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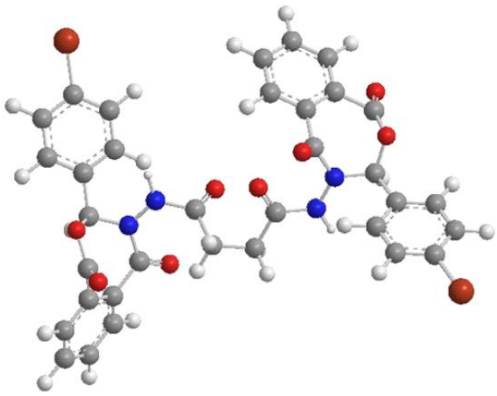

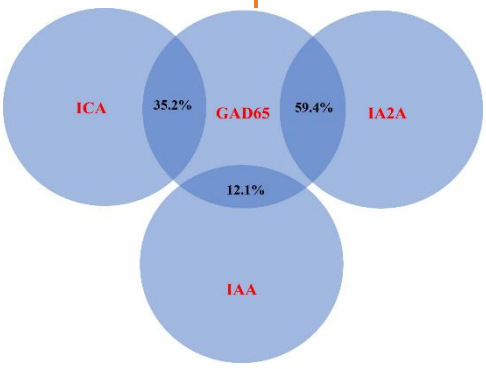

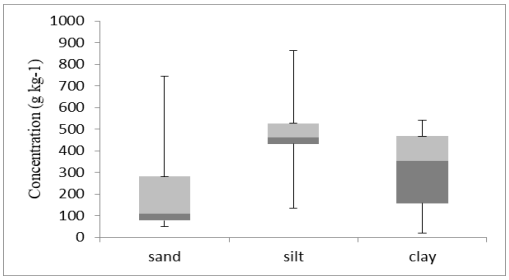

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Assessment of Side Effects of COVID-19 Vaccine Among General Population attending Kalar COVID-19 Vaccine Centers, Sulaimaniyah, Iraq

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Abstract

Background: The SARS-CoV-2 virus is an extraordinary virus that has become a severe public health problem; the symptoms that usually end in mortality include fever, dry cough, tiredness, shortness of breath, chills and etc. **Objectives:** This study examines the potential relationship between sociodemographic factors and the side effects of COVID-19 vaccination. **Patients and methods:** A total of 511 participants were included in this study and were distributed according to their sociodemographic characteristics, including gender, age, marital status, education level, and occupation. Data on vaccination side effects were collected at 24 hours, 72 hours, and one week after vaccination. Statistical analysis was performed to identify significant associations between sociodemographic factors and vaccination side effects. **Results:** most patients were aged between (40-65 years), females, married, housewives, illiterate, and lived in an urban area. The study's findings revealed insufficient awareness in >50% of patients. A highly significant correlation between awareness and the level of education has been founded and also a significant association with age, gender, and profession was found. At the same time, marital status and residency didn't affect the awareness. **Conclusions:** This study highlights the importance of considering sociodemographic factors in assessing COVID-19 vaccine side effects. The findings show that occupation and gender may significantly predict vaccine side effects and should be considered when evaluating vaccine safety and efficacy.

Introduction

The emergence of the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) virus, also known as COVID-19, prompted the World Health Organization (WHO) to declare the disease a public health emergency in late January 2020 [**1**]. The SARS-CoV-2 virus is primarily responsible for global COVID-19 outbreaks. It is an extraordinarily infectious virus that has become a severe public health problem [**2**]. The symptoms that usually end in mortality include fever, dry cough, tiredness, shortness of breath, chills, muscle soreness, headache, gastrointestinal difficulties, and weight loss[**3**]. COVID-19 vaccines' efficacy and safety, which are essential for the success and eradication of this virus, may rely on how they are created and function [**4**,**5**]. The viral vector (mRNA) vaccine for SARS-CoV-2 encodes the full-length S protein ectodomains containing T and B cell epitopes that can stimulate cellular and humoral immune responses against viral infection [**6**]. The development of COVID-19 vaccines results from the collaboration of many

scientists and researchers worldwide. The idea of using vaccines to prevent COVID-19 was first proposed by researchers and scientists in various institutions, including the University of Oxford and the National Institutes of Health (NIH) in the United States. The team at the University of Oxford was led by Professor Sarah Gilbert, who had previously worked on developing vaccines for other diseases [**7**,**8**]. In January 2020, when the genetic sequence of the novel coronavirus was made available, scientists and researchers worldwide began working on developing a vaccine. The first vaccine to receive emergency use authorization was the Pfizer-BioNTech vaccine, developed by scientists at Pfizer, BioNTech, and the University of Pennsylvania [**9**].

