Effect of Taking COVID 19 Vaccine On Nurses' Fear from Infection and Their Adherence to Preventive Measures

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Abstracts: High level of nurses' fear of getting infected with COVID–19 leads to increase distress, lower job satisfaction, decreased health perceptions, and increased turnover intention. This study aims to compare the follow of standard precautionary measures and level of fear of Saudi nurses in dialysis units from acquired COVID-19 infection, before and after patients vaccination. Methods: descriptive cross-sectional study was used. Thirty-three Saudi nurses from dialysis units in Sakaka city participated in our study. Study tools; demographic data, fear of COVID-19 Scale, and questioner about '5 moments of hand washing, and wearing PPE. Results: The study found before vaccination, 54.5% of nurses reported extreme fear of getting acquired COVID-19 infection while only 15.5% reported fear after vaccination. There was a negative relationship between fear from infection and educational level, before and after vaccination. Also, negative relation was found between level of fear and years of experience before vaccination while positive relation was noted after vaccination. Conclusions: after vaccination the nurses' fear level decreased but still within normal level. Both level of education and years of experience played a major role in nurses' fear levels, following hand hygiene, and wearing PPE.

Keywords: COVID-19, Vaccination, Hand Hygiene, PPE, FCV-19S.

1. INTRODUCTION

Fortunately, this study is the first of its kind which measured Saudi dialysis nurses' fears from exposure to acquired COVID-19 infection after patients' vaccinations in KSA. Many previous studies[1,2,3] measured nurses' fear from COVID-19 at the during the crisis while no study was compared nurses' fear before and after patients' vaccinations.

Coronaviruses are a family of 'RNA' viruses which can cause seasonal colds and severe lower respiratory tract infections after bronchitis and pneumonia.[4] Generally, viral respiratory tract infections caused four million deaths each year, about 40% from them are caused by different types of coronavirus.[5] In December 2019, a new type of coronavirus appear in Wuhan, a city in China. In February 2020, the World Health Organization named this virus COV-19.[6] Previously, the new virus which causes COV-19 is titled as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). This virus spreads in the population at a rate of 0.8- 3% more than normal influenza.[7] The first infected case with COVID-19 was confirmed on March 2020, In Saudi Arabia. It has been confirmed that, SARS-CoV-2 is a highly infectious virus that remains full of life even at temperatures below 0°C. The worldwide infection has affected over 40 million persons and over one million died.[8]

World Health Organization mentioned that safe and effective vaccine are essential to ending the coronavirus-19. Additionally, WHO is working hard to develop a safe and effective vaccine against covid-19. However, it is not only the vaccine that is the solution, but also we must be following and continuing to wear masks, washing our hands, safeguarding good ventilation, ensuring physical distance, and avoiding crowds. Because being vaccinated does not mean thatwe can throw caution to the storm and put ourselves and others at risk. Researches is still ongoing into how much vaccines protect against coronavirus and decrease its transmission.[9] Vaccine Alliance mentioned that there are 4 types of vaccines against COVID-19; whole virus, protein subunit, viral vector, and nucleic acid (RNA and DNA). These vaccines will protect people against the risk of COVID-19, but by producing immunity differently.[10] Vaccine Alliance reported also that now COVID-19 vaccines have reached billions of people globally, the evidence is confirming that no matter which type you take, the vaccines offer life-saving protection against the risk of the new coronavirus which has killed millions. The pandemic is far from over, and they are our best bet of

staying safe.[10] While, the Ministry of Health in Saudi Arabia has approved more than one type of COVID-19 vaccine. The acceptable vaccines used to immunize people in the KSA are Pfizer/BioNTech, AstraZeneca, and Moderna.[11]

According to the report of Ibrahim Al-Arifi, Director General of Health Affairs in the Eastern Province told that there is global competition over the available supplies of vaccines, and that is a big request for the Pfizer vaccine.[11] So we can confirm that Pfizer's vaccine is the most widely used in Saudi Arabia.

