Research Article

Observed Adverse Effects of Sinopharm COVID-19 Vaccine in Healthcare Workers

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Abstract: Background: Covid-19 was first identified in Wuhan China in December 2019, and rapidly spread world over. Vaccine was always thought as first line defence against viral infections, and Covid was no exception. Although developed through different technologies, Pakistan got its share of Sinopharm from China and vaccination started in February 2021, with priority for Healthcare workers. There were lot of myths and hesitancy related with the adverse effects and urgency in approving these vaccines. Addressing adverse effects in post vaccinated population hence, became an important matter.

Objective: Aim of this study was to observe the adverse effects of this vaccine in Pakistani population, to assess safety and develop confidence in Healthcare Workers.

Materials and Methods: A cross-sectional Observation study was carried out in vaccinated Healthcare Professional through Non-probability purposive sampling over a period of one month. A team collected data directly, as well as on the telephone call. A Google form was also generated and sent. Information was collected and analysed on IBM-SPSS 23.0

Result: Majority of the participants were less than 55 years with female dominance. Among co-morbidities, hypertension was most common, followed by diabetes. In local and systemic adverse effects, pain and fatigue were most common, followed by muscle weakness, fever and headache respectively. These effects were also more common after first injection.

Conclusion: Results favor that people should be more careful after the first dose as more adverse effects were felt after that. This vaccine has a good safety profile as no major adverse effects were noticed. It was also considered safe for patients with co-morbidities.

Keywords: Sinopharm, Adverse effects, Covid-19, Vaccine, Hypertension, Healthcare.

INTRODUCTION

In late 2019, a new coronavirus, SARS-CoV-2, emerged in Wuhan, China, quickly evolving into a global pandemic. Recognized as coronavirus disease 2019 (COVID-19), this highly contagious virus has been officially declared a pandemic by the World Health Organization (WHO). Its rapid spread has led to numerous fatalities and has triggered worldwide economic crises [1]. The initial outbreak occurred in Wuhan in December 2019, rapidly escalating from a local concern to a global health crisis affecting 209 countries across America, Europe, Australia, and Asia, including Pakistan. The global impact has resulted in over fifty thousand deaths, with a continually rising number of confirmed cases exceeding one million [2]. This highly infectious disease caused symptoms ranging from asymptomatic to mild flu-like symptoms to very severe acute respiratory distress syndrome claiming the life of more than 800,000 people worldwide [3]. Patients suffering from SARS-CoV-2 infection, especially older individuals and those with respiratory or cardiovascular co-morbidities are at higher risk of having more serious complications, including severe pneumonia, acute respiratory distress syndrome, multiple organ failure, and in some cases, death [4]. This situation became so grave that in order to decrease the spread of infection social distancing and worldwide lockdown strategies were implemented that led to a huge social, physical, emotional and economic burden [5]. This life threatening pandemic established an urgent need of creating an effective vaccine that would provide protection against COVID-19. At present, all the efforts were put into developing an effective and safe vaccine against COVID -19 especially for the vulnerable and high-risk groups and, as of late August 2020, there were 30 vaccines in clinical trials with over 200 in various stages of development. Including AstraZeneca/Oxford's AZD1222, Moderna's mRNA-1273 and Sinovac's CoronaVac vaccines [3]. Due to the urgency of the situation many vaccines were rapidly developed, including recombinant-protein based vaccines, replicating or non-replicating viral vector-based vaccines, DNA vaccines, and mRNA vaccines, live attenuated vaccines, and inactivated virus vaccines. Like every other medicine all of these vaccines may have advantages and disadvantages, however at the moment it is too early to predict the true efficacy or the adverse effects of these vaccines [3].