Protein subunit vaccines contain harmless pieces of the SARS-CoV-2 virus that can prompt an immune response. The Novavax vaccine is an example of a protein subunit vaccine [**10**]. The Pfizer-BioNTech vaccine and the Moderna vaccine are both mRNA vaccines, which use a small piece of genetic material called messenger RNA (mRNA) to teach cells how to make a protein that triggers an immune response [**11**]. The AstraZeneca vaccine and the Johnson & Johnson vaccine are viral vector vaccines, which use a harmless virus to deliver a piece of genetic material from the SARS-CoV-2 virus into cells, prompting an immune response [**12**]. The Novavax vaccine is a protein subunit vaccine containing harmless fragments of the SARS-CoV-2 virus that can produce an immune response. Finally, the Sinovac vaccine and the Bharat Biotech vaccine (also known as Covaxin) are inactivated virus vaccines containing a dead or inactivated version of the SARS-CoV-2 virus, prompting an immune response without causing illness [**10**]. This study also aims to assess the toxicity, safety, and side effects of COVID-19 vaccinations in the Iraqi Kurdistan province of Kalar.

Materials and Methods

Study design and setting

A quantitative-descriptive cross-sectional design was conducted on participants who performed a COVID-19 vaccine that is attending the COVID-19 vaccine centre in Kalar district from May 2022 to February 2023.

Ethical consideration

This study proposal was revised, corrected, and accepted by the Scientific Committee at the College of Nursing and Ethics Committee at the College of Medicine, University of Sulaimani, Sulaymaniyah, Iraq. (NO:47)

Participant consent

To ensure that participants' consent was fully informed and voluntary, written and verbal methods were utilized before starting the data collection process. All parts of the study were correctly explained to the participants. Additionally, patients were free to leave the study at any time they desired, while the participant **(s')** data was kept confidential.

Study sample

A non-probability convenience sampling technique included (511) participants with established COVID-19 vaccines.

Inclusion criteria

Participants who receive either single or double doses of the COVID-19 vaccine.

Exclusion criteria

All participants refused to participate or those not vaccinated against COVID-19.

Study instrumentation

To achieve the study's objectives, the researcher developed a questionnaire through an extensive review of the international literature and guidelines. The questionnaire was divided into three parts. The first part included demographic data, such as gender, age, marital status, level of education and occupation. In contrast, the second part dealt with participants' medical history having any chronic disease, autoimmune disease, food and medication allergy, COVID-19 previous infection, type and dose of COVID-9 vaccines, side effects, onset and duration of COVID-19 vaccines, visit physician and hospitalization. Wheras third part consists of 11 items to identify the COVID-19 vaccine side effects such as the site of injection, bone and muscle pain, blurred vision, flu-like symptoms, allergic reaction, and lymph node enlargement. GI, cardiological, urological, psychological, and neurological symptoms.

Statistical analysis

The obtained data were analyzed through the Social Package of Social Science (SPSS, version 22.0). Descriptive statistics, frequency, percentage, mean and standard deviation were performed to find the participant's demographic characteristics profile. Inferential statistics (fisher-exact test) were used to correlate the overall side effects of COVID-19 vaccine patients. The P-value is considered significant at the level of ≤ 0.05.

Rating and scoring

Scoring scales of two categories for level awareness, such that (know, and don't know) respond with integer numbers (1 and 0). Reassessment scoring scales for scale dichotomous random variable and scoring scales according to the following intervals were implemented:

L (Low) 0.00 – 33.33; M (Moderate) 33.33 – 66.66; H (High) 66.66 – 100

Results

Around 268 patients are between 33 and 52 years old, while 43% (no.=223) patients are between 12 and 32 years old, and only 20 patients are over 53 years old. In terms of gender, the majority are females (no.=321) and 190 patients are male. Additionally, 69.5% of patients are married, 29.5% are single, and only 1% are widows. Also, 135 patients got a primary degree, while 117 patients got a university degree, and the rest were distributed between secondary, diploma and Illiterate patients. Finally, 191 patients are employed, and 131 are self-employed, whether the rest are either jobless or housewives (Table 1).

