

Prevalence of Covid-19 Vaccine Hesitancy among Chronically-ill Egyptian Patients in Tertiary Care Centers

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ABSTRACT

Background: COVID-19 caused a high level of morbidity and mortality. All age groups are at risk to acquire infection, especially chronically-ill patients; however, there is a hesitancy toward vaccines among them.

Aim of the work: The study aims to assess the prevalence of Covid-19 vaccine hesitancy and to identify the underlying factors among chronically-ill patients. **Methods:** An analytical cross-sectional study was conducted at the outpatient clinics of the Internal Medicine Department at Kasr Al-Ainy Medical school. A self-administered Arabic questionnaire was distributed by the researchers to the patients surveying the acceptance rate of vaccination.

Results: A total of 587 participants ruled in the study, and their response rate was 78.2 %. The prevalence of COVID-19 Vaccine hesitancy was 29.8%, and the main underlying causes of vaccine hesitancy were fear of the complications of vaccination and fear of the deterioration of chronic diseases (36.4% & 25.5 %) respectively. A statistical significance was detected between vaccine hesitancy and many factors such as (gender, educational level, smoking status, type of chronic disease, and attitude toward the safety of vaccine) $P \leq 0.001$. Multiple logistic regression models yielded that significant predictors for vaccine hesitancy were females (OR 2.119), Illiterate (OR 1.73), not working in medical field (OR 2.311), using sources of knowledge other than Ministry of Health Website (OR 3.716), non Hypertensive (OR 1.45), having autoimmune diseases (OR1.68).

Conclusions: Relatively significant Covid-19 vaccine hesitancy among chronically-ill patients is influenced by gender, educational level, smoking status, attitude toward safety of vaccine, and source of knowledge regarding the vaccine.

Keywords: COVID-19, Vaccine hesitancy, Chronically-ill, Morbidity, Mortality

INTRODUCTION

The COVID-19 pandemic has been a major public health problem all over the world since 2020 as it causes high-risk morbidities and mortalities ^(1,2,3). All age groups are at risk for infection, however, chronically ill patients are five times more likely to acquire infection and develop more serious complications ^(4,5).

Since the emergence of the pandemic, no definite treatment has been identified ⁽⁶⁾, which mandated that global health organizations find a way to prevent and protect from such a disease. In this context, many vaccines have been developed ⁽⁷⁾.

Vaccination is considered one of the best preventive measures to control infectious diseases ⁽⁸⁾, also vaccination reduces the transmission of infection among people. So, it was declared that vaccination plays a role in controlling the spread of the disease ^(9,10,11). Many types of vaccines against (SARS-CoV-2) have been developed and distributed to reduce the risk of infection with COVID-19 ^(12,13).

The acceptance rate of vaccination against COVID-19 is variable from one country to another. Whilst most developed countries have an impacted response to the vaccination ^(14,15), in Egypt, there is still a lack of accomplishment of across-country vaccination.

Overall the acceptance rate of vaccination has been estimated to be very low in Africa. ^(16,17) This might be attributed to the individual's behavior which is

influenced by the perceived threat of this pandemic, perceived benefits, barriers to vaccination, presence of comorbidities, and low educational level ^(18,19,20).

It was also reported that chronic patients have a high hesitancy regarding the vaccine in lower-income countries which may be related to a lack of communication and false information regarding the vaccine ^(21,22).

There is a paucity of studies that assess vaccine hesitancy among chronically ill patients in Egypt. So the study aims to identify the acceptance degree towards COVID-19 vaccination and underlying factors for vaccine hesitancy among chronically ill patients.

MATERIALS AND METHODS:

Study design and allocation:

The study is an analytical cross-sectional study that was implemented among chronically ill patients attending outpatient clinics and /or admitted to the Internal Medicine wards, of Kasr Al Aini Hospital, Cairo, Egypt.

All patients suffering from chronic illness such as diabetes mellitus, hypertension, chronic kidney, chronic rheumatic, autoimmune, or respiratory diseases, and also those who have concurrent malignancy whether catching COVID-19 infection or not, were included in the study.

Those who refused participation were ruled out.

Sample size & sampling technique:

The sample size was calculated by the software program PASS. Assuming the margin of error is 5%, the confidence level is 95%, and the response distribution is 50%, depending on the average number of patients attending the outpatient clinics, and/or admitted to the hospital wards. After the addition of 20% due to the expected drop-out, the sample size reached 500 participants. Informed consent was obtained from patients before recruitment to the study after explaining the objectives of the work. A convenient sampling technique was applied.

Data collection tool:

A structured questionnaire was used to collect data. The questionnaire was translated into Arabic form to be easily fulfilled by the patients. A self-administrated Arabic close-ended questionnaire was distributed by the researchers to the patients at the outpatient clinics (**Anonymous questionnaire**).

