Evaluating the Side Effects of COVID-19 Vaccines Available in Al-Diwaniyah Province

Meraim Attyah Kazaal, Roaa Abid Jaythoom[1], Noor Dakil Mahdi[2], Doaa Yousief Mohammed[1]

Departments of Nursing Techniques, [1]Community Health Techniques, Technical Institute of Al-Diwaniyah, Al-Furat Al-Awsat Technical University, [2]Directorate General of Education, Al-Diwaniyah, Iraq

Abstract

Background: Vaccines are critical to reducing the viral attack by permitting the body to generate a safe immune response that defends it by preventing or limiting infection. Objectives: The study aimed to detect the side effects that caused by immunization with Coronavirus (COVID-19) vaccines. **Materials and Methods:** 286 samples were collected from individuals immunized with Corona vaccines (Pfizer, Sinopharm, and AstraZeneca) of different ages, whether they were previously infected with COVID-19 or not. The side effects and pathological complications of immunization have been clinically determined by specialized doctors. **Results:** Pfizer vaccine was the most used vaccine, yet its typical side effects of first dose include mild fever (28%) and injection site pain (20%). The second dose side effects of Pfizer vaccine were high fever in 200/246 people (81%). Moreover, 7% of the cases did not experience side effects after both doses. The first dose of Sinopharm vaccine side effects were pain in the area of the injection (30%) and mild fever (19%), and 8% of cases suffered from fever and pain in the head and joints, whereas high fever was one of the most prominent signs when taking the second dose by (51%) whereas 27% of them did not show any side effects when taking the two doses. Only three individuals were immunized with AstraZeneca vaccine and suffered from fever, headache, and joint pain after taking the first dose, whereas two of them were suffering from high temperature, and one was suffering from fatigue and joint pain after taking the second dose. **Conclusion:** The symptoms of COVID-19 vaccines are as the same as other vaccines, but still needs more studies analyzing their side effects to ensure their safety for immunization.

Keywords: AstraZeneca, COVID-19, Pfizer, side effects, Sinopharm, vaccine

Introduction

Immunization is a swift, safe, and successful method to avoid infections because it stimulates the immune system to produce antibodies and forces the body to fight certain pathogens.[1] Considering the Coronavirus (COVID-19) rapid proliferation, which has infected most of the world's population. Vaccines are critical to reducing the viral attack by permitting the body to generate a safe immune response that defends it by preventing or limiting infection. Where the vaccination allowed countries to abolish the ban, alleviate social isolation, and return to normal life.[2,3] Vaccines reduce the chance of disease by supporting the body's natural defenses. After vaccination, the immune system reacts in a way that allows it to identify the virus as soon as it enters the body.[4] It creates antibodies, which are proteins the immune system normally generates to control diseases and which memorize of the disease and how to combat it. The vaccine is, therefore, a sensible and safe method.[3-5] As soon as the body takes the recommended dosage of the vaccine, it stimulates an immune response without causing disease, instead of treating the disease after it occurs, the vaccine will prevent the disease from happening in the first place.[6]

Each COVID-19 vaccine enhances the immune system to produce antibodies to fighting COVID-19. COVID-19 vaccines use a harmless version of the spiny structure

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Address for correspondence: Roaa Abid Jaythoom, MSc, Department of Community Health Techniques, Technical Institute of Al-Diwaniyah, Al-Furat Al-Awsat Technical University, Al-Diwaniyah, Iraq
E-mail: Roaa.Jaythoom@atu.edu.iq

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found on the surface of the COVID-19 virus known as S protein, nucleic acid, or part of the envelope.[7,8] On the other hand, these vaccines differ in their prices and availability from one country to another, but the method of giving the vaccine remains according to the manufacturer's instructions.[9] Corona vaccines available in Iraq from the end of the year 2020 until the beginning of 2023 are Pfizer, Sinopharm, and AstraZeneca. The "Sinopharma" vaccine is used for prompting the immune system of human to create antibodies to the Corona virus, in which viral proteins are bound, such as the so-called spinal proteins that are studded with virus surface. To produce this vaccine, researchers at the Beijing Institute brought three types of Corona virus from infected people in Chinese hospitals, in addition to a mutated virus that can multiply.[10-12]

Depending on the strategic experts group, the Pfizer-Biontech COVID-19 messenger RNA (mRNA) vaccine is a secure and efficient vaccination.[13] Vaccine is made of genetic material called "liquid RNA," which has undergone "nucleoside" modification according to scientists, which is enveloped by lipid nanoparticles. It carries the genetic material of the protein of the generated Corona virus; this allows it to attach to the virus and reduce its activity.[13,14] In the case of the vaccine of AstraZeneca, scientists took the genetic material of COVID-19 virus and inserted it into a altered version of another virus (known as a viral vector).[15] As soon as the viral vector enters cells, it transmits genetic material from the COVID-19 virus that instructs the body's cells to synthesize copies from S protein. When cells start to exhibit S proteins on their surfaces, the immune system's response is demonstrated by the production of antibodies and defending white blood cells. In the future when a person gets infected by COVID-19, the antibodies will fight Corona virus.[15,16]

