


Health Consequences of University Employees Post-COVID-19 Vaccination at Palestinian Universities

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Abstract

Introduction: The control of vaccine hesitancy comes with key protective measures against coronavirus disease (COVID-19) and excellent efficacy in clinical trials and effectiveness in real-world data. However, some people believe that vaccination is ineffective and it causes health problems. This study aimed to assess the health consequences of university employees' post-COVID-19 vaccination at Palestinian universities.

Method: A cross-sectional study was conducted between February and June 2021. A total of 310 university employees participated from six universities in Palestine. A self-reported questionnaire was used for data collection and included the following: personal characteristics of university employees, knowledge about COVID-19 vaccination, medical background of the participant, and their perception regarding receiving the COVID-19 vaccination.

Results: The results revealed that 32.6% and 43.2% of the participants had fever post the first and second doses, respectively. Also, 49.0% and 39.4% of them complained of exhaustion or fatigue and headache post the first dose and 58.1% and 46.1% had exhaustion or fatigue and pain in their muscles post the second dose, respectively. In addition, 29.2% and 16.7% of them had respiratory and digestive problems post the first dose and 38.9% and 19.0% had problems in respiratory and digestive respectively post the second dose. Furthermore, the analysis revealed that fever, symptoms at (the injection site), and exposure to physical symptoms have significant differences between the first dose and second doses of the vaccine ($p < .001$).

Conclusion: This study confirmed that the respiratory and digestive problems are the main problems post-COVID-19 vaccination. Also, this study confirmed that fever, symptoms at (the injection site), and exposure to physical symptoms have significant differences between the first dose and second dose of the vaccine.

Keywords

health consequences, post-COVID-19 vaccination, Palestinian universities

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Introduction

The new coronavirus disease (COVID-19) was discovered in Wuhan in 2019, heralding the beginning of a major worldwide pandemic (Wu et al., 2020). Since then, COVID-19 has infected around 107,532,472 individuals and killed 2,354,212 people globally. COVID-19 had infected 317,961 Palestinians and killed 3,406 people as of April 2021 (Palestinian Ministry of Health, 2021). This has resulted in serious consequences for world health and the global economy and forced governments to operate in a context of radical uncertainty, as there were previously no definitive treatments or vaccines (Allain-Dupré et al., 2020).

Review of Literature

Vaccination against COVID-19 is a leading strategy to change the course of the COVID-19 pandemic worldwide (Chakraborty & Maity, 2020). COVID-19 vaccines show excellent efficacy in clinical trials and effectiveness in real-world data (Patel et al., 2021). However, some people still

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become infected with SARS-CoV-2 after vaccination (Kojima & Klausner, 2022). Vaccination is recognized as the most successful and cost-effective public health intervention in today's world, and it has made a very large contribution to improving global health by reducing the incidence and deaths of many infectious diseases (Dubé, et al., 2013; Rappuoli et al., 2011). China and the whole world are experiencing the third wave of epidemics. Therefore, it is very important to establish herd immunity by vaccinating against COVID-19 (DeRoo et al., 2020).

Vaccine hesitancy could be due to inconvenience in accessing vaccines, complacency, or lack of trust (Portfolio, 2021). There were differences in the acceptance rate of the COVID-19 vaccine in different countries—less than 55% in Russia to 90% in China (Lazarus et al., 2021). In the KSA, in December 2020, 50.5% of health workers (Qattan et al., 2021) and 48% of the general population (Alfageeh et al., 2021) expressed their intent to receive the COVID-19 vaccine.

Serious COVID-19 vaccine adverse effects were rare. However, female sex, younger age, full vaccination dose, vaccine brand, and having had COVID-19 before vaccination were associated with greater odds of adverse effects (Beatty et al., 2021). Swelling and severe allergic reaction of the eyelids, acute hyperglycemia, severe hypotension, shortness of breath, generalized body aches, severe chest pain, weakness, and numbness on the injected arm, and fever more than 39°C were among the unusual signs and symptoms post-COVID-19 vaccine (Al Khames Aga et al., 2021).

