perceptions were examined in relation to a broad range of social-demographic variables in this research. COVID-19 vaccine awareness and health education campaigns will benefit from our results.

Most of the surveyed participants had little idea what

COVID-19 vaccinations were or how they worked. They mostly heard about it from friends and relatives, whereas government-initiated campaigns had little part in it. In this research, characteristics such as education, household structure, monthly income, and prior vaccination usage were all important factors.

Although a large number of the population was illiterate (44.6%), our study indicated that those with higher levels of education had a better understanding of the COVID-19 vaccination, which is in line with prior findings [16]. COVID-19 was better understood by those with a higher level of education. Having access to more knowledge and participating in life events like COVID-19 vaccines, persons with higher levels of education may be more conscientious about their health and well-being.

In our study, 35.2% of people, who took part in it, said that everyone in Bangladesh should get the COVID-19 vaccine, while 64.8% said no to this idea.

As a result of our survey, 73.6% of respondents believed that the new COVID-19 vaccination, which is now used in Bangladesh, may cause negative effects. This might be due to media-spread misinformation and myths that drive individuals to be fearful of or avoid vaccinations. Misinformation on social media has been connected to a lack of trust in vaccines, as well as thoughts [17].

This research indicated that those who had previously received a vaccination had a better understanding of the COVID-19 vaccine. For this to be successful, people must have had positive vaccination experiences in the past. There is a far greater awareness about COVID-19 vaccinations in urban areas compared to rural places. However, when multiple regressions were used, this association did not hold up.

With the rapid pace at which vaccines are being developed and some specialists' doubt regarding COVID-19, many people are concerned. According to our research, vaccination should be made available to all citizens of Bangladesh at no cost. Previous research in Indonesia found that most individuals who received the COVID-19 vaccination were ready to pay for it, but this study shows that this is not the case here. Some consumers were prepared to spend as much as $23 for the COVID-19 vaccination, according to another survey [18]. A poll in Ecuador likewise indicated that 86% of those who received the COVID-19 vaccination were prepared to pay for it [19].

This is different from the other countries because a lot of people in Bangladesh have lost their jobs and homes because of COVID-19 lockdowns and quarantines, which have also caused unemployment, hunger, starvation, and social disputes. This has made it hard for people to pay for the COVID-19 vaccine.

LIMITATIONS

When using this study's results, there are a few considerations to keep in mind. Because it was cross-sectional research, no causation can be assigned to the regression models. This implies that the results may not be applicable in the future. A long-term investigation is necessary for this scenario. One of the problems with this study was that the people who took part might give answers that were more likely to be accepted by others. Another drawback of this research was the inability to compare the knowledge, attitudes, and actions of the participants across age groups, genders, educational attainment, marital status, and occupation. Another issue with this research was the lack of consistency in the measures we used to gauge participants' levels of knowledge, attitudes, and actions. In order to minimize the consequences of the pandemic, health regulators and planners will need to make sure that most people get vaccinated.

CONCLUSION

However, a COVID-19 vaccination might be a ray of hope for the future as COVID-19 continues to spread over the globe. People in Bangladesh may not know much about COVID-19 vaccinations, but they have a very positive attitude about it, according to this research. According to the results, health officials should implement immediate health education campaigns and disseminate more accurate information. Vaccine hesitancy is exacerbated and fostered by disinformation in the media, and policymakers should make efforts to ensure that people have enough knowledge, favorable attitudes, and positive views of COVID-19 vaccinations.

ACKNOWLEDGMENT

Financial Disclosure

Conflict of Interest

The authors declare that they have no conflict of interest.

Informed Consent

All study participants provided written informed consent.

Author Contributions

SJ has designed and executed the study. SJ has also drafted the manuscript. AM, FS, MMI, YM, NS, SK, MAR, NY, and MM have assisted in sample collection and analysis. SJ and TS supervised this manuscript preparation and provided critical editing.

REFERENCES

1. CDC COVID-19 response team, Jorden MA, Rudman SL, Villarino E, Hoferka S, Patel MT, Bemis K, Simmons CR, Jespersen M, Johnson JI, Mytty E, Arends KD, Henderson JJ, Mathes RW, Weng CX, Duchin J, Lenahan J, Close N, Bedford T, Boeckh M, Chu HY, Englund JA, Famulare M, Nickerson DA, Rieder MJ, Shendure J, Starita LM. Evidence for limited early spread of COVID-19 within the United States, January-February 2020. Morbidity and Mortality Weekly Report. 2020 June 5;69(22):680-684. https://bit.ly/3Fol901

2. WHO Coronavirus Disease (COVID-19) Dashboard. September 30, 2021. https://bit.ly/3weUKO

3. Daria S, Asaduzzaman M, Shahriar M, Islam MR. The massive attack of COVID-19 in India is a big concern for Bangladesh: The key focus should be given on the interconnection between the countries. Int J Health Plann Manage. 2021 Sep;36(5):1947-1949. doi: 10.1002/hpm.3245. Epub 2021 May 19. PMID: 34014016; PMCID: PMC8239703.