Table 2 shows the distribution of the medical history of COVID-19 vaccinated patients. According to the result, the majority of the patients, about 85.7%, didn't have any medication conditions. However, 14.3% of the patients did have medical conditions. Around 4.7& had hypertension illness, and 4.1% got people with diabetes, while the rest suffered from other ailments, including cancer, Multiple chronic diseases and respiratory and cardiovascular diseases. Also, 95.7% of the patients didn't have any autoimmune disease. 4.3% of the patients got the autoimmune disease and the rest suffered from type 1 diabetes, Rheumatoid arthritis, Inflammatory bowel disease, graves' disease and Pernicious anemia.

Additionally, about 93.5% of the patients didn't have allergies to medications or food, while 6.5% got allergies to drugs and food. Moreover, 95.7% disagreed with the possibility of taking the influenza vaccine, and only 4.3% agreed they would take it. 398 patients weren't smokers and only 113 patients were smokers.

Table 1: Distribution of the patient's according to sociodemographic characteristics.

Sociodemographic characteristics		Frequency F	Percentage %
Age	12-32 years	223	43.7
	33-52 years	268	52.4
	>53 years	20	3.9
Mean± SD 36.9 ± 13.9			
Gender	Male	190	37.2
	Female	321	62.8
Marital status	Single	151	29.5
	Married	355	69.5
	Widowed	5	1.0
Level Education	Illiterate	60	11.7
	Primary	135	26.4
	Secondary	85	16.6
	Diploma graduate	81	15.9
	University graduate	117	22.9
	Informal education	33	6.5
Occupation	Employed	191	37.4
	Self-employed	131	25.6
	Housewife	82	16.0
	Jobless	73	14.3
	Other	34	6.7
Total		**511**	**100**

Additionally, according to the result, 50.3% of the patients were infected by COVID-19 before taking the vaccine, while 49.7% didn't get infected with COVID-19. 99.4% of the patients took Pfizer and BioNTech vaccines, and only 0.6% took AstraZeneca/Oxford vaccine. Also, 78.7% of those vaccinated got side effects after vaccination, and 21.3% didn't get any side effects. Around 1.2% of the patients visited a physician after the side effect appearance. Finally, about 0.2% of the patients had to go to the hospital due to side effects.

Table 2: Distribution of medical history of patient COVID-19 vaccine patients of the study sample.

Variable		Frequency F	Percentage %
-Do you have any medical condition	Yes	73	14.3
	No	438	85.7
	If yes		
	Hypertension	24	4.7
	Diabetic	21	4.1
	Cardiovascular disease	7	1.4
	Respiratory disease	4	0.8
	Cancer	7	1.4
	Multiple chronic diseases	10	2.0

-Do you have any autoimmune diseases?	Yes	22	4.3
	No	489	95.7
	If yes		
	-Type 1 diabetes mellitus	1	0.2
	-Rheumatoid arthritis	6	1.2
	-Inflammatory bowel disease	1	0.2
	-Graves' disease	3	0.6
	-Pernicious anemia	11	2.2
- Do you have any allergies to medication or food?	Yes	33	6.5
	No	478	93.5
-Have you had or are you going to have the influenza vaccine?	Yes	22	4.3
	No	489	95.7
-Are you a smoker?	Yes	113	22.1
	No	398	77.9
-Have you been infected with COVID-19 before vaccination?	Yes	257	50.3
	No	254	49.7
-Which type of COVID-19 vaccines have you received?	AstraZeneca/Oxford	3	0.6
	PfizerBioNTech	508	99.4
Dose vaccine	First dose	229	44.8
	Second dose	255	49.9
	Third dose	23	4.5
	More	4	0.8
Side effect	Yes	402	78.7
	No	109	21.3
The onset of symptoms:	Immediately	48	9.4
	After 24 hours	354	69.3
	After 72 hours	0	0
Duration of the side effects?	From 1-2	339	66.3
	From 3 to 5	52	10.2
	More than 5	11	2.2
Taking medication to mitigate side effects	Nothing	227	44.4
	Took a rest/slept	102	20.0
	Took pain killer	60	11.7
	Consulted physician	2	0.4
	Traditional treatment	11	2.2
-Visiting a physician due to side effects	Yes	6	1.2
	No	396	77.5
-Hospitalization due to side effects	Yes	1	0.2
	No	401	78.5
Total		**511**	**100**

