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Adverse events occurring post-covid-19 vaccination among healthcare professionals – A mixed method study

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ABSTRACT

Background: Healthcare professionals (HCPs) are at the front line of the nation's fight against COVID-19 and are always at a greater risk of contracting contagious disease. But amidst the crisis, the vaccines were not accepted by all the HCPs due to adverse events occurring post-COVID-19 vaccination. Hence, the present study was designed to assess adverse events occurring among HCPs post-COVID-19 vaccination both quantitatively and qualitatively. **Method:** Sequential mixed-method approach was employed. A cross-sectional E-survey was conducted among the healthcare professionals of a North Indian (*Statistically significant ($p < 0.05$)) college and hospital. The second phase included a semi-structured qualitative interview of the participants who were willing to participate.

Results: Among all the HCPs with age groups ranging from 20 to 70 years, majority of them experienced pain at the site of injection (88.8–100%) followed by tiredness (87.7–60%) and body ache (86.6–40%) post-vaccination. There is an increased frequency of adverse events in females as compared to males. Qualitative findings are summarised in three major domains i.e vaccine adverse effects, fear and hesitancy for vaccines and vaccine acceptance.

Conclusion: Short term adverse events of COVISHIELD vaccine were very few and were mild in severity yet interviews showed hesitancy of study participants for vaccination.

1. Introduction

The world is facing the dangerous challenges of the COVID-19 pandemic. There have been a total of 195,266,156 confirmed cases of COVID-19, including 4,180,016 deaths, reported to World Health Organization (WHO) as of 28th July 2021 [1]. In India, the count of COVID-19 cases is 31,484,605. Out of these affected COVID-19 cases in India 422,022 died because of the fatal nature as well as the comorbidities associated with the disease [2]. As WHO and partners work together on the response tracking the pandemic, advising on critical interventions, distributing vital medical supplies to those in need they are racing to develop and deploy safe and effective vaccines [3]. Clinical trials for all vaccines must first show that they are safe and effective before any vaccine can be authorized or approved for use. Hence, pharmacovigilance of the COVID-19 vaccine was need of the hour. The known and potential benefits of a COVID-19 vaccine must outweigh the known and potential risks of the vaccine before it is used under what is known as an Emergency Use Authorization (EUA) [4]. India, being the second country in the list of highest number of infections in the world

and the panic, driven by news of new virus variants, fuelled the approval of SARS-CoV2 vaccines [5]. COVID-19 vaccination proved to be an important tool to help stop the pandemic. With the second largest population and one of the biggest pharmaceutical manufacturing capacities in the world, India played an indispensable role in the COVID-19 vaccination effort. But hurried approval of its own vaccine threatens to undermine domestic trust [5]. On 3 January 2021, India's top drug regulator issued emergency approval for two vaccines for restricted use against COVID-19, even though phase III clinical trials for COVISHIELD and COVAXIN were still going on in India.

Finally India launched its vaccination drive against the coronavirus disease on 16 January 2021. The first group included healthcare and frontline workers. The second group to receive COVID-19 vaccines were the persons above 60 years of age as of January 1st, 2021, and persons between 45 and 59 years with comorbid conditions. But a lack of transparency, around COVISHIELD and COVAXIN, India's first home-produced vaccine, threatens to shatter trust at a time when the country is planning one of the largest and most difficult vaccination efforts in the world while deploying its pharmaceutical production expertise to

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supply vaccine stocks to countries desperately in need of them. [5]

India's cumulative recoveries had surged to 1,06,56,845 till mid of February 2021. Rising recoveries along with contained daily deaths had ensured a sustained fall in the COVID-19 active caseload. But in April 2021, there was a steep rise in the number of cases. From April 5 onwards, the country saw over 100,000 cases being reported in a day, while from April 15, the single-day rise in the number of cases went past 200,000 and from April 22, it started recording over three hundred thousand cases daily. With a record number of over 3.86 hundred thousand new cases recorded in the 24 h on 29th of April, India's COVID-19 tally rose to 18,767,962 – from 12,149,335 at the end of March 2021 [6].

