



Post-vaccination symptoms and adverse reactions in healthcare workers infected by covid-19 prior to vaccine administration: A questionnaire survey

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ABSTRACT

A severe respiratory disorder syndrome originated in Wuhan city of China in December 2019. The World Health Organization designated it as a worldwide public health emergency on January 30, 2020. As of July 1, 2020, there were 10 million identified cases of COVID-19 infection with 5,08,000 confirmed deaths. The COVID-19 pandemic is anticipated to continue to cause massive morbidity and mortality while having a devastating impact on communities and economies throughout the world. The COVID-19 vaccine, which protects against COVID-19, may produce certain adverse effects, which usually go away within a few days, but are natural indicators that the body is developing immunity. On the other hand, some people may experience no adverse effects of any kind. COVAXIN (chimpanzee adenovirus-vectored vaccination) and COVISHIELD (attenuated dead virus) are the two primary vaccines used in India. There have been several types of research on the adverse effects of vaccines on various populations. We used a population of fully immunized health professionals in this study to see if the vaccination had any unintended consequences on individuals who had previously been infected with Covid 19.

Keywords: Covid-19, Post Vaccination, Adverse Reactions, Covishield and Covaxin

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INTRODUCTION

A severe respiratory disorder syndrome originated in Wuhan city of China in December 2019. The World Health Organization designated it 'a worldwide public health emergency on January 30, 2020[1]. We all know that Covid-19, the disease has soon declared a pandemic due to its relentless spread to more than 200 countries around the world. The infection, which is incited by the new SARS-CoV-2, might be asymptomatic or symptomatic. Covid 19 presents with wide spectrum of symptoms, mild symptoms such as fever, dry cough, diarrhea, loss of sense of taste and smell, and severe symptoms like trouble breathing, constant pain in the chest & life-threatening sepsis and which led to a sudden hospitalization for pneumonia with the multiorgan disease. As of July 1, 2020, there were 10 million identified cases of COVID-19 infection with 5,08,000 confirmed deaths. The COVID-19 pandemic is predicted to continue to wreak havoc on communities and economies throughout the world, causing massive morbidity and mortality[5].

In the era of the covid-19 pandemic, our immune system plays a pivotal role, by using several tools to fight the invasion of the virus. Therefore, knowledge regarding our body's immune response mechanism and the ability to fight illness is of prime importance.

Any kind of viral infection occurs when a virus invades our body, they attack and multiply leading to illness. As the body's defense mechanism, macrophages digest the viral protein, giving rise to antigens, that our body identifies and stimulates the production of antibodies by B- lymphocytes. While T- lymphocytes, a type of defensive white blood cell, attack the already infected cells in the body. Our immune system can be broadly divided into adaptive and humoral immunity. Adaptive immunity is the second line of defense that recognizes cells as self and non-self and attacks the pathogens when it recognizes them. When a novel pathogen is confronted, the adaptive immune system remembers it, allowing for a rapid turnaround when the pathogen encounters again. On the other side humoral immunity depends on the action of antibodies circulating throughout the body to recognize and bind to a

new antigen, and produce more new antibodies. T cells on other hand are responsible for cell-mediated immunity and assist with the elimination of infected body cells.

When a person is infected with the covid-19 virus for the first time, the usual time to develop immunity may range from several days to a few weeks. After the viral infection, a few of the T-lymphocyte cells are retained by the body, which are known as memory cells. when the same person is exposed to the virus for the second time, these memory cells resume their course of action.

Vaccines are one of the most efficient tools in public health, especially when there is no viable therapy for a disease. A vaccination is a biological substance that offers active acquired immunity against a specific infectious illness. It includes an agent that looks like a disease-causing bacterium and is frequently produced from weakened or dead microbes, their toxins, or one of their surface proteins. It fools the system to produce antibody and memory B & T cells, which protects from future infection. Someone could likely get affected by the COVID-19 virus. just before or after immunization and subsequently become ill as a result of the vaccination not having sufficient time ensuring security as the body processes T-lymphocytes and B-lymphocytes by a few weeks post-immunization. Different types of vaccines include: [3].