The distribution of side effects of COVID-19 vaccine patients of the study sample is shown in Table 3. According to the result, 94.5% of the patients suffered side effects at the injection site after 24 hours, and 82.5% got pain at the injection site during the first 24 hours. However, 78.1% of the patients didn't have side effects after 72 hours, and the side effect got reduced by 99% after one week of injection. Furthermore, 39.1% got bone and muscle pain in the first 24 hours after injection, and the ratio reduced to 2.7% after a week from vaccination. However, the majority, about 41.3% of the patients, got flu symptoms, and around

58.7% of the patients didn't get the flu symptoms, and the rate was reduced to 97.3% after a week of injection.

Additionally,84.3% of the vaccinated samples didn't get GI side effects, while only 15.7% got GI side effects, and the rate is reduced over time. The result also shows that 86.1% got no Psychological SE, while only 13.9% got a Psychological SE, including Sleep disturbance. Moreover, the study findings show that there weren't any Lymph node enlargement and swelling side effects after vaccination. In terms of allergies, only 0.5% got allergies after 24 hours of vaccination and around 1.2% of the patients got Urological side effects. After vaccination, there were Blurred vision side effects, around 0.2% of the sample size and 0.6% got Cardiac side effects after 24 hours of injection, and only 2.7% got a Neurological SE after vaccination.

Table 3: Distribution of side effects of COVID-19 vaccine patients of the study sample.

Variable		After 24 hrs.		After 72 hrs.		After one week	
		F	%	F	%	F	%
Injection site	Yes	380	94	88	21.9	4	1.0
	No	22	6.0	314	78.1	388	99.0
	If yes						
	Pain	333	82.3	77	19.2	4	1.0
	Redness	1	0.2	0	0	0	0
	Swelling	2	0.6	0	0	0	0
	Multiple symptoms	44	16.9	11	2.7	0	0
Bone and muscle pain	Yes	157	39.1	84	20.9	11	2.7
	No	245	60.9	318	79.1	391	97.3
Flu symptoms	Yes	166	41.3	93	23.1	14	3.5
	No	236	58.7	309	76.9	388	96.5
	If yes						
	Fever	28	7.0	6	1.5	2	0.5
	Headache	11	2.7	15	3.7	3	0.7
	Chills	1	0.2	10	2.5	0	0
	Fatigue	16	4.0	1	0.2	2	0.5
	Cough	1	0.2	0	0	7	1.8
	Multiple symptoms	109	27.2	61	15.2	0	0
GI side effect	Yes	63	15.7	30	7.5	2	0.5
	No	339	84.3	372	92.5	400	99.5
	If yes						
	Nausea	1	0.2	1	0.2	0	0
	Diarrhoea	2	0.5	2	0.5	0	0
	Loss of appetite	50	12.4	19	4.7	2	0.5
	Abdominal pain	3	0.7	8	2.0	0	0
	Multiple symptoms	7	1.7	0	0	0	0
Psychological SE	Yes	56	13.9	15	3.7	1	0.2
	No	346	86.1	387	96.3	401	99.8
	If yes						
	Sleep disturbance	56	13.9	15	3.7	1	0.2
Lymph node enlargement and swelling:	Yes	0	0	0	0	0	0
	No	402	100	402	100	402	100
Allergic reaction:	Yes	2	0.5	0	0	0	0
	No	400	99.5	402	100	402	100
	If yes						
	Skin itching	2	0.5	0	0	0	0

