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Original article

Adverse reactions of different COVID-19 vaccines among healthcare professionals: A qualitative study in Mosul, Iraq

Shahad M. Khaleel^a, Sadeel A. Shanshal^{a,*}, Mohammed I. Aladul^{a,b}^a College of Pharmacy, Department of Clinical Pharmacy, University of Mosul, Mosul, Iraq^b College of Pharmacy, Ninevah University, Mosul, Iraq

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ABSTRACT

Background: COVID-19 disease was highly infectious causing a declaration of a global pandemic and the scientists believed that developing a safe and effective vaccine was the solution. Various vaccine candidates were announced by different health authorities. Many factors affect the acceptance of vaccines. This study aims to explore the perceptions, attitudes, and expectations of healthcare professionals (HCPs) toward COVID-19 vaccines.

Method: A qualitative study approach was conducted by using face-to-face semi-structured interviews with HCPs in Mosul city, Iraq.

Results: Twenty-five HCPs participated in the interviews. After qualitative analysis four main themes emerged: perception of vaccines; participants believed that vaccines were vital inventions, motivations to take the vaccine; most HCPs were motivated based on the scientific evidence regarding COVID-19 vaccines, expectations about the safety and efficacy of COVID-19 vaccines; participants had different opinions based on the type of the vaccine and the available data, side effects experienced; severe side effects were expected but only mild adverse reactions were experienced by the majority.

Conclusion: HCPs had good knowledge about COVID-19 vaccines which was not affected by rumors and misinformation. In contrast to their expectations, the experienced side effects of the first and the second doses were mild to moderate in severity. The majority of HCPs based their choice of the vaccine on the efficacy and safety profile of the available options.

1. Introduction

Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) is one of hundreds of viruses belonging to the family of coronavirus which emerged and led to a contagious disease named coronavirus disease (COVID-19).^{1,2} Wuhan city in China was the first place where the virus had been identified in December 2, 019.³ COVID-19 disease was highly infectious, crossed all borders, and spread quickly around the world in a short period causing a declaration of a global pandemic on March 11, 2020, by the World Health Organization (WHO).⁴

Because there was no medication able to end the pandemic and return life as it was before COVID-19, the scientists believed that the only available solution to get out of this disaster is to develop a safe and effective vaccine that can be afforded at a reasonable price.⁵ Developing a new vaccine is usually a long process that typically takes about a decade to complete. The mumps vaccine was the fastest vaccine that had

been developed and approved in about 5 years.^{1,6} Therefore, there was great pressure on the entire world that triggered a race against time to overcome the challenge of developing a new vaccine in a record time as an attempt to end the COVID-19 pandemic.

Various vaccine candidates were announced by different health authorities at the beginning of 2021 for emergency use authorization.⁷⁻⁹ Sinopharm -inactivated virus-vaccine (BBIBP-CorV), Oxford-AstraZeneca vaccine (ChAdOx1 nCoV-19) and Pfizer-BioNTech mRNA vaccine (BNT162b2) were the first vaccines introduced to Iraq. Healthcare professionals (HCPs) and the elderly were the first groups authorized to get COVID-19 vaccines.¹⁰ Because HCPs are extremely exposed to different biological risks during COVID-19 pandemic as part of their daily work, many governments around the world -including Iraq-assured that those people working in the first line to confront COVID-19 are the most deserving group who should be vaccinated as early as possible.^{11,12}

* Corresponding author.

E-mail address: sadeelshanshal@uomosul.edu.iq (S.A. Shanshal).<https://doi.org/10.1016/j.cegh.2022.101175>

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Many factors affect the acceptance of COVID-19 vaccines including efficacy as the most important factor followed by longer protection and finally safety of the vaccine.¹³ There was a reluctance to take COVID-19 vaccines despite their availability since the beginning of 2021, this hesitancy to accept vaccination among the population may be attributed to the rumors and inaccurate data people heard from unreliable sources regarding the safety and efficacy of vaccines.^{14,15}