The questionnaire included the following sections:

1. **Socio-demographic characteristics section:** including age, sex, educational level, and occupation.
2. **Type of chronic diseases & previous history of infection with Covid-19 section.**
3. **A section including questions regarding safety, acceptance, barriers, and previous COVID-19 vaccination.**

Pilot test:

The questionnaire was tested on 50 patients through 3 visits to the outpatient clinics to check the validity and clarity of the questions and to estimate the time needed to complete the questionnaire.

Data analysis:

All collected questionnaires were revised for completeness and logical consistency. Pre-coded data were entered into the Microsoft office excel program for windows, 2010 then transferred to the statistical package for social science version 21 (SPSS- V 21) for data analysis.

The following approaches for statistical data analysis and presentation were applied:

Simple frequency distribution tables were used to describe the studied group. Kolmogorov-Smirnova of normality was used to check the data distribution. Normally distributed quantitative data were presented using mean and standard deviation. For qualitative data; cross-tabulation presenting the number and percentage for the studied group, and suitable statistical tests of significance were used. The difference will be considered significant at a P-value ≤ 0.05 . Multiple logistic regression model tests were conducted to find significant predictors of vaccine Hesitancy in the study.

Ethical Consideration:

The study was revised and approved by the research Ethical committee, Faculty of Medicine, Cairo University (#N 110-2022). Confidentiality will be guaranteed in handling the database and questionnaire forms according to the revised Helsinki deceleration of biomedical ethics (World Medical Association 2011).

RESULTS

A total of 750 participants were recruited to participate in the study, and 587 participants agreed to participate in the study with a response rate of 78.2 %. Nearly two-thirds of the study groups (60.1 %) were females, and the mean age of participants was 49.02± 12.88 years. Nearly one-third (32.3 %) of the study group was illiterate, on the other hand, another third (34 %) were college graduates or post-graduates. Three-quarters of them (78.5% & 72.6 %) were (married & non- smokers) respectively, while the majority of them (92.2 %) weren't working in the medical field. As shown in **Table (1)**.

Table (1) Distribution of study group according to their socio-demographic characteristics (N 587):

Socio-demographic characteristics	N (%)
Age	
Mean± SD	49.02± 12.88
Median	49 (40: 59)
Gender	
Female	353 (60.1)
Male	39.9) (234
Educational level	
Illiterate	189 (32.3)
Basic Education	59 (10)
Secondary Education	139 (23.7)
Graduates & Post Graduate	(34) 200
Marital status	
Single	126 (21.5)
Married	461 (78.5)
Smoking status	
Yes	96 (16.4)
No	426 (72.6)
EX- smoker	65 (11.1)
Working in the medical field	
Yes	46 (7.8)
No	541 (92.2)

According to the type of chronic diseases and history of previous COVID-19 infection, our study revealed that nearly half of the study group (50.6 % & 47.2 %) had a positive history of (hypertension & diabetes mellitus) respectively, while nearly one-quarter of the study group (26.9 %) had a positive history of infection as demonstrated in **Table (2)**.

Table (2): Distribution of study group according to the type of chronic disease and history of previous COVID 19 infection.

Vaccination status and causes of COVID vaccination hesitancy	N (%)
Vaccine hesitancy	
No	412 (70.2)
Yes	175 (29.8)
Attitude toward safety of vaccine	
Agree	285 (48.6)
Disagree	302 (51.4)
Vaccination status	
Yes	412 (70.2)
No	175 (29.8)
Type of vaccine	
Whole Virus Vaccine	144 (35)
Vector Vaccine	95 (23)
Messenger RNA vaccine	60 (14.6)
Don't know	113 (27.4)
Causes for accepting the vaccination	
For protection	282 (68)
Government obligation	133 (32)
Causes for vaccine hesitancy	
Vaccine not effective	47 (9.5)
Complication of vaccine	180 (36.4)
Previously infected	8 (1.6)
Chronic disease deteriorate due to vaccine	126 (25.5)
Medication interaction with vaccine	46 (9.3)
Source of knowledge about vaccine	
Television	293 (49.9)
News paper	7 (1.2)
social media	269 (45.8)
Physician Advice	148 (25.2)
Egyptian Ministry of Health website	41 (7)
World Health Organization website	26 (4.4)

The study revealed that nearly one third (29.8 %) of the study group had vaccine hesitancy, also nearly one third 32% were vaccinated due to government obligation and nearly half (51.5 %) didn't agree that the vaccine was safe.

On the other hand 70.2 % of the study group were vaccinated, of whom nearly one third of them received whole virus vaccine (35%). The study revealed that (36.4 % & 25.5 %) of the study group reported that the main causes for vaccine hesitancy were fear of vaccine complications & and that chronic disease may deteriorate due to vaccination, respectively.

