

# Receiving The COVID-19 Vaccine and Its Correlation with Post COVID-19 Long Term Morbidity

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## ABSTRACT

**Back ground:** Long-coronavirus disease is the long-term consequences of COVID-19 infection experienced by individuals who are infected with the virus. Signs, symptoms, and problems that persist or worsen following an acute COVID-19 infection are collectively referred to as long COVID. This study tries to determine the correlation between vaccination status and the post-COVID long-term effects in vaccinated versus non-vaccinated infected individuals.

**Methodology:** It was a cross-sectional descriptive design, encompassing 416 individuals. Study cases represented vaccinated individuals who were infected and were suffering from the long-term consequences of COVID-19, as opposed to non-vaccinated infected individuals. Individuals who were neither infected, vaccinated, or unvaccinated considered as a reference group for estimating the correlation utilizing Odds ratio (OR).

**Result:** This study revealed that vaccinated individuals were more commonly affected by weakness (OR= 0.93; 95% CI 0.49-1.7), joint pain (OR= 0.7; 95% CI 0.41-1.4), and concentration problems (OR= 0.87; 95% CI 0.44-1.7) so that present study didn't notify significant statistical findings for post-COVID conditions risks regarding to vaccination status.

**Conclusion:** The correlation between vaccinated and non-vaccinated individuals who develop post-COVID-19 conditions showed that risk factors for developing these conditions were independently associated with vaccination status among infected participants.

**Key word:** Post COVID-19 condition, COVID 19, COVID19 vaccine, Vaccine & post COVID-19 long-term morbidity

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## INTRODUCTION

An epidemic of acute atypical respiratory infection occurred in Wuhan, China in December 2019. The transmission of this infectious disease rapidly distributed from Wuhan to the nearby areas. Later on, it was established that a novel strain of coronavirus was the primary factor responsible for a new coronavirus, known as SARS-CoV-2 or 2019-nCoV, has approximately eighty percent similarity with SARS-CoV. SARS-CoV is the virus that triggered acute respiratory distress syndrome (ARDS) with elevated death rates between 2002 and 2003.<sup>1</sup>

Since the COVID-19 pandemic, which resulted in a huge number of serious illnesses and millions of fatalities, healthcare experts are now facing a new problem. This crisis is caused by the emergence and possibly persistence of symptoms after the acute phase of SARS-CoV-2 infection, which generally occurs after three months. This syndrome is usually known as long-COVID.<sup>2</sup>

Patients who were infected previously with SARS-CoV-2 are more prone to develop the post-COVID-19 syndrome. This syndrome usually appears approximately three months following its onset of COVID-19 and is distinguished by symptoms that persist at least two months and cannot be attributable to any other diagnosis. The most frequent signs include fatigue, trouble breathing, declining in concentration, and other impacts that interfere with ordinary tasks. Symptoms could manifest for the initial time after recovering from an acute COVID-19 episode, or they may persist since the illness began. Symptoms could evolve and vary or recur after a while.<sup>3</sup> Montani D et al. initiated an investigation involving 183 persons within American hospitals 35 days after discharge and 120 patients discharged from a French hospital over a period of 100 days following admission to the hospital, during the period of follow-up, at least thirty percent the study's findings participants exhibited tiredness, dyspnea, and psychological distress such as post-traumatic stress disorder (PTSD), anxiety, depression, and abnormalities in concentration and sleep.<sup>4</sup> Throughout an acute SARS-CoV-2 infection, more than 100 symptoms might arise, influencing various organs including the cardiovascular, respiratory, musculoskeletal, and neurological systems.<sup>5</sup>

The exponential development of vaccines represents a significant turning point in the ongoing battle against COVID-19 infection. COVID-19 vaccines have notably decreased the opportunity of acquiring serious clinical signs and the elevated mortality rate attributed regarding COVID-19.<sup>6</sup>

Even though vaccines reduce the potential risk possibility of severe COVID-19, it is still unclear whether vaccination before or after an acute infection has any influence on the development of long-term COVID symptoms. Actually, people who were given the COVID-19 vaccination are still susceptible to virus infection and have asymptomatic, mild, or moderate

symptoms, especially if the viral infection is caused by a variation of concern (VOC) such as Omicron. Long-COVID may develop after a mild or asymptomatic SARS-CoV-2 infection.<sup>7,8</sup>

A recently published comprehensive review found no evidence that pre-infection immunization may reduce the chance of acquiring long-COVID later on. However, the efficacy of vaccines in those who have previously had long-term COVID endures controversial.<sup>2</sup> The precise impact of receiving vaccines on long-term COVID might be unknown.<sup>8,9</sup> This study main objective of this research tried to figure out the correlation between long-term post-COVID morbidity among individuals who have been vaccinated compared to those who have not.

## METHODOLOGY

A prospective and retrospective cross-sectional survey in Baghdad extended from 2023 to 2024. The study relies on data collected from individuals through simple sample sampling technique, aimed at identifying any persistent post-COVID-19 symptoms. This study basically recruited individuals who had experienced with post-long-term morbidity for two months or more. Those individuals were assessed regarding their vaccination status, so they were  $\geq 18$  years old to be eligible to receive vaccines regarding the previously applied vaccination protocol in Iraq during this period of time.

