

Original Article

Evaluation of rate and severity of COVID-19 infection after vaccination in the age group of 18–25-year population: A questionnaire-based study

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Received: 13 March 2023
Accepted: 01 September 2024
Epub Ahead of Print: 15 November 2024
Published:

DOI
10.25259/JADE_23_2023

Quick Response Code:



ABSTRACT

Objectives: Covid-19 has been a challenging and challenging pandemic for mankind, with the introduction of the novel coronavirus, SARS-CoV-2, in late December 2019. Vaccination has proven to be a boon in these challenging times, with the study aiming to determine the efficacy of vaccination against the novel coronavirus in terms of the number of cases affected before and after vaccination and the severity of illness in post-vaccinated Covid-affected individuals. The study aims to learn from the lessons learned during this challenging period.

Material and Methods: Students between age group of 18 to 25, from Nashik District, Maharashtra State, India, were the subject of a questionnaire-based study. Using Google Form, a survey was created.

Results: It was found that vaccination has reduced the number of positive Covid 19 cases and we have seen a statistically significant decrease in the number of Covid-19-affected individuals.

Conclusion: In the present study, we found that the severity is reduced and a smaller number of severe cases are seen after vaccination however the sample was small so this finding was not statically significant.

Keywords: COVID-19, Vaccine, Novel coronavirus, Pandemic

INTRODUCTION

The term “coronavirus” has been derived from the Latin word “corona,” which signifies “crown.”^[1] It has the potential to result in ailments that vary from a mild common cold to a severe respiratory distress syndrome.^[2] A growing threat to global well-being is the present novel coronavirus disease, frequently referred to as COVID-19 and severe acute respiratory syndrome (SARS)-CoV-2.^[3] In the initial months of 2019, the COVID-19 epidemic rapidly spread to Thailand, Japan, South Korea, Singapore, and Iran after its emergence in Wuhan City, China, toward the conclusion of December.^[4-6]

Middle East respiratory syndrome and SARS are two catastrophic global outbreaks that have impacted the human population in the Middle East region.^[7] The COVID-19 disease has been declared a worldwide public health crisis by the World Health Organization.^[8] As a novel disease, COVID-19 has emerged as an enigmatic contagion that requires extensive research and understanding of the virus's biology while often posing challenges to the creation of a potent vaccine.^[9]

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The capacity of immunization to save you hospitalization is acknowledged, and it's been found that vaccination lessens the severity of COVID-19.

Results from part of the segment III vaccination efficacy study had been released by the end of 2020, taking into consideration the vaccines' approval and introduction.

Several companies, including Pfizer-BioNTech,^[10] Moderna,^[11] AstraZeneca-University of Oxford,^[12] Johnson and Johnson,^[13] Gamaleya,^[14] Sinovac Biotech,^[15] Sinopharm,^[15] Novavax,^[16] and Bharat Biotech,^[17] have released effectiveness data for their vaccines. The most prevalent vaccination injections employed in India's vaccination drives were Covishield produced by AstraZeneca, Covaxin created by Bharat Biotech, and Sputnik V developed by Gamaleya. In response to the COVID-19 outbreak, a study was conducted to assess the efficacy of vaccination against the novel coronavirus. The pandemic had a significant impact on people worldwide in various ways. To deal with future challenges effectively, we must learn lessons and equip ourselves accordingly. There was apparent hesitancy and apprehension among the public regarding the vaccination.^[18,19] This led to the creation of a study to evaluate the efficacy of the COVID-19 vaccination. The goal of the study was to determine the prevalence of COVID-19 in people between the ages of 18 and 25 and to determine if the disease's prevalence and severity changed as a result of immunization.

MATERIAL AND METHODS

To ensure thorough research and reliable results, an online survey is a well-established means of collecting data.^[20] Students from Nashik District, Maharashtra State, India, were the subject of a questionnaire-based study. Using Google Forms, a survey was created. Students were encouraged to participate in the study by being urged to share it on social media with their friends. From 4 April 2022 to 2 August 2022, 743 students in total took part in the study.