The process of developing immunity following vaccination can sometimes induce symptoms such as fever. According to Maheshi N Ramasamy et al, vaccination with 'ChAdOx1 nCoV-19' resulted in nearly all individuals, even older persons without significant comorbidities, producing neutralizing antibodies against SARS-CoV-2, with greater levels in boosted groups compared to non-boosted groups[6].

ChAdOx1 nCoV-19 is a chimpanzee adenovirus-vectored vaccine that expresses the full-length SARS-CoV-2 spike glycoprotein gene and is replication-defective (GenBank accession number MN908947). After a single dose of ChAdOx1 to-19 vaccination, rhesus macaques develop humoral and cellular immune responses and are protected against SARS-CoV-2 infection. In this study post-vaccination symptoms like injection-site pain, feeling feverish, muscle ache, headache, local reactions were reported in (88%). Systemic reactions are seen in the older group.

COVID-19 vaccination that protects against COVID-19 may cause some side effects, which tend to resolve within few days but are normal signs suggesting that the body is building immunity. On the other hand, some may not have any side effects. In India there are two main vaccines, one is COVAXIN (chimpanzee adenovirus-vectored vaccine) and COVISHIELD (accentuated dead virus). With millions of people getting affected, it is mandatory to understand the symptoms observed post-vaccination in those who have previously tested positive to better evaluate the effect of the vaccine [3]. In this study, we have taken a population of health workers who were fully vaccinated and wanted to understand the side effects of the vaccine was on those who were previously infected by Covid 19, & having comorbidity after the first and second dose of the vaccine. And we also tried to understand the side effects in relation to Covishield vs Covaxin.

MATERIAL AND METHODS

Study Population

The cross-sectional survey was conducted between the 24th March and 14 April 2021 among Indian health care professionals. Our study population consisted of dentists, undergraduate students, post-graduate trainees, and healthcare professionals based in India, independent of their work setup (either private clinics, hospitals, or health centers). The tool utilized for data collection was a specifically designed online Google Forms questionnaire {fig 2}. A questionnaire was sent to 250 individuals, to which a total of 203 Indian healthcare professionals had responded. The data collection was anonymous to ensure the authenticity of all of the information.

Study Instrument

The survey questions were constructed following a thorough examination of relevant research and international norms. The survey was prepared in English and consisted of a sequence of questionnaires concerning socio-demographic traits, comorbidity, previous infection of COVID-19 as well as the effect following the covid-19 vaccine administration. The survey consisted of a streamlined multiple-choice questionnaire and was categorized into: socio-demographic data, general health, medical history, and vaccination.

Questionnaire For Phase 1 and phase 2 vaccination :

7/15/2021 Covid vaccine survey

Covid vaccine survey

* Required

1. NAME *

2. SURNAME

3. SEX

Mark only one oval.

Female

Male

Prefer not to say

Other: _____

4. DATE OF BIRTH *

Example: January 7, 2019

5. ADDRESS

https://docs.google.com/forms/d/14Nu-gDwz_jp9M4L-wd5MUM1TtW30r0a2raMPE_D48wcl 1/4

7/15/2021 Covid vaccine survey

6. JOB TITLE *

7. DO YOU SUFFER FROM ANY OF THE FOLLOWING HEALTH CONDITIONS? *

Check all that apply.

Diabetes

Heart or circulatory disorders

Stomach or intestinal disorder

Any condition which causes difficulties sleeping

Chronic chest disorder

Any other health factors that might affect fitness at work

none

Other: _____

8. Are you done with vaccination? *

Mark only one oval.

Yes

No

9. Have you undergone any premeditations before vaccine administration? *

Mark only one oval.