According to some medical sources and reports, Corona vaccines are considered safe, because the vaccine has successfully completed the testing process and developed an immune response and stable antibodies.[17,18] Those sources also mentioned that the side effects of the vaccine are usually minor and temporary (for example, pain in the site of injection, fever, headache, etc.) and rarely may be severe. And through our follow-up, most of these sources are not official or represented by a long-term study to determine the extent of the dangers of those vaccines.[18,19]

However, any rigorously licensed vaccine must go through a series of testing stages before being approved for use, and is continuously reassessed. For any indication that the vaccine may cause health implications, scientists continuously collect information from different sources.[17-20] And because the vaccines used to reduce the Corona virus are all modern, and monitoring their side effects is still very important, so we are trying through the current study to contribute, even partially, to determining the side effects of the vaccines used in Iraq.

Materials and Methods

Patients and sample collection

The current studies include data collection and medical examinations from people vaccinated with the Corona vaccine of different ages, whether they were previously infected or not infected by COVID-19. Samples were collected during the period from November 15, 2021 to January 12, 2022, where 100 samples were collected from Al-Diwaniyah General Teaching Hospital, 68 samples from Maternity Teaching Hospital, 50 samples from outpatient clinics, and 50 samples from students and employees of the Technical Institute in Diwaniyah, Iraq. The following details were collected from all vaccinated patients: name, gender, kind of vaccine taken, past infected, symptoms of illness after taking each dose of vaccine.

Available vaccines in Al-Diwaniyah city

From the information collected, it was found that the vaccines used are Pfizer-BioNTech (New York, USA), Sinopharm BIBP (Beijing Bio-Institute of Biological Product, China), and AstraZeneca plc (British-Swedish Multinational Pharmaceutical and Biotechnology Company, UK).

Determining the vaccines side effects

We relied by our study to determine the side effects or pathological complications on the questionnaire collected from patients, in addition to the clinical diagnosis of some cases by specialized doctors. The most important examinations were temperature, pressure, X-ray, and magnetic resonance imaging.

Statistical analysis

The current study results were analyzed using Excel 2010 and the Statistical Package for Social Science (SPSS 19) (IBM, Chicago, USA) program, version 19.0, where the probability smaller than 0.05 (P value < 0.05) was considered to be statistically different.

Ethical approval

The local Research Ethics Committee granted approval for this study on February 22, 2022. After obtaining ethical approval from all participants, whether they were the vaccinated persons or the hospital administration.

Results

The current study included 286 individuals immunized with COVID-19 vaccines, and their ages ranged from 15 to 65 years, with an average age of 30.42 years, as shown in Table 1. The current study also showed that most of the vaccinations were received by women with a percentage of 54%, whereas the percentage of men was 46%, and these

Table 1: Age properties of vaccinated individuals

Age properties/years	
Age range	16–65
Age mean	30.42
Standard deviation	9.33
Standard error	0.84
Total number	286

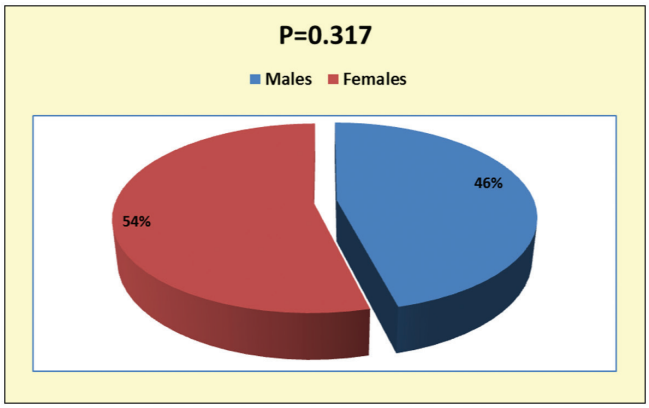

Figure 1: Percentage of males and females vaccinated with COVID-19 vaccines

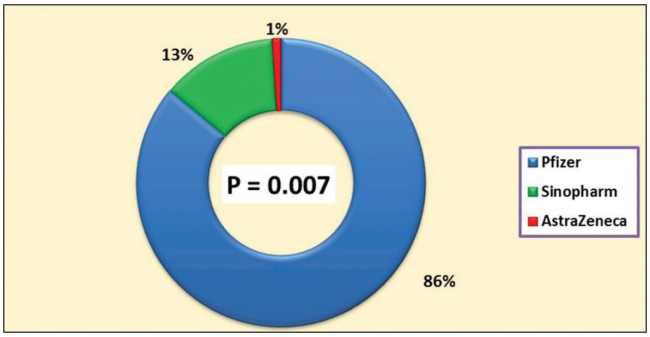

Figure 2: Percentage of each type of COVID-19 vaccines

differences were not statistically clear ($P > 0.05$). From this we note that there is a greater desire for women to be immunized against the Corona virus as shown in Figure 1.