Nurses' fear of coronavirus-19 infection obstructs and delays health teamwork.[12] So that, it is vital for us to detect the COVID-19 associated psychological problems as 'fear' for providing appropriate interventions at an early stage to ensure the efficiency of patients' health care in health institutions.[13,14]

Reducing the nurses' fears from COVID-19 will move us forward toward a better and comfortable work environment for conducting better health service in the hospitals and all health agencies. Additionally, it is very important to link in the nurses' minds between avoiding getting infection and following standard precautionary measures. So our study also evaluates the continuance of nurses to follow precautionary measures for infection control.

The study aims to compare the follow of standard precautionary measures and level of fear of Saudi nurses from acquired COVID-19 infection, before and after patients vaccination.

2. MATERIEL AND METHODS

2.1. Research Design; A Descriptive Cross-Sectional Study.

2.2. Data Collection

In December 2021, the research purposely selected the Autumn Dialysis Unit in Prince Miteb Bin Abdul-Aziz Hospital in Sakaka city in Saudi Arabia. and Diaverum Dialysis Center in King Abdul-Aziz Specialist Hospital, to conduct this study. This choice is suitable for the study because the dialysis patients come for hemodialysis sessions from 3 to 4 days a week. So, the researcher can follow the nurses' and patients' vaccination status. Dialysis nurses were invited and encouraged for sharing in this study. After taking their agreement, the volunteer nurses were given the study questionnaire to fill out. The questionnaire consists of three sections;

The first section contains demographic data as; age, gender, level of education, marital status, years of experience, presence of chronic disease.

The second section measures the nurses' fear level of getting COVID-19 nosocomial infection. The researcher used fear of COVID-19 Scale (FCV-19S). The researchers adopted it from Ahorsu et al., 2020.[15] Evaluation of the level of agreement of 'FCV-19S' statements was done by using the Likert scale. Answers ranged from strongly disagree to strongly agree; "strongly disagree, disagree, neither agree nor disagree, agree and strongly agree". The lowest score possible for e;ach question is '1', and the highest is '5'. A total score is calculated by adding up each item score (ranging from 7 to 35). A high score means greater fear and a lower score means less fear.

The third section is a nurse self-evaluation about following the precautionary measures against infection which include; 5 moments of hand washing and wearing personal protective equipment. The questioner sheet took about 10 min to complete. All questioner sheet questions were obligatory. The data were coded and analyzed by researchers confidentially. We used score provides the sum of the row where each cell is multiplied by corresponding values assigned to the categories as; Always, Often, Sometimes, Rarely, Never, takes degrees (4,3,2,1,0 respectively). For measuring the total score of practical self-evaluation we used 5 points Likert scale for satisfaction; 'very unsatisfied, unsatisfied, neutral, satisfied, and very satisfied'. The lowest score possible for each question is '0', and the highest is '4'. Poor satisfaction (< 50% = 0-9) - Satisfactory (50 - < 70% =10-14) – Good satisfaction (>70% = 15-20).

2.3. Study Sample

Convenience sampling. Thirty-three nurses from the total forty were joined into this study while the rest were absent during data collection. The seven remaining nurses couldn't share in the study because they obtained official vocation during time of data collection.

2.4. Ethical Considerations

There is no risk of involvement in this study except for participant data confidentiality. So, the ethical approval not sought before the study. The researcher discussed aim the study with the directors of the Autumn Dialysis Unit and Diaverum Dialysis Center and obtained an oral consent before data collection. Participants are voluntarily joined. Kept data with no identity disclosure from participants and data secure and anonymous to ensure participants' privacy and confidentiality. Also, oral consents were obtained from volunteer nurses before their study participation.