Some people who had severe illness experienced many of these effects, if not all body systems or autoimmune conditions over a long period of time, with symptoms including heart, lung, kidney, skin, and brain functions. Autoimmune conditions occur when the immune system is attacked, causing inflammation as swelling or tissue damage. Severe illness of the lung or other organ can cause health effects like severe weakness and exhaustion that need hospitalization to control health status in an intensive care unit. These effects can include severe weakness, problems with thinking, and post-traumatic stress disorder (Fakhroo et al., 2020).

Understanding the potential adverse effects of vaccination is critical for all individuals involved, including the person receiving the vaccine (Hervé et al., 2019). Increasing the COVID-19 vaccination rate among individuals is a sensible and evidence-based approach to public health concerns (Mosina et al., 2021). The importance of vaccination programs impacts health care personnel and nurses views toward public health preventative measures, especially when contemplating a long-term anti-COVID-19 approach that requires future doses of booster immunizations (Bar-On et al., 2021). Furthermore, nurses serve as a guide and a reliable source of vaccination information for the general population. They can protect against misleading and incorrect information (Fares et al., 2021).

Reported side effects of COVID-19 vaccines have mostly been mild to moderate and have lasted no longer than a few days. Typical side effects include fever, pain at the injection

site, fatigue, muscle pain, headache, chills, and diarrhea. The chances of any of these side effects occurring after vaccination differ according to the specific vaccine. Therefore, this study aimed to assess the health consequences of university employees' post-COVID-19 vaccination at Palestinian universities.

Method

A cross-sectional study was conducted on employees who work at six universities in Nablus, Palestine: Nablus University for Vocational & Technical Education, An-Najah National University, Modern University College, Birzeit University, Hebron University, Arab American University, and Al-Quds Open University.

Research Question

What are the health consequences of university employees' post-COVID-19 vaccination at Palestinian universities?

Sample and Sampling Method

The total number of employees who work in targeted universities are approximately 1,500 employees. The sample size was calculated using Raosoft program with confidence level 95%, margin of error 5%, and response rate 50%. A total sample of 306 participants was needed to conduct this study. An additional 30 participants were added to overcome participants' who had incomplete questionnaires or dropped out. So the final sample was 336 participants. The sample was selected proportionally according to each employee in these universities.

Inclusion and Exclusion Criteria

All employees who work full time targeted the universities in Palestine with a minimum of 1 year experience and who have been vaccinated with the COVID-19 vaccine since the vaccine's approval in Palestine. Exclusion those who are illiterate or did not agree to participate in the study

Instrument of the Study

A self-reported questionnaire was developed by the researchers after critical reviewing literature including:

1. Demographic characteristics of university employees include age, gender, educational level, place of residence, monthly family income, and BMI. Scoring of BMI was classified into Underweight = <18.5, Normal weight = 18.5–24.9, Overweight = 25–29.9, Obesity Class 1 = 30–34.9, Obesity Class 2 = 35–39.9, and Extreme Obesity Class 3 = >40.
2. Medical history included receiving annual flu vaccination before COVID-19 vaccine, chronic medical problems, history of COVID-19 infection, family history of

Table 1. Demographic Characteristics of the Participants (n = 310).

Demographic characteristics	M (SD)	n (%)
Age	36.6 ± 7	
	< 20	26 (8.4)
	20 < 30	55 (17.7)
	30 ≤ 40	128 (41.3)
	> 40	101 (32.6)
Gender	Male	246 (79.4)
	Female	64 (20.6)
Education level	Basic education	29 (9.4)
	University education	89 (28.7)
	Postgraduate education	110 (35.5)
	Other	82 (26.4)
Place of residence	City	170 (54.8)
	Village	115 (37.1)
	Camp	25 (8.1)
Monthly family income	Sufficient	129 (41.6)
	Not enough	133 (43.0)
	Enough and safe	48 (15.4)
Body mass index	< 18.5 (underweight)	12 (3.9)
	18.5–25 (normal)	268 (86.5)
	25–30 (overweight)	30 (9.6)
	30–35 (obese)	0 (0.0)

COVID-19, smoking, and exposure to any environmental pollutants.

- Health consequences assessment and it composed of fever, temperature measurement, symptoms at the injection site, exposure to physical symptoms, and health complications. The responses were yes or no. Cronbach's alpha was found to be 0.82 so the questionnaire was reliable.

