

Self-Reported Side Effects of Different COVID-19 Vaccines in Bangladesh- A Vaccine Recipient Survey

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ABSTRACT:

Background: COVID-19 (coronavirus disease 2019) is a newly discovered disease that originated in China and quickly spread throughout the world, killing millions of people and infecting many more. People have a new hope due to newly discovered vaccines for this fatal disease. However, the vaccines showed a number of side effects on the people receiving them. Nonetheless, it has proven to be helpful in providing protection against fatal infection. **Purpose:** To analyze the probable side effects of the vaccines experienced by vaccine recipient and their belief regarding vaccines. **Method:** An online survey was conducted through different social media platforms and Email from 11 July'2021 to 16 July'2021. Ethical permission and consent were taken prior to the survey and data collection. Occurrence and the extent of vaccine side effects were analyzed using descriptive and logistic regression analysis. **Result:** Among 175 vaccine recipients, 92 (52.58%) received one dose and 83 (47.42%) received two doses, with 93 (53.1%) receiving the SinoPharm vaccine, 78 (44.6%) receiving AstraZeneca vaccine, and 4 (2.3%) receiving Pfizer vaccine. More than half of the respondents experienced side effects among which headaches (50.3%) and drowsiness (45.71%) were common followed by fever (36%) and muscle aches (32%). Female (P=0.000) and vaccine-concerned group (P=0.033) experienced more side effects. Headache (68.8%), fever (40.9%), and drowsiness (50.5%) were more common among Sinopharm recipients. Fever (50%) and muscle aches (50%) were more common among Pfizer recipients while muscle aches (43.5%) and drowsiness (42.3%) were common among the AstraZeneca recipients group. **Conclusion:** Headache, fever, muscular discomfort, soreness at the injection site, drowsiness, nausea, and other adverse effects are common with the COVID-19 vaccination. Females are more susceptible to side effects than males, and the probability of experiencing them increases with the second dose. AstraZeneca vaccine recipients experience more side effects than other types of vaccine recipients.

KEYWORDS: COVID-19 vaccine; side effects; Bangladesh

INTRODUCTION

COVID-19 (Corona Virus Disease 2019) is a newly detected disease caused by SARS-CoV-2, a novel coronavirus of the beta genus. In December of 2019, the illness was first detected in Wuhan, China. The World Health Organization (WHO) declared it a pandemic in January 2020. The illness has infected almost 190 million individuals globally and more than 40 million people have died so far^{1, 2, 3} and is still ongoing. This contagious viral disease has several symptoms like fever, dry cough, tiredness, aches and pains, sore throat, diarrhea, conjunctivitis, headache, loss of taste or smell, severe breathing problems, etc.¹ Though more than 97% of people infected with the deadly virus has already recovered, people having severe respiratory distress ends up dying with multiple organ failure.⁴

To prevent diseases like COVID-19, vaccines are the most important solution as no drugs have yet been successfully developed to treat it. According to WHO, Vaccines are the products that help to achieve immunity against viral organisms by triggering the immune response and producing antibodies. Though developing vaccines is a challenging situation, several renowned pharmaceutical companies have already launched vaccines all over the world approved by the FDA. Besides, billions of people have already been vaccinated.¹ Trials testing of the vaccines were started in March 2020 with 100 candidates among whom four companies were able to clear the phase three trial.⁵ Worldwide vaccination programs began in December 2020 and are still ongoing with vaccines from 6 different companies. Till June 2021, vaccines from Pfizer/BioNtech vaccine, AstraZeneca, Johnson & Johnson, Moderna, Sinopharm and Sinovac have been

finalized for administration. Two doses of the COVID-19 vaccine are necessary to assist in minimizing the severity of the disease since the administration of two doses at the determined time interval is essential to guarantee enhanced immunity.¹

Facing side effects is a very common phenomenon in case of administering any medication whether it is a drug or vaccine, as a foreign substance is being entered into the body. Several reports have already been published about the possible side effects of the Covid-19 vaccines. After administering the doses some side effects like arm soreness, muscle/ joint ache, fever, drowsiness and headache may arise according to reports. Drugs like paracetamol is said to be safe for use to treat these mild side effects but it has been advised to consult a physician if the side effects are too severe to handle. Even after receiving both doses of the vaccine, a person can become infected with the virus if adequate precautions, as described by WHO, are not maintained.¹