2.5. Data Analysis

Initially, the studied variables were analyzed by using the descriptive method. Number, percentage, average, mean, and standard deviation were measured. The researcher examines the construct of the FCoV-19 scale by using; principal component analysis (PCA). Then measuring the Sampling Adequacy by using Kaiser–Meyer–Olkin Measure of (KMO) to determine the appropriateness of the data for factor analyses and was set to be more than 0.60.[16]

The data was analyzed using the IBM Statistical Package for Social Sciences (SPSS) version 25. The researchers used the English and the Arabic version of the FCV-19S and 5 moments hand hygiene to assess the severity of fear of COVID-19 and hand washing among dialysis nurses in the two selected hospitals, in Saudi Arabia. The total fear score will be calculated by summing all item scores which range between 7 and 35. If the scores 0-9 = No fear from getting infected with COVID-19, and 10 -19= Normal fear due to nature of the virus in spread rapidly COVID-19 (can be handled), 20-35= extreme fear. Associated with the nature of chronic failure disease which decreases the patients' immunity and increases their chance for infection and therefore transmits the infection to nurses.[12] A one-way ANOVA test was used to compare the distribution of fear COVID-19 scale scores. To analyze the relationship between the level of education, years of experience, and total scores of the fear scale. Also, to analyze the relationship between the level of education, years of experience, and following the precautionary measures. The Spearman Correlation test was used. The results were estimated with statistically significant differences at $p \leq 0.05$.

3. RESULTS

3.1. Demographic Data

Concerning COVID-19 vaccines, all nurses of the Autumn Dialysis Unit (24 nurses) in Prince Miteb Bin Abdul-Aziz Hospital in Sakaka city in Saudi Arabia. and all nurses of Diaverum Dialysis Center (16 nurses) in King Abdul-Aziz Specialist Hospital, Sakaka city received the two essential dosages against COVID-19. Regarding patients' vaccination, all patients in Diaverum Dialysis Center 113 patients received the two vaccines dosage and about 80% of them received one booster dosage. While in Autumn Dialysis Unit, the total patients' number was fifty-three, 52(98.1%) of them received two vaccines dosage and only 3(1.8%) received one booster dosage.

As regards the demographic data, the majority of them (97%) ranged from 20 to 40 years, (84.8%) are married, (60.6%) are male, (48.5%) held Bachelor degree of nursing while (45.5%) held Diploma degree of nursing, (51.5%) were Saudi nurse and the rest of them are non-Saudi, (97%) didn't have chronic diseases, (57.6%) work in Autumn Dialysis Unit while (42.4%) in Diaverum Dialysis Center, (54.5%) had more than 5 years' experience in the dialysis

unit, (33.3%) had experienced between 1-5 years, and (12.1%) had experienced less than one year.

3.2. Assessment of nurses' fear levels

Table 1. Assessment of nurses' fear from acquired COVID-19 infection, before and after patients' vaccination (N=33)

Items / (FCoV-19S)	Before Vaccination					After Vaccination					P-V
	(SD) N(%)	(D) N(%)	(N) N(%)	(A) N(%)	(SA) N(%)	(SD) N(%)	(D) N(%)	(N) N(%)	(A) N(%)	(SA) N(%)	
1- I am afraid from COVID-19 even after vaccination	4 (12.1)	7 (21.2)	3 (9.1)	11 (33.3)	8 (24.2)	7 (21.2)	10 (30.3)	3 (9.1)	10 (30.3)	3 (9.1)	.01*
2- Its uncomfortable to me to think about COVID-19 even after vaccination	8 (24.2)	6 (18.2)	4 (12.1)	10 (30.3)	5 (15.5)	6 (18.2)	17 (51.5)	3 (9.1)	5 (15.2)	2 (6.1)	.014*
3- When I think about COVID-19, my hands become clammy, even after vaccination	7 (21.2)	13 (39.4)	7 (21.2)	6 (18.2)	0 (0.0)	13 (39.4)	16 (48.5)	2 (6.1)	1 (3.0)	1 (3.0)	1.33
4- I am afraid from losing my life due to COVID-19 infection, even after vaccination	10 (30.3)	7 (21.2)	4 (12.1)	11 (33.3)	1 (3.0)	14 (42.4)	11 (33.3)	2 (6.1)	5 (15.5)	1 (3.0)	1.58
5- I become anxious, when hearing news or stories about COVID-19, even after vaccination	8 (24.2)	6 (18.2)	1 (3.0)	12 (36.4)	6 (18.2)	9 (27.3)	10 (30.3)	6 (18.2)	7 (21.2)	1 (3.0)	.02*
6- I cannot sleep because I'm afraid from getting COVID-19, even after vaccination	9 (27.3)	15 (45.5)	1 (3.0)	8 (24.2)	0 (0.0)	16 (48.5)	13 (39.4)	2 (6.1)	1 (3.0)	1 (3.0)	.268
7- When I think about the possibility of getting infection with COVID-19, my heart become palpitates, even after vaccination	10 (30.3)	12 (36.4)	2 (6.1)	9 (27.3)	0 (0.0)	12 (36.4)	17 (51.5)	2 (6.1)	1 (3.0)	1 (3.0)	.05*