Without vaccinations, the number of deaths would have been definitely higher. Vaccination has helped in preventing mortalities, but infection is continuing to spread among doctors owing to the nature of their profession [7].

In India, availability and production of WHO approved COVISHIELD vaccine (Oxford-Astrazeneca) which is developed by the Serum Institute of India was comparatively more. Hence owing to the bulk distribution and availability of the COVISHIELD vaccine in India, major number of responses collected from the research participants were of COVISHIELD vaccination. COVISHIELD is a monovalent vaccine composed of a single recombinant, replication-deficient chimpanzee adenovirus (ChAdOx1) vector encoding the S glycoprotein of SARS-CoV-2 [8]. Following administration, the S glycoprotein of SARS-CoV-2 is expressed locally, stimulating neutralizing antibody and cellular immune responses. Activation of this cell mediated immune response could lead to various post-vaccination adverse events like high-grade fever, pain at the site of injection or in the whole body, dizziness etc. [8]. Adverse events post-immunization is a critical aspect. Even during other universal immunization, which have been going on for decades, many adverse effects are seen in children and adults. So the possibility of an adverse event can't be denied.

An adverse event following immunization (AEFI) is any untoward medical occurrence that follows immunization, and which does not necessarily have a causal relationship with the usage of the vaccine. The adverse event may be any unfavorable or unintended sign, abnormal laboratory finding, symptom or disease [9]. The same definition will continue to be used to identify and report, all AEFI following COVID-19 vaccines. WHO says, "if it is not rapidly and effectively dealt with, it can undermine confidence in a vaccine and ultimately have dramatic consequences for immunization coverage and disease incidence [10]. Adverse events occurring post-COVID-19 vaccination may not be exactly phrased by the study participants.

Healthcare professionals (HCPs) are always on the front line of the nation's fight against COVID-19. These HCPs are at a greater risk of contracting contagious disease or of spreading them [11]. Those who work in hospitals regularly encounter patients as an essential part of their jobs. COVID-19 can easily spread from patients to health care professionals and then back to other patients in a hospital. So, the solution, in the view of most public health officials, is to have all health care professionals vaccinated. The vaccinated HCPs can be like an example for the common population to get vaccinated.

Despite being the first group of people vaccinated against COVID-19 in the country, HCPs have continued to fall prey to the disease. There was a high rate of denial or refusal or delay in acceptance of vaccines by HCPs as well. The Indian Medical Association (IMA) reported that 270 doctors have succumbed so far during the second COVID-19 wave in the country, which began around March-April 2021. Overburdened HCPs had no time to deal with the post-COVID-19 vaccination symptoms as they were busy in treating and saving COVID-19 affected lives. But to save others they needed to save themselves first. Authorities at some hospitals said the percentage of vaccinated staff could have been higher, but initially, some doctors too had been hesitant to take the shots.

Hence the present study was designed to provide independent evidence on COVID-19 vaccine's adverse events to help update guidance to

health professionals first and also to reassure the general population about the safety of the vaccines. Hence data presented in this study reflected solely the adverse events caused by COVISHIELD vaccination.

2. Methodology

Ethical clearance was sought from the Institutional Ethical Committee after presenting the aim, objectives, and procedures of the study. The study sample included HCPs from a college and hospital of North India opting for COVID-19 vaccination.

2.1. Sampling and recruitment

It was a mixed method study that was conducted in two phases. The first phase was a quantitative analysis of the adverse events reported by study participants with the help of an E-survey and the second phase was a qualitative approach using in-depth semi-structured face-to-face telephonic interviews. Participants were selected based on convenience sampling method. The Mail IDs and contact numbers were taken from the participants on the day of vaccination. Adverse events post-COVID-19 vaccination could arise as early as within 30 min or may show up even after 2–3 days. Considering this adverse events were reported for as long as occurring after 5 days since vaccination. Post-vaccination for at least 1–5 days, consistent calls were made to the volunteers for focus group or telephonic interviews to assess any post-vaccination adverse events.