Subject Area(s): **VACCINES | VIROLOGY**

4. Doyle AA, Friedlander MS, Li GD, Marble W, Smith CJ, Baronia N, Calkins CR, Chang T, Harris M, Kolker S, Traboulsi AA, Zerbe A, Srinivasan, The evidence and tradeoffs for a'Stay-at-Home'pandemic response: A multidisciplinary review examining the medical, psychological, economic and political impact of 'Stay-at-Home' implementation in America. SSRN. 2020 April 18. doi: 10.2139/ssrn.3578841.

5. Woolf SH, Chapman DA, Lee JH. COVID-19 as the Leading Cause of Death in the United States. JAMA. 2021 Jan 12;325(2):123-124. doi: 10.1001/jama.2020.24865. PMID: 33331845; PMCID: PMC8553021.

6. Moona AA, Islam MR. Mucormycosis or black fungus is a new fright in India during covid-19 pandemic: Associated risk factors and actionable items. Public Health Pract (Oxf). 2021 Nov;2:100153. doi: 10.1016/j.puhip.2021.100153. Epub 2021 Jun 21. PMID: 34179859; PMCID: PMC8215889.

7. CDC. Benefits of Getting a COVID-19 Vaccine. February 24, 2021.

8. World Health Organization. Coronavirus disease (COVID-19): Vaccines. August 27, 2021. https://bit.ly/3P6Ovokv

9. Mercadante AR, Law AV. Will they, or Won't they? Examining patients' vaccine intention for flu and COVID-19 using the Health Belief Model. Res Soc Adm Pharm. 2021; https://doi.org/10.1016/j.sapharm.2020.12.012 PMID: 33431259

10. Ruiz JB, Bell RA. Predictors of intention to vaccinate against COVID-19: Results of a nationwide survey. Vaccine. 2021 Feb 12;39(7):1080-1086. doi: 10.1016/j.vaccine.2021.01.010. Epub 2021 Jan 9. PMID: 33461833; PMCID: PMC7794597.

11. Paul E, Steptoe A, Fancourt D. Anti-vaccine attitudes and risk factors for not agreeing to vaccination against COVID-19 amongst 32,361 UK adults: Implications for public health communications. medRxiv. 2020. doi: 10.1101/2020.10.21.20216218

12. Sallam M, Dababseh D, Eid H, Al-Mahzoum K, Al-Haidar A, Taim D, Yaseen A, Ababneh NA, Bakri FG, Mahafzah A. High Rates of COVID-19 Vaccine Hesitancy and Its Association with Conspiracy Beliefs: A Study in Jordan and Kuwait among Other Arab Countries. Vaccines (Basel). 2021 Jan 12;9(1):42. doi: 10.3390/vaccines9010042. PMID: 33445581; PMCID: PMC7826844.

13. Rhodes A, Hoq M, Measey MA, Danchin M. Intention to vaccinate against COVID-19 in Australia. Lancet Infect Dis. 2021 May;21(5):e110. doi: 10.1016/S1473-3099(20)30724-6. Epub 2020 Sep 14. PMID: 32941786; PMCID: PMC7489926.

14. Ferdous MZ, Islam MS, Sikder MT, Mosaddek ASM, Zegarra-Valdivia JA, Gozal D. Knowledge, attitude, and practice regarding COVID-19 outbreak in Bangladesh: An online-based cross-sectional study. PLoS One. 2020 Oct 9;15(10):e0239254. doi: 10.1371/journal.pone.0239254. PMID: 33035219; PMCID: PMC7546509.

15. Ten health issues WHO will tackle this year. 2019. https://bit.ly/3P0IEki

16. Jesmin S, Maqbool A, Sohael F, Islam MM, Matsuishi Y, Shima T, Shimojo N, Kawano S, Rahman MA, Yamaguchi N, Moroi M. COVID-19 Community Survey, Knowledge, Attitude and Practice by Bangladeshi Population. Journal of Biomedical Research & Environmental Sciences. 2022 April 21;3(4):367-372. doi: 10.37871/jbres1450.

17. Puri N, Coomes EA, Haghbayan H, Gunaratne K. Social media and vaccine hesitancy: new updates for the era of COVID-19 and globalized infectious diseases. Hum Vaccin Immunother. 2020 Nov 1;16(11):2586-2593. doi: 10.1080/21645515.2020.1780846. Epub 2020 Jul 21. PMID: 32693678; PMCID: PMC7733887.

18. Wong LP, Alias H, Wong PF, Lee HY, AbuBakar S. The use of the health belief model to assess predictors of intent to receive the COVID-19 vaccine and willingness to pay. Hum Vaccin Immunother. 2020 Sep 1;16(9):2204-2214. doi: 10.1080/21645515.2020.1790279. Epub 2020 Jul 30. PMID: 32730103; PMCID: PMC7553708.

19. Sarasty O, Carpio CE, Hudson D, Guerrero-Ochoa PA, Borja I. The demand for a COVID-19 vaccine in Ecuador. Vaccine. 2020 Dec 3;38(51):8090-8098. doi: 10.1016/j.vaccine.2020.11.013. Epub 2020 Nov 6. PMID: 33187765; PMCID: PMC7832521.