Regarding the source of the information about vaccine the majority were driven from Television 293 (49.9%) followed by social media 269 (45.8%), nearly a quarter of them derived their knowledge from direct physician

advice (25.2%) and the minority received data through health organization channels like the Egyptian Ministry of Health and World Health Organization websites were 41 (7 %), 26 (4.4 %) respectively.

The distribution of study group according to vaccination status and causes of COVID vaccination hesitancy is illustrated in **Table (3)**.

Table 3: Distribution of study group according to vaccination status and causes of COVID vaccination hesitancy (N 587):

Type of chronic disease and history of previous COVID 19 infection	N (%)
History of chronic diseases	
Diabetes Mellitus	277 (47.2)
Hypertension	297 (50.6)
Chronic Renal disease	45 (7.7)
Chronic Gastrointestinal diseases	62 (10.6)
Rheumatologic and immunological Diseases	103 (17.5)
Cancer	60 (10.2)
Respiratory system diseases	80 (13.6)
Previous infection with COVID 19	158 (26.9)
Yes	382 (65.1)
No	47 (8)
May be	
Severity of symptoms of COVID 19 infection	65 (33.5)
Severe, required hospitalization	21 (10.8)
Severe, not required hospitalization	108 (55.7)
Mild to moderate	
Contact with family members during COVID 19 infection	196 (33.4)
Yes	391 (66.6)
No	

The factors associated with vaccine hesitancy among the study group included the female sex ($P \leq 0.001$), lower level of education ($P=0.009$), type of chronic disease as patients with rheumatic or auto-immune disease were more hesitant ($P \leq 0.001$) than patients with other diseases. **On the other hand** smokers, patients with Diabetes mellitus, as well as patients with positive attitude toward safety of vaccine were less hesitant ($P =0.002$, $P= 0.008$, $P \leq 0.001$), respectively. These results are represented in as in **Table (4)**.

Table 4: Factors affecting vaccine hesitancy among the study group (N 587):

Factors affecting vaccine hesitancy	Vaccine hesitancy		P value
	No N (%)	Yes N (%)	
Gender			
Female	226 (54.9)	127 (72.6)	0.001
Male	186 (45.1)	48 (27.4)	
Educational level			
Illiterate	119 (28.9)	70 (40)	0.009
Basic Education	39 (9.5)	20 (11.5)	
Secondary Education	94 (22.8)	45 (25.7)	
College Graduate & post Graduate	160 (38.8)	40 (22.8)	
Marital status			
Single	83 (20.2)	43 (24.6)	0.084
Married	329 (79.9)	132 (75.4)	
Smoking status			
Yes	80 (19.4)	16 (9.1)	0.002
No	286 (69.4)	140 (80)	0.009
EX- smoker	46 (11.2)	19 (10.9)	0.913
Working in medical field			
Yes	37 (9)	9 (5.1)	0.114
No	375 (91)	166 (94.9)	
History of chronic diseases			
Diabetes Mellitus	209 (50.7)	68 (38.9)	0.008
Hypertension	218 (52.9)	79 (45.1)	0.085
Renal disease	28 (6.8)	17 (9.7)	0.224
Gastrointestinal diseases	46 (11.2)	16 (9.1)	0.466
Rheumatologic and immunological	57 (13.8)	46 (26.3)	0.001
Cancer	36 (8.7)	24 (13.7)	0.069
Respiratory system diseases	57 (13.8)	23 (13.1)	0.823
Previous infection with COVID 19			
Yes	117 (28.4)	41 (23.4)	0.45
No	262 (63.6)	120 (68.6)	
May be	33 (8)	14 (8)	
Severity of symptoms of COVID 19 infection			
Severe, required hospitalization	48 (33.8)	17 (32.7)	0.976
Severe, not required hospitalization	15 (10.6)	6 (11.5)	
Mild to moderate	79 (55.6)	29 (55.8)	
Attitude toward safety of vaccine			
Agree	274 (66.5)	11 (6.3)	0.001
Disagree	138 (33.5)	164 (93.7)	
Causes for vaccine hesitancy			
Vaccine not effective	21 (6.5)	26 (15.1)	0.002
Complication of vaccine	62 (19.3)	118 (68.6)	0.001
Previously infected	4 (1.2)	4 (2.3)	0.458
Chronic disease deteriorate due to vaccine	30 (9.3)	96 (55.8)	0.001
Medication interaction with vaccine	6 (1.9)	40 (23.3)	0.001
Source of knowledge about vaccine			
Television	202 (49)	91 (52)	0.510
News paper	7 (1.7)	0 (0)	0.110
social media	184 (44.7)	85 (48.6)	0.384
Physician Advice	109 (26.5)	39 (22.3)	0.287
Egyptian Ministry of Health website	37 (9)	4 (2.3)	0.004
World Health Organization website	22 (5.3)	4 (2.3)	0.1

The results depicted in **Table (5)** showed independent predictors of vaccine hesitancy among the study group, through multiple logistic regression model indicating that female sex, not working in medical field, having rheumatologic and immunological diseases, not having hypertension, Lower levels of education and having knowledge about the vaccine from sources other than the Egyptian Ministry of Health Website, were significant predictors of vaccine hesitancy.