*= Significant differences FCoV-19S = Fear of COVID-19 Scale

SD=strongly disagree, D=disagree, N=neither agree nor disagree, A=agree, SA=strongly agree

Table (1) shows the nurses' fear from acquired COVID-19 infection before and after vaccination. The nurses 'fear decreased after patients' vaccination with statistically significant differences in statement number 1,2,3,5 p-value ≤0.05.

3.3. Assessment of Nurses' Performance of Hand Hygiene and Wearing Ppe

Table 2. Nurses' self-evaluation about their performance of hand hygiene, before and after patients' vaccination (N=33)

Items / 5 moments of hand hygiene	Degree of frequency (% of responses) Before Vaccination					Degree of frequency (% of responses) After Vaccination					P-V
	(A) N (%)	(O) N (%)	(ST) N (%)	(R) N (%)	(N) N (%)	(A) N (%)	(O) N (%)	(ST) N (%)	(R) N (%)	(N) N (%)	
1- I do hand washing before touching the patient	26 (78.8)	5 (15.2)	1 (3.0)	0 (0.0)	1 (3.0)	30 (90.9)	3 (9.1)	0 (0.0)	0 (0.0)	0 (0.0)	.149

2- I do hand washing after touching the patient	28 (84.8)	4 (12.1)	0 (0.0)	0 (0.0)	1 (3.0)	31 (93.9)	2 (6.1)	0 (0.0)	0 (0.0)	0 (0.0)	.144
3- I do hand washing after touching the patient surrounding	27 (81.8)	4 (12.1)	1 (3.0)	0 (0.0)	1 (3.0)	28 (84.8)	4 (12.1)	1 (3.0)	0 (0.0)	0 (0.0)	.06
4- I do hand washing before clean/aseptic procedure.	26 (78.8)	5 (15.2)	1 (3.0)	0 (0.0)	1 (3.0)	30 (90.9)	3 (9.1)	0 (0.0)	0 (0.0)	0 (0.0)	.140
5- I do hand washing after exposure to patients' body fluids	26 (78.8)	5 (15.2)	0 (0.0)	1 (3.0)	1 (3.0)	31 (93.9)	2 (6.1)	0 (0.0)	0 (0.0)	0 (0.0)	.307

A= Always, O= Often, ST= Sometimes, R= Rarely, N= Never.

Table (2) illustrates the nurses' self-evaluation about their performances of hand hygiene based on '5 moments of hand hygiene before and after COVID-19 vaccination. No statistical differences found between the nurses' performance of hand hygiene before and after vaccination p-value >0.05. The result confirms that the nurses were careful do hand hygiene and to follow '5 moments of hand hygiene as a same before and after COVID-19 vaccination.

