The prevalence of potential side effects of COVID-19 vaccines among vaccinated Iraqi people: a prospective cross-sectional study

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Abstract

Purpose – Several types of vaccines were manufactured by different companies to control and stop the spread of COVID-19. This study aimed to identify the postvaccination side effects of the three different vaccines (Pfizer, AstraZeneca and Sinopharm) among the Iraqi population in Baghdad, Iraq.

Design/methodology/approach – A prospective cross-sectional study was conducted in Baghdad, Iraq from May 2021 to March 2022. An online-based questionnaire was used to collect the data through social media, i.e. WhatsApp, Messenger and Google Classroom. A total of 737 vaccinated participants using a snowball sampling methodology were used in this study.

Findings – Among the study population, 328 (44.50%) were males and 409 (55.50%) were females. The highest age group that participated was 18–30 years (79.10%) followed by 31–40 years (12.10%), 41–50 years (4.20%), 51–60 years (2.40%) and 60 = years (2.20%). However, 58.8% of the participants received Pfizer-BioNTech, 23.7% received the AstraZeneca-Oxford vaccine and 17.5% received Sinopharm. Out of the total participants, 56.60% showed postvaccination side-effects such as fever, headache, fatigue and dizziness, while 33% showed no side-effects and 10.40% were not sure. Pfizer-BioNTech and AstraZeneca-Oxford vaccines were the most vaccines prevalent of side-effects.

Originality/value – The majority of the side reactions associated with the AstraZeneca and Pfizer vaccines were manageable and self-limiting, including fever, fatigue, headache, joint pain and dizziness, compared to the Sinopharm vaccines, which reported lower postside effects.

Keywords SARS-CoV2 infection, Pfizer-BioNTech, AstraZeneca-Oxford, Sinopharm, Adverse effect

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Introduction

The coronavirus disease 2019 (COVID-19) produced by severe acute respiratory syndrome coronavirus-2 (SARS CoV-2) reportedly infected and killed millions of people (Dong, Du, & Gardner, 2020). Coronavirus appeared originally from Wuhan in China in 2019 and spread all over the world. In the middle of 2021, its morbidity was more than 170 million, and its mortality was close to four million (Wu & McGoogan, 2020). The research community made an immediate international request to create vaccines (Kaur & Gupta, 2020). Doubts about the effectiveness of vaccines have been imposed with respect to short-term evaluation and long-term adverse reactions (Harrison & Wu, 2020). This is regarded as one of the main challenges that has been connected to population acceptance of COVID-19 vaccines varying widely.

The efficiency of Pfizer and AstraZeneca vaccines was reported to be 95% and 70%, respectively (Voysey *et al.*, 2021). The Chinese vaccine Sinopharm was the first to be admitted to Iraq (Funk, Laferrière, & Ardakani, 2021). The total number of vaccinated people in Iraq until Apr 28, 2022, is 10,524,458. Several research studies in different countries have corroborated the fact that the fear of vaccine side effects is the most prominent and common cause of vaccination avoidance (Luyten, Bruyneel, & van Hoek, 2019; Szmyd *et al.*, 2021). According to Al-Mufty *et al.*, the postvaccination side effects of the three vaccines were mild to moderate in severe (Almufty, Mohammed, Abdullah, & Merza, 2021). Furthermore, a recent study demonstrated that the most side effects shown were fatigue, reactions to the site of injection, fever, myalgia and a headache and cold in equal measure (Albasry & Al-Taie, 2023).

However, Iraqi people have their fears regarding these vaccines, some are certain about conspiracy theories. Other reasons contributing to low vaccination attendance include potential side effects and a lack of trust in manufacturing sectors (Harrison & Wu, 2020). These factors prompted the necessity for an evaluation of the postCOVID-19 vaccination adverse effects of various vaccine companies existing in Iraq. Hence, the current study aimed to estimate the prevalence of side effects from three vaccines and to compare the potential side effects of these vaccines.

Materials and methods

Study design settings

This cross-sectional study was conducted in Baghdad, Iraq from May 2021 to March 2022. To collect information on postvaccination side effects among the Iraqi people, a standard survey tool based on Google Form was used. The survey included three main parts: demographic information (age and gender); health history (chronic diseases, previous infection with coronavirus before vaccination and severity of the infection) and vaccines information (type of vaccine, symptoms of postvaccination and the intensity of symptoms). To maintain the privacy of the participants, questions such as name and other personal information were not included in the survey. Ethical approval was not included as the study was based on the survey, and there was no direct contact with the participants. However, the study and the purpose of this survey were fully explained to the participants in the beginning of the questionnaire, and the consent form was obtained.