Yes

No

10. If yes, give details of premeditations

https://docs.google.com/forms/d/14Nu-gDwz_jp9M4L-wd5MUM1TtW30r0a2raMPE_D48wcl 2/4

7/15/2021 Covid vaccine survey

11. TYPE OF VACCINE-

Mark only one oval.

Covishield

Covaxin

Other: _____

12. Did you suffered from any signs and symptoms after vaccination in phase 1?

Check all that apply.

Injection site pain

Injection site swelling

Injection site redness

Injection site etching

stiffness in upper arm

weakness in injection arm

body ache

headache

fever

weakness

rashes

nausea

vomiting

difficulty in breathing

swelling of face

swelling in throat

dizziness

rashes all over the body

malaise

Other: _____

https://docs.google.com/forms/d/14Nu-gDwz_jp9M4L-wd5MUM1TtW30r0a2raMPE_D48wcl 3/4

7/15/2021 Covid vaccine survey

13. If you were infected with covid 19 previously did your pain and reaction to vaccine got

Mark only one oval.

worse

mid

no pain at all

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Google Forms

https://docs.google.com/forms/d/14Nu-gDwz_jp9M4L-wd5MUM1TtW30r0a2raMPE_D48wcl 4/4

7/15/2021 Covid vaccine phase-2 survey

16. Regarding signs and symptoms the severity of phase 1 vaccination is-

Mark only one oval.

Worse
 moderate
 mild

17. Regarding signs and symptoms the severity of phase 2 vaccination is-

Mark only one oval.

Worse
 moderate
 mild

This content is neither created nor endorsed by Google.

Google Forms

<https://docs.google.com/forms/d/1t8kYNDuuzp0fAqM5W9WqCCZCPqo0hgT7MvUf8Vd8>

55

7/15/2021 Covid vaccine phase-2 survey

14. Did you suffered from any signs and symptoms after vaccination in phase 2?

Check all that apply.

Injection site pain
 injection site swelling
 injection site redness
 injection site itching
 stiffness in upper arm
 weakness in injection arm
 body ache
 headache
 fever
 weakness
 rashes
 nausea
 difficulty in breathing
 swelling of face
 swelling in throat
 dizziness
 rashes all over the body
 malaise
 diarrhea
 vomiting
 Other: _____

15. if you were infected with covid-19 previously did your pain and reaction to vaccine got-

Mark only one oval.

worse
 mild
 no pain at all

<https://docs.google.com/forms/d/1t8kYNDuuzp0fAqM5W9WqCCZCPqo0hgT7MvUf8Vd8>

65

7/15/2021 Covid vaccine phase-2 survey

11. have you ever been infected with covid-19 virus?

Mark only one oval.

Yes
 No

12. Are you done with two doses of vaccination?

Mark only one oval.

yes
 no

13. TYPE OF VACCINE-

Mark only one oval.

Covishield
 Covaxin
 Other: _____

<https://docs.google.com/forms/d/1t8kYNDuuzp0fAqM5W9WqCCZCPqo0hgT7MvUf8Vd8>

58

7/15/2021 Covid vaccine phase-2 survey

6. JOB TITLE *

7. DO YOU SUFFER FROM ANY OF THE FOLLOWING HEALTH CONDITIONS? *

Check all that apply.

Diabetes
 Heart or circulatory disorders
 Stomach or intestinal disorder
 Any condition which causes difficulties sleeping
 chronic chest disorder
 any other health factors that might affect fitness at work
 none
 Other: _____

8. Are you done with vaccination? *

Mark only one oval.

Yes
 No

9. Have you undergone any premedication before vaccine administration? *

Mark only one oval.

Yes
 No

10. If yes, give details of premedication

<https://docs.google.com/forms/d/1t8kYNDuuzp0fAqM5W9WqCCZCPqo0hgT7MvUf8Vd8>

2/5

7/15/2021 Covid vaccine phase-2 survey

Covid vaccine phase-2 survey

* Required

1. NAME *

2. SURNAME

3. SEX

Mark only one oval.