Urological side effects:	Yes	5	1.2	4	1.0	2	0.5
	No	397	98.8	398	99.0	400	99.5
	If yes						
	Increase urination	3	0.7	1	0.2	0	0
	Change urine colour	2	0.5	3	0.7	2	0.5
Blurred vision:	Yes	1	0.2	4	1.0	0	0
	No	401	99.8	398	99.0	402	100
Cardiac side effect	Yes	3	0.6	3	0.6	0	0
	No	399	99.4	399	99.4	402	100
	If yes						
	Shortness of breath	1	0.2	1	0.2	0	0
	Palpitation	1	0.2	1	0.2	0	0
	Chest pain	1	0.2	1	0.2	0	0
Neurological SE	Yes	11	2.7	4	1.0	0	0
	No	391	97.3	398	99.0	402	100
	If yes						
	Dizziness	11	2.7	4	1.0	0	0
Total		402 (100)					

Table 4 depicts the severity of the side effects of COVID-19 vaccination patients in the study population. The study found a high-intensity side effect after 24 hours of vaccination and moderate bone and muscular discomfort after 24 hours after vaccine injection. The results also show mild flu symptoms after the first 24 hours following vaccination. In addition, the findings indicate a common GI side effect, a low Psychological SE, and other impacts.

Table 4: Distribution of severe side effects of COVID-19 vaccine patients of the study sample.

Variable	After 24 hrs.		After 72 hrs.		After one week		Level of severe side effects
	F (%)	Mean of Score	F (%)	Mean of score	F (%)	Mean of score	
Injection site Yes No	 380 (94.5) 22 (5.5)	 0.94	 88 (21.9) 314(78.1)	 0.21	 4 (1.0) 398 (99.0)	 0.01	High (after 24 hrs.) Low effect
Bone and muscle pain Yes No	 157 (39.1) 245 (60.9)	 0.39	 84 (20.9) 318 (79.1)	 0.20	 11 (2.7) 391 (97.3)	 0.02	Moderate (after 24hrs.) Low Effect
Flu symptoms Yes No	 166 (41.3) 236(58.7)	 0.41	 93 (23.1) 309(76.9)	 0.23	 14 (3.5) 388(96.5)	 0.03	Moderate (after 24hrs.) Low Effect
GI side effect Yes No	 63 (15.7) 339(84.3)	 0.15	 30 (7.5) 372(92.5)	 0.07	 2 (0.5) 400(99.5)	 0.00	Low Effect
Psychological SE Yes No	 56 (13.9) 346(86.1)	 0.13	 15 (3.7) 387(96.3)	 0.03	 1 (0.2) 401 (99.8)	 0.00	Low Effect
Lymph node enlargement and swelling: Yes No	 0 (0) 402 (100)	 0.00	 0 (0) 402 (100)	 0.00	 0 (0) 402 (100)	 0.00	 Low Effect

Allergic reaction: Yes No	2 (0.5) 400 (99.5)	0.00	0 (0) 402 (100)	0.00	2 (0.5) 400 (99.5)	0.00	Low Effect
Urological side effects: Yes No	5 (0.5) 397(99.5)	0.00	4 (1.0) 398 (99.0)	0.00	0 (0) 402 (100)	0.00	Low Effect
Blurred vision: Yes No	1 (0.2) 401 (99.8)	0.00	4 (1.0) 398 (99.0)	0.00	0 (0) 402 (100)	0.00	Low Effect
Cardiac side effect Yes No	3 (0.6) 399 (99.4)	0.00	3 (0.6) 399 (99.4)	0.00	0 (0) 402 (100)	0.00	Low Effect
Neurological SE Yes No	11 (2.7) 391(97.3)	0.02	4 (1.0) 498 (99.0)	0.00	0 (0) 402 (100)	0.00	Low Effect
Total	402 (100)						

The overall side effects of COVID-19 vaccination are shown in Table 5, indicating that 97.3% of the patients got a mild side effect, while 2.2% got a moderate side effect. Only 0.5% didn't get a side effect within the first 24 hours after the vaccination. The result shows that 99.8% earned a mild side effect after one week of vaccination.

Table 5: Overall side effects of COVID-19 vaccine patients of the study sample.

Overall side effect	N= 402						Pearson correlation P-value
	After 24hrs.		After 72 hrs.		After one week		
	F	%	F	%	F	%	
Mild	391	97.3	398	99.2	401	99.8	<0.001 Highly Significant
Moderate	9	2.2	1	0.2	1	0.2	
Sever	2	0.5	3	0.6	0	0	

The result of this study found a significant correlation between the total mean side effects of COVID-19 vaccinated patients ($p<0.001$) and various timelines (Table 6).