The first case of COVID-19 was confirmed in Bangladesh, the South Asian country on March 7, 2020. More than one million individuals have been infected with the virus, with over 16000 people dying as of July 2021. The escalating number of cases has created a concerning scenario in the country.^{3, 6} On January 27, 2021, the government of Bangladesh started a SARS CoV-2 vaccination program and the whole vaccinations process is being handled by a website where people can register, check status and collect their vaccination certificate easily.⁴ In February 2021, the vaccination process started in Bangladesh with the vaccine of AstraZeneca and later vaccines of Pfizer and Sinopharm have also been administered. The first person who took the vaccine was a nurse of Kurmitola General Hospital, and later 25 other influential persons of the country including the Health & Family Welfare Minister were vaccinated. Almost 6 million people were vaccinated till July, 2021, among which 4.28 million people were fully vaccinated.^{7,8}

The hesitancy among people of Bangladesh, regarding the side effects and safety of the vaccines, made them think twice about taking it. People have also faced few minor side effects after taking the shots and they have suggested others to take the vaccines saying it to be safe. In this paper the main focus is to discuss about the side effects of the vaccines reported by the people who have already taken either one or two dose of the vaccine in respect of their age, gender and occupation.

MATERIALS AND METHODS

This study was designed for vaccinated (COVID-19 vaccine) people only in Bangladesh. A cross sectional survey was conducted with both 200 male and female participants of different age groups and occupation. Among them, 175 recipients can remember which vaccine they were given. Only the participants who were diagnosed Covid-19 positive by RT-PCR test and was vaccinated under valid certificates were chosen in our study. The ethical permission was taken from Research Ethics committee of Sapporo Dental College & Hospital, Uttara, Bangladesh. Survey participants were anonymous. However, permissions were taken from each participant whether they want to take part in this survey or not. A questionnaire designed with Google Form was distributed through several online platforms like Face book, Messenger, WhatsApp, LinkedIn and Email from 11 July, 2021 to 16 July, 2021. We made sure that one person can only fill the form once with one unique mail ID. In the questionnaire, the participants were asked about their COVID-19 illness, the vaccination,

and the side effects they experienced after the doses of vaccine, as well as their response to the side effects and their thoughts on the COVID-19 vaccine. The validity and relevancy of the questions with the research was reanalyzed by an expert panel. Following the collection of responses, the data were compiled and analyzed using SPSS Statistical software. Socio-demographic factors and vaccine related information were expressed by descriptive analysis and reported as frequency and percentage (%).

Those respondents who were not hesitant and confident about the safety and efficacy of the vaccination, they were considered as keen to receive vaccine. On the other hand, those respondents who were hesitant and concerned about the safety and efficacy of the vaccination, they were considered as concerned about vaccine.

Graphical presentations were used to show in incidences of Covid-19 infection before and after the vaccination. The side effect of vaccination and the duration of the side effects were also presented by that. Multivariate logistic regression was performed to observe the comparison in incidence of side effects among different vaccine recipients, comparison among participants according to presence or absence of prior Covid-19 infections, among participants according to keen or concern level regarding vaccine.

RESULT

Among the 175 respondents, majority were female (55%), younger age group (<25 years) and students (58.28%). Among the vaccine recipients, 23.4% had the history of COVID positive before receiving 1st dose of vaccine, however, this percentage gradually decreased, after receiving the 1st dose, it was 7.4% and after receiving 2nd dose it was 3.4% (Table-1). Though 37.7% of the respondents hesitated to take vaccine, a significant proportion considered the Covid-19 vaccine safe (80%) and effective (81%).