Validity of the Tool

To test the questionnaire's validity, it was sent to experts in the field of Community Health Nursing and Medical professor staff. The modifications were implemented in response to the feedback.

Data Collection

After obtaining permission to conduct the study from targeted universities, the researchers visited the universities and met the head of human resources departments. He explained to them the objectives of the study and asked them to prepare a list of names of the employees to meet them. Then, the researcher explained the objectives of the study to the employees. The employee who agreed to participate assigned the informed consent and then completed the questionnaire. The participants completed the paper format questionnaires in the Arabic version. The study was conducted in the middle of the COVID-19 pandemic. The participants used masks for its control when they completed the questionnaires.

Ethical Approval

Ethical approval was obtained from the targeted universities. A consent form was assigned from every participant prior to the study. Voluntary participation was explained. It was explained that all data will be kept confidential and will be used for study purposes only. A clear explanation was given to each participant about the study objectives and tool and enough time was given for questions

Pilot study: The piloting was carried out on 31 participants. The participants indicated that they had no trouble in interpreting or clarifying the contents of the instruments. The pilot study found that the average time taken to complete the questionnaire 10–20 min. The pilot study participants were excluded from the actual study.

Data Analysis

Statistical analysis was performed using Statistical Package for Social Sciences (SPSS version 21). Mean ± SD was computed for continuous data. Frequencies and percentages were calculated for categorical variables. The data were analyzed using chi-square test and considered the findings significant if the *p*-value was < 0.05.

Results

Sample Characteristics

Three hundred and ten out of 336 questionnaires (92.3% response rate) were completed and returned by the

participants. The results revealed that less than half of the studied employees (41.3%) were between 30 and <40 years old, with $\pm SD$ 36.6 ± 7 . Males made up 79.4% of the population with 35.5% having a postgraduate degree. More than half (54.8%) of the studied employees lived in the city. Also, 43% of studied employees' monthly income was not enough. Also, the majority (86.5%) of studied employees were recorded as normal weight, as shown in Table 1.

Also, the analysis revealed that more than two-thirds of studied employees (67.4%) hadn't received the seasonal influenza vaccine before COVID-19. Nearly three-quarters of them (72.6%) were suffering from chronic diseases such as diabetes, blood pressure, asthma, and kidney diseases. Moreover, 64.5% of them were not diagnosed with COVID-19 before taking the vaccine. In addition, 57.4% of the employees had contacted COVID-19 family cases. Furthermore, 72.3% and 47.8% of studied employees

smoke cigarettes and are exposed to environmental pollution, such as vehicle exhaust pollutants, as shown in Table 2.

According to the kind of vaccine, 126 (40.6%) of the participants received Sinopharm vaccine. While only 37 (11.9%) of them received Moderna vaccine, as shown in Table 3.

Research Question Results

The analysis revealed that less than half of the employees studied (32.6%) had fever following the first dose of COVID-19 vaccination and (43.2%) post the second dose. The temperatures of 48.4% of the employees ranged between 38.5 and 40°C. Regarding the site of injection, 31.3% and 16.1% of them had a feeling of pain and itching after the 1st dose of injection, and 35.5% and 30.3% had a feeling of pain and itching post the second dose, respectively. In addition, 49.0% and 39.4% of them complained of exhaustion or fatigue and headache post the first dose and 58.1% and 46.1% had exhaustion or fatigue and pain in their muscles post the second dose, respectively. Also, 29.2% and 16.7% of them had respiratory and digestive problems post the first dose and 38.9% and 19.0% had problems in respiratory and digestive respectively post the second dose. Furthermore, the analysis revealed that fever, symptoms at (the injection site), and exposure to physical symptoms have significant differences ($p < .001$), as shown in Table 4.

Table 2. Medical History of the Participants (n = 310).