A study was conducted by Almuftu et al.¹⁶ in Iraq, to report the potential side effects that may occur after receiving COVID-19 vaccines which are available in Iraq (Sinopharm vaccine, Oxford-AstraZeneca vaccine, or Pfizer-BioNTech mRNA vaccine). The most recorded side effects were pain or discomfort at the injection site, fatigue, headache, body aches, elevated body temperature, and chills. More than 80% of the participants in this study suffered from adverse effects regardless of the type of the vaccine. However, in terms of severity, most of the symptoms were tolerable without medications and ranged from mild to moderate.¹⁶

To the best of our knowledge, no current study was conducted to determine in-depth HCPs perceptions towards COVID-19 vaccines side effects in Iraq. The results of such studies could inform health authorities about the preferences of HCPs towards a particular vaccine in term of side effects they experienced, which would be reflected and transmitted to their patients. Therefore, this study aims to explore the perceptions, and attitudes of HCPs regarding COVID-19 vaccines side effects they experienced post vaccination and their expectation about the safety and efficacy of these vaccines. The aims are achieved by face-to-face semi-structured interviews with HCPs from Mosul City in Iraq.

2. Methods

To elucidate in-depth perspectives and opinions regarding the adverse effects of COVID-19 vaccines and experienced side effects following vaccination in respondents' words, a qualitative study approach involving face-to-face semi-structured interviews was performed. A convenient sample of HCPs from different specialties and professions (physicians, dentists and pharmacists) who attended the Iraqi Healthcare Professionals Meeting for COVID-19 Updates in July 2021 were approached by the researchers. Their contact details were collected to create a closed WhatsApp group. An invitation letter was distributed through a closed group of attended HCPs in Mosul city, Iraq. This WhatsApp group contains 510 physicians, dentists, and pharmacists. The invitation letter debriefed the aims of the study with contact details of the researchers asking the HCPs if they wish voluntarily to participate in a face-to-face interview for about 20 min, at a place of their preference.

Upon acceptance, the participants were supplied with consent forms to fill out and the time when the interview would take place. They were also assured that their identity was confidential, and no personal or sensitive questions would be asked. Furthermore, the researchers assured the participants that they can withdraw from the research at any time.

The interviews were conducted between the 1st of September and the 30th of December 2021. The interviews were conducted by SM and SA, trained pharmacists, at the interviewee's clinic or office. The interviews started with a discussion of the aims and objectives of the study and the signing of the consent forms. All interviews were audio-recorded in addition to taking field notes. The anonymized audio records were transcribed verbatim by the researchers (SM and SA) and then were checked by MIA for accuracy following transcribing. NVivo 12 Pro software was used to aid in the analysis, using thematic analysis. The six stages of thematic analysis (familiarization, code generation, finding themes, reviewing themes, defining and naming themes, and writing the final report) were followed by each researcher separately. The researchers agreed on the themes that were common and suggested by all of them. The training themes were either reevaluated or merged with existing themes.

The questions asked to the participants constituted the interview guide, which has been developed from an interpretation of the literature¹⁷⁻²⁰ and piloted with three HCPs (a physician, dentist, and pharmacist) and a specialist in qualitative research at the university of Mosul. The guide included questions asking about the respondents' views about vaccines in general, and COVID-19 vaccines specifically. The guide also included questions about the respondents' thoughts about the available COVID-19 vaccines, their motivations and concerns about getting these vaccines. The HCPs were also asked in the interviews if they have been informed about the expected side effects before getting the vaccine, and about their expectations before and after getting the vaccine. The final section of the interview involved questions asking if the adverse effects the HCPs experienced were less or more tolerable than being infected with COVID-19, if the development of adverse effects was considered a good sign by the HCP and if the health authorities were informed about the experienced adverse effects.

3. Ethics statement

The protocol of the study was ethically approved by the Scientific Committee in the Department of Clinical Pharmacy at the University of Mosul before distributing the invitation letter. Additionally, the study received ethical approval from the Collegiate Committee for Medical Research Ethics of the University of Mosul with their letter referenced 71/116 on 08/08/2021.

4. Results

An invitation letter was sent to a close group of Mosul HCPs on WhatsApp to participate in a face-to-face interview. Only 25 HCPs responded to the invitation and participated in the study (response rate of 5%).