Table (5): Predictors of Vaccine hesitancy among the study group:

Predictors of Vaccine hesitancy	P value	OR	95% C.I for OR	
			lower	upper
Gender (male/female)	<0.001	2.119	1.414	3.176
Work in medical field (yes/no)	0.035	2.311	1.063	5.025
Hypertension (yes/no)	0.05	1.455	1.001	2.115
Rheumatologic and immunological diseases (yes/no)	0.028	1.686	1.059	2.682
Source of Knowledge about Vaccine from Ministry of Health Website (yes/no)	0.016	3.716	1.28	10.787
Constant	0	0.002		

DISCUSSION

Since COVID-19 pandemic has been a public health, especially among the high risk groups as chronically ill patients ⁽²³⁾, All over the world vaccination is considered a priority for vulnerable groups and higher risky population of exposure to infection as health care workers and chronically ill patients ^(11,12). Unfortunately, there are many challenges towards the success of COVID- 19 vaccination coverage, as limited funds for the vaccines, misconception regarding safety of vaccine and efficacy ⁽²⁴⁾. This study tries to identify the hesitancy rate for COVID-19 vaccine and to identify underlying factors among chronically ill patients.

The current study pointed out that the prevalence of COVID 19 Vaccine hesitancy among Egyptian patients with chronic illness was **29.8%**.

In consistent with our results, the unwillingness to get COVID-19 vaccine was found to be much pronounced in low-resource countries as in Africa, Previous studies revealed that vaccine hesitancy was (34.3%) in Egypt ⁽²⁵⁾and in (24.2%) Ethiopia ⁽²⁶⁾.

On the other hand Acceptance rate has been found to be higher in European Countries as in Italy ⁽²⁷⁾ and Belgium ⁽²⁰⁾ where there is high trend towards vaccination. This controversy may be due to difference in socio-demographic and educational characteristics of the study participants.

Interestingly an Arabian country as Saudi Arabia there was more willingness towards vaccination (52%), which might be caused by deeply rooted conceptions among various classes of their population ⁽²⁸⁾.

The study revealed that 48.6% of the study participants had a positive attitude toward COVID 19 vaccine and this finding was nearly to the results of another study in Ethiopia ⁽¹¹⁾ which reported that 44 % of the study participants had positive attitude toward the vaccine. On the other hand, these findings were lower than those yielded from reports in China ⁽²⁹⁾ and Bangladesh ⁽³⁰⁾ whose rates were 70.1% & 78%

respectively. This could be explained by variations in the cultural characteristics and sample size

In this study although 29.8 % of the participants had vaccine hesitancy, 70.2 % of them were vaccinated due to government obligation. There are many factors affecting vaccine hesitancy as safety, efficacy of the vaccine, the study demonstrated that the topmost factors of vaccine hesitancy were fear of vaccine complication and that chronic disease may deteriorate due to vaccine administration, with similarities with many previous study done across the low income world ^(13,31,32).

In consistent with earlier reports, the current study also revealed that the main source of knowledge regarding vaccine among the study participants were Television and social media which may be sources of false information affecting the vaccine hesitancy ⁽³³⁾

Being notably, vaccine acceptance could be influenced by gender and educational level. ^(22,34,35) Our findings showed that females were found to be less acceptable to the vaccine than males, less well-educated patients were more hesitant, as well.

Driven sources of knowledge towards vaccines are variable, accordingly the study found that participants who derived their knowledge regarding the vaccine from sources other than Egyptian Ministry of Health Website were 3 times more hesitant, this finding was in agreement with a study reported that the governmental healthcare system channels are the most trustworthy source to guide patients about the potential benefits of COVID-19 vaccine ⁽¹¹⁾.

Generally, chronically-ill patients have a high hesitancy rate about taking the vaccine in lower-income regions due to false data and poor communication. Therefore, special attention should be paid to those patients to increase awareness of importance of vaccination since they are more liable to COVID-19 associated morbidities and mortalities.

Although the current study shed the light on the vaccination hesitancy rate among Egyptian chronically ill patients, yet some study limitations should be mentioned the study is cross-sectional observational

study that can't confer causative relation and small sized sample that mandate more widely studies.

CONCLUSION

The hesitancy regarding the COVID-19 vaccine is found in chronically ill Egyptian patients more pronounced in patients of female gender, elderly and low educational, level.

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