Female
 Male
 Prefer not to say
 Other: _____

4. DATE OF BIRTH *

Example: January 7, 2019

5. PLACE

<https://docs.google.com/forms/d/1t8kYNDuuzp0fAqM5W9WqCCZCPqo0hgT7MvUf8Vd8>

1/5

RESULTS



Figure 1- Gender wise response distribution to the questionnaire

Phase 1 vaccination - Out of the 203 responses received, 69.9% were female and 30.5% were male. This graph infers, more females were vaccinated in comparison to males.

Phase 2 vaccination - Out of the 181 responses received, 72.3% were female and 26.7% were male. This graph infers, more females were vaccinated in comparison to males.

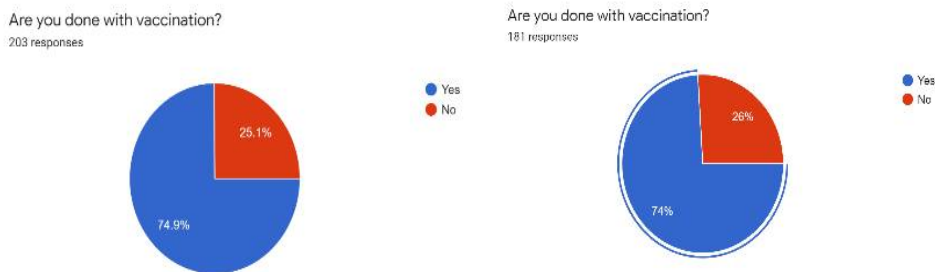


Figure 2-status of vaccine administration response to the questionnaire

Phase 1 vaccination - Out of the 203 responses received, 74.9% of the participants were vaccinated, comprising a total of 152 responses.

Phase 2 vaccination- Out of the 181 responses received, 74% of the participants were vaccinated, comprising a total of 134 responses.

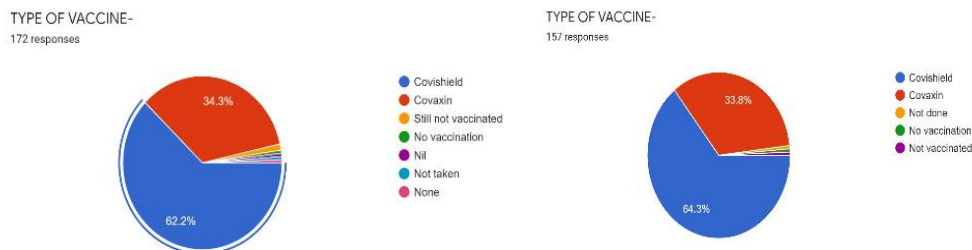


Figure 3- Type of vaccine administration response

Phase 1 vaccination- Out of the 172 responses received, 62.2 % of the participants were vaccinated with Covishield, and the remaining 34.3 % were vaccinated with Covaxin. This graph infers, Covishield was administered to more participants as compared to that of Covaxin.

Phase 2 vaccination- Out of the 157 responses received, 64.3 % of the participants were vaccinated with covishield, and the remaining 33.8 % were vaccinated with Covaxin. This graph infers, covishield was administered to more participants as compared to that of Covaxin.