Semi-structured interviews were conducted in person with the HCPs (physicians, dentists, and pharmacists) from different hospitals in the city. Data saturation was achieved in interview number 22 in which no further themes emerged. Participants' demographics were summarized in [Table 1](#).

Table 1
Participated healthcare professionals demographics.

Code	Gender	Profession	Age	Years of experience
P1	Female	Dentist	44	10
P2	Female	Pharmacist	42	18
P3	Female	Pharmacist	34	10
P4	Female	Pharmacist	39	10
P5	Female	Physician	56	20
P6	Female	Clinical Pharmacist	37	5
P7	Female	Physician	43	5
P8	Male	Pharmacist	44	19
P9	Female	Physician	48	11
P10	Female	Physician	54	16
P11	Male	Pharmacist	51	23
P12	Female	Pharmacist	33	11
P13	Female	Pharmacist	44	20
P14	Female	Dentist	37	8
P15	Female	Pharmacist	38	10
P16	Female	Physician	43	21
P17	Male	Pharmacist	48	24
P18	Female	Physician	40	15
P19	Male	Dentist	43	20
P20	Female	Physician	45	20
P21	Male	Pharmacist	38	4
P22	Male	Pharmacist	56	20
P23	Male	Physician	58	20
P24	Male	Pharmacist	42	16
P25	Male	Physician	61	20

5. Themes emerged

Upon analysis of the semi-structured interviews, four main themes emerged: perception of vaccines, motivations to take the vaccine, expectations about the safety and efficacy of COVID-19 vaccines, and side effects experienced.

6. Perception of vaccines

In response to the question “What do you think about vaccination?“, all interviewed HCPs described vaccines in general as an important and necessary invention that saved human beings from many dangerous diseases and perhaps even from extinction. The majority of respondents shared that they were keen to get vaccines for themselves and their families.

“I believe that vaccines are the most important invention in the nineteenth century, they saved humanity from sever dangerous infections” ... P3

“Vaccines are important inventions that protected human beings from serious diseases for ages. Sometimes I think that without them we might be extinct!” ... P19

When the respondents were asked if they have been infected with COVID-19? more than half of the respondents have been infected with COVID-19 at least one time since the beginning of the pandemic with different severity ranging from mild to severe infection and the majority of these infections were confirmed with laboratory tests. All those who have been infected were very concerned about reinfection, in contrast only four of those participants who have not been infected were concerned about getting the infection.

“I am very concerned about being infected ... it’s a serious condition and it’s highly contagious and anyone can get infected so, that is why I am concerned” ... P1

“I have had a severe infection six months ago ... It was very severed, and I have been hospitalized for more than a week at the intensive care unit” ...”my infection was confirmed by x-ray and laboratory tests” ... P25

7. Motivations to take COVID-19 vaccine

The majority of the respondents expressed that at the time of COVID-19 vaccine development, and before they got the vaccine, they have heard many rumors and misinformation about COVID-19 vaccine when they were asked “What have you heard about the COVID-19 vaccine?”. These were related to the short time spent on research, development, and clinical studies of the vaccines. Furthermore, the rumors that have been heard were talking about interfering with genes, causing infertility, magnetism at the site of administration, and dying within two years of the first dose. The respondents shared that the main source of these rumors and misinformation was social networking like Facebook and Twitter. These rumors were also spread by some scientists who were reluctant to the vaccines.

“I have heard many negative and worrying things, such as anyone takes the vaccine will die in two years” ... P14

“There are many people, including scientists, who warned against the vaccine ... that it will interfere with memory cells in the immune system of the affected person, and there are also some exaggerated reports that it works to interfere with the genes of the human body” ... P17

On the other hand, the majority of the respondents expressed that they heard also positive things about the vaccine which were more convincing and made them take the decision and have the vaccine. The

source of this good news was real-life data, reports from other countries, and reputable bodies like the American Centers for Disease Control and Prevention (CDC) and scientific articles.

“As for the positive news, it came from studies and published medical research, as well as some specialists working on developing vaccines or specialists in this field ... in addition to the stats from USA and UK” ... P3

When the HCPs asked, “Please tell me what was your motivation to get COVID-19 vaccine?”, HCPs expressed that the main motives for taking the vaccine were: returning to normal life (pre-pandemic), prevention of new infections and re-infections and that the vaccine became a work requirement in the Iraqi health institute.

