

## Persistence of COVID-19 Among Private Medical College Students Even after Immunization

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### Abstract

**Objective:** To ascertain the frequency of COVID-19 among Private Medical College Lahore students despite vaccination aimed at immunity against evolving variants of concern, thus safeguarding against potential future epidemics globally.

**Material and Methods:** The study was conducted at the Central Park Medical College among students of different years of medicine using a cross-sectional quantitative approach and circulating e-questionnaire to collect information about COVID occurring before and after vaccination, the number of booster shots given, type of vaccine administered. The gathered data was examined using the ANOVA technique. It was conducted from March 2022 to August 2022.

**Results:** There were 402 participants in the study. The results showed that immunization in its entirety was very successful. Students who received the first booster dose had fewer COVID-19 cases, and those who received the second shot had even greater success in lowering the number of cases.

**Conclusion:** To sum up, COVID-19 is still very contagious. This study helps to explain related symptoms and offers insightful information on breakthrough instances that occur after vaccination. The findings highlight how crucial it is to inform the public on social distancing. Governments can leverage these findings to formulate strategies and interventions to mitigate potential future pandemics.

**Keywords:** Covid -19, vaccine, Virus SARS Covid

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### Introduction

The novel coronavirus known as coronavirus 2 (SARS-CoV-2) first surfaced in Wuhan, China, in late 2019. It is often diagnosed as coronavirus disease-2019 (COVID-19), a severe acute respiratory illness. After the virus began to spread outside of China, the WHO deemed COVID-19 to be a pandemic on March 11, 2020. According to Yu Shi, on March 15, 2020, SARS-

CoV-2 quickly spread to 34 Chinese provinces and cities; infections were reported in 144 nations, territories, and places on five continents (World Health Organization, 2020). The Islamic Republic of Pakistan, which likewise had the greatest death toll in the middle of May 2022, also declared an emergency.

Many individuals who were impacted by COVID-19 experienced various mental and physical health problems. Frailty, alcohol-related conditions, cardiovascular risk factors (smoking-related conditions, hypertension, diabetes mellitus, dyslipidemia, and obesity-related conditions), cardiovascular diseases (heart failure, coronary heart disease, cardiac rhythm disorder, valvular heart disease, occlusive peripheral arterial disease, stroke, and pulmonary embolism), chronic respiratory conditions, dialysis, having a kidney transplant, liver failure, active cancer, depression, psychosis, dementia, epilepsy, Parkinson's disease, inflammatory bowel disease, rheu-

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matoid arthritis, and ankylosing spondylitis) were found to be associated with severe COVID-19 outcomes (Kim Bouillon, 2021).

The research of vaccines had quickened as several nations battled new illnesses brought on by COVID-19. Immunization against the virus and prevention of its spread is achieved through vaccination, which is a vital and economical measure (Fiolet, 2021). More than three billion COVID-19 doses had been given globally by the middle of 2021, and 24% of the world's population had received at least one dose of the vaccine. Around 40 million doses of the COVID-19 vaccine were being given out daily globally by that point. By the middle of 2021, the following nations had vaccinated at least 50% of their citizens against COVID-19: the United States, France, Italy, Spain, Chile, Uruguay, Israel, Bahrain, Hungary, and the United Kingdom. By the end of June 2021, however, just 1% of individuals in low-income nations had received a dosage of the COVID-19 vaccination. Just 53 million vaccination doses have been given in Africa [Duduzile and Charles, 2021]. According to Adeel Siddique, there are more than 6 million and 20 million fully and partially vaccinated individuals in Pakistan (out of a total population of about 220 million). By the final week of July 2021, the total number of doses given out daily at approved COVID-19 immunization locations had risen to approximately 600,000–900,000 doses. In 2021, Michael et al.

The global COVID-19 epidemic is still far from under control, and both prevention and control of the outbreak continue to present formidable obstacles. Since there is currently no known cure for COVID-19, the most practical and affordable ways to contain the pandemic are to encourage vaccination campaigns and foster herd immunity. On the other hand, the recipients' level of neutralizing antibodies declines with time, and the vaccine's protective effectiveness progressively wanes. It is yet unclear if booster vaccinations are required to increase the immune system's defenses against illness. We compiled the available information on the efficacy and durability of COVID-19 vaccinations in this work.