2.2. Quantitative phase

In this phase, HCPs were selected as a target population from a college and hospital in North India. The study included students and faculties of the college. A questionnaire survey was designed, validated and passed on to the participants through Gmail, Facebook, Instagram or Whatsapp social media platforms to assess the possible adverse events faced by the participants after vaccination. A set of 12 questions on the participant's experience after COVID-19 vaccination along with socio-demographic details were sent to the participants. A panel of two experts in the field did the content validation of the questionnaire. A pilot trial was run on 5 participants to assess the validity of the final questionnaire. Questions were presented in the English language.

2.3. Qualitative phase

The second phase of this study was performed after the completion of quantitative data collection. The principal investigator was trained by a professional to execute qualitative interviews. A pilot trial was accomplished to test the quality and scheduling of the interviews.

2.4. Interview procedure

We originally sought to interview the HCPs who were willing to participate personally or through social media platforms, or telephonically. We decided to undertake interviews of HCPs experiencing adverse events post-vaccination. This brought a large response from the interviewees reporting symptoms for 1–5 days post-vaccination.

The topic of the interview was fixed, whereas question formulations and the sequence of questioning was flexible based on the participant's response. The interview followed a semi-structured pattern to collect adequate information. Main points in the interview guided towards various reactions/after effects faced by the participants post-COVID-19 vaccination. Interviews were carried out at the dental college or telephonically which lasted for 3–5 min. The principal investigator interviewed all the participants. All the interviews were audio-recorded and were translated into the English language.

2.5. Consent

All potential participants were given brief details of the study and offered a more detailed standard information sheet. In accordance with ethics committee recommendations and infection control measures at the time (which discouraged exchange of paper documents), consent was collected either by email or verbally at the beginning of the audio or videotape. Participants were assured that all data would be de-identified, stored, and handled anonymously; and that if they changed their mind about anything they said, they could contact a named researcher and withdraw that section of the data.

2.6. Data management and analysis

Quantitative data analysis was performed using Statistical package for social science software version 21 IBM inc. Independent t-tests were used for gender-wise comparison of adverse events occurring post-COVID-19 vaccination. Binary logistic regressions were performed when the dependent variable had two groups. For each regression, the unadjusted odds ratio (OR) and adjusted odds ratio (AOR) with their 95% confidence interval were presented. For qualitative analysis, interviews of 25 volunteers were transcribed in full. A deductive approach was used to analyze the data. We did not use any software to code our data. Transcripts were manually analyzed and coded. A code of the list of major themes was developed manually using the deductive approach for content analysis & was then compared and cross-checked with additional interviews. A final agreed theme was applied to all interviews.

3. Results

3.1. Quantitative phase

The final sample consisted of 476 participants. Overall, the incidence of pain, redness, swelling, fever, chills, headache, tiredness, nausea, and muscle pain was found to be 88.7%, 19.5%, 18.7%, 55%, 36.6%, 46.2%, 74.4%, 26.3, and 70.2% respectively (Table 1). Out of 476 study participants, 268 were from 20 to 30 years age group, 69 were from 31 to 40 years age group, 65 were from 41 to 50 years age group, 62 were from 51 to 60 year age group and 12 from 61 to 70 year age group (Table 2). Among all the subjects with age group ranging from 20 to 70 years, the majority experienced pain at the site of injection (88.8–100%) followed by tiredness (87.7–60%) and body ache (86.6–40%) post-vaccination. All the study participants belonging to 20–60 years of age group experienced all the adverse events post vaccination where as participants with >60 years of age did not experience few adverse events like swelling, itchy skin, decreased appetite, dizziness and redness.