Population and sampling

The survey was sent to the participants through social media, i.e. WhatsApp, Messenger and Google Classroom, and only the vaccinated people were included in the study. A convenient sample using snowball sampling methodology was used. When the population is unknown, the sample size can be derived by computing the minimum sample size required for accuracy in estimating proportions by considering the standard normal deviation set at 95% confidence level, and the confidence interval of 5% (Albasry & Al-Taie, 2023). However, a total of 737 vaccinated participants were included in this study. The age of participants was

categorized into 18–30, 31–40, 41–50, 51–60 and ≥60 years old. All the participants had received, at least, the first dose of the COVID-19 vaccine.

Statistical analysis

The Statistical Package for Social Sciences software version 28.0 (Chicago, USA) was used for the statistical analysis of the research data. The percentages of demographic variables for the sample under study were extracted to know the characteristics of the samples such as gender, age and other variables. The chi-square test was used to test the relationship between the type of vaccine and the potential side effects among participants.

Results

Demographic properties

Among the study population, 328 (44.5%) were males and 409 (55.5%) were females. The majority of the participants were aged 18–30 years old (79.10%) followed by 31–40 years (12.10%), 41–50 years (4.20%), 51–60 years (2.40%) and 60≥ years (2.20%). The enrolled participants had received Pfizer-BioNTech (58.8%) followed by AstraZeneca-Oxford (23.7%) and Sinopharm (17.5%). Among them, 56.60% showed postvaccinated side effects, 33.0% showed no side effects, whereas 10.40% were not sure. Table 1 demonstrates the demographic

Demographic variables		Percentage (%)
Sex	Male	44.50
	Female	55.50
Age	18–30 years	79.10
	31–40 years	12.10
	41–50 years	4.20
	51–60 years	2.40
	Above 60 years	2.20
Chronic diseases	Diabetes mellitus	2.60
	Hypertension	3.10
	Tachycardia	3.80
	Colitis	5.30
	Other diseases	5.20
	No diseases	80.10
Previously infected with corona virus before vaccination	Yes	37.00
	No	53.90
	Not sure	9.10
Severity of the infection	Not infected	34.20
	Severe (admitted to hospital)	3.90
	Moderate (no hospital required)	25.00
	Mild (no side-effects)	36.90
Type of vaccines used	Astra Zeneca	23.70
	Pfizer	58.80
	Sino pharm	17.50
Side-effects of post vaccination	Yes	56.60
	No	33.00
	Not sure	10.40
Intensity of symptoms	Severe (showed all side-effects)	14.20
	Moderate (few side-effects shown)	25.60
	No symptoms	28.20

Source(s): Table by authors

Table 1. Demographic characteristics of the participants

characteristics of the participants. The side effect symptoms by gender are shown in Table 2 while the side effect symptoms by age groups of the participants were listed in Table 3.

General adverse postvaccinated side effects

The most common postvaccination side effects were fever 407 (25.2%), general fatigue 355 (22.0%), headache 282 (17.4%) and joint pain 218 (13.5%). Figure 1 illuminates the postvaccination side effects. Table 4 showed the recurrences of symptoms among the three