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In Pakistan, vaccination process started on February 2, 2021 by inoculation of the first healthcare professional in Islamabad [6]. Sinopharm vaccine provided by China is being used for vaccinating the high risk populations. Initially the vaccine was being provided by the government to the healthcare workers only. Sinopharm is an inactivated coronavirus vaccine and it acts by boosting the immunity by producing antibodies against spike proteins [7]. In various studies, a significantly higher incidence of adverse effects of Sinopharm among younger healthcare workers compared to other vaccines [8]. Reported common adverse effects of the Sinopharm vaccine, including pain at the injection site, general lethargy, myalgia, body pain, low-grade fever, and headache [9]. Additionally, noted a significantly higher prevalence of adverse effects in females, such as pain at the site of injection, headache, joint pain, fatigue, and loss of taste or smell, following the second dose of the Sinopharm vaccine [10]. In Pakistan, there is much hesitancy even by the healthcare Workers in getting vaccinated because of the possible adverse effects and adverse reactions of the vaccine [11]. No such data regarding the adverse effects of Sinopharm vaccine is available in Pakistani population. A study carried out by Xia S, *et al*. observed the effects of Sinopharm vaccine on safety in Chinese population in Phase I and Phase II trials [12]. We have different demographic features compared to the Chinese population, so a study was carried out to see the adverse effects of this vaccine in our population in order to know better about the safety of this vaccine with regard to our population. The primary COVID-19 vaccination series commonly resulted in inflammation and redness at the injection site, accompanied by injection site pain. Individuals also frequently reported systemic adverse effects, with fever and arthralgia/myalgia being the most prevalent. Booster vaccinations were primarily associated with adverse effects such as arthralgia/myalgia, fatigue, and fever.

Between April and October 2022, a cross-sectional study involving 377 healthcare workers in Tehran, Iran, was conducted. Data were collected through researcher-conducted interviews utilizing a checklist to evaluate both systemic and local adverse effects associated with COVID-19 vaccines. The study revealed instances of post-vaccination adverse effects specifically among healthcare workers with heightened exposure to SARS-CoV-2. It is noteworthy that the immune response of this group may differ from that of the broader population, underscoring the limitation that the findings may not be universally applicable to the general population in Iran. Additionally, the reliance on subjectively reported adverse effects introduces the possibility of recall bias in the study [13].

One study conducted by S.A. Meo *et al*. observed and compared the adverse effects of Pfizer/BioN Tech and Moderna Vaccines on Pakistani population but they did not study the adverse effects of Sinopharm vaccine in our population [14]. As initially, we only had Sinopharm vaccine that was being provided to our healthcare workers so the adverse effects of this vaccine were studied.

The aim of our study was to observe the adverse effects of this vaccine in Pakistani population, to assess safety and develop confidence in healthcare workers. It will also help in finding out if our population has similar adverse effects of this vaccine, as is documented in literature.

MATERIALS AND METHODS

We conducted a cross-sectional observational study to assess the adverse effects of the Sinopharm vaccine in healthcare workers. The study was conducted over a period of 1 month. This duration was chosen considering practical constraints and the need for timely data collection; however, it may limit the ability to capture potential long-term adverse effects.

Initially, a sample size of 152 participants was calculated with a 95% confidence interval, 5% margin of error, and an expected 25% incidence of adverse reactions among healthcare workers receiving the COVID-19 vaccine. However, due to a high vaccination turnout, data from approximately 420 participants were collected to enhance statistical power. The rationale for this deviation from the initial sample size calculation was the increased availability of participants during the study period. Non-probability purposive sampling was used to recruit the participants. This approach was chosen for its practicality; however, it introduced potential biases, and the findings may not be fully generalizable to the broader population of healthcare workers.

All healthcare workers who received COVID-19 vaccines and agreed to participate in the study were included. The duration since vaccination was also included in the inclusion criteria. Healthcare workers who did not agree to participate were excluded from this study.

Upon obtaining permission, data were collected from the vaccination site at Sir Ganga Ram Hospital. A dedicated team of doctors contacted the vaccinated individuals and collected information via telephone after obtaining consent. A maximum of three calls were made to each participant, with a follow-up period of 2 weeks after the second dose. In case of no response, a message about the study was sent, and if the person agreed, data were collected either through a phone call or through Google Forms. Additionally, a Google form was distributed to the healthcare workers through social media and personal email addresses. Efforts were made to ensure accuracy during data collection, and confidentiality of the information received was maintained.