Inclusion criteria

The following criteria were included in the study:

1. Students in Nashik District
2. Students between the age group of 18 years and 25 years

Exclusion criteria

The following criteria were excluded from the study:

1. Migrated students from an area other than Nashik District. Data were collected and analyzed and results were calculated.

RESULTS

The total number of responses collected from March 2, to April 4, 2022, was 743 including 311 males and 432 females.

Table 1 shows that between March 2, 2022, and April 4, 2022, 743 responses were received, with 311 being male and 432 being female. The total number of responses was 743.

Table 2 shows that of the 743 individuals, only 6 (0.8 %) had not had any vaccinations, 7 (0.9 %) had received a third dosage, 699 (94 %) had received a second dose, and 31 (41.8 %) had received only one dose.

To ascertain if immunisation reduces the risk of Covid 19, data were split according on the number of Covid instances prior to and following vaccination, as shown in Table 3. It was shown that immunisation really reduces the chance of contracting Covid-19, as seen by the 110 cases (14.8%) that occurred after vaccination compared to the 132 cases (17.8%) among people who were not immunised.

The data of COVID-19 patients were divided into mild, moderate, and severe cases to determine if immunization lessens the severity of infection.^[9] It was discovered that a lesser proportion of pupils in the current research showed serious symptoms following immunization. The degree of infection was used to categorise the Covid 19 patient data. Table 4 divides the severity of symptoms into mild, moderate, and severe instances based on vaccination status to see if immunisation reduces symptoms. After receiving the initial dosage of the virus, 0.0% of infected students showed no symptoms, 72.7% displayed mild symptoms, 9% displayed moderate symptoms, and only 18.1% displayed severe symptoms. Among the students who contracted the infection after the second dosage, 11.3% displayed no symptoms, 51.54% mild symptoms, 35.1% moderate symptoms, and just 2.1% severe symptoms. Only two of the pupils who contracted the disease after

Table 1: Gender distribution.

	Frequency (n)	Percentage
Male	311	41.9
Female	432	58.1
Total	743	100
Chi-square test=2.38, P=0.009 (NS)		
NS: No statistically significant difference between gender distribution		

Table 2: Vaccination status.

	Frequency (n)	Percentage
Only one dose	31	41.8
Two doses	699	94
Three doses	7	0.9
None	6	0.8
Chi-square test value=18.41, P<0.001**		

**P<0.001 - highly statistically significant between groups as almost all have taken two doses

Table 3: Comparison between the number of COVID cases before and after vaccination.

	Yes n (%)	No n (%)	P-value
Have you been infected with COVID-19 before vaccination (n=743)	132/743 (17.8)	611/743 (82.3)	P<0.001**
Have you got infected with COVID-19 after vaccination (n=743)	110/743 (14.8)	633/743 (85.2)	P<0.001**

**P<0.001 - highly statistically significant

Table 4: Severity of symptoms according to vaccination status.

Vaccination	No symptoms (n=11) (%)	Mild symptoms (n=61) (%)	Moderate symptoms (n=34) (%)	Severe symptoms (n=4) (%)	Total
1 st dose	0 (0)	8 (72.7)	1 (9)	2 (18.1)	11
2 nd dose	11 (11.3)	50 (51.54)	34 (35.1)	2 (2.1)	97
3 rd dose	0 (0)	2 (100)	0 (0)	0 (0)	2
Total COVID-positive after vaccination 110					
Total COVID-positive before vaccination 132					
Fischer test result: P>0.05					

Table 5: Need for hospitalization and oxygen supplementation.

Vaccination status	Total number of COVID-19-positive cases	Hospitalization (n=23) (%)
None	132	1 (50)
1 st dose	11	2 (18.18)
2 nd dose	97	19 (19.59)
3 rd dose	2	0 (0)
Fischer test result: P>0.05		

the third treatment did so with mild symptoms. However, the sample size was small so these results are statistically not significant and similar studies on a larger population are suggested.