We discovered that using a booster immunization approach is essential. Still, not every participant needs a booster shot six months following the first vaccination. High-risk populations, such as the elderly and those

with immunodeficiency, should receive priority treatment. Compared to homologous immunizations, a heterologous booster can strengthen immune protection and elicit stronger immunological responses. Nevertheless, additional empirical evidence and clinical investigations are required to confirm the safety of heterologous vaccination approaches. (Meng and Associates, 2022).

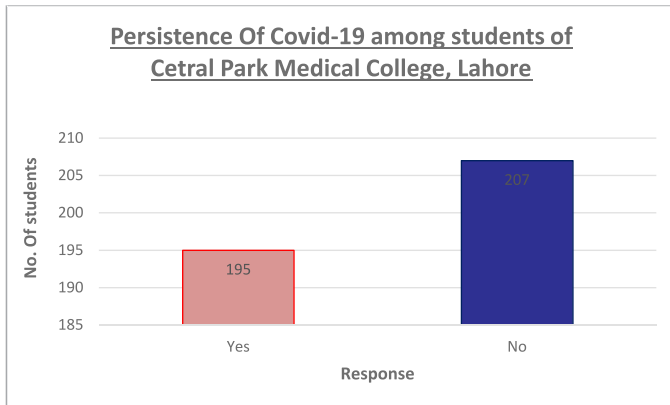
The prevalence of COVID-19 was examined for the first time in Pakistan although numerous cases were still reported there even after receiving the full immunization.

## Material and Methods

This study involved 402 students in total. The professorial group created and approved the Standardized Questionnaire (Acharya 2010) from the month of March-August in the year 2022. The IRB registration No was CPMC/IRB-No/1381-A. Age, gender, marital status, travel history, times of coronavirus, year of vaccination, COVID occurring before and after vaccination, number of booster shots given, type of vaccine used, and corona symptoms were among the ten factors that were taken into consideration when formulating the questions. The students were contacted through both manual and online means. 'Yes' and 'No' responses to the items were used as a measurement system. To compare the pupils with and without corona, a bar chart was created. Data on the durability of corona following vaccination after one and two booster injections was analyzed by ANOVA.

## Results

Demographic statistics included age, gender, times of coronavirus, COVID occurring before and after vaccination, number of booster shots given, and type of vaccine administered in students of Central Park Medical College, Lahore. This research includes 402 participants, with the majority being females at 237 (58.9%) and the remaining being males at 165 (41.1%). Most participants fall within the age range of 20 to 23. Our Results, by One-way ANOVA, indicated a highly significant effect of vaccination (DF=2, F=532.30, p=0.001). The effect of vaccination was found to be highly effective for being completely vaccinated (Mean=138.67, SD=3.21). The application of 1st booster shot to the students was found to decrease the corona cases.



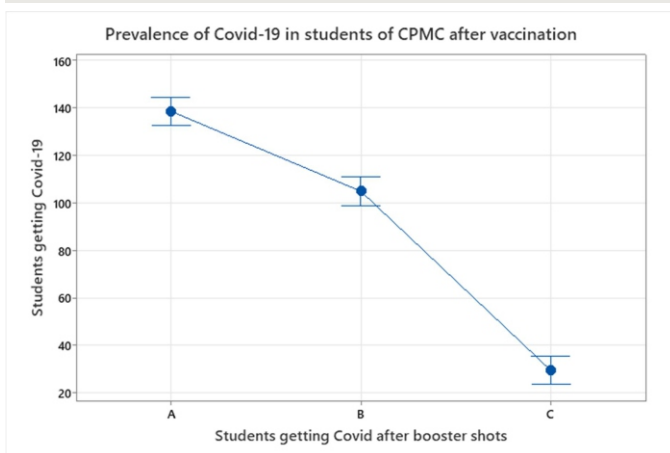
**Figure 1:** Graph showing students having corona after vaccination

One-way ANOVA showed highly significant results for the effect of vaccination (DF =2, F = 532.30, p= 0.001). The effect of vaccination was found to be highly effective for being completely vaccinated (Mean = 138.67, SD=3.21). The application of 1st booster shot to the students was found to decrease the corona cases (Mean= 138.67, SD=3.21) while the application of 2nd booster shots was highly significant. (Mean= 105.0, SD=5.00)