STATISTICAL ANAYLSIS

Data were compiled and analysed using IBM SPSS version 23.0. The variables included age, sex, comorbidities (diabetes, hypertension, heart diseases, respiratory illnesses, etc.), and symptoms/adverse effects after vaccination. Descriptive statistics, including the mean with standard deviation for quantitative data and counts with percentages for qualitative variables, are reported. Local and systematic adverse effects after doses of

COVID vaccinations were analysed and classified according to sex and age groups. A brief rationale for the variable selection and statistical methods used in the analysis was provided. Efforts were made to mitigate the bias during the analysis phase.

RESULT

In the present study a total of 420 healthcare workers participated, having mean age 35.7±11.9years, 91.9% participants were aged ≥ 55years, 43.3% were male gender. Among the participants, 6.5% reported for diabetes, 9.9% reported for hypertension, 1.3% reported for heart disease and 3% reported for respiratory illness (Table **1**).

Table 1. Baseline Characteristics of Studied Participants (n=420).

Characteristics		n	%
Age Group Mean=35.7±11.9 years	<=55 years	386	91.9
	>55 years	34	8.1
Gender	Male	182	43.3
	Female	238	56.7
Diabetes Mellitus	No	289	93.5
	Yes	20	6.5
Hypertension	No	281	90.1
	Yes	31	9.9
Heart Disease	No	298	98.7
	Yes	4	1.3
Respiratory Illness	No	293	97.0
	Yes	9	3.0

Table 2. Distribution of Injection Site Adverse Reaction at after First & Second Dose of Covid-19 Vaccine.

Local Adverse Effects of 1st Dose (at Injection Site)					
Local Adverse effects	**Total n (%)**	**Male n (%)**	**Female n (%)**	**≤55 years n (%)**	**>55 years n (%)**
Pain	120 (28.6%)	34 (18.7%)	86 (36.1%)	111 (28.8%)	9 (26.5%)
Induration	3 (0.7%)	1 (0.5%)	2 (0.8%)	3 (0.8%)	-
Redness	1 (0.2%)	-	1 (0.4%)	1 (0.3%)	-
Itching	-	-	-	-	-
Swelling	4 (1%)	-	4 (1.7%)	4 (1%)	-
Muscular weakness	13 (3.1%)	5 (2.7%)	8 (3.4%)	11 (2.8%)	2 (5.9%)

Local Adverse Effects of 2nd Dose (at Injection Site)					
Local Adverse effects	**Total n (%)**	**Male n (%)**	**Female n (%)**	**≤55 years n (%)**	**>55 years n (%)**
Pain	81 (19.3%)	26 (14.3%)	55 (23.1%)	73 (18.9%)	8 (23.5%)
Induration	2(0.5%)	1(0.5%)	1(0.4%)	2(0.5%)	-
Redness	-	-	-	-	-
Itching	2 (0.5%)	1 (0.5%)	1 (0.4%)	1 (0.3%)	1 (2.9%)
Swelling	2 (0.5%)	1 (0.5%)	1 (0.4%)	2 (0.5%)	-
Muscular weakness	11 (2.6%)	6 (3.3%)	5 (2.1%)	10 (2.6%)	1 (2.9%)

Out of 420 participant, 129(30.7%) participants responded for local adverse effects (at injection site) after first dose of COVID-19 vaccine, whereas 91(21.7%) participants reported local adverse effects (at injection site) after second dose of COVID-19 vaccine. Local adverse effects of 1st dose at injection site, in majority of participants, pain was reported by 28.6% participants followed by 3.1% for muscular weakness and 1% reported for swelling. Among female participants, pain was reported by 36.1%, followed by muscular weakness (3.4%). Among participants with age more than 55-years, predominantly 26.5% reported pain at the site of injection. Local adverse effects of 2nd dose were reported as 19.3% for pain followed by 2.6% reported for muscular weakness. Among participants with age more than 55-years old, pain was reported by 23.5% participants and muscular weakness reported by 2.9% participants (Table **2**).