“The main motive for taking the vaccine is to end the epidemic and return to normal life as it was before the vaccine was taken” ... “also it became mandatory among the requirements of the work” ... P3

“It is certainly the desire to end the epidemic and return to life” ... P12

8. Expectations about the safety and efficacy of COVID-19 vaccine

When the following questions been asked “Did you have a dose of the vaccine? Did you have the option to opt a particular vaccine? Why?”, all of the participated HCPs stated that they have taken COVID-19 vaccine, and the majority took 2–3 doses of the vaccine. Two third (64%) of the participants were vaccinated with the Pfizer-BioNTech vaccine and seven participants (28%) with the Sinopharm vaccine, while only two (8%) participants took the AstraZeneca vaccine. Half of the respondents stated that the choice of the vaccine was based on the availability of the vaccine. The majority of the participants who were vaccinated with the Pfizer-BioNTech vaccine mentioned that they preferred this type also due to its higher efficacy, while those who were vaccinated with the Sinopharm vaccine stated that their choice was based on safety.

“I chose the Pfizer vaccine with the availability of the rest of the types because the studies carried out on it are more and because I was familiar with it, I concluded that I took it that it will be more effective than the rest of the types” ... P12

“I took the two doses of the Pfizer vaccine two months ago ... I chose and waited for the availability of the Pfizer vaccine in particular, because according to what I heard, the Sinopharm vaccine is not effective enough, and the AstraZeneca vaccine raised a lot of concerns about it.” ... P16

“I took the two doses of the Sinopharm vaccine, ...I chose this type because it is the safest one among the vaccines” ... P4

“I have chosen the Chinese one because most of those who took the Sinopharm vaccine did not suffer from only mild side effects” ... P10

Furthermore, the HCPs were asked “Did the healthcare professionals discuss/instruct you with the most common adverse reactions you may have had following vaccination?”. Only one-third of the respondents stated that they were informed about the possible side effects that they may experience postvaccination. However, the rest expressed that they were not informed about the possible side effects since they work at the same institute and have good knowledge about the possible side effects of the vaccine.

“At the hospital, specialists gave me some notes about the side effects that I might be exposed to, such as fever and the rest of the symptoms” ... P12

“Non from the medical staff there spoke to me about the potential side effects of the vaccine, given that we are from the medical

community and do not need the information that they give to the rest of the people" ... P2

In response to the following question, "Did vaccination make you feel less worried about catching COVID-19?", more than two-thirds of the participants expressed that taking the vaccine made them feel less concerned about re-infection and safer than before. They further confirmed their confidence in the vaccine by reducing the preventive measures they were practicing before vaccination. However, some participants were still concerned and continued to practice the same level of preventive measures of sanitation and social distancing just as before vaccination.

"I became less committed to them [preventive measures] after the vaccination in practicing my social life with family and markets ... I am confident that my vaccine is working" ... P10

"my adherence to preventive measures was not reduced than before vaccination, especially using face masks, using alcohol for sterilization and social distancing" ... P1

The majority of the HCPs shared the thought that their vaccine would give protection for 6–12 months and only half of them think that it will be effective against newly emerged strains of COVID-19.

"According to research and scientific articles, Pfizer, yes, it would provide a protection against new strains, and even if I get an infection, it would be mild ... expect that the vaccine will provide me with minimal protection for 6 months and a maximum period of about a year" ... P15

9. Side effects experienced

When the HCPs were asked "What was your expectation following vaccination?", the majority of the respondents stated that they expected that the side effects of the first dose of the vaccine would be severe, ranging from severe headache and fever to anaphylactic reactions.

"My expectations regarding the side effects before the vaccination are that I may suffer from headache, fever, and pain at the injection site" ... P1

Less than half of the respondents have experienced side effects following the first dose of the vaccine. According to their incidence among participants, these side effects were generalized pain (44%), pain at the site of injection (40%), fever (32%), headache and lethargy (20%), lymph node swelling (12%), absence of smell and taste (8%) and allergic reactions (8%). Only one-third of those respondents who experienced side effects described these side effects as severe, while the rest described them as mild to moderate.