Table-1: Information of Participants

Variable	Participants	percentage
Age (years)		
Mean±Std. Deviation	31.19±12.53	
Gender		
Male	79	45%
Female	96	55%
Age group in years		
Mean age ± SD		
<25	21.7±1.6	103 58.9%
26-35	33±2.8	11 6.3%
36-45	41.5±2.3	33 18.9%
46-55	50.4±3.1	23 13.1%
>56	64±2.9	05 2.9%
Occupation		
Student	102	58.28%
Job Holder	19	10.85%
Housewife	15	8.57%
Teacher	13	7.43%
Businessperson	9	5.14%
Medical Representative	8	4.57%
Doctor	6	3.43%
Others	3	1.71%
Attitude towards Vaccine		
Hesitate to take vaccine	66	37.7%
Considered the Covid-19 vaccine to be safe	140	80%
Considered the vaccine to be effective against COVID-19	142	81.1%

Having History of Covid Positive		
Covid positive and negative before 1st dose		
Covid positive before 1st dose	41	23.4%
Covid negative before 1st dose	134	76.6%
Covid positive and negative before 2nd dose		
Covid positive before 2nd dose	13	7.4%
Covid negative before 2nd dose	162	92.6%
Covid positive and negative after 2nd dose		
Covid positive after 2nd dose	6	3.4%
Covid negative after 2nd dose	169	96.6%
Total Covid Positive	55	31.4%
Total Covid negative	120	68.6%
Name of Vaccine's Company		
AstraZeneca	78	44.6%
Sinopharm	93	53.1%
Pfizer	4	2.3%
Number of Dose Vaccinated		
One	92	52.58%
Two	83	47.42%

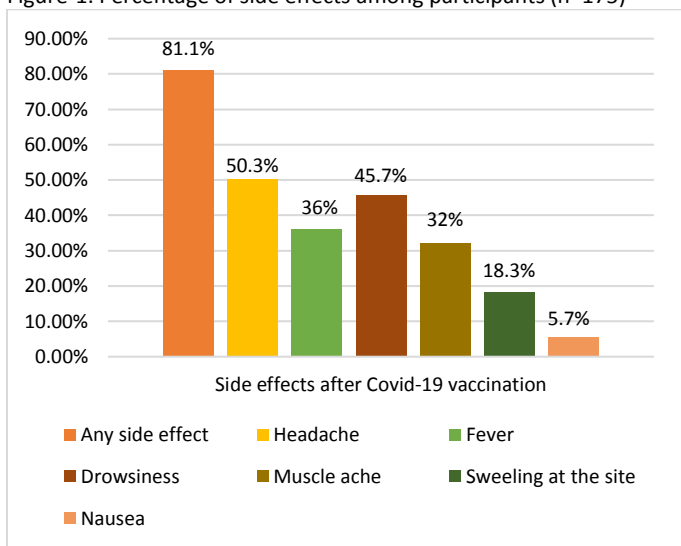
Table-2: Percentage (%) of different vaccine types according to 1st and 2nd doses

Number of doses	Company name of the vaccines			Total vaccinated
	AstraZeneca	Sinopharm	Pfizer	
1st dose	78 (44.6%)	93 (53.1%)	4 (2.3%)	175
2nd dose	37 (44.6%)	44 (53%)	2 (2.4%)	83

Vaccine Side Effects Overview

More than three quarter (81.1%) of the respondents experienced side effects of the COVID vaccine. Majority of the respondents felt headache (50.3%) and drowsiness (45.7%) as side effects followed by fever (36%) and muscle ache (32%) (Fig-1). Furthermore, among those, who took only the first dose vaccine (n=92) at the time of data collection, the percentage of side effect was 77% (n=71) while among the 2 dose recipients (n=83), it was 85.5% (n=71).

Figure-1: Percentage of side effects among participants (n=175)



Female respondents of this study tend to have more side effects than male except injection site swelling side effects (Table-3).