Gender-wise comparison showed raised incidence of adverse

Table 1

Overall distribution of the adverse events experienced post-vaccination among study participants.

ADVERSE EVENTS		
Systemic		
	N	%
Tiredness	354	74.4%
Muscle pain, body pain, joint pain	334	70.2%
Fever	262	55%
Chills	222	46.6%
Headache	220	46.2%
Dizziness	190	39.9%
Nausea	125	26.3%
Decreased appetite	106	22.3%
Local		
Pain at the injection site	422	88.7%
Redness	93	19.5%
Swelling	89	18.7%
Itching/ Skin rashes	28	5.9%

symptoms occurring post-vaccination among females. Pain at the site on injection, tiredness, swelling, muscle pain, fever, dizziness, headache, nausea, and decreased appetite was found to be significantly more among females with $p < 0.05$ (Table 3).

Binary logistic regression analyses indicated a significant unadjusted and adjusted association of age and gender with different adverse events occurring post-COVID-19 vaccination. Reference category was chosen as 20–30 years. Unadjusted odds ratio was found to be significantly more in the age group of 31–50 years for the adverse events like tiredness (OR = 10.444), muscle pain (OR = 8.458), fever (OR = 2.457), headache (OR = 1.996), dizziness (OR = 2.720), decreased appetite (OR = 2.309) and nausea (OR = 2.372). Adjusted odds for age and gender showed that the pain at the site of injection (AOR = 0.329), tiredness (AOR = 8.047), muscle pain (AOR = 5.694), Dizziness (AOR = 2.335) and fever (AOR = 2.436) was found to be significantly more in 31–50 years age group whereas swelling was found to be significantly more in older age group with AOR = 0.211 (Table 4).

3.2. Qualitative phase

In the second phase of the study qualitative interviews regarding symptoms and adverse events experienced by the participants were conducted among 25 participants until the redundant saturation level was attained. 5 participants from each age group (i.e 21–30 years, 31–40 years, 41–50 years, 51–60 years, and 60–70 years) were selected for the interviews. The qualitative findings were reported in 3 main domains

- I. Vaccine adverse effects
- II. Fear and hesitancy for vaccines
- III. Vaccine acceptance

3.2.1. Vaccine adverse effects

Majority of the study participants reported one or other features of post-vaccination events like redness, pain, swelling at the site of injection, body ache, fever, or chills. None of the participants reported any severe unmanageable symptoms.

1. “I experienced only swelling at the site of injection without pain. I didn’t feel any other symptom on the site of injection as well as on the whole body” (P1)

Most of the study participants only experienced mild swelling at the site of injection. No other symptoms were reported by the study participants.

2. “I had a very painful experience post-COVID-19 vaccination. Despite having the prophylactic doses of the analgesic, anti-inflammatory, anti-allergic, and antacid post-vaccination, I felt severe pain at the site of injection as well as on the whole body. Along with this I suffered from fever, chills, and shivering throughout the night. I also took extra pain killers to subside my pain and restlessness” (P2)

Almost 20% of the study participants had experienced pain, along with swelling at the site of injection with malaise and fever.

3. “I experienced redness, swelling, and pain at the site of injection. I did not experience any other post COVID-19 symptoms. Redness and swelling lasted up to 7 days accompanied by mild pain.” (P3)
4. “I didn’t feel any kind of post-vaccination adverse events. I thought I was given a dose of water or saline instead of the COVID-19 vaccine.” (P4)
5. “I was having fever and chills for 2 days post-COVID-19 vaccination. I took paracetamol for 2 days and I was completely fine after that.” (P5)

Table 2
Age group-wise distribution of the adverse events.