"I was very concerned of the side effects, especially after hearing and reading in Facebook that many people suffered from severe and strong side effects after taking the Pfizer vaccine, very similar to a severe COVID-19 infection. However, I only experienced a headache, a slight fever, and pain in injection site "... P9

"When I took the first dose, I suffered mostly from headache that lasted for 4 days and pain at the injection site last about 2 days. My symptom was mild" ... P23

Regarding the answer to the question "Did you report these symptoms to the health authorities?", only one HCP reported his side effect to health authorities due to the severe anaphylactic reaction he experienced while the rest of the HCPs did not report either due to the less severity of the symptoms that they can deal with, or they were not aware of the presence of a hotline for emergency cases.

"They gave me a phone number to report if any side effects experienced, but I did not call them, because my symptoms were minor" ... P9

"Yes, I did, since I have had itching at the site of injection that increased gradually, followed by generalized urticaria especially at chest and arm pits ... the physicians told me that I have become allergic, and they discourage me from taking the second shot!" ... P25

On the other hand, HCPs replied to the questions "Do you think that the second dose would be more/less intense than the first dose? Did you seek medical advice/take medication for these symptoms? Did these symptoms affect your daily activities or your work?" that on the second dose of the vaccine, the majority of the HCPs expected to have more intense side effects than the first dose. About 80% of the respondents experienced side effects. The majority of those who experienced side effects expressed their symptoms as mild and were much less intense compared to the first dose.

"Unlike my first dose, in my second dose, I did not feel anything actually except pain at the injection site." ... P24

The HCPs response to the question "Do you think that these adverse reactions are more serious than COVID-19 infection or the benefit outweigh the risk?" was that the majority of HCPs mentioned that despite the side effects they experienced during the two doses of the vaccine, they were still less severe in comparison with the COVID-19 infection they have experienced before.

"No, certainly Corona virus infection is more dangerous than taking the vaccine" ... P9

"The side effects of the vaccine, whatever they are, will be more acceptable and less intense than the person being infected with the virus itself" ... P15

However, the answer to the following question "Do you think that the experience of vaccine side effects are good signs?" revealed that about half of the respondents believed that the appearance or experiencing side effects is a good sign or an indication that the vaccine is working, and the immune system becomes activated.

"I think that it is a good indication that the vaccine stimulated the immune system and did its job" ... P1

"Yes, I think the side effects are a good indicator. And the absence of side effects is evidence of the ineffectiveness of the vaccine" ... P4

"Definitely it is a good sign! I think that it is an indication that my body and the immune system responded to the vaccine and started working" ... P16

10. Discussion

Most of the participating HCPs had similar opinions, knowledge, attitudes, and expectations toward the different types of vaccines in general and COVID-19 vaccines in particular. These similarities involved having a good level of awareness among HCPs about the necessity of vaccination, being keen on getting vaccines, and worries/concerns about being infected with the coronavirus. The HCPs heard a lot about COVID-19 vaccines including both rumors and misinformation besides the positive and good news. Moreover, the motivation beyond vaccination was the same in most participants. On the other hand, HCPs' perceptions varied regarding the reasons behind choosing a particular type of COVID-19 vaccine, their concerns about re-infection and their commitment to protective measures before and after vaccination, side effects experienced, their views on the efficacy of the vaccines against new strains of coronavirus, and their beliefs about the relationship between the appearance of side effects and the efficacy of the vaccine. Despite the small sample size and the non-random sampling technique, the results of the current study sheds lights on the Iraqi HCPs views and opinions regarding COVID-19 vaccines and their side effects.

COVID-19 pandemic put the whole world under tremendous

pressure and negatively affected many aspects of peoples' lives^{21,22} Currently, among the most important concerns are to prevent COVID-19 infection through vaccination along with assuring the safety and effectiveness of the vaccines.²³ Collected data from the UK revealed that HCPs are considered the most trusted source of information about the vaccines; their sense of responsibility, as well as their conviction in the importance of vaccination programs, made them supportive of the public getting the vaccines.²⁴ Heckman et al.,²⁵ study showed that British HCPs were inclined to advise their patients to be vaccinated. Another study recognized that HCPs might be more likely to encourage others to take the vaccines if they were already been vaccinated.²⁶ Similarly, the participants of this study were the vaccinated HCPs which reveals that all participating HCPs considered vaccines as a necessary and important invention to save humanity from extinction, and the majority of them are keen to get the vaccine for themselves and their families.