Table-3: Comparison in the occurrence of side effects among male and female

Side effect	Male (%)	Female (%)	P-value
Any side effects	32%	67.6%	0.000
Headache	27.3%	72.7%	0.000
Fever	28.6%	71.4%	0.001
Drowsiness	10%	90%	0.000
Muscle ache	46.4%	53.6%	0.815
Swelling at the site of injection	56.3%	43.7%	0.162
Nausea	0%	100%	0.003

Headache and Nausea were more common among Sinopharm vaccine recipients (P<0.05) while muscle ache were more common among Pfizer (50%) and AstraZeneca (43.5%) recipients (P<0.05). Among the other side effects, fever was predominant amongst Pfizer and Sinopharm recipients. On the other hand, drowsiness is prevalent among AstraZeneca and Sinopharm recipients. (Table-4)

Table-4: Comparison in occurrence of side effects among participants who vaccinated with different companies' vaccines-

Side effects	AstraZeneca (In percentage)	Sinopharm (In percentage)	Pfizer (In percentage)	Chi-square test, p-Value
Any side effects	87.2	77.4	50	.073
Headache	30.8	68.8	00	.000
Fever	29.5	40.9	50	.255
Drowsiness	42.3	50.5	00	.100
Muscle ache	43.5	21.5	50	.006
Swelling at the site of injection	23.1	14	25	.290
Nausea	1.3	9.7	00	.055

Overall, occurrence of vaccine side effects was more common among COVID-19 previous infectious group than the non-infectious group except muscle ache. However, swelling at the site of injection was significantly high among previous COVID-19 infectious group (P=0.006). (Table-5)

Table-5: Comparison in occurrence of side effects among participants who had or did not have a prior COVID-19 infection-

Side effects	Among previous Covid-19 infectious group (In percentage)	Among previous Covid-19 non-infectious group (In percentage)	Side Effects: Risk Ratio (95% CI)	Side Effects: Multivariate Logistic Regression, p-Value
Any side effects	85.5%	79.2%	1.365 (0.715-2.6)	0.810
Headache	56.4%	47.5%	1.277 (0.82-1.989)	0.423
Fever	38.2%	35%	1.098	0.493

			(0.702-1.718)	
Drowsiness	50.9%	43.3%	1.23 (0.795-1.907)	0.666
Muscle ache	23.6%	35.8%	0.658 (0.385-1.123)	0.412
Swelling at the site of injection	37.7%	11.7%	2.174 (1.439-3.285)	0.006
Nausea	9.1%	4.2%	1.65 (0.851-3.197)	0.109

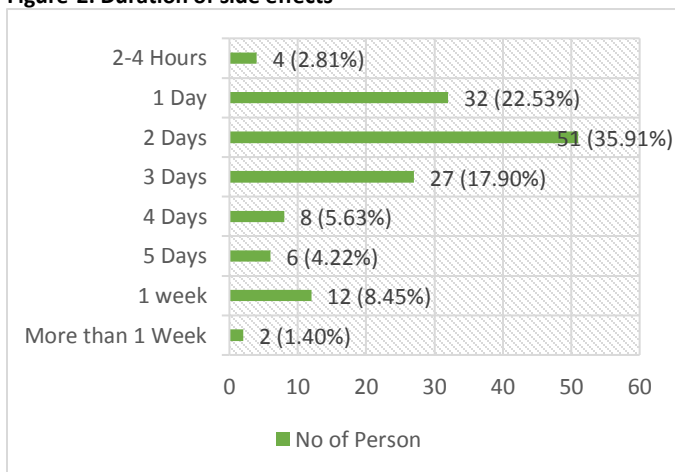
Experience of drowsiness, muscle ache, swelling at the site of injection, and nausea were about 2.5, 1.2, 1.9, and 1.8 times prevalent respectively among the concerned group. Statistically significant value (p< 0.05) was found in case fever, drowsiness and headache. (Table-6).

Table-6: Differences in the of side effects among people who were keen to receive the vaccine versus those who were concerned about receiving the vaccine.

Side effects	Side Effects: Risk Ratio (95% CI)	Side Effects: Multivariate Logistic Regression, p-Value
Any side effects	0.823 (0.743-0.911)	0.033
Fever	0.610 (0.205-1.812)	0.014
Drowsiness	2.529 (0.913-7.006)	0.000
Muscle ache	1.198 (0.436-3.288)	0.377
Swelling at the site of injection	1.976 (0.702-5.568)	0.542
Nausea	1.865 (0.317-10.96)	0.978
Headache	0.075 (0.010-0.555)	0.000

The duration of these side effects ranged from a few hours to over a week. The majority of individuals (36.91%) stated that they had post COVID-19 vaccine adverse effects for two days. Duration of side effects was ranging from 2-4 hours to even more than 1 week (Fig-2).