Age group		Pain at the injection site	Swelling	Fever	Chills	Tiredness	Headache	Nausea	Muscle/body/joint pain	Itchy skin/rash	Decreased appetite	Dizziness	Redness	Total
20–30 years	N 238	62	178	130	235	147	90	232	13	77	125	57	268	
	% 88.8	23.1	66.4	48.5	87.7	54.9	33.6	86.6	4.9	28.7	46.6	21.3	100	
31–40 years	N 60	2	26	28	50	33	13	40	0	8	28	11	69	
	% 87.0	2.9	37.7	40.6	72.5	47.8	18.8	58.0	0.0	11.6	40.6	15.9	100	
41–50 years	N 55	7	25	26	39	12	9	30	7	10	19	7	65	
	% 84.6	10.8	38.5	40.0	60.0	18.5	13.8	46.2	10.8	15.4	29.2	10.8	100	
51–60 years	N 57	18	28	33	23	23	13	25	8	11	18	18	62	
	% 91.9	29.0	45.2	53.2	37.1	37.1	21.0	40.3	12.9	17.7	29.0	29.0	100	
61–70 years	N 12	0	5	5	7	5	0	7	0	0	0	0	12	
	% 100	0.0	41.7	41.7	58.3	41.7	0.0	58.3	0.0	0.0	0.0	0.0	100	

6. “I got severe chills throughout the night along with a fever. Along with this, I had episodes of disorientation. I visited a specialist the next morning and he diagnosed this condition as Vaccine-induced hypertension.” (P6)

3.2.2. Fear and hesitancy for vaccines

Lack of trust in the vaccine developed and the adverse events after vaccination lead to compromised acceptance of vaccine by the general population as well as HCPs which lead to acquired fear and hesitancy to get vaccinated. Varied responses were received from the selected population.

- “Getting vaccinated is too risky. How can a vaccine against a COVID-19 be made so easily when it took years of research to develop vaccines against other diseases.” (P7)
- “I might get vaccinated but first I want to see people getting vaccinated. If people will not have any post-vaccination symptoms then I can go for it otherwise not.” (P8)
- Vaccination centers are so crowded that I do not want to welcome a painful guest on my own. So I am better off it. (P9)
- I already have diabetes and hypertension. Phase 3 trials have not been completed yet. I am not sure whether getting vaccinated is safe for me or not. (P10)

Many participants at the initial phases had the fear of developing severe complications post-vaccination because of the associated comorbidities already present in them.

3.2.3. Vaccine acceptance

Various HCPs have also shown ready acceptance towards vaccination. Their perception was solely dependent on the principles of health education i.e motivation and leadership. If they are motivated and vaccinated, they can encourage the general population to get vaccinated.

Table 3
Gender wise distribution of different symptoms occurring post-vaccination.

Symptoms and Adverse events	Male N (%)	Female N (%)	P value
Pain at the site of injection	126 (81.8%)	296 (91.9%)	<0.0001*
Swelling	19 (12.3%)	70 (21.7%)	0.014*
Redness	29 (18.8%)	64 (19.9%)	0.788
Itching/ Skin rashes	9 (5.8%)	19 (5.9%)	0.980
Fever	73 (47.4%)	189 (58.7%)	0.020*
Chills	64 (41.6%)	158 (49.1%)	0.124
Tiredness	89 (57.8%)	265 (82.3%)	<0.0001*
Headache	44 (28.6%)	176 (54.7%)	<0.0001*
Nausea	19 (12.3%)	106 (32.9%)	<0.0001*
Muscle pain, body pain, joint pain	72 (46.8%)	262 (81.4%)	<0.0001*
Decreased appetite	16 (10.4%)	90 (28%)	<0.0001*
Dizziness	47 (30.5%)	143 (44.4%)	0.004*

- “COVID-19 has emerged as a deadly disease and so far what I could make out that the best possible way to protect ourselves from COVID-19 is vaccination. I don’t want to regret it later. When I have a solution for it I would definitely go for my second dose too.” (P11)
- “I got vaccinated as soon as it was made available by the government. I don’t worry about the common post-vaccination symptoms. Without vaccination, there are more chances of getting infected with COVID-19. But after vaccination, there will be a lesser chance of getting infected or if in case I got infected, the severity of the symptoms will be comparatively milder.” (P12)
- I wanted to get vaccinated but I was advised not to get vaccinated and to take at least one month course of antihistaminic drug before going for vaccination. (P13)