There are multiple sources from which the people get their information about COVID-19 vaccines ranging from scientific research to social media websites like Facebook and Twitter. The latter provides conflicting and contradictory information which leads the general population to take opposite reactions and to be confused toward COVID-19 vaccines.^{27,28} It has been demonstrated in a study conducted in the UK on a sample of 24 healthcare workers that HCPs trusted evidence-based sources and data from clinical trials and therefore they advocated vaccination based on the data that highlighted the effectiveness of the vaccines in reducing the severity of infection.²⁹

In comparison to the latter study, the current work, even with the small sample size, demonstrated that participating HCPs heard a lot of misinformation and rumors about COVID-19 vaccines that mainly came from social media websites. However, some HCPs in this study were reluctant to vaccinate initially but started to hear promising news about the vaccines from real-life data, reports from other countries, and scientific research which all helped them to decide to take the vaccines themselves and encourage their families to be vaccinated. Numerous studies have investigated the factors that may affect HCPs' motivation to get COVID-19 vaccination. These studies showed that low recognized risk of contracting COVID-19 in France,³⁰ doubt about the effectiveness of the vaccines in China,^{31,32} considerable concerns about the unknown side effects of the vaccines in China and the USA,^{31,33,34} and a substantial apprehension about the time spent on the development of COVID-19 vaccines in China³² were associated with hesitancy for vaccination. The results of Lin et al.,³⁵ study showed that the main motivations of the front-line HCPs and the public to receive COVID-19 vaccines were in response to the efficacy as well as knowledge of the vaccines' mechanism of action. Jęskowiak et al.,³⁶ study revealed that the reasons behind taking COVID-19 vaccines among Polish medical students and employees were; concerns about their families' health, their health, and occupational health. To a lesser extent, ending the pandemic and traveling were also stated as reasons for taking the vaccine.

In the current study, the results showed that the main motivations to receive COVID-19 vaccination among HCPs were returning to normal life, prevention of infection and reinfection and that the vaccine became a job requirement in Iraqi health institutions. Even though the sample size here was small, the factors mentioned as motivations were not very different from the previously mentioned international studies.

Health literacy, which is defined by WHO as "cognitive and social skills that determine the motivation and ability of individuals to access understand and use the information to promote and maintain optimal health" can have a vital role in maintaining the health of the public.¹⁷ Although HCPs in this study relied on scientific evidence in choosing to take the vaccines, they were reluctant at first due to misinformation they heard from social media. This may be a warning sign for the healthcare system that health literacy in Iraq needs major attention, because if the HCPs could be affected by misinformation, then the situation with the general public would be far worse.

Studies from different countries showed that there were safety concerns regarding COVID-19 vaccination among various community groups, including college students in the USA³⁷ and HCPs in Malta.³⁸ Hatmal et al.,³⁹ study which was conducted in Jordan, showed that the most used vaccines among participants were Sinopharm, Pfizer-BioNTech, and AstraZeneca, respectively. This order was in contrast to their personal preferences for the Pfizer-BioNTech vaccine if they had the opportunity to opt for a particular manufacturer. The reason for this preference for Pfizer-BioNTech may be attributed to the fact that it was the first universally authorized vaccine.⁴⁰ Another reason might be the huge amount of data from published scientific research that vouch for its effectiveness and safety, and that is probably why the Pfizer-BioNTech vaccine is the most commonly administrated type of COVID-19 vaccine globally.⁴¹ In our study, most of the participants (two-thirds) chose and preferred Pfizer-BioNTech, Sinopharm, and AstraZeneca vaccines respectively. The reasons for this order of preference reported by the HCPs were the availability, higher efficacy for Pfizer-BioNTech, and safety for Sinopharm. Similarly, a survey of Jordanian inhabitants showed that Pfizer-BioNTech was the most preferred choice.³⁹