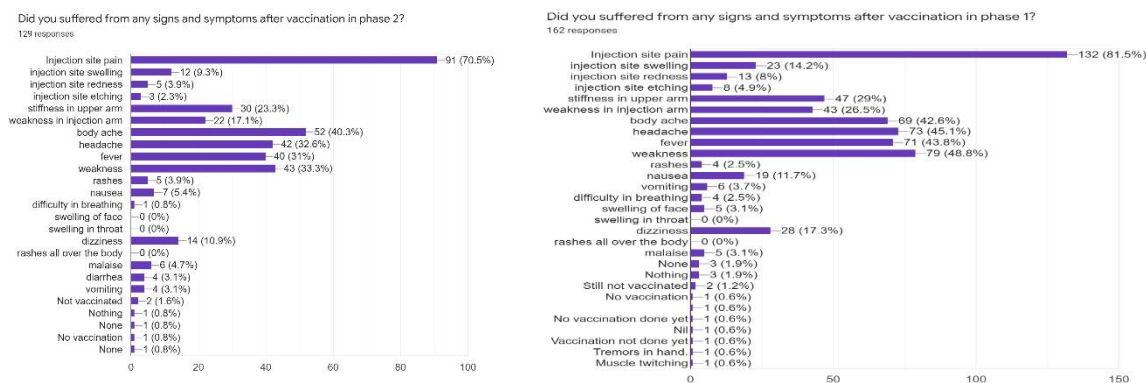


Figure 4- participants showing signs and symptoms after phase 1 vaccination.

Out of 162 responses, 81.5% reported pain at the site of injection, 48.8% had a weakness, 45.1% had a headache, 43.8% reported fever, and 42.6% body ache. While other symptoms of mild severity included stiffness in the upper arm (29%), weakness in the injection arm (26.5%), dizziness (17.3%), swelling at the site of injection (14.2%). 3.8% of the total responses did not show any signs and symptoms after phase 1 vaccination.

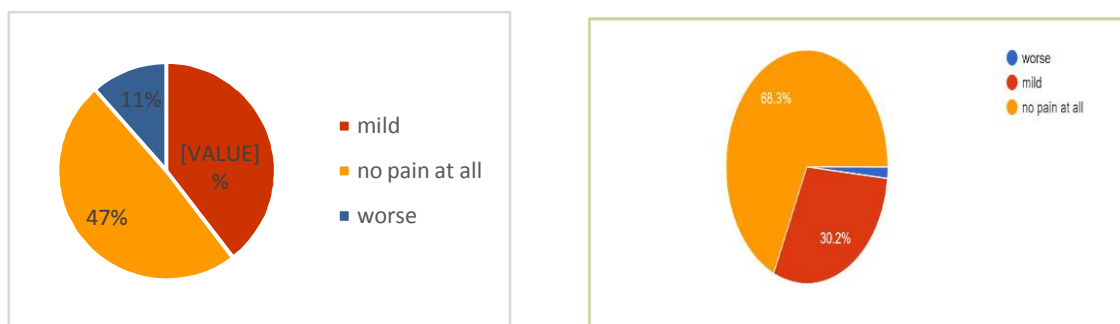


Figure 5- Post-vaccination signs and symptoms in responses who were affected by Covid 19 before vaccine administration

Phase 1 vaccination – before the phase 1 vaccination, out of the total responses, 96 individuals were already affected with covid 19. 38% of the responses showed mild symptoms and 11 % showed worse symptoms. 47% of the responses showed no pain at all.

Phase 2 vaccination - before the phase 2 vaccination, out of the total responses, 63 individuals were already affected with covid 19. 30.2% of the responses showed mild symptoms and 1.6% showed worse symptoms. 68.3% of the responses showed no pain at all.

DISCUSSION

Vaccination is an efficient way to decrease COVID-19 infection, although its success is dependent on vaccine uptake. To avoid the vaccination program failing, it is necessary to address vaccine-apprehensive persons' worries. This study intended to examine concerns, potential indications, and symptoms following vaccination in people who had previously been exposed to COVID-19, as well as acceptance rates for the COVID-19 vaccine among Indian healthcare professionals. The COVID-19 pandemic is predicted to continue wreaking havoc on communities and economies throughout the world, causing massive morbidity and mortality. This will need enough healthcare capacity, as well as measures to improve vaccination trust and acceptability among those who administer it.