4. Discussion

The present study was designed this way to reflect participants’ perceptions and point of view regarding adverse events occurring post-COVID-19 vaccination. There could be a different perception of all the participants regarding adverse events occurring post-vaccination as all the study participants were health workers. The threshold, the understanding, and the acceptability may vary among study participants. Hence interviewing method was chosen for this study along with a quantitative assessment of responses.

The findings of the present study showed that more than one-third of the study population experienced one or the other adverse event post-vaccination. Yet no casualty-related serious adverse events (SAEs) were caused by the study vaccine. The age-wise comparison showed pain at the injection site, redness, swelling, chills, itching was found to be more among younger age group. Whereas symptoms like swelling was found to be significantly more in older age group. Riad et al in their study among HCPs in the Czech Republic assessing the prevalence of COVID-19 adverse events showed an increased prevalence of injection site pain, fatigue, and muscle pain among the younger age group [12]. These findings are also consistent with those reported by the Food and Drug Administration and Mennie et al. [13]. Corroborating with the results of the present study, injection site pain was found to be more among the younger age group in a study conducted by Riad et al. [12]. Occurrence of post-vaccination pain at the site of injection was found to be the most commonly reported adverse event, in the present study. This could be attributed to the differences in technique of injection, vaccine temperature, and injection velocity.

Gender-wise comparison showed higher prevalence of post vaccination adverse events among females. Pain at the site of injection, tiredness, swelling, muscle pain, fever, dizziness, headache, nausea, and decreased appetite were found to be significantly more among females with $p < 0.05$. Similar results were reported by Riad et al. [12]. Immune response to the H1N1 vaccine found that in both humans and mice, the presence of the major female sex hormone estradiol in adult females led to more robust antibody responses following vaccination in comparison with males and older females without high levels of estradiol. This

Table 4

Binary logistic regression adjusted for age and gender for prediction of adverse events.