The current study results indicated that the vaccines available in hospitals and health centers in the city of Diwaniyah are Pfizer, Sinopharm, and AstraZeneca, and the proportion of those immunized with Pfizer vaccine was 86%, Sinopharm by 13%, and AstraZeneca by 1%, as shown in Figure 2. The results also showed that 43 (15%) of the vaccinated were already infected with the Corona virus, whereas 243 (85%) of the vaccinated were not infected before as in Figure 3.

According to the current study results, most (91%) from the patients had side effects after taking both of two doses of vaccines, whereas the remaining 9% did not have any

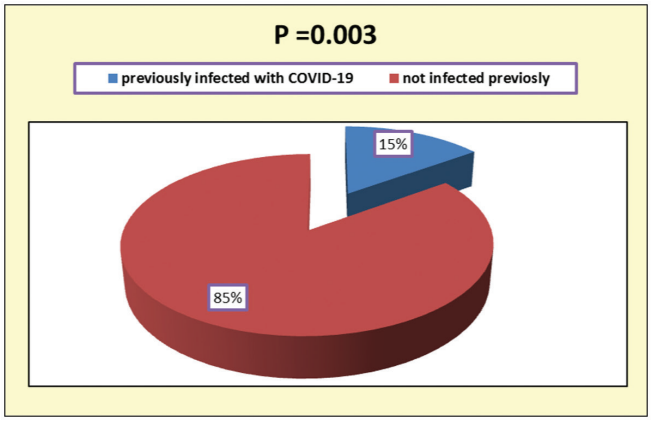

Figure 3: Rate of previously infected by COVID-19 among vaccinated participants

Table 2: The proportion of side effects of vaccines according to sex

Gender	Side effects	Not have side effects	*P* value
	N (%)	*N* (%)	
Males (n = 154)	135 (88)	19 (12)	0.0008
Females (n = 132)	125 (95)	7 (5)	0.0001
Total number	260	26	

symptoms. This study also showed that 95% and 88% of women and men, respectively, suffer from side effects when taking vaccinations, whereas 5% and 12%, respectively, of them did not show these symptoms as shown in Table 2.

We have recorded several side effects after taking the first dose of Pfizer vaccine; the most important of which are mild fever (28%) and pain in the injection area (20%). We also found 15% of the vaccinated suffered from fever, headache, and joint pain, and 12% suffer from fatigue and joint pain, whereas 9% of the vaccinated were suffering from a high fever, after which they were transferred to the hospital as shown in Table 2. The side effects of the second dose of Pfizer vaccine were high fever in 200/246 people. Moreover, after the first or second dose of Pfizer vaccine, 7% of those immunized did not experience side effects.

For those immunized with the vaccine of Sinopharm (first dose), they suffered from pain in the area of the injection (30%) and mild fever (19%), and 8% of them suffered from fever and pain in the head and joints, while high fever was one of the most prominent signs when taking the second dose by (51%) as well as fatigue and joint pain appeared in 14% of them, and 27% of them did not show any side effects when taking the two doses. In contrast, and as we mentioned previously, only three people were immunized with the AstraZeneca vaccine, and all of them were suffering

Table 3: The first dose side effects of COVID-19 vaccines

Side effects	Pfizer ($n = 246$)	Sinofarm ($n = 37$)	AstraZeneca ($n = 3$)	X^2	*P* value
	N (%)	*N* (%)	*N* (%)		
Headache	16 (7)	1 (3)	0 (0)	1.96	0.067
High fever	23 (9)	1 (3)	0 (0)	2.08	0.059
Fever, headache, and joint pain	36 (15)	3 (8)	3 (100)	7.82	0.006
Fatigue and joint pain	29 (12)	2 (5)	0 (0)	2.33	0.053
Pain in the site of injection	50 (20)	11 (30)	0 (0)	6.39	0.016
Mild fever	70 (28)	7 (19)	0 (0)	4.82	0.022
Other symptoms	6 (2)	2 (5)	0 (0)	0.94	0.101
Without side effects	16 (7)	10 (27)	0 (0)	7.11	0.010

Table 4: The second dose side effects of COVID-19 vaccines

Side effects	Pfizer ($n = 246$)	Sinofarm ($n = 37$)	AstraZeneca ($n = 3$)	X^2	*P* value
	N (%)	*N* (%)	*N* (%)		
Pain in the site of injection	24 (10)	3 (8)	0 (0)	0.52	0.125
High fever	200 (81)	19 (51)	2 (75)	3.72	0.031
Fatigue and joint pain	6 (2)	5 (14)	1(25)	4.03	0.027
Without side effects	16 (7)	10 (27)	0 (0)	5.88	0.024

from fever, joint pain, and headache after taking the first dose, whereas two of them were suffering from high temperature, and one was suffering from joint pain and fatigue after taking the second doses as shown in Tables 3 and 4.