Rahamim-Cohen et al., 2021 study in Israel explored the public adherence to preventive measures in post-vaccinated people. It showed that there was a reduction in social distancing and face mask-wearing, especially in people under the age of 50 years, while among HCPs, commitment to wearing a face mask was still prevalent in contrast to adherence to social distancing which was decreased.⁴² In this study, more than two-thirds of participating HCPs admitted to reducing their commitment to protective measures due to their belief that they were now safer than before and that their chance of being re-infected is low post-vaccination. Possibly with larger sample, the picture might be different, since a minority of the participated HCPs have admitted adhering to protective measures even after vaccination.

Even though the incidence of side effects of the vaccines in real-world was lower than that recorded during clinical trials, the spectrum was broader. In addition, different kinds of side effects that were not noticed during clinical trials appeared after the vaccines' rollout. This suggests that attention is required for the detection and treatment of rare side effects.⁴³ Several studies showed approximately similar results for post-vaccination side effects described as mild, especially for pain, redness and swelling at the injection site, exhaustion, fever, headache, muscles and joints pain, itching, nausea, and vomiting.⁴⁴⁻⁴⁷ Most of the side effects that appeared on participants in a Saudi study were reported on the first day after receiving vaccines in 85% of the participants and persisted for 24 h in 75% of them.⁴⁸ Our study is the first study that investigated both the expected and the experienced side effects either after the first dose or after the second dose, and it revealed that one-third of the participants who experienced side effects after receiving the first dose of vaccines described their symptoms as severe while the rest described the side effects as mild to moderate. Only one HCP in the current study suffered from severe anaphylactic reaction and reported this to health authorities in contrast to the majority of the participants who did not report their side effects. The most common side effects experienced by participants according to their incidence were generalized pain, pain at the site of injection, fever, headache and lethargy, lymph node swelling, absence of smell and taste, and allergic reactions respectively. The side effects reported after the first dose went somewhat parallel with the expectations of participants regarding what might occur if they receive the first dose vaccine, they expected that the side effects of the first dose of the vaccine would be severe, ranging from severe headache and fever to anaphylactic reactions. The HCPs' expectations for side effects following the second dose were, however, contrary to what they experienced; the participants expected to suffer from more intense side effects than those after the first dose, but the majority of participants who experienced side effects following the second dose described their symptom as mild and were much less intense compared to the first dose. Additionally, our study revealed that

half of the HCPs thought that the occurrence of side effects after receiving the vaccine is a good sign that the immune system is responding, while the others thought that side effects are not related to immune system response. It has been shown in a similar study by Riad et al.,⁴⁹ that the majority of HCPs participants who suffered from post-vaccination side effects would think that it is a sign that their immune systems started working and doing what they were expected to do.

The strength of this study is that it is the first qualitative study conducted in Iraq to explore HCPs' perception of COVID-19 vaccination and to evaluate the severity and the common side effects experienced postvaccination. This study had a few limitations. Although the HCPs who were recruited had different professions, more than half of the participants were pharmacists, this may lead to the skewness of the results towards pharmacists' opinions. In addition, the small sample size may limit the generalization of the results from this study to all HCPs. Another limitation to the generalization of the results is the sampling technique which makes it difficult for the studied sample to be representative of all the people working in the healthcare system.

11. Conclusion

This study concludes that the participated HCPs had good knowledge about COVID-19 vaccines which was not affected by rumors and misinformation. Furthermore, Iraqi HCPs relied on evidence-based information and reputable scientific journals. In contrast to the HCPs' belief, the experienced side effects of the first and the second dose were mild to moderate in severity. The majority of HCPs opted for the vaccine they have got according to the vaccine's efficacy and safety profile.

Author contributions

All authors contributed equally to the study concept and design and were equally involved in data collection. Mohammed I. Aladul performed the data analysis. Shahad M. Khaleel and Sadeel A. Shanshal were responsible for the writing of the first draft. Mohammed I. Aladul and Sadeel A. Shanshal have approved the final version of the manuscript.

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Declaration of competing interest

None.

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