There were 35% participants responded for systematic adverse effects after first dose of COVID-19 vaccine, whereas, 25.5% participants reported for systematic adverse effects after second dose of COVID-19 vaccine.

Among the reported systematic adverse effects following the first dose of Covid-19 vaccine, 18.1% reported for fatigue, 15.5% reported for muscle pain and 15% reported for fever. Among female participants 19.3% reported for fatigue, 16.8% reported for muscle pain, 11.3% reported for headache and 15.1% reported for fever as common systematic adverse effects after dose-I , among participants with age more than 55-years common systematic adverse effects were fatigue (11.8%) followed by fever (8,8%) and muscle pain (8.8%) (Table **3**).

Table 3. Distribution of Adverse Effects Observed after First Dose of Covid-19 Vaccine.

Systemic Side Effects	Total n (%)	Male n (%)	Female n (%)	≤55 years n (%)	>55years n (%)
Fever	63 (15%)	27 (14.8%)	36 (15.1%)	60 (15.5%)	3 (8.8%)
Headache	49 (11.7%)	22 (12.1%)	27 (11.3%)	47 (12.2%)	2 (5.9%)
Fatigue	76 (18.1%)	30 (16.5%)	46 (19.3%)	72 (18.7%)	4 (11.8%)
Vomiting	6 (1.4%)	1 (0.5%)	5 (2.1%)	6 (1.6%)	-
Diarrhea	10 (2.4%)	3 (1.6%)	7 (2.9%)	9 (2.3%)	1 (2.9%)
Muscle pain	65 (15.5%)	25 (13.7%)	40 (16.8%)	62 (16.1%)	3 (8.8%)
Nausea	11 (2.6%)	3 (1.6%)	8 (3.4%)	11 (2.8%)	-
Joint pain	15 (3.6%)	5 (2.7%)	10 (4.2%)	13 (3.4%)	2 (5.9%)
Throat pain	15 (3.6%)	4 (2.2%)	11 (4.6%)	14 (3.6%)	1 (2.9%)
Cough	23 (5.5%)	10 (5.5%)	13 (5.5%)	21 (5.4%)	2 (5.9%)
Dyspnea	5 (1.2%)	2 (1.1%)	3 (1.3%)	3 (0.8%)	2 (5.9%)
Impaired appetite	24 (5.7%)	8 (4.4%)	16 (6.7%)	24 (6.2%)	-
Dizziness	5 (1.2%)	2 (1.1%)	3 (1.3%)	5 (1.3%)	-
Pruritus	3 (0.7%)	1 (0.5%)	2 (0.8%)	3 (0.8%)	-

Adverse effects following the second dose of covid-19 vaccine, 12.6% reported for fatigue, 10.7% reported for muscle pain, 9.3% reported for fever. Among female participants 14.7% reported for fatigue, 12.2% reported for muscle pain, 9.7% reported for headache and 11.8% reported for fever as common systematic adverse effects after dose-II , among participants with age more than 55-years common systematic adverse effects were fatigue (17.6%), Headache (14.7%) and muscle pain (11.8%) (Table **4**).

Table 4. Distribution of Adverse Effects Observed after Second Dose of Covid-19 Vaccine.