Discussion

The vaccines of COVID-19 as other vaccines, cause side effects. The majority of these side effects are mild or moderate and disappear on their own in a few days. These vaccines can have more serious or long-term side effects, as evidenced by the results of clinical trials.[20-22] Vaccines are constantly monitored for the purpose of detecting any harmful side effects, so this is the reason for conducting this study. It is known that the vaccination can have various side effects that range from mild to moderate.[23-25] This is according to the immune system instruction for the body to react by certain ways as it increases blood flow to promote the circulation of more immune cells and to increase body temperature in order to fight viruses.[25] Previous studies have shown that the occurrence of side effects ranging from mild to moderate, such as mild fever or muscle pain, is normal and does not cause concern, they indicate that the immune system of the body is responding to the vaccine, specifically the antigen (the molecule that induces the immunological response), and is being ready to confront the virus.[26,27] After a few days, most of these side effects disappear on their own. According to medical reports, the most common side effects after receiving the Pfizer/Biontech or AstraZeneca/Oxford anti-Coronavirus vaccine is "moderate and short-term." The majority of symptoms are high temperature, fatigue, and pain at the injection site, or pain throughout the body accompanied by headache, as is evident in our current study.[5,27-29] However, initial reports showed that some of the vaccinated with the vaccine, especially the Pfizer/Biontech, developed severe allergic reactions as bronchitis.[30] The UK Medicines and Healthcare Products Regulatory Agency recommends monitoring of all vaccinated people for at least 15 min immediately after vaccination.[30,31] In addition to the previous side effects, the Harvard Medical School website indicates the possibility of fever, chills or nausea, and vomiting after vaccination. In contrast, recent studies also indicate that persons who were infected with COVID-19 in 2020 and then received mRNA vaccines develop very large amounts of antibodies which are potentially effective against current and possibly future mutant strains of COVID-19. Hybrid immunity is the term used by some researchers to describe this condition, but further study is still required.[13,14,32-34]

Contrarily, we found many people feel more side effects, especially high temperature, after getting the second COVID-19 vaccine dose, which consists of two doses, and some studies say that this dose often causes additional side effects because the trigger dose (the first one) has prepared the body for it, after receiving the first dose, the body accumulates a limited set of memory B cells, and with receiving the second dose, the numbers of these cells increase, so that the immune system responds faster, larger and better when the actual infection occurs later.[35,36] Researchers say the second dose may have more side effects in some people because those memory B cells have already formed in response to the first dose, they adds, "inflammation causes the B cells to quickly switch to these

antibody-producing factories. Although researchers do not fully understand why some people are more exposed to the COVID-19 vaccines side effects, epidemiological data point to some general trends, researchers say that women's immune response is often stronger compared to men, and the response in young people is often stronger than in the elderly.[12,17,23,37]

According to a new study of more than 45,000 patients, people experienced most of the side effects after getting the COVID-19 vaccines could be due to the "nocebo" effect, which scientists describe as the "evil twin" of fake drug, which opposite to placebo.[38] During drug experiments, placebo gives them an improvement due to the psychological state. But nocebo does the opposite, as suggested by a study published by Science Alert, as it causes a feeling of "pseudo side effects due to the psychological state as well. The study included analyzes of forty-five thousand clinical trial cases, where a team of researchers at a Boston medical center found that "up to 64 percent of negative effects of a vaccine may be attributable to this type of effects (nocebo)."[37-40]

In the end, it must be mentioned that studies about the side effects of COVID-19 vaccines are still ongoing and at the same time few, adding that these vaccines are new to the medical field and research on them needs to be followed up for a longer period. Despite that, we tried through the current study to show part of these symptoms in a limited period.

Conclusion

Our study showed that Pfizer, Sinopharm, and AstraZeneca are the available vaccines in Al-Diwaniyah Governorate, Iraq, and the Pfizer vaccine was the most desired by the citizens because they believed that, it is the best vaccine in preventing infection with Corona virus. We also found that women were more likely to receive Corona vaccines. We found that 91% of immunized patients observed side effects after taking both doses. The side effects after taking the first dose were the high temperature, pain in the area of injection, joint pain, and headache, whereas high temperature was one of the most important symptoms after taking the second dose.

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Conflicts of interest

There are no conflicts of interest.

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