



# Study of IgG and IgM antibody response afterPfizer mRNA Vaccine first dose in Previously infected with COVID-19and uninfected individuals

Fadhil Kahdim Jassim<sup>1</sup>, Aseel kasim kareem<sup>1</sup>, Maher Mohammed Khadairi<sup>2</sup>, Nassar Abdalaema Mera<sup>1</sup>, MahirAbdulkadhum Alzughaibi<sup>1</sup>, Mohammed Zuhair Najji<sup>3</sup>, Saif Sahib Radhi<sup>3</sup>, Ali Fahim Mohammed<sup>1</sup>, Marowa H Abbas<sup>1</sup>.

<sup>1</sup>Babylon Health Directorate, Babylon, Iraq

<sup>2</sup>Department of Anesthesia, Al-ma'moon university college, Baghdad, Iraq.

<sup>3</sup>Department of Medical Laboratory Techniques, Al-Mustaqbal University College, Hilla, Iraq.

Corresponding author E-Mail: alifahim490@gmail.com

## Abstract

The current research aimed to demonstrate the extent such as increase in the rate of immune response to antibodies (IgG, IgM) for people who received the first dose of the Pfizer mRNA vaccine at (1-3) weeks times period and to compare them with people who were not taken for the first dose of the same vaccine and none infected with COVID -19. Also the results appeared significant variations in immunoglobulin (IgG) levels ( $P \leq 0.05$ ) between case (Recipients mRNA vaccination) and control patients, there were. In terms of age and gender, however, there were no significant changes ( $P \geq 0.05$ ) in immunoglobulin (IgM) levels between case (Recipients mRNA vaccination) and control patients. .

**Keywords:** COVID-19, Pfizer mRNA Vaccine ,IgG,IgM.

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## 1. introduction

Coronaviruses are a varied category of viruses that can infect a wide range of animals, as well as people, causing mild to severe respiratory diseases. COVID-19 is the third coronavirus disease that has been discovered in humans and identified as extremely pathogenic. Despite being less lethal than SARS, as well as MERS [1]. COVID-19 individuals' histopathological abnormalities are mostly found in the lungs

and that revealed scattered alveolar destruction on both sides, as well as hyaline plaques. Formation of pneumocyte membranes, Pneumocyte desquamation and fibrin deposits in the lungs of persons with severe asthma [2]. Genetic vectors, DNA, mRNA in nanomaterials, killed viruses, live attenuated viruses, and protein elements are one of the approaches being used to develop SARS-COV-2 therapies in the future [3]. The approach is employed in



mRNA vaccines to trigger an immunological response. which cells produce proteins COVID-19 mRNA shots, like other vaccines, have undergone extensive safety testing before being approved for use in the United States[4,14].mRNA is a recent development, yet it is not unknown. mRNA vaccinations do not include a live virus and do not put the inoculated person at risk of illness. As according study, mRNA from the immunization always enters the cell nucleus and has no effect on or association with a person's DNA[4].SARS-CoV-2 mRNA-based vaccines were tested in people to see if they induced antigen-specific plasma blast and germinal center B cell responses. A robust IgG-dominated plasma blast response was elicited by the vaccination, which peaked one week following the booster injection[5].

## 2. Materials and Methods

### Study Design

The work was applied on 50cases (29 female,21 male) who taking first dose of mRNA Pfizer vaccine and 50 (29 males, 21 females) without prior clinical signs as control groupfor the period between the July 2020for end November of 2021from

Dispensaries and hospitals where vaccines are taking in Babylon Governorate.

### Collection Blood Samples

Using disposable syringes, blood samples (5ml) were obtained from each case and control group via vein puncture. The blood was placed in a Jell tube and allowed to coagulate at room temperature (25-20) for 10 minutes before being centrifuged at 3000 rpm for 10 minutes and then carefully transferred to Eppendorf tubes and stored at -20° until use.

### Immunological Tests

The levels of immunological criteria for IgG and IgM were determined using an ELISA Kit and Elabscience's manual techniques.

### Analytical Statistics

To examine the significance difference between two groups of measurement, such as pre-test of the research group and pre-test of experiment group, the data were analyzed using the statistical tables frequency and percentage, mean of scores, t-test, and independent sample t-test. The SPSS "Statistical Package of Social Sciences" version 20 and Microsoft Excel were also used to evaluate the study data (2010).