Figure-2: Duration of side effects



DISCUSSION

In this paper we have demonstrated information obtained from a survey performed on 175 people who have taken either one or two doses of the vaccine of COVID-19. These individuals range in age and employment, with the majority of them being students. This study included a total of 96 female and 79 male participants (Table-1) from different parts of Bangladesh. They reported receiving vaccinations from three companies: AstraZeneca, Pfizer, and Sinopharm. It is one of the pioneer studies conducted in Bangladesh which reported first ever the self-reported side effects comparison of different COVID-19 vaccines

In our study, we found that, a significant number of participants (49.7%) were keen to receive vaccine, a small percentage (8%) were concerned about the safety and efficacy of the vaccine. Almost similar findings were observed in the other study done to reveal the COVID-19 vaccination Intent in Bangladesh. The study reported that, among the participants, 26% demonstrated a definite intent, 43% probable intent, 24% probable negative and 7% a definite negative intention.⁵ Headache, fever, sleepiness, muscular discomfort, soreness at the injection site, nausea, and other adverse effects were experienced by 142(81.1%) participants, with the first four being the most common (Figure-1). This percentage indicates that having side effects after vaccination is a common occurrence. These effects are almost similar as reported in research in United Kingdom and UAE. According to those researchers, the Pfizer-BioNTech, Oxford-AstraZeneca and Sinopharm vaccines induced systemic and local side effects such as headache, tiredness, diarrhea, fever, nausea, itching, swelling, and redness. However, the frequency of these side effects was observed to be lower than in phase 3 vaccination studies. Nevertheless, the vaccines were claimed to reduce the risk of COVID-19 infection within 12 days of vaccination by the researchers.^{9, 10}

Compared to male participants number of female participants facing side effects is more in this survey. In terms of taking vaccine facing side effects almost 96 (67.6%) female participants faced side effects whereas, only 46 (32.4%) male participants experienced same side effects (Table-3). Therefore, females are more vulnerable to the after effects of COVID-19 vaccination than males according to our research. Several studies also reported about more side effects in women than men.^{11, 10}

In our study, more than three-quarters (81.1%) of the respondents experienced side effects of the COVID-19 vaccine. In another study conducted in Bangladesh to find out the adverse effects following COVISHIELD vaccine, the rates of adverse events were 54.1% and 41.3% after the 1st and 2nd doses of vaccine. In our study, majority of the respondents felt headache (50.3%) and drowsiness (45.7%) as side effects followed by fever (36.%) and muscle aches (32%) (Figure 1), while in their study, the most frequent adverse events was pain at the injection site (32.5%) and the fever (20%) following the 1st dose and 12.15% reported fever in the 2nd dose. Only 6.9% reported headache.¹²

In another study of 3 clinical trials in UK, Brazil and South Africa by WHO SAGE Working Group, the headache had been observed among 52.6% of participants, while the phase 1/2 trial found 68% of participants experienced headache.^{13, 14}

Phase 1/2 trial in the UK found generalized body pain among 60% of participants, and the WHO SAGE Working Group paper observed this adverse event among 44% respondents. However, in our study, we only found 43.5% reported this adverse event.^{13, 14, 15, 16}

Vaccine side effects were more common among COVID-19 previous infectious group than the noninfectious group in our study. Swelling at the site of injection was significantly high among previous COVID-19 infection group ($P=0.006$) (Table-5). It is also found significant in another self-reported vaccine side effect survey where they found that, a previous Covid-19 infection was associated with an increased severity of any local side effects ($P<0.001$). Moreover, we found that drowsiness was more than 3 times (RR: 2.529) more among the recipients who were concerned about the safety and efficiency of the vaccine before receiving it in comparison to those who were keen to receive the vaccine ($P=0.000$) (Table-6). In another online survey, they found almost similar findings ($P<0.001$).¹⁷