Table 2. The side effect post-vaccination stratified by gender

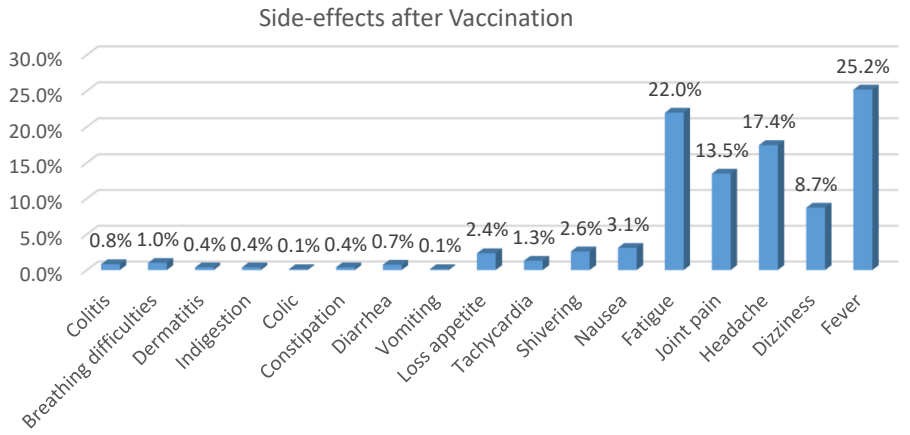
Side-effects	Gender		Total
	Male N (%)	Female N (%)	
Fever	215 (39.3%)	332 (60.7%)	547
Dizziness	57 (33.9%)	111 (66%)	168
Headache	132 (38.6%)	210 (61.4%)	342
Arthritis	89 (33.9%)	173 (62.1%)	262
General Fatigue	147 (33%)	298 (66.9%)	445
Nausea	18 (30.5%)	41 (69.5%)	59
Shivering	19 (42.2%)	26 (57.7%)	45
Tachycardia	6 (23%)	20 (77%)	26
Loss of appetite	15 (32.6%)	31 (67.4%)	46
Vomiting	1 (25%)	3 (75%)	4
Diarrhea	8 (61.5%)	5 (38.5%)	13
Constipation	3 (50%)	3 (50%)	6
Colic	1 (50%)	1 (50%)	2
Indigestion	6 (85.7%)	1 (14.3%)	7
Dermatitis	0	8 (100%)	8
Respiratory symptoms	6 (31.5%)	13 (68.5%)	19
Colitis	12 (63.1%)	7 (38.9%)	19
Total	*326 (40%)*	*488 (60%)*	*814*

Source(s): Table by authors

Table 3. The side-effects of post vaccination stratified by age

Side effect symptoms	Age groups N (%)					Total
	18–30 years	31–40 years	41–50 years	51–60 years	60 ≥ years	
Fever	427 (78%)	78 (14.2%)	21 (3.8%)	11 (2%)	10 (1.8%)	547
Dizziness	143 (85.1%)	15 (8.9%)	1 (0.6%)	4 (2.3%)	5 (2.9%)	168
Headache	271 (79.2%)	37 (10.8%)	21 (6.1%)	6 (1.7%)	7 (2%)	342
Arthritis	203 (77.4%)	41 (15.6%)	6 (2.2%)	10 (3.8%)	2 (0.7%)	262
General Fatigue	358 (80.4%)	51 (11.4%)	19 (4.2%)	7 (1.5%)	10 (2.2%)	445
Nausea	52 (88.1%)	2 (3.3%)	3 (5%)	2 (3.3%)	0 (0.0%)	59
Shivering	30 (66.6%)	11 (24.4%)	0 (0.0%)	3 (6.6%)	1 (2.2%)	45
Tachycardia	20 (76.9%)	6 (23%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	26
Loss of appetite	43 (93.4%)	3 (6.5%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	46
Vomiting	4 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4
Diarrhea	9 (69.2%)	3 (23%)	0 (0.0%)	1 (7.6%)	0 (0.0%)	13
Constipation	3 (50%)	2 (33.3%)	1 (16.6%)	0 (0.0%)	0 (0.0%)	6
Colic	1 (50%)	1 (50%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2
Indigestion	5 (71.4%)	1 (14.2%)	0 (0.0%)	1 (14.2%)	0 (0.0%)	7
Dermatitis	6 (75.0%)	2 (25.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	8
Respiratory symptoms	11 (57.8%)	4 (21%)	0 (0.0%)	3 (15.7%)	1 (5.2%)	19
Colitis	12 (63.1%)	0 (0.0%)	5 (26.3%)	0 (0.0%)	2 (10.5%)	19
Total	*646*	*101*	*36*	*19*	*12*	*814*

Source(s): Table by authors



Source(s): Figure by authors

Figure 1. Post-vaccination side-effects

Symptoms	Type of vaccines AstraZeneca No.	AstraZeneca %	Pfizer No.	Pfizer %	Sinopharm No.	Sinopharm %	Chi-square	*p*-value
Colitis	2	15.4%	10	76.9%	1	7.7%	2.976	0.226
Respiratory symptoms	3	18.8%	10	62.5%	3	18.8%	0.605	0.739
Dermatitis	1	16.7%	2	33.3%	3	50.0%	4.361	0.113
Indigestion	0	0.0%	3	50.0%	3	50.0%	6.414	0.040
Colic	1	50.0%	1	50.0%	0	0.0%	1.349	0.509
Constipation	2	33.3%	4	66.7%	0	0.0%	1.822	0.402
Diarrhea	3	25.0%	9	75.0%	0	0.0%	3.398	0.183
Vomiting	0	0.0%	2	100.0%	0	0.0%	2.710	0.258
Loss of appetite	12	31.6%	23	60.5%	3	7.9%	4.365	0.113
Tachycardia	8	38.1%	10	47.6%	3	14.3%	3.715	0.156
Shivering	17	40.5%	22	52.4%	3	7.1%	13.083	0.001
Nausea	16	32.0%	32	64.0%	2	4.0%	10.031	0.007
General fatigue	121	34.1%	202	56.9%	32	9.0%	86.573	<0.001
Arthritis	83	38.1%	116	53.2%	19	8.7%	60.117	<0.001
Headache	104	36.9%	155	55.0%	23	8.2%	83.040	<0.001
Dizziness	65	36.9%	61	55.0%	15	8.2%	69.184	<0.001
Fever	135	33.2%	232	57.0%	40	9.8%	88.625	<0.001