Adverse events	Unadjusted odds ratio (95% CI)	P value	Adjusted odds ratio (95% CI)	P value
Pain at the injection site (Ref category 20–30 years)				
31–50 years	0.575 (0.215 to 1.538)	0.270	0.329 (0.116 to 0.936)	0.037*
51 years and above	0.439 (0.157 to 1.228)	0.117	0.392 (0.139 to 1.12)	0.078
Tiredness (Ref category 20–30 years)				
31–50 years	10.444 (5.790 to 18.842)	<0.0001*	8.047 (4.338 to 14.928)	<0.0001*
51 years and above	2.901 (1.614 to 5.214)	<0.0001*	2.814 (1.553 to 5.096)	<0.0001*
Muscle pain, body pain, joint pain (Ref category 20–30 years)				
31–50 years	8.458 (4.742 to 15.086)	<0.0001*	5.694 (3.092 to 10.484)	<0.0001*
51 years and above	1.436 (0.811 to 2.542)	0.215	1.336 (0.739 to 2.415)	0.338
Fever(Ref category 20–30 years)				
31–50 years	2.457 (1.455 to 4.149)	<0.0001*	2.436 (1.395 to 4.253)	<0.0001*
51 years and above	0.763 (0.429 to 1.358)	0.358	0.762 (0.428 to 1.357)	0.356
Chills (Ref category 20–30 years)				
31–50 years	0.892 (0.533 to 1.494)	0.665	0.782 (0.451 to 1.355)	0.381
51 years and above	0.639 (0.361 to 1.133)	0.125	0.621 (0.350 to 1.104)	0.105
Headache (Ref category 20–30 years)				
31–50 years	1.996 (1.177 to 3.383)	0.010*	1.365 (0.774 to 2.410)	0.283
51 years and above	0.831 (0.460 to 1.500)	0.538	0.757 (0.413 to 1.391)	0.370
Dizziness(Ref category 20–30 years)				
31–50 years	2.720 (1.518 to 4.871)	0.001*	2.335 (1.268 to 4.302)	0.006*
51 years and above	1.681 (0.887 to 3.183)	0.111	1.633 (0.860 to 3.103)	0.134
Nausea(Ref category 20–30 years)				
31–50 years	2.373 (1.238 to 4.545)	0.009*	1.605 (0.807 to 3.194)	0.178
51 years and above	0.922 (0.434 to 1.958)	0.832	0.839 (0.389 to 1.811)	0.655
Decreased appetite (Ref category 20–30 years)				
31–50 years	2.309 (1.155 to 4.617)	0.018*	1.590 (0.765 to 3.302)	0.214
51 years and above	0.889 (0.395 to 1.999)	0.775	0.813 (0.357 to 1.853)	0.622
Redness (Ref category 20–30 years)				
31–50 years	0.840 (0.458 to 1.541)	0.574	0.847 (0.442 to 1.624)	0.617
51 years and above	0.483 (0.233 to 0.999)	0.050	0.483 (0.233 to 1.002)	0.051
Swelling (Ref category 20–30 years)				
31–50 years	0.936 (0.513 to 1.710)	0.831	0.744 (0.386 to 1.433)	0.376
51 years and above	0.224 (0.095 to 0.529)	0.001*	0.211 (0.089 to 0.502)	<0.0001*
Itching/ Skin Rashes (Ref category 20–30 years)				
31–50 years	0.421 (0.167 to 1.057)	0.065	0.374 (0.138 to 1.011)	0.053
51 years and above	0.455 (0.158 to 1.309)	0.144	0.443 (0.153 to 1.281)	0.133

indicates that while women might actually have more adverse events as well as report them more often, they also may benefit more from the protective effects of a vaccine [14].

In the present study, the most commonly reported symptom occurring post-vaccination was found to be pain at the site of injection followed by tiredness. Thus, it is recommended to lower the patient's arm while being injected to relax the muscle which may lead to lesser pain. Also, HCPs in the vaccination process should be receiving appropriate training on optimal injection techniques. Vaccines in situ are preserved

at very low temperatures, including the COVISHIELD vaccine which requires $-70\text{ }^{\circ}\text{C}$, and if injected without optimal warming up, this may increase the probability of post-vaccination pain at the injection site.

The present study enlisted the possible adverse events occurring post-vaccination. These adverse events are found to be similar in other countries like the USA, Russia etc. The researchers attempted to gather the possible adverse events occurring post-vaccination which were probably the major cause for not getting vaccinated.

Despite a thorough literature search, we could not find many studies to compare the data reported in the present study. So, there is a need for further epidemiological studies for COVID-19 vaccines in the upcoming months to increase public confidence regarding vaccine safety which in turn could lead to an acceleration in the vaccination drive process.

4.1. Strengths and limitations

This is the first mixed method study that was done to evaluate and explore the common adverse events occurring post-vaccination and people's perception towards COVID-19 vaccination.

The external validity of the present study is limited as the sample population is not homogeneously distributed across population and gender. Also, this study has many limitations. We used self-reported data, which can introduce information bias. Also, some participants might be more likely to report symptoms than others, and there is the potential for users to drop out of reporting in the questionnaire survey. Participants were a self-selected group and not representative of the general population. The participants in all voluntary studies, including clinical trials were likely to be more interested in health and might behave differently to the general population as a result.

5. Conclusion

In conclusion, short-term adverse events of the COVISHIELD vaccine were moderate in frequency and mild in severity. The most common side effect reported was pain at the site of injection followed by tiredness. Adverse events were reported more frequently among females and the younger age group. Further independent studies on its safety are required to assure the public regarding the safety of the vaccine.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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