3.4. Assessment of Nurses' Wearing of Personal Protective Equipments (Ppe)

Table 3. Nurses' self-evaluation about wearing personal protective equipments (PPE), before and after patients' vaccination (N=33)

Items / (PPE)	Degree of frequency (% of responses) Before Vaccination					Degree of frequency (% of responses) After Vaccination					P-V
	(A) N (%)	(O) N (%)	(ST) N (%)	(R) N (%)	(N) N (%)	(A) N (%)	(O) N (%)	(ST) N (%)	(R) N (%)	(N) N (%)	
1- I am wearing sterile gloves before contacting the patient	18 (54.5)	5 (15.5)	2 (6.1)	7 (21.2)	1 (3.0)	19 (57.6)	5 (15.5)	1 (3.0)	8 (24.2)	0 (0.0)	.000**
2- I am wearing suitable gown before contacting the patient	22 (66.7)	7 (21.2)	2 (6.1)	0 (0.0)	2 (6.1)	23 (69.7)	9 (27.3)	1 (3.0)	0 (0.0)	0 (0.0)	.115
3- I am wearing face mask	24 (72.7)	4 (12.1)	3 (9.1)	0 (0.0)	2 (6.1)	27 (81.8)	5 (15.5)	1 (3.0)	0 (0.0)	0 (0.0)	.117
4- I am wearing face shields before contacting the patient	16 (48.5)	8 (24.2)	5 (15.5)	3 (9.1)	1 (3.0)	15 (45.5)	9 (27.3)	5 (15.5)	4 (12.1)	0 (0.0)	.001**
5- I am wearing goggles before contacting the patient	14 (42.4)	6 (18.2)	6 (18.2)	4 (12.1)	3 (9.1)	14 (42.4)	6 (18.2)	4 (12.1)	7 (21.2)	2 (6.1)	.001**

******= Significant differences A= Always, **O**= Often, ST= Sometimes, R= Rarely, N= Never

Table (3) shows nurses' self-evaluation about wearing personal protective equipment (PPE) before and after patients' vaccination. Beyond any doubt, the previous table clear that there are highly statistically significant differences between the nurses' commitment to wearing sterile gloves, face shields, and goggles, equally before and after patients' vaccination, (P-value < .05). Concerning wearing gowns and face masks also the result indicated an improvement between before and after vaccination but without statistically significant differences. These results confirm that the nurses keen to wear gowns and masks as the same before and after vaccination while wearing sterile gloves, face shields and goggles decreased a little after vaccine than before.

3.5.A. Total Score of Nurses' Fear According to Fear of Covid-19 Scale

Table 4. Scoring of nurses' fear level before/after COVID-19 vaccination (N=33)

Fear levels	Before Vaccination	After Vaccination	p-value
1- No fear	6 (18.2%)	5 (15.5%)	

2- Normal fear	9 (27.3%)	23 (69.7%)	0.014*****
3- Extreme fear	18 (54.5%)	5 (15.5%)	
Average of fear level	18.4	14.7	

*= Significant differences. No fear = 0-9, Normal fear =10-19, Extreme fear =20-35

Table (4) illustrates the differences in the nurses' fear level from acquired COVID-19 infection before and after patients' vaccination. It was found that more than half of nurses 54.5% report extreme fear from acquired COVID-19 infection before patients' vaccination while only 15.5% report extreme fear after vaccination. There are statistically significant differences in nurses' fear levels before and after patients' vaccination (< P-value). As regards to average of fear level for Saudi nurses, it changed from The study results confirm that COVID-19 vaccinations succeed to decrease the nurses' fears of getting infected with average change from 18.4 to 14.7.