Source(s): Table by authors

Table 4. Association of side effects and COVID-19 vaccines

vaccines employed in this study. There was a significant relationship ($p > 0.05$) between the symptoms of shivering, nausea, fatigue, joint pain, headache, dizziness, fever and the type of vaccine employed. The other symptoms have no significant ($p < 0.05$).

Discussion

COVID-19 infection continues as a pandemic that strikes the entire world including Iraq. However, the vaccines emerged to control and lower the death rate of the disease. The vaccines were showing different postvaccination side effects.

Among the age group, 18–30 years old were the highest to be vaccinated (79.10%) while 60 years old and above were the lowest (2.20%) (Table 1). Similar findings were seen in a recent

report where the age groups 50–69 and 70 above were the lowest to be vaccinated (Almufty *et al.*, 2021). This is maybe due to that the present survey was online and not all those in these age groups were aware of using the net. However, the age group (18–30 years) mostly was students and government employees which they have strictly imposed to get vaccinated.

Among the study population, 58.8%, 23.7% and 17.5% were received Pfizer-BioNTech, AstraZeneca-Oxford and Sinopharm, respectively. Similar results were declared in the previous reports (Attash, Al-Obaidy, & Al-Qazaz, 2022). The high intake of Pfizer-BioNTech vaccine was due to well reputation of Pfizer Company among the Iraqi individuals. However, Pfizer vaccine showed up to 95 % efficacy against the coronavirus (Rahman *et al.*, 2022). Nevertheless, in Iraq, Sinopharm vaccine was on-demand at the beginning of vaccination but due to the lack of supplies of the vaccine made it at the last of the list.

In the present study, 56.60% of vaccinated participants exhibited side effects (moderate to severe) while 33% experience no side effects, and 10.40% were not sure (Table 1). This finding is in line with observational study in United Arab Emirates reported by Ganesan *et al.*, which found that only 5% of the participants needed hospital treatment while the rest of vaccinated participants showed mild side effects (Ganesan *et al.*, 2022). The current data revealed that 53.90% of vaccinated participants were not infected by COVID-19 before vaccination while 37% were previously infected (Table 1). The previous infection of COVID 19 was reported to be in concordance with the high frequency of postvaccination side effects (Almufty *et al.*, 2021; Menni *et al.*, 2021). However, there is no obvious reason; this might be related to an increased immune response as a consequence of vaccination (Menni *et al.*, 2021).

The most common side effects was fever 407 (25.2%), general fatigue 355 (22.0%), headache 282 (17.4%) and joint pain 218 (13.5%) while the less showed side effects were vomiting and abdominal colic 2 (0.1%) (Figure 1). This is in accordance with recent reports from different countries were shared similar side effects such as fever, fatigue, headache and joint pain (Almufty *et al.*, 2021; Attash *et al.*, 2022; Rahman *et al.*, 2022).