Medical history		n (%)
Receive annual flu vaccination before COVID-19 vaccine	Yes	101 (32.6)
	No	209 (67.4)
Chronic medical problems	Yes	85 (27.4)
	No	225 (72.6)
Chronic problems (n = 85)	Diabetes	25 (29.4)
	Blood pressure	12 (14.1)
	Cardiovascular disease	11 (12.9)
	Thyroid gland	1 (1.2)
	Allergy to certain medicines	2 (2.4)
	Asthma and lung diseases	12 (14.1)
	Kidney disease	13 (15.3)
Liver disease		5 (5.9)
	Arthritis	4 (4.7)
Diagnosed with COVID-19 before taking the vaccine	Yes	110 (35.5)
	No	200 (64.5)
Has anyone in the family contacted COVID-19 family cases	Yes	178 (57.4)
	No	132 (42.6)
Smoke cigarettes	Yes	224 (72.3)
	No	86 (27.7)
Exposed to any environmental pollutants	Yes	148 (47.8)
	No	162 (52.2)
Pollutants (n = 148)	Straw/wood/coal smoke	13 (8.8)
	Smoke factories	23 (15.5)
	Vehicle exhaust	57 (38.5)
	Others	55 (37.2)

Note. COVID-19 = coronavirus disease.

Discussion

Vaccination has significantly decreased the burden of infectious diseases (Lee et al., 2018). Its role in disease control, elimination, or eradication has been recognized, and its benefits extend beyond the prevention of particular diseases in individuals. A high degree of vaccination coverage is needed to meet the global vaccine requirements (Maraqa et al., 2021).

This study found that the percentage of the participants who had fever after the second dose of COVID-19 vaccination increased more than post the first dose, with temperature ranging from 38.5 to 40°C. Also, the percentage of the participants was increased after the second dose comparing to the first dose according to symptoms at the injection site as pain and itching. This study also found that exhaustion or

Table 3. Kind of coronavirus disease (COVID-19) Vaccine Received by the Participants (n = 310).

Kind of vaccine	n (%)
Moderna	37 (11.9)
Sputnik	53 (17.1)
AstraZeneca	42 (13.5)
Pfizer	52 (16.8)
Sinopharm	126 (40.6)

Table 4. Health Consequences of the Participants Post the First and Second Doses of Vaccination (n = 310).

Health consequences		First dose n (%)	Second dose n (%)	χ^2	P-value			
Fever	Yes	101 (32.6)	134 (43.2)	14.3	.001**			
	No	209 (67.4)	176 (56.8)					
Temperature measurement	37.5–38.3°C	125 (40.3)	119 (38.5)	47.9	.899			
	38.5–4°C	106 (34.1)	150 (48.4)					
	>4°C	35 (11.3)	85 (27.4)					
Symptoms at (the injection site)	Pain	97 (31.3)	110 (35.5)	18.3	.001**			
	Redness	27 (8.7)	35 (11.3)					
	Swelling	45 (14.5)	56 (18.1)					
	Itching	50 (16.1)	94 (30.3)					
	Nothing	39 (12.6)	67 (21.6)					
Exposure to physical symptoms	None	135 (43.5)	113 (36.5)	31.5	.001**			
	Chills	116 (37.4)	138 (44.5)					
	Headache	122 (39.4)	100 (32.3)					
	Joint pain	97 (31.3)	112 (36.1)					
	Pain in the muscles or the body	121 (39)	143 (46.1)					
	Exhaustion or fatigue	152 (49.0)	180 (58.1)					
	Emesis (nausea)	114 (36.8)	123 (39.7)					
	Vomiting	70 (22.6)	74 (23.9)					
	Diarrhea	53 (17.1)	60 (19.4)					
	Abdominal pain	110 (35.5)	122 (39.4)					
	Rash on different parts of the body	27 (8.7)	35 (11.3)					
	Others	17 (5.5)	13 (4.2)					
	Health complications	Thyroid problems	4 (1.9%)			5 (2.3)	15.1	.056
		Health problems in the kidney	18 (8.3%)			24 (11.1)		
		Health problems in the liver	5 (2.3%)			7 (3.2)		
Cardiovascular problems		18 (8.3%)	22 (10.2)					
Thrombophlebitis		12 (5.6%)	19 (8.8)					
Digestive health problems		36 (16.7%)	41 (19.0)					
Diabetic problems		25 (11.6%)	33 (15.3)					
High blood pressure		21 (9.7%)	28 (13.0)					
Respiratory problems		63 (29.2%)	84 (38.9)					

*P-value is significant at the .05 level.