3.6.b. Total Score of Nurses' Performance of Hand Hygiene

Table 5. Scoring of satisfaction about nurses' self-evaluation in performing hand hygiene and wearing PPE, before and after patients' vaccination (N=33)

Practice	Scoring Items	Before Vaccination	After Vaccination	p-value
1-Performing Hand hygiene	1- Poor Satisfaction	0 (0.0)	1 (3.0)	0.875
	2- Satisfactory	4 (12.1)	1 (3.0)	
	3- Good Satisfaction	29 (87.9)	31(93.9)	
2- Wearing PPE	1- Poor Satisfaction	1 (3.0)	0(0.0)	0.236
	2- Satisfactory	10(30.3)	7(21.2)	
	3- Good Satisfaction	22(66.7)	26(78.8)	

Poor Satisfaction = 0-7, Satisfactory = 8-11, Good Satisfaction = 12-20

Table (5) show nurses' self-evaluation about their application of hand washing according to '5 moments of hand hygiene' and their commitment of wearing personal protective equipment (PPE). The statistics indicated that Saudi nurses succeeded in commitment of precautionary measures from the beginning of the COVID-19 crisis to now. As regards their report about the performance of hand hygiene it increased from 87.9% before vaccination to 93.9% after vaccination. Also, wearing PPE increased from 66.7% before vaccination to 78.8% after vaccination. Although we note an improvement in their performances, there are no statistically significant differences present p-value < 0.05. This result is a bright sign indicating that nurses' commitment has not decreased after vaccination but they are still committed to preventive measures and this indicates their high culture in matters of infection control and ways to deal with the epidemic diseases.

3.6.A. Study Correlation Between Nurses' Fear, Level of Education and Years of Experience

Table 6. Correlation between nurses' level of education, job experience and total score of the fear scale, before and after patients' vaccination (N=33)

Items		Total score of fear scale (Mean ± SD)	Test	P-value
Before vaccinations	Level of education	18.8±7.35	rs = - 0.446	.009*****
After vaccinations		15.00±6.23	rs = - 0.161	0.371
Before vaccinations	Job experience	5.012±3.08	rs = - 0.371	0.06
After vaccinations		2.42±0.708	rs = 0.121	0.52

***=** significant differences

Table (6) estimate the correlation between nurses' fear level from getting infected with COVID-19 and 'their educational level & years of experience' before and after patients' vaccination. It was found a negative relation between the nurses' level of fear and their educational level with statistically significant differences before patients'

vaccination p-value < 0.05 while positive relation after vaccination. As regards to the relation between the level of fear and years of experience before vaccination, the study result found negative relations while after vaccination the study estimated an appositive relation.

3.6.B. Study Correlation Between Performance of 'Hand Hygiene & Wearing Ppe' And 'Level of Education & Years of Experience

Table 7. Correlation between level of education, job experience and total score of performing hand hygiene and PPE, before and after patients' vaccination (N=33)

Procedures	Items		Total satisfaction score (Mean ± SD)	Test	P-value
1- Performing hand hygiene	Before vaccinations	Level of education	15.576±4.796	rs = 0.055	.0762
	After vaccinations		16.273±3.135	rs = - 0.086	0.633
2-wearing PPE	Before vaccinations	Job experience	18.303±3.81	rs = - 0.011	0.952
	After vaccinations		16.273±3.135	rs = 0.000	0.996

Table (7) estimate the correlation between nurses' performances of hand hygiene & wearing PPE and 'educational level & years of experience' before and after patients' vaccination. It was found a positive relationship before vaccination between performances of hand hygiene and level of education while negative relation was noted between years of experience and wearing PPE. This means before patients' vaccination as the nurses' level of education increased their performances to hand hygiene increased while wearing PPE decreased as their year of experience increased. After the patients' received the COVID-19 vaccination, there is a negative relationship between nurses' level of education and their performing hand hygiene while there is not any relationship found between job experience and wearing PPE.

4. DISCUSSIONS

Nurses are directly exposed to a high risk of infection because they provide care to patients in close physical proximity. They perceived the risks of the pandemic as part of their role and professional responsibilities.

Nevertheless, many previous studies estimated different levels of nurses' anxiety and fear which ranged from high to moderate fear from getting COVID-19 infection during patients' care.[1,2,3] No wonder from their feelings because all of the world people fear this novel coronavirus.