Moreover, 57.0% of the participants who took Pfizer vaccine showed fever in comparison with AstraZeneca (33.2%) and Sinopharm (9.8%) vaccines, respectively. Similar findings were presented in recent studies (Riad *et al.*, 2021; Zhu *et al.*, 2020). There was a significant relationship between indigestion and the type of vaccine used ($p > 0.05$). Furthermore, a significant relationship ($p > 0.05$) was shown between the side effects of shivering, nausea, general fatigue, arthritis, headache, dizziness, fever and the type of vaccine employed (Table 4). Moreover, no significant relationship was seen between other symptoms and types of vaccines (Table 4). However, recent studies showed that the symptoms such as fever, fatigue, indigestion, nausea, dizziness and diarrhea were associated more with AstraZeneca vaccine than Pfizer and Sinopharm (Rahman *et al.*, 2022; Riad *et al.*, 2021). This is not in accordance with the present study due to the number of participants who acquired Pfizer vaccine in this study being higher than the rest of the vaccines (Table 4). There was a strong relationship between vaccination type and side effect prevalence, with AstraZeneca and Pfizer having the greatest rates of side-effects compared to the Sinopharm vaccine (Table 4). Old participants were noted to have asymptomatic to very mild symptoms. These data were consistent with the Food and Drug Administration (FDA)'s study, which believed that those over the age of 55 years were less likely to experience side effects (Abukhalil *et al.*, 2023). In addition, a research study revealed that young individuals were more certain to experience adverse effects with the Pfizer vaccination (Riad *et al.*, 2021). Measured trials on the effectiveness and safety of AstraZeneca vaccine in different countries also showed a reduction in the quantity and severity of adverse effects in older individuals (Voysey *et al.*, 2021). Generally, younger people generate higher immunological reactions than elderly adults (Voysey *et al.*, 2021). In correspondence, younger individuals tend to have more frequent and severe side effects.

In the present study, the majority of the side effects were reported after the first dosage, which was in accordance with the Attash *et al.*, in Iraq and Hatmal *et al.*, in Jordan (Attash *et al.*, 2022; Hatmal *et al.*, 2021) while El-Shitany *et al.* noticed that the adverse effects arose

after the second dosage (El-Shitany *et al.*, 2021). According to Polack *et al.*, similar side effects were observed following the first and second dosages of the vaccine (Polack *et al.*, 2020). As per the Centers for Disease Control and Prevention, the intensity of symptoms increased following the second dosage. All the participants were experienced pain at the site of injection. However, recent studies showed that people who received Pfizer vaccine were experienced more pain at the site of injection followed by AstraZeneca and Sinopharm (Almufty *et al.*, 2021; Attash *et al.*, 2022).

Among the participant who received Pfizer and AstraZeneca vaccines, systemic effects were shown varies symptoms. Individuals who got the Pfizer and AstraZeneca vaccinations experienced considerably higher frequency ($p < 0.05$) of systemic side-effects such as fever, headache, shivering and dizziness (Table 4).

With respect to intestinal tract symptoms (colic, colitis, nausea, constipation, diarrhea, vomiting, loss of appetite and indigestion), very less participants demonstrated these symptoms; therefore, no significance ($p < 0.05$) was shown among the types of vaccines (Table 4). This is contrary to Attash *et al.*, who reported a great association of vomiting and nausea with AstraZeneca vaccine (Attash *et al.*, 2022). Furthermore, very less individuals experienced tachycardia and difficulty in breathing (Table 4), which is not in comparable to the previously reported studies (Almufty *et al.*, 2021; El-Shitany *et al.*, 2021; Rahman *et al.*, 2022). In an Iraqi study, breathlessness was more common among AstraZeneca vaccination participants (Almufty *et al.*, 2021), whereas it was uncommon in Saudi Arabia; it did affect a small number of people (El-Shitany *et al.*, 2021). Moreover, in an Indonesian study, 1 % of the vaccinated individual showed breathing difficulties (Djanas *et al.*, 2021).

Those who received Pfizer and AstraZeneca vaccination showed higher symptoms of joint pain in contrast to Sinopharm ($p > 0.05$) (Table 4). Different studies around the world showed a different percentage of joint pain symptoms such as in Jordan (around 50%) (Hatmal *et al.*, 2021), In Bangladesh (12.52%) (Sultana *et al.*, 2021) while only 2% in Saudi Arabia (Alhazmi *et al.*, 2021). Loss of taste and smell and sleeplessness were also reported in other studies (Almufty *et al.*, 2021; Jayadevan, Shenoy, & Ts, 2021; Riad *et al.*, 2021).

There are certain limitations in the study. First, since this is a descriptive cross-sectional study employing an online survey, only those who often use the network enrolled in the report. Therefore, elder individuals were low. Second, the study was designed to report the vaccinations' short-term side effects; however, a long-term follow-up investigation in the general population is necessary. Third, the study is not representative of the entire Iraqi population, the study included participants who resided in Baghdad. Fourth, a large cohort study is required to understand the differences of side effects.

Conclusion

The study revealed that the participants who took the Pfizer and AstraZeneca vaccinations complained of fever, fatigue, headache, joint pain and dizziness. However, the post-vaccination symptoms were mild to moderate in intensity and were tolerable. Sinopharm was the lowest vaccine developed post side effects. Further studies are warranted to understand the molecular biology of the virus and expected mutation.

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