**Table 1 and 2:** Effect of vaccination and booster shots on the students of corona vaccination

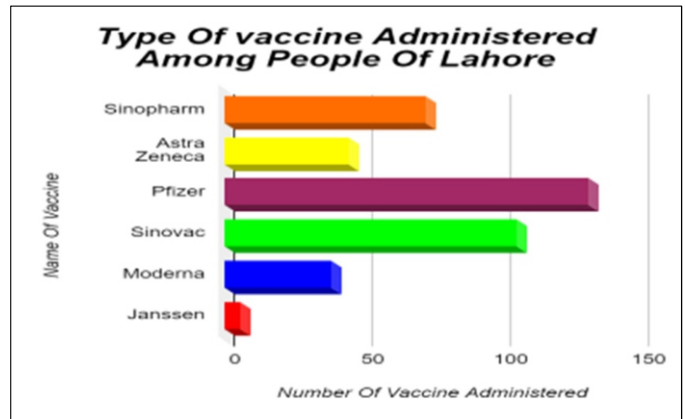
Sr. No	Group	Mean±SD
1	A	138.67a± 3.21
2	B	105.0b±5.00
3	C	29.67c±4.16

DF	F	P
2	532.3	0.001



**Figure 2:** Comparison between the people having corona after 1st and 2nd shots

The graph illustrates that the COVID-19 prevalence among CPMC students was lower after the 2nd booster shot when compared to the prevalence after 1st booster shot.



**Figure 3:** Effect of different Types of vaccines administered to students of CPMC

Every vaccination we tested produced incredibly meaningful results. After Pfizer was shown to be a very efficient vaccine, Sinovac was also shown to be effective. Sinopharm also demonstrated very encouraging outcomes in this area. When compared to Moderna, Astra Zeneca demonstrated more noteworthy outcomes, although Janssen was less successful in this area.

## Discussion

This study represents the inaugural investigation into the prevalence of COVID-19 among CPMC Students post-vaccination. Our findings as in figure 1 underscore the profound impact of complete vaccination among CPMC students, a feat largely attributable to the proactive vaccination campaign spearheaded by the Government of Pakistan, which not only encouraged but also provided free vaccination services across the nation (Gias et al 2023).

Against the backdrop of the COVID-19 pandemic, vaccination emerges as the paramount strategy for mitigating the spread of this perilous disease, leveraging available vaccines within healthcare systems globally<sup>[7]</sup>. Notably, Cihan's 2021 study reported that 41.8% of the US, 2.3% of Asia, 17% of Europe, 0.6% of Africa, 8.8% of South America, and 5.6% of the global population would be fully vaccinated against COVID-19.

(Khosa et al., 2023) Figure 2 illustrates the remarkable efficacy of vaccines in preventing COVID-19 (Patel et al. 2022) emphasize vaccination as the most effective



defense against viral diseases, reducing disease severity and transmission.

The utilization of booster shots has yielded significant outcomes. In the US, health professionals advocate for revaccination six months post-second dose for Pfizer BioNTech or Moderna recipients. Conversely, since April 2021, EU administrations have deliberated on accelerating booster vaccinations. In France, citizens aged 18 and above are eligible for booster shots five months post-second dose, with penalties for those failing to comply by mid-December 2021

Israel's proactive approach has resulted in over 40% of citizens receiving a third dose, as evidenced by a Lancet study indicating an 81% increase in effectiveness against mortality post-third dose. Despite successful vaccination campaigns, rising SARS-CoV-2 infections are attributed to the Delta variant's higher infectivity and reduced immunity post-earlier vaccination. Early evidence suggests mRNA vaccine's third dose efficacy in mitigating severe COVID-19 outcomes

The persistence of COVID-19 prevalence post-vaccination can be attributed to several factors. Firstly, no COVID-19 vaccine offers 100% protection (Thompson et al. 2021), with estimated adjusted vaccine effectiveness against SARS-CoV-2 infection at 91% and 81% for full and partial vaccination, respectively. Secondly, vaccine efficacy varies across different COVID-19 variants, as demonstrated by Fiolet (2021) and Zeng (2022), with booster vaccination proving more effective against Delta and Omicron variants

Our research confirms positive outcomes for all vaccines studied. Pfizer's notably high efficacy may be due to study biases favoring younger demographics as elderly individuals are less likely to participate in online surveys.

Further research is imperative to explore booster doses, heterologous vaccination, dosing intervals, vaccine breakthrough infections, and the duration of vaccine-induced immunity against emerging variants of concern.

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### Authors Contribution

**FNT:** Conceptualization of Project

**HT:** Data Collection

**ZT:** Literature Search

**RS:** Statistical Analysis

**SM:** Drafting, Revision

**AK:** Writing of Manuscript