Data was collected concerning a total of 416 individuals who attended medical health centers. 164 of them had post-COVID-19 long-term consequences, comprising those who got the infection post-vaccine receiving and infected non-vaccinated individuals. Participants' vaccination and infection status with COVID-19 were validated by their own vaccination certificates accompanied with their own positive polymerase chain reaction (PCR) test. In the same context, 108 participants were non-infected individuals had negative PCR tests, plus individuals who had not been infected previously with COVID-19 and were not suffering from its common symptoms they were also categorized regarding the vaccine receiving situation. Performing statistical analysis by utilizing the ODDS ratio (OR) considering that the reference group involves individuals who have not been infected, they encompass both vaccinated and non-vaccinated individuals, compared with post-vaccinated infected individuals and non-vaccinated infected individuals substantially regarding their experiences with post-COVID-19 long-term morbidity.

**Ethical consideration:** This research had already been approved by the officials from the health authority institutions with the following documents: 167841-11/11/2022 and 71413-26/12/2022. Gathering data in this study is obtained after obtaining both official approvals from the health institutions and a verbal agreement from participants to get involved with the study prior the process of filling out

a questionnaire form, which comprises a written consent statement highlighting the request to participate in this research with a brief description of the study title and its main goals precisely, as well as clarifying their willingness to withdraw or abstain from study engagement immediately if they want to, concerning their own information it will remain confidential and will not be individually used; also clarifying short notes about the study's nature and research objectives.

## RESULTS

The categorization of vaccinated individuals regarding the incidence of post-COVID long-term morbidity that exists between vaccinated and non-vaccinated individuals reveals that no correlation is statistically supposed to be a significant risk factor for post COVID-19 long-term morbidity, which was determined by estimating the odds ratio (OR) using non-infected individuals regarding their vaccination status as a reference group (Table 1).

**Table 1: Bivariate logistic analysis of study variables**

Post COVID long-term morbidity	Post vaccination COVID-19 infected individuals		OR* [C.I 95%]	P value
	Vaccinated (%)	Not vaccinated (%)		
Breathlessness	21 (72.4)	8 (27.5)	1.20 (0.48-2.99)	0.6
Weakness	49 (67.1)	24 (32.8)	0.93 (0.49-1.7)	0.8
Concentration problems	38 (65.5)	20 (34)	0.87 (0.44-1.7)	0.69
Cough	20 (62.5)	12 (37.5)	0.76 (0.33-1.7)	0.52
Chest pain	22 (84)	4 (15.3)	2.50 (0.8-7.9)	0.11
Joints pain	47 (62)	28 (37.3)	0.70 (0.41-1.4)	0.41
Sleeping problem	27 (69)	12 (30.7)	1.30 (0.46-2.28)	0.93
Fever	24 (75)	8 (25)	1.37 (0.56-3.38)	0.48
Erythema	4 (33.3)	8 (66.6)	0.22 (0.06-0.8)	0.02
Diarrhea	14 (46)	16 (53)	0.40 (0.17-0.91)	0.03
Palpitation	23 (51.1)	22 (48.8)	0.84 (0.23-0.97)	0.04
Menstrual changes	8 (44.4)	10 (55.5)	0.36 (0.13-1.01)	0.05
Diabetes	2 (33.3)	4 (66.6)	0.22 (0.04-1.31)	0.098
Hair loses	2 (25)	6 (75)	0.15 (0.02-0.79)	0.02
Blood sensitivity	2 (100)	0 (0)	2.30 (0.1-49.5)	0.59

\*Reference group: Post vaccination Not infected individuals (Vaccinated 74 (68.5%) and Not vaccinated 34 (31.4%))

## DISCUSSION

The long-term effects of post-vaccination infection are the main concern, and numerous studies aimed to assess its associations. A study conducted by César Fernández-de-las-Peñas et al. revealed that no significant differences in post-COVID infection symptoms between received vaccinations and non-vaccinated individuals, with the possible exception of a higher prevalence of dyspnea with exertion ( $p < 0.001$ ) as well as poorer sleep quality ( $p = 0.03$ ) reported by vaccinated patients compared to non-vaccinated individuals.<sup>10</sup> Juan P. Wisnivesky, et al. suggested that the consequences of post-acute COVID-19 infection did not show significant differences when comparing changes from baseline to 6 months in anosmia, respiratory symptoms, sadness, anxiety, PTSD, and quality of life between vaccinated and unvaccinated individuals ( $p$ -value  $> 0.05$ )<sup>11</sup>, so these data basically matched with what this study proposed of: overall multivariate post-COVID-19 long-term effects information for the participants in this study were categorized regarding their vaccination status in non-infected individuals; they were represented a reference group compared to infected (vaccinated and non-vaccinated) individuals who were along with post-COVID-19 long-term morbidities, demonstrated significant statistical correlation between taken variables was clearly not qualified to consider it as a risk factor; furthermore, this finding needs to be sup-

ported by another study with a qualified estimated sample size to determine the nature of the association between these variables regarding to vaccination status.

One of the limitations of the study was that we were not able to perform polymerase chain reaction (PCR) testing in all asymptomatic person to rule out COVID-19 infection due to restriction imposed by health authorities. Testing was allowed in symptomatic cases only.

## CONCLUSION

This study illustrated that there are no significant differences between vaccinated and non-vaccinated individuals regarding the development of long-term morbidity consequences post COVID-19 infection.

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