Table 6: Correlation between the mean side effects of COVID-19 vaccine patients of the study sample.

Variables	N	Mean ±SD Total	Pearson Correlation P- Value
After 24 hrs.	402	2.09± 1.67	<0.001 Highly Significant
After 72 hrs.	402	0.80± 1.63	
After 1 Week	402	0.08± 0.51	

Table 7 summarizes a link between sociodemographic factors and overall adverse effects in COVID-19 immunization patients 24 hours after vaccination. There was no link found between age, gender, marital

status, or education level and COVID-19 vaccination side effects, according to the research. Despite this, a substantial relationship existed between occupation and vaccination side effects after 24 hours.

Table 7: Association between sociodemographic characteristics and overall side effects of COVID-19 vaccine patients after 24 hrs.

Variables	N=402						Total	
	Mild		Moderate		Sever			
	F	%	F	%	F	%	F	%
Age								
12-32 years	162	97.0	3	1.8	2	1.2	167	41.5
33-52 years	213	97.7	5	2.3	0	0	218	54.3
>53 years	16	94.1	1	5.9	0	0	17	4.2
P. value 0.283	Not Significant					FET= 4953		
Gender								
Male	161	95.8	5	3.0	2	1.2	168	41.8
Female	230	98.3	4	1.7	0	0	234	58.2
P. value 0.188	Not Significant					x2= 3.547		
Marital Status								
Single	121	96.8	2	1.6	2	1.6	125	31.1
Married	266	97.4	7	2.6	0	0	273	67.9
Widowed	4	100	0	0	0	0	4	1.0
P. value 0.220	Not Significant					FET= 6.826		
Education level								
Illiterate	52	100	0	0	0	0	52	12.9
Primary	94	96.9	2	2.1	1	1.0	97	24.1
Secondary	67	95.7	2	2.9	1	1.4	70	17.4
Diploma graduate	64	97.0	2	3.0	0	0	66	16.4
University graduate	90	97.8	2	2.2	0	0	92	22.9
Informal education	24	96.0	1	4.0	0	0	25	6.2
P. value 0.886	Not Significant					FET= 6.036		
Occupation								
Employed	149	98.0	3	2.0	0	0	152	37.8
Self-employed	86	95.6	4	4.4	0	0	90	22.4
Housewife	73	98.6	1	1.4	0	0	74	18.4
Jobless	59	98.3	1	1.7	0	0	60	14.9
Other	24	92.3	0	0	2	7.7	26	6.5
P. value 0.003	Significant					FET=31.980		

FET= Fisher-exact-test x2 = Chi-square DF = degrees of freedom

Table 8 shows a link between sociodemographic characteristics and overall side effects in COVID-19-vaccinated patients 72 hours after vaccination. The findings showed no link between age, marital status, or education level and COVID-19 vaccine adverse effects. Nonetheless, there was a significant correlation between gender and occupation regarding vaccination side effects after 72 hours.

Table 8: Association between sociodemographic characteristics and overall side effects of COVID-19 vaccine patients after 72 hrs.

Variables	N=402						Total	
	Mild		Moderate		Sever			
	F	%	F	%	F	%	F	%
Age								
12-32 years	164	98.2	0	0	3	1.8	167	41.5
33-52 years	217	99.5	1	0.5	0	0	218	54.3
>53 years	17	100	0	0	0	0	17	4.2
P. value 0.227	Not Significant			FET= 10.919				
Gender								
Male	164	97.6	1	0.6	3	1.8	168	41.8
Female	234	100	0	0	0	0	234	58.2
P. value 0.030	Significant			x2= 5.627				
Marital Status								
Single	122	97.6	0	0	3	2.4	125	31.1
Married	272	99.6	1	0.4	0	0	273	67.9
Widowed	4	100	0	0	0	0	4	1.0
P. value 0.069	Not Significant			FET=10.603				
Education level								
Illiterate	52	100	0	0	0	0	52	12.9
Primary	96	99.0	0	0	1	1.0	97	24.1
Secondary	69	98.6	0	0	1	1.4	70	17.4
Diploma graduate	65	98.5	1	1.5	0	0	66	16.4
University graduate	91	98.9	0	0	1	1.1	92	22.9
Informal education	25	100	0	0	0	0	25	6.2
P. value 0.907	Not Significant			FET=8.015				
Occupation								
Employed	151	99.3	1	0.7	0	0	152	37.8
Self-employed	90	100	0	0	0	0	90	22.4
Housewife	74	100	0	0	0	0	74	18.4
Jobless	59	98.3	0	0	1	1.7	60	14.9
Other	24	92.3	0	0	2	7.7	26	6.5
P. value 0.010	Significant			FET=13.101				