COVID-19 is most commonly shown as respiratory symptoms, which can range from moderate to severe acute respiratory distress. The severity of the sickness can range from a minor ailment to a life-threatening condition known as acute respiratory distress syndrome (ARDS). The gastrointestinal tract, liver, and pancreas functions can all be affected by SARS-CoV-2 infection, resulting in gastrointestinal symptoms. SARS-CoV-2 can also produce central and peripheral neurological symptoms, as well as damage to the cardiovascular system, and cause renal failure.[4]

In the trial phase of Astra-Oxford ChAdOx1 nCoV-19, 47% were females and 53 % were males. The gender predilection for phase 1& phase 2 vaccination in our survey showed females were taking the vaccine in sizable numbers when compared to males. With an average of 70.9% females taking vaccines in

comparison to 25.6% males. This percentage fell more for males for the second dose and marginally increased for females, 30.5 % to 20.7 % for males and from 69.9% to 72.% were females for phase 1 &2 vaccination.[6]Of the total survey participants, 62.2% took Covishield and 34.3% took Covaxin in phase 1 vaccination. While in phase 2 64.3% took covishield and the remaining 33.8% got Covaxin.[7]

All vaccines can activate PRRs(pattern recognition receptors), which trigger the production of a variety of mediators. The body recognizes antigens from the vaccination and immune boosters administered into the muscle as possible diseases. Local cells are activated as a result of this identification, which leads to the migration of blood immune cells to the local region, as well as the production of vasodilators and cytokines, which may contribute to the development of local inflammatory clinical manifestations (pain, redness, and swelling)[8]. Evidence from this study intimates pain at the site of injection to be the most common post-vaccination symptom, regardless of the phases of vaccination. Also, a considerable drop in the frequency of post-vaccination symptoms was observed in phase 2. Following phase 1, 81.5 % reported pain at the site of injection. A decline by 11% was seen after phase 2 and the rate stood by 70.5%.

A considerable drop in the rate of post-vaccination symptoms was observed in the second dosage of vaccination. After phase 1 immunization, 8% presented with injection site redness while 14.2% with injection site swelling. On comparing phase 2 with phase 1 vaccination, the percentage of injection site redness and injection site swelling decreased and it accounted for 3.9% and 9.3% respectively.

The transit of some of these substances via the circulation, along with the production of an extra systemic component by immunological blood cells or distant organs may support the formation of common signs and symptoms, in the vaccine. Less than 50%of the respondents reported general symptoms. Headache takes into account 45.1% after phase 1 vaccination, which subsequently decreased to 32.6 % after the second phase. Fever and myalgia, two of the predominant general symptoms, reach up to 43.8% and 42.6% respectively after the first dosage. A slight decrease in fever and myalgia was noticed following the second dose of immunization, which resulted in 31% and 40.3% respectively.[8]

In our study, the main focus was on participants who were already affected by Covid-19. Comparing phase 1 of immunization to phase 2, the severity and rate of signs and symptoms were lesser in phase 2 than in phase 1. The severity of these post-vaccination signs and symptoms in the current study was determined according to three different variables-mild, worse, and no pain at all. Considering these variables, after phase 1 immunization, 47 % reported mild effects and 11 % reported worse symptoms. Following phase 2 immunization, there was a decrease in rate, with 30.2 % moderate symptoms and 1.6 percent worse adverse responses.47% after phase 1 and 68.3% of the respondents after phase 2 did not report any kind of adverse reaction after immunization. This drop-in percentage after phase 2 vaccination may be attributed to the concept of memory cells, which develop on initial exposure to a viral infection and when denudated to the infection for the second time, resume their path of activity.

CONCLUSION

The study's design included an unregulated, self-contained survey that was reliant on participants' capacity to access and exchange information over the internet. Within the limitations of this questionnaire survey, it can be concluded that the majority of healthcare workers who completed the survey and had a history of covid-19before the vaccination, reported more symptoms after phase 1 of covid-19 vaccination as compared to phase 2.Further studies can be carried out with the general population from various demographic groups.

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