Understanding the nurses' experience can help identify specific stressors and useful coping strategies during a pandemic. It is currently very important for the creation of support systems to keep nurses in employment and to make it easier for them to provide quality healthcare. [17]

Although there have been many studies since the beginning of the COVID-19 crisis that estimated the levels of anxiety and fear in healthcare professionals, there are not enough studies to examine the dialysis nurses' fears from COVID-19. Also, there is no study examining the nurses' level of fear after patients' vaccination. Therefore, our study is the exclusive study that measured dialysis nurses' fears of acquired COVID-19 infection after vaccinating patients. In addition, it's the first study that compared the nurses' fear level and adherence to precautionary measures before and after patients' vaccination.

The study results of Ünver and Yeniğün[2] found the surgical nurses have a moderate level of COVID-19 fear and the mean fear score was (25.09 ± 7.29 7.29). It's in line with our study results which found Saudi nurses had normal fear levels both before and after patients' vaccination and the mean fear score was (18.8±7.35 and 15.00±6.23, respectively) with statistically significant differences p< 0.05. Also, the study of Moussa, et al.[3] found the mean fear score level of nurses was (19.7±7.03), it's similar to our study results which found the mean of nurses fear was (18.8±7.35) before patients' vaccination with the same moderate level of fear.

Our study finding confirmed that the nurses' level of fear decreased with statistically significant differences after patients' vaccination but their average of fear before patients' vaccination and after patients' vaccination remained at a normal level with average (18.4 and 14.7, respectively). Its agree with the study results of Ünver and Yeniğün[2] report that after about seven months from the pandemic, their study nurses were still afraid and uncomfortable from coronavirus. The researcher see nurses' fear of getting infected with COVID-19 is logical because the corona pandemic is not ended yet, so it is clear that their fear is still ongoing with a moderate level in both studies.

In opposite side, the study of Tayyib and Alsolami [18] which done on RNs working with patients with the COVID-19 in KSA during the outbreak indicated high levels of anxiety, fear, and stress during COVID-19 outbreak (7.76 out of 10). This study disagrees with our study results. This mainly due to the differences in nurses' work, nurses in Tayyib and Alsolami's study are the frontline HCWs who provide care for patients infected with COVID-19, so their fear is higher than our nurses in dialysis units.

Also, Ünver and Yeniğün[2] found a statistically significant correlation between the fear scores, and duration of nursing experience ($r = 0.205$; $P = .003$). This result disagreed with our study results before patients' vaccination, which found a negative correlation between fear scores, and duration of nursing experience ($r = - 0.371$; $P = 0.06$). It is disagrees with our study results which found a positive relationship between the fear scores, and years of experience after patients' vaccination ($r = 0.121$; $P = 0.52$).

Overall, nurses have a high chance of exposure to infectious diseases. Wearing personal protective equipment (PPE) can protect them from infection.[19] Our study results confirmed that nurses had high performances level about infection control standards during the pandemic. The nurses succeeded in maintaining wearing PPE before and after patients' vaccination with a clear increase in the percent of wearing PPE, 66.7% before vaccination and 78.8% after vaccination.

CONCLUSIONS

This study reported normal levels of fear before and after COVID-19 patients' vaccination (average 18.4 & 14.7 respectively from total fear score 35) among registered nurses who work in dialysis units in Sakaka city, Saudi Arabia with significant statistical differences p-value =0.014. There is a negative correlation between nurses' level of fear and their educational level before and after patients' vaccination with significant differences before vaccination p-value >0.05. Job experience in dialysis units reports a negative correlation with nurses' fear before vaccination while a positive correlation is noted after vaccination. Concerning nurses' performance to hand hygiene and wearing PPE before vaccination, there is a positive relation between performances of hand hygiene and level of education while negative relation noted between years of experience and wearing PPE.

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