Systemic side-effects	Total n (%)	Male n (%)	Female n (%)	≤55 years n (%)	>55years n (%)
Fever	39 (9.3%)	11 (6%)	28 (11.8%)	36 (9.3%)	3 (8.8%)
Headache	39 (9.3%)	16 (8.8%)	23 (9.7%)	34 (8.8%)	5 (14.7%)
Fatigue	53 (12.6%)	18 (9.9%)	35 (14.7%)	47 (12.2%)	6 (17.6%)
Vomiting	2 (0.5%)	-	2 (0.8%)	2 (0.5%)	-
Diarrhea	4 (1%)	-	4 (1.7%)	4 (1%)	-
Muscle pain	45 (10.7%)	16 (8.8%)	29 (12.2%)	41 (10.6%)	4 (11.8%)
Nausea	4 (1%)	-	4 (1.7%)	4 (1%)	-
Joint pain	15 (3.6%)	7 (3.8%)	8 (3.4%)	13 (3.4%)	2 (5.9%)
Throat pain	20 (4.8%)	8 (4.4%)	12 (5%)	18 (4.7%)	2 (5.9%)
Cough	18 (4.3%)	7 (3.8%)	11 (4.6%)	16 (4.1%)	2 (5.9%)
Dyspnea	3 (0.7%)	1 (0.5%)	2 (0.8%)	3 (0.8%)	-
Impaired appetite	6 (1.4%)	2 (1.1%)	4 (1.7%)	5 (1.3%)	1 (2.9%)
Dizziness	11 (2.6%)	3 (1.6%)	8 (3.4%)	11 (2.8%)	-
Pruritus	3 (0.7%)	2 (1.1%)	1 (0.4%)	2 (0.5%)	1 (2.9%)

Among the 308 participants who done PCR after COVID-19 vaccination, 8.1% participants were found positive for COVID-19 after the vaccination, the median of developing PCR positive COVID illness after vaccination was reported as 7th day with rage 1- 36 days. There were 57.1%participants that reported PCR Positive after 1st dose and 42.9% after the 2nd dose of vaccine.

DISCUSSION

This study showed that local adverse effects at the injection site were greater after the first dose than after the second dose. Among the adverse effects, pain was most frequently felt after the first dose. This could be due to apprehension about vacci-

nation and fear of being unknown. It was observed more frequently in females than in males. These findings were similar to those observed in a review article by Fillingim *et al*., who stated that women were more sensitive to pain than men [15]. In addition, the younger group experienced more pain than the older group, which was similar to a meta-analysis carried out by Stefan Lautenbacher in which it was evident that aging reduces pain sensitivity [16]. Among other local adverse effects, induration, swelling, and redness were observed only in a very small percentage, indicating that this vaccine does not cause any severe local inflammatory response. Local itching was not present in any individual on the first dose however 2 participants (0.5%) developed itching after the second dose. This may be due to a delayed hypersensitivity reaction. Similar observations were also made after the Moderna vaccine [17]; however, these reactions were self-limiting and improved on their own without causing any serious adverse reactions. Three percent of the patients developed muscular weakness after the first dose, whereas 11 percent developed weakness after the second dose, showing that muscle weakness was felt more after the second dose, and the older group developed more muscle weakness than the younger individuals. This may be because the immune system becomes sensitized after the first dose and thus produces a more emphatic response after the second dose. A study carried out in Saudi Arabia by El Shitany *et al.* using Pfizer vaccine also showed increased local site muscle pain after the second dose which was similar to our findings [18].The muscular weakness was experienced more in age above 55yrs older as compared to the young which may be due to the age related decrease in the muscle size as well as impairment in neural activation of the muscle unit [19].