We found that these side effects persisted from a few hours to over a week. But majority 51(35.9%) stated that they had post COVID-19 vaccine adverse effects for two days (Figure-2). However another study held in Bangladesh found that the mean duration of the symptoms persisted 1.9 ± 1.3 days ($p < 0.01$) for the 1st dose of vaccination while 1.7 ± 0.9 days ($p < 0.01$) following the 2nd dose of vaccination.¹²

Among 78 people taking AstraZeneca vaccine, 68(87.2%) reported facing side effects whereas among 93 Sinopharm and 4 Pfizer vaccine recipients 72(77.4%) and 2 (50%) had side effects respectively. Sinopharm had a higher rate of side effects including headache, muscular ache, and drowsiness than the other two vaccines. However, among the AstraZeneca recipients, the percentage of experiencing fever and discomfort at the injection site was higher (Table-4). As the number of participants taking Pfizer vaccination was lower in number, it was thought to be unjustified to analyze the result regarding its probable side effects.

To overcome the side effects, in our study, 17.65% responded sought medical advice from physicians. On the other hand, 8.2% and 3.9% responded needed medical consultation after their 1st and 2nd dose of vaccination respectively in another study conducted in Bangladesh. Furthermore, in our study, 43.79% used medications to address these side effects, whereas 25.9% and 19.7% responded needed medication after their 1st and 2nd dose of vaccination respectively to manage the side effects in that study.¹² The respondents used Paracetamol, Antibiotics, Antihistamines, NSAIDs, and a variety of other medications to combat these side effects. However, in most of the cases, the side effects were gone without any medical consultation. 120(68.6%) persons reported to be uninfected, whereas 13(7.4%) participants were infected after one dose, 6(3.4%) after two doses, and the remaining 41(23.4%) were infected prior to receiving the vaccination. This data says that vaccination cannot completely protect a person from the disease though the rate is very low according to our survey.

As the vaccine was recently invented, people were hesitating to take it and some were doubtful about its safety and efficacy. In our study, 66(37.7%) of people reported they were hesitant to be vaccinated, whereas 109(62.3%) reported they had no hesitations. Some misconceptions, such as the vaccine's ability to induce illness, appear to be a primary source of skepticism. The data we got from the survey says that majority of the survey population, almost 140(80%), thought the vaccine to be safe and effective though the rest 35(20%) persons thought the exact opposite. Besides, the percentage of hesitant population is also below 50%. This says that most people are confident about the safety of the vaccines they are being given.

Though the numbers think the vaccine to be ineffective and unsafe, it should not be taken lightly. More awareness programs should be arranged to reduce these numbers.

CONCLUSION:

From the overall analysis, it is visible that these COVID vaccines produce either one or several side effects in human body. Among the entire effects headache, fever, muscle ache and drowsiness are the most common side effects. But no fatalities of these effects have yet been reported. These effects lasted from a few hours to several weeks but in most of the cases, the ailed got over within 2 to 4 days. Help from physicians and necessity to take medicines were less common events observed in the side effects facing the population. It can be assumed from this information that the side effects of these vaccines are less harmful and easy to cure with regular medication. Moreover, possibility of COVID-19 infection after taking the vaccine reduces to some extent, though it does not completely nullify the chance of infection. People are also more confident in the vaccine's effectiveness and are less reluctant to be immunized now.

RECOMMENDATIONS: More awareness programs on Covid-19 vaccines should be encouraged regarding its potential roles in preventing COVID-19 infection with minimum side effects.

LIMITATIONS: This survey only recorded the response of the internet users hence cannot be generalized for all socioeconomic groups.

CONFLICT OF INTEREST: The authors declare no conflict of interest.

FUNDING: This research received no external funding.

STUDY APPROVAL STATEMENT: The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Research Ethics Committee of Sapporo Dental College and Hospital, Dhaka, Bangladesh on 2 June 2021 (Reference Number: SDC/C-7/2021/835).

INFORMED CONSENT STATEMENT: Informed consent was obtained from all participants involved in the study.

DATA AVAILABILITY STATEMENT: The data presented in this study are available at reasonable request from the corresponding author.

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