**P-value is significant at the .001 level.

fatigue and pain in the muscles or the body were most increased exposure to physical symptoms among participants. The results also showed that the respiratory and gastrointestinal system were most affected post the first and second doses of the vaccine. These findings agree with Polack et al. (2020) who found that symptoms, including fever, headache and fatigue were the most common ones complained after the first dose, and injection-site pain. However, less than one third of users complained of injection site pain and less than a quarter of them suffered from fatigue and headache after the first dose. Symptoms were significantly more prevalent in women than in men. On the other hand, a study was carried out by Xia et al. (2020) stated that systemic symptoms in injection site reactions appear within 7 days after each injection. The most common adverse reaction was pain at the injection site, which varied in severity and was relieved without the need for special treatment. Furthermore, during the first 8 to 28 days after injection, the subjects experienced serious adverse events that occurred during follow-up. In

addition, a woman had severe emesis after receiving the second dose, which resulted in emergency visits; however, she was relieved after receiving appropriate medication.

Regarding the health consequences, the current study showed more than half of the studied employees suffered from health consequences; some of them had high blood pressure and diabetic problems. After the first and second doses, less than a quarter of the employees in the study experienced digestive issues. Also, some of them had cardiovascular, kidney, liver, and thyroid problems post the second dose of vaccination. This result is highly supported by Wise (2021), whose study found that people who have chronic diseases and suffer from health problems post-vaccination had many stressors such as difficulty breathing, respiratory problems, frequent feelings of tiredness, nausea, and abdominal pain, hypertension, and diabetes.

These diseases will lead to frequent hospitalization, multiple invasive problems, and feelings of anxiety. In addition, the light of (Lopez-Leon, 2021) includes the participants

having experienced chronic diseases that lead to frequent hospitalization and feelings of anxiety. Menni et al. (2020) mentioned that people with chronic diseases perceive more stress, which leads to an increased risk for cardiovascular diseases. In addition, a study was done by Malik et al. (2020) who found that people suffering from chronic diseases and being treated for COVID-19 reported less satisfaction with their health, more physical discomfort, more activity limitation, and social isolation. These people commonly need to use medication for life, which increases their own feelings of stress related to the continuity of the medications and the possible occurrence of the side effects of vaccination with its health consequences. From the researcher's point of view, proper vaccination coverage could help in reducing the infection and subsequent mortality rates due to COVID-19, which may cause some health problems for some people at some times.

This study also found that there was significant difference in fever, symptoms at (the injection site), and exposure to physical symptoms between participants post the first dose and second doses of COVID19 vaccine. These results were supported by Ossato et al. (2021) who found that 46.76% (136) of the participants experienced some side-effects after the first dose of vaccine and 63.23% (184) experienced some side-effects after the second dose.

Nurses are responsible for supervising all aspects of the vaccination procedure following administration. They are responsible for post-vaccination monitoring, which includes identifying and treating any physical or emotional reactions to immunizations. This can also include giving medical care to individuals with underlying medical issues, compiling vaccination data, and maintaining patient records (Catton, 2021).

Strengths and Limitations

It seems to be the first study in Palestine to assess the health consequences of university employees' post-COVID-19 vaccination at Palestinian universities. Also, it was a multicenter study. One limitation of the study was the self-reported questionnaire. The participants document their claimed symptoms, which are subjective and may involve recall bias.

Implications for Practice

Based on the results of the study, the following points are recommended: More community-based studies on vaccination safety are urgently needed to better understand the potential risk factors for vaccine side effects, boost public trust in vaccines, and accelerate their uptake. There is a need to monitor additional reports on vaccines' short-term and long-term side effects.

Conclusion

In the light of this study finding, the study reported that main symptoms post-COVID-19 vaccination at the injection site

were pain and itching. Also, the study confirmed that the main health consequences were respiratory and digestive health problems post the first and second doses of COVID-19 vaccination. Fever, symptoms at (the injection site), and exposure to physical symptoms were significant differences between the first dose and second doses of the vaccine. In addition, this study indicated that the main symptoms were exhaustion or fatigue and headache post the first dose and exhaustion or fatigue and pain in their muscles post the second dose.

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