In systemic adverse effects, more adverse effects were noticed after the first dose as compared to the second dose and younger group observed more symptoms as compared to the older group, and female developed the adverse effects more frequently than males. These results were different from that observed in the study conducted in Saudi Arabia using Pfizer Covid Vaccine in which second dose produced more adverse effects than the first dose. However, in both the studies female participants developed more adverse effects [18]. The most frequent systemic adverse effects noted were fatigue, generalized muscle pain, fever, headache and impaired appetite in order of their frequency. These adverse effects can be explained by the possibility of the involvement of immune system that could produce cytokines leading to an inflammatory response on the blood vessels, muscles, and other tissues. As a result, they can develop fever and flu-like symptoms that could last for days after vaccination. This could also explain the prevalence of these adverse effects in younger age group as younger people have stronger and more efficient immune systems. No systemic allergic reactions or any hypersensitivity reactions were reported after the vaccination. Among the respiratory symptoms cough was the most commonly noted feature after the first dose whereas throat pain was most commonly observed after the second dose. In addition to this a small percentage also reported dyspnoea. These respiratory symptoms of cough, dyspnoea and throat pain may be due to vaccine associated humoral response that caused increased vaccine-induced S-specific IgG levels resulting in lung injury. This theory was supported by earlier vaccine safety studies carried out on animals in which acute lung injury was noted in the vaccinated animals even in aged animals, demonstrating eosinophilic immune pathology in the lungs [20]. However, these adverse effects were not severe and in most of the cases resolved on their own. In the gastrointestinal system most commonly observed adverse effects were impaired appetite, nausea, diarrhoea and vomiting. These adverse effects were more observed in the younger participants. They were observed more after the first dose. These findings were similar to the cross-sectional study carried out by El-Shitany *et al*. on Minor to moderate adverse effects of Pfizer BioNTech covid-19 vaccine among Saudi residents. This may be due some dysregulation of the immunity leading to changes within the intestinal flora. Such clinical and microbiological changes were also observed in Covid infections [21]. In musculoskeletal system muscle aches and joint pains were observed in higher frequency after the first dose. Younger participants felt more muscular aches whereas older individuals felt more joint pains. This may be explained due to the fact that inflammatory response produced by the body can impact almost every system, including the musculoskeletal system [22].

Similarly, another investigation indicated a slightly higher incidence of adverse effects following the second dose in comparison to the first dose, with exceptions for nausea (1.5% vs. 1.1%), allergy (1.1% vs. 0.0%), cough (1.1% vs. 0.7%), intestinal discomfort (1.85% vs. 1.5%), and backache (4.1% vs. 3.0%). The observed reaction patterns in the immune system offer a potential explanation for these results. The immune response triggered by vaccination may induce flu-like symptoms that persist for a brief period. Cytokines produced during this immune response may contribute to inflammatory reactions involving the vascular system, muscles, and other tissues. Notably, these findings align with recently published research. In contrast to previously reported studies, this research suggests that adverse symptoms were more prevalent after the first dose compared to the second dose, with exceptions such as pain at the injection site (38.0% vs. 39.3% [first vs. second dose]), nausea (2.0% vs. 4.74%), flu-like symptoms (7.3% vs. 22.3%), myalgia (20.3% vs. 23.3%), swelling of the glands (17.3% vs. 28.0%), breathlessness (22.7% vs. 28.3%), diarrhea (12.0% vs. 16.7%), and chest pain (9.3% vs. 27.3%) [23].

In order to assess the efficacy of the vaccine a question related to the development of PCR positive symptomatic COVID infection, after vaccination was asked. 308 participants replied to this question. Out of these 8.1% developed positive PCR Covid infection suggesting that efficacy of this vaccine was around 91.9% which was more than reported by the Sinopharm clinical trials where they announced it around 79% [24]. We would be in a better position to comment on this after a follow up period of 6 months. We could then say if they developed Covid infection, and what was the severity and recovery ratios. Our response to development of Covid post vaccination was different for first and second vaccine groups.57.1% Individuals developed Covid

after the first dose and 42.9% developed after the second dose. However, mostly developed these symptoms after the first dose and within the first week of the vaccination. According to the CDC it takes around 2 weeks for the body to start producing the immunity after vaccination which was similar to our study in which Covid infection developed in most cases within the first week after the injection at the time when immune system had not fully been activated against the virus [25] .

A descriptive cross-sectional study, approved by ethical standards, spanned a 6-month period from July to December 2022, employing a written questionnaire to assess the adverse effects linked to COVID-19 vaccination. Utilizing a random sampling technique, the multi-center study gathered data from various hospitals in Karachi. The study enrolled a total of 400 participants, aged 18 to 59, of both genders, residing in Karachi, and having received at least one dose of the inactivated COVID-19 vaccines, Sinopharm and SinoVac. The participants' experiences of vaccine adverse effects after the first or second dose were analyzed, categorizing the intensity into mild, moderate, and severe.