FET= Fisher-exact-test x2 = Chi-square

The analysis results demonstrate an association between sociodemographic variables and overall side effects in COVID-19 vaccination patients after one week (Table 9). According to the results, individuals over 33 had mild side effects after one week of vaccination and no moderate side effects. Only 0.65 of those under 33 had moderate side effects after one week of injection. Also, according to the Fisher exact test, there was a significant connection between occupation and COVID-19 vaccine side effects.

Table 9: Association between sociodemographic characteristics and overall side effects of COVID-19 vaccine patients after one week.

Variables	N=402				Total	
	Mild		Moderate			
	F	%	F	%	F	%
Age						
12-32 years	166	99.4	1	0.6	167	41.5
33-52 years	218	100	0	0	218	54.3
>53 years	10	100	0	0	17	4.2
P. value 0.458	Not Significant		x2= 1.411			
Gender						
Male	167	99.4	1	0.6	168	41.8
Female	234	100	0	0	234	58.2
P. value 0.418	Not Significant		x2= 1.396			
Marital Status						
Single	124	99.2	1	0.8	125	31.3
Married	273	100	0	0	273	67.9
Widowed	4	100	0	0	4	1.0
P. value 0.321	Not Significant		x2= 2.222			
Education level						
Illiterate	52	100	0	0	52	12.9
Primary	96	99.0	1	1.0	97	24.1
Secondary	70	100	0	0	70	17.4
Diploma graduate	66	100	0	0	66	16.4
University graduate	92	100	0	0	92	22.9
Informal education	25	100	0	0	25	6.2
P. value 1.000	Not Significant		FET=4.940			
Occupation						
Employed	152	100	0	0	152	37.8
Self-employed	90	100	0	0	90	22.4
Housewife	74	100	0	0	74	18.4
Jobless	60	100	0	0	60	14.9
Other	25	96.2	1	3.8	26	6.2
P. value 0.006	Significant		x2 =14.498			

FET= Fisher-exact-test x2 = Chi-square

Discussion

This study investigated the impact of sociodemographic factors on COVID-19 vaccine side effects, contributing to the existing body of research. While previous studies, such as Polack et al. (2020) and Voysey et al. (2021), have reported that side effects from Pfizer-BioNTech and Oxford-AstraZeneca vaccines were generally mild and not significantly influenced by age, sex, race, or coexisting medical conditions, other studies have found contrasting results **[14,15]**. For example, Jabal et al. (2021) discovered that women were more likely to report side effects than men, and younger age was associated with a higher risk of side effects **[16]**. In addition, Blumenthal et al. (2021) found that people with a COVID-19 infection were more likely to experience side effects, albeit mild and short-lived **[17]**. It is crucial to consider these diverse findings to develop a comprehensive understanding of COVID-19 vaccine safety and efficacy and to design effective and equitable vaccination campaigns.

This study's results reveal significant associations between sociodemographic factors and side effects at different time points following vaccination. Occupation and gender were notably correlated with side effects 72 hours post-vaccination. Additionally, work was linked to side effects 24 hours after vaccination. While most participants experienced mild side effects within the first week of vaccination, this study highlights the importance of examining sociodemographic factors in understanding the potential risks and benefits of COVID-19 vaccines.

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Conclusions

According to the study's findings, sociodemographic factors may play an essential role in predicting the side effects of COVID-19 vaccination. For example, the study discovered significant correlations between occupation, gender, and vaccination side effects at different time points after immunization. This information has important implications for public health officials and healthcare providers, who should consider these factors when assessing the vaccine's safety and efficacy.

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Conflict of interest

The authors confirm that they are not affiliated with or involved in any organization or entity with financial interests.

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