## Results

**Table 1:** Distribution of Case(RecipientsmRNA Vaccine)and Control According to Age and Gender in both Groups (n=50)

Demographic Data	Groups	Case		Control	
		Freq.	%	Freq.	%
Age / Years	20-29 years	10	20.0	16	32.0
	30-39 years	36	72.0	32	64.0
	≥40 years	4	8.0	2	4.0
	Total	50	100.0	50	100.0
	Mean±S.d	34.4±4.823		28.12±5.145	
Gender	Male	21	42.0	29	58.0
	Female	29	58.0	21	42.0
	Total	50	100.0	50	100.0

The demographic features of the case-control group are represented in this table in terms of frequency and percentage, The ages in case and control groups ranged from 30-39 years old at mean age=34.4 and 28.12 respectively ,perhaps one of the reasons behind the increase in the number of

participants in this category in taking this vaccine( Pfizer BioNTech mRNA) may beBecause they are the most vulnerable group in society to this virus and also more spread to it due to their large presence and direct interaction with the areas of life, also vaccine makers initially focused on



adults, partially because children were proving far less likely to die from COVID-19 ,a child’s biology differs from that of an adult, which can affect the way vaccines work[6].Respect to gender, findings demonstrated that female were predominated in case group accounting for 58 %. Because many viral vaccinations induce distinct immunological responses in males and females, the latest have greater amounts of specific antibodies than males ,

males predominated to control group, accounting for 42 percent. After immunization against influenza, protective antibody responses in adult females are twice as great as in males[7]. In children, adults during their reproductive years, and even beyond menopause, Vaccine-induced immune responses differ according to sexual identity , Despite this, the majority of vaccine trials do not break down data on immune response outcomes by gender[8].

**Table 2:**Statistical distribution of the Study Group by their overall responses with Significant Difference between Case(Recipients mRNA Vaccine) and Control according to (IgG)

Periods of Measurement	Mean	N	Std. Deviation	t-value	D.f.	p-value
Case	3.795	50	2.821	2.678	98	0.010 S
Control	2.325	50	2.542			

"(Sd) standard deviation, (S): significant , (t- value): t-test, (D.f.): degree of freedom"

With a p-value less than 0.05, there is a considerable difference between the case and control groups, according to the data..in terms of the statistical mean, the study results show that the case group's responses improve after receiving the first dose when compared to the control group, may be one in thereason was increased immune response of participants who had previously been infected with COVID- 19 about before six months ago as minimum ,also because your immune system identifies the viral spike protein from the first vaccine dose and develops a stronger response following the second injection, as this study agreed with Alexis *et a*/that Individuals recovering have high antibody responses to the first immunization dose were observed in confirmed cases of COVID-19, also the

current study consistent with recent reports[9,10].

Furthermore, positive case responses demonstrate that after the first vaccine dosage, immunity in the positive cases group is much lower than in the recovered COVID-19 group. The seropositive group, like the non-immune group, takes two doses to get an antibody response comparable to the COVID-19 group[11].According to the vaccine's newness, researchers are unsure how long it will provide protection. Although the amount of antibodies may decrease with time, memory B and memory T cells are found in the immune system, and they can store information about the coronavirus for tens of years , Immunity may last 3–6 months, according to recent study, although this has yet to be proven, and it is too early to say for sure[12].

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**Table 3:**Statistical distribution of the Study Group by their overall responses with Significant Difference between Case (Recipients mRNA Vaccine) and Control according to (IgM)

Periods of Measurement	Mean	N	Std. Deviation	t-value	D.f.	p-value
Case	0.049	50	0.145	0.371	98	0.712 NS
Control	0.064	50	0.270			

"(S.d) standard deviation, (NS): no-significant , (t- value): t-test, (D.f.): degree of freedom"



With a p-value greater than 0.05, there was no statistically significant difference between the case and control groups, according to the findings. In terms of the statistical mean, the study results show that the case group's reactions do not appeared improvementwhen compared to the control group during the first dosage , For IgM antibodies it results appeared negative ( IgM not found) thatdepends on several reasons, including it is possible that the participants who were examined did not have a recent infection or that the people who received the vaccine did not have enough time to form inside their body the antibodies and the last reason is that the samples that were examined were after a period of time about two weeks to three, and this period is during which this antibody is not present because it is present only in recent infection and recent vaccination[13].

If you've had a positive test result (antibodies identified), you may have recently been infected with the virus that causes COVID-19, or you may have produced antibodies as a result of recent vaccination with one of the SARS-CoV-2 vaccines that are currently available.[13].

**Conclusion:**The current study indicated at the effective role of thefirst dose of the PfizermRNA vaccine, as its efficiency was 95% in combating many genotypes of COVID-19 through laboratory studies that are currently underway on it.

#### Conflict of Interest

The author declare that they have no conflict of interest.

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