Approximately 30% of participants reported both local and systemic adverse effects for Sinopharm and SinoVac. The study's findings indicated that the frequency and severity of adverse effects were generally milder with both doses of the Sinopharm or SinoVac vaccine. Common adverse effects included fever, injection site pain and burning, rash, joint pain, myalgia, and fatigue, while less common effects encompassed shortness of breath, cough, chest pain, diarrhea, flu-like symptoms, and nausea. This research contributes valuable insights into the safety profile of Sinopharm and SinoVac COVID-19 vaccines among the studied population in Karachi [26].

In a research investigation, the majority of adverse effects were observed post-administration of the AstraZeneca vaccine, followed by Sputnik V and Sinopharm, aligning with existing literature. Babaee *et al*. found that Sputnik V (82.7%) and AstraZeneca (70.5%) induced a higher prevalence of adverse effects compared to Sinopharm (37.4%) among vaccinated individuals in Iran. Another study from Jordan similarly revealed a higher incidence of post-vaccination adverse effects for Sputnik V (50.8%) in contrast to AstraZeneca (37.4%) and Sinopharm (16.0%). Overall, there appears to be a correlation between adverse effects and the vaccine development platform, with vector-based vaccines potentially inducing more adverse effects than those developed using inactive viruses. Notably, this study reported a 1-2% occurrence of anaphylaxis following COVID-19 vaccination, a higher rate than seen in previous studies. Consequently, it is advisable for individuals to remain at the vaccination center for 15-30 minutes to facilitate prompt medical intervention in the event of anaphylaxis [13].

Based on the observed adverse effects of the Sinopharm vaccine in healthcare workers, it is imperative to formulate policy-level recommendations to address and mitigate these effects. The prevalence of common adverse effects such as injection site pain, fatigue, headache, muscle pain, chills, and systemic symptoms like fever, myalgia, and lethargy should be carefully considered in policy development. Healthcare facilities should prioritize the establishment of comprehensive monitoring and reporting systems to track and document the occurrence of adverse effects following Sinopharm vaccination. This will enable the collection of real-time data on the prevalence and severity of adverse effects, facilitating evidence-based policy decisions. Healthcare workers should receive thorough education and training on recognizing, managing, and reporting vaccine-related adverse effects. This includes the dissemination of information on the expected adverse effects of the Sinopharm vaccine and the appropriate steps to take when these occur. Additionally, clear guidelines should be provided on when to seek medical attention for severe or persistent adverse effects.

LIMITATIONS

This study has certain limitations that need consideration. The research focused on healthcare workers with increased exposure to SARS-CoV-2, potentially resulting in a distinct immune response compared to the general population. Consequently, the findings may not be applicable to the broader population in Iran. Additionally, the reliance on subjectively reported adverse effects introduces the possibility of recall bias.

One notable limitation is the exclusive inclusion of healthcare workers in the study. This group typically exhibits enhanced immunity due to favorable socioeconomic status and healthy dietary habits. To gain a more comprehensive understanding of the vaccine's safety and efficacy profile, individuals from diverse social strata should be included in future studies.

Furthermore, the study acknowledges that healthcare workers may experience the first dose of the vaccine as a booster, given their high risk of exposure to COVID-19 patients. Additionally, healthcare workers, having better access to healthcare facilities and greater awareness of first aid, might have managed adverse effects more effectively, potentially leading to a slight exaggeration of reported effects [13].

CONCLUSION

These results favor that people should be more careful after the first dose as more adverse effects were felt after the first dose. This vaccine has a good safety profile as no major adverse effects were noticed. It is also considered safe for patients with co-morbidities like diabetes mellitus, respiratory and heart diseases as they also did not develop any significant problems after vaccination. This vaccine has a good efficacy against moderate to severe Covid infections

AUTHORS' CONTRIBUTION

- **Khadija Muneer**: Conception and design of the study, Manuscript writing.
- **Nimra Tufail and Sadia Inam**: Data collection and entry.

- **Imran Hassan Khan**: Critical review.
- **Saima Ayub**: Data analysis.

CONFLICT OF INTEREST

Declared none.

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