Data were divided into categories such as non-vaccinated, first, second, and third doses of vaccine to see whether vaccination lowers the requirement for hospitalization. In the present study, the percentage of patients that needed hospitalization was 18.18% after the first dosage, 19.59% after the second dose, and 0% after the third dose of vaccination. To determine if vaccination reduces the need for hospitalisation, data were split into groups such as nonvaccinated, first, second, and third doses of the vaccine [Table 5]. It is recommended that comparable research be conducted on a broader population because the sample size was tiny, making the results statistically insignificant.

DISCUSSION

In the present study, 41.9% of males and 58.1% of females were affected by COVID-19.

It was observed that only 6 (0.8%) participants were not vaccinated, 7 (0.9%) participants had taken a third dose,

699 (94%) participants had taken a second dose, and 31 (41.8%) participants had taken a first dose. In the present study, it was found that vaccination reduces the severity of illness which is in line with the research report titled "Analysis of Omicron Strain during COVID-19 Outbreak and the Consequences of Immunization, Spread, Death Rate, and Recurrence in South Africa, Germany, and Brazil," the fatality rate for unvaccinated individuals in these nations is 3–4 times greater than that of fully vaccinated individuals.^[21] The immunizations presently available that have obtained authorization have effectively prevented illnesses such as COVID-19.^[22] In the present study, all the vaccines available in Nashik district were included in the study design and were effective in preventing the disease and reducing the severity of the illness in affected individuals. Various vaccinations have been tested in different parts of the world, exhibiting different levels of effectiveness in preventing infection. BNT162b2 was given in two doses and provided 95% protection against COVID-19 in individuals aged 16 and above.^[10] Following the administration of the second dose, COVAXIN[®] demonstrated an interim efficacy of 81% in preventing COVID-19 among individuals who had not previously contracted the virus. A provisional assessment of a phase 3 randomized controlled trial conducted in Russia reported a 91.6% effectiveness rate against COVID-19, corroborating the safety and efficacy of a heterologous prime-boost COVID-19 vaccine based on rAd26 and rAd5 vectors.^[14]

In the present investigation, 85.2% of the individuals in the research sample from the Nashik District were safeguarded following vaccination and did not acquire COVID-19. It was observed that vaccination improves the outcome of disease and decreases the need for hospitalization. However, the sample size was selected as per the following criteria:

1. Limited period – April 4, 2022–August 2, 2022
2. Limited age group – 18 years–25 years
3. 90% confidence level
4. 6 standard deviation
5. Margin of error (confidence interval) of $\pm 4\%$.

However, it is suggested that a similar study should be done on a larger sample size so that statistically significant results can be obtained. This study may act as a guideline for future such studies. The COVID-19 pandemic has been one of the most challenging situations for mankind. Various studies have proven the efficacy of vaccination to overcome this challenge.

CONCLUSION

The combat against COVID-19 has largely triumphed through immunization. Looking back at this epidemic is imperative to provide suggestions that would equip us to handle a similar crisis in the future, if it occurs. A study was conducted with the same aim to assess the efficiency of immunization on the Indian populace. Although it was noted that it also helps in mitigating the severity of illness in the affected individuals, it is recommended to carry out research on a larger sample size to obtain statistically significant results. The research disclosed that immunizations are effective and had an 85.2% efficacy ($P = 0.001$) in shielding against COVID-19 infection.

Ethical approval

The research/study is approved by the Institutional Ethics Committee at Mahatma Gandhi Vidya Mandir's Karmaveer Bhausaheb Hiray Dental College & Hospital, number MGV/KBHDC/938/2021-22, dated 18th February 2022.

Declaration of patient consent

Patient's consent not required as there are no patients in this study.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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How to cite this article: Nikam DS, Dahivelkar SD, Mali S. Evaluation of rate and severity of COVID-19 infection after vaccination in the age group of 18–25-year population: A questionnaire-based study. *J Academy Dent Educ*. doi: 10.25259/JADE_23_2023