

Effect of Vaccination on Clinical Features of COVID Patients

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ABSTRACT

Background: many studies described the clinical features of COVID 19 since the appearance of the disease at end of 2019, however other studies needed for the clinical features of the disease after vaccination coverage.

Objectives: To demonstrate the impact of vaccine on clinical features of the coronavirus disease 2019 (COVID 19) infection.

Methods: A cross-sectional study of 200 patients enrolled with COVID 19 were collected in Al Immamain Al Kahdmian medical city from 1 May 2021 to 30 August 2022. The patients reported their data regarding the demographic, and clinical characteristics, which includes symptoms (fever, cough, dyspnea, rhinorrhea, sore throat, nausea/vomiting, diarrhea, headache and generalized weakness), past medical history (like ischemic heart disease, hypertension, and diabetes mellitus). Also, duration of symptoms and oxygen saturation (SpO₂). The patients classified into two groups (vaccinated and non-vaccinated groups).

Results: One hundred patients non-vaccinated (group one) and 100 vaccinated (group two). The age of first group between 17-81 years (means 44.78), while the second group between 16-75 years (means 40.2). Males in first group were 40% and females 60%, while in second group males were 55% and females 45% with statistically significant difference between the two groups (p value 0.034), fever and dyspnea are the only clinical findings which significantly different between the two groups. Oxygen saturation (SpO₂) was lower in first group with statistically significant difference. The vaccinated group of three types of vaccines (Pfizer 70%, Sinopharm 23%, and AstraZeneca 7%). Rhinorrhea is the only clinical finding that is statistically significant difference between the three vaccine types.

Conclusion: Fever and dyspnea are more common in non-vaccinated group. SpO₂ is lower in non-vaccinated group.

Keywords: COVID 19, COVID 19 vaccination, Clinical features.

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COVID 19 disease is firstly emerged as presentation of a severe respiratory tract infection in Wuhan city, China at end of 2019⁽¹⁾. In January of 2020, the lower respiratory sample taken from Infected patients were demonstrated the novel corona-virus (SARS-CoV-2)⁽²⁾. SARS-CoV-2 can be transmitted from person to person through the respiratory aerosols, and though direct human contact⁽³⁾. After initial exposure, the patients may develop symptoms of the disease within 5 to 6 days (called incubation period) however about 20% of the patients may remain asymptomatic throughout the infection period⁽⁴⁾.

In the adults clinical features varies widely. Significant proportion of the individuals have only mild symptoms at time of the diagnosis. The symptoms which commonly reported are cough and fever⁽⁵⁾, may include other symptoms like headache, lethargy, loss of smell, myalgia (aching muscles), nasal obstruction, taste dysfunction, rhinorrhea (runny nose), diarrhea, vomiting, sore throat, and confusion; but fever may not present in all symptomatic patients⁽⁶⁾. Progression of the disease, multiple organs dysfunction and even death may occur in the some patients⁽⁷⁾.

Recognition of pandemic spread of the disease has been accelerating testing and development of many vaccines with using platforms that investigated during the

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previous emergencies as in SARS pandemics⁽⁸⁾.

Vaccination which discovered against the SARS CoV 2 infection is one of the important interventions that deployed to mitigate COVID-19 disease. At October 2021, WHO has been listed four vaccines: Pfizer/BioNTech, Sinopharm, AstraZeneca-SK Bio, and Moderna vaccines for the emergency use under an Emergency Use Authorisation (EUA)⁽⁹⁾. Most of vaccine candidates that focus on the immunization with a spike S protein, which is a main target for the neutralizing antibodies. Neutralizing antibodies blocks viral entry into the host cell through the preventing of interaction between spike protein Receptor Binding Motif (RBM) and host cells Angiotensin-converting enzyme 2 (ACE2) that expected to be a protective^(10,11). The available data showed that COVID 19 vaccines are effective in the prevention of severe complications of disease and even death⁽¹²⁾, that include the infection with Delta and Omicron variants of the SARS CoV2^(13,14).

After vaccines administration to protect people against SARS-CoV-2 in the early 2021, some individuals infected with this virus.

The aim of this study is to show the impact of vaccination on the clinical features of the disease.

Methods

This is a descriptive cross-sectional study of 200 patients. The patients who confirmed to have COVID 19 were enrolled in Al Immamain Al Kahdmian medical city from 1 May 2021 to 30 August 2022.

COVID-19 disease was confirmed by detecting the SARS CoV-2 RNA with swab samples from throat by using a virus nucleic acid detection kit for COVID_19 by Real Time - Polymerase Chain Reaction (RT-PCR). The case definitions of confirmed infection with SARS -Cov 2 accordance to the guidance from World Health Organization (WHO)⁽¹⁾. Confirmed patients were from outpatient's clinic. The time cut

off has taken as a time needed for the seroconversion following COVID 19 vaccination was at least four weeks.

The patients with COVID 19 reported their data regarding the demographic, and clinical characteristics. The following information's took for every patient; age, gender, past medical history (like ischemic heart disease, hypertension, and diabetes mellitus), history of previous COVID-19 infection, symptoms (fever, cough, dyspnea, rhinorrhea, sore throat, nausea\vomiting, diarrhea, headache and generalized weakness). Also, duration of symptoms and oxygen saturation (SpO₂). Oxygen saturation measured by pulse oximeter. SpO₂ divided in two groups 94% and more or less than 94%. The patients classified into two groups (vaccinated and non-vaccinated groups).

The inclusion criteria are unvaccinated patients with clinical features of COVID 19 and vaccinated patients with two doses of vaccination.

The exclusion criteria are the patients with asymptomatic positive RT PCR, or symptomatic negative RT PCR test diagnosed by other types of investigation and those with single dose of vaccination.

Statistical analyses were performed by using SPSS software version 25.0 (SPSS, Chicago). Continuous data were presented as mean and standard deviation, and analyzed with Student t-test for two group comparison, and analysis of variance (ANOVA) for three group comparison. Categorical variables were expressed as number and percentage and analyzed with Chi-square test. A p value less than 0.05 was considered to indicate a statistically significant difference.

Results

Regarding the demographic characteristics of vaccinated and non-vaccinated patients, the age of non-vaccinated group (first group) between 17-81 years (mean 44.78), while the vaccinated group (second group) between 16-75 years (mean 40.2) with no statistically

significant difference between the two groups. In first group males 40% and females 60%, in second group males 55% and females 45% with statistically significant difference between the two groups (p value 0.034). Regarding the highest ascertained medical diseases was hypertension (HTN) followed by diabetes mellitus (DM) then ischemic heart diseases (IHD). Smoking status was 16% in first group and 23% in second group, all these risk factors no statistically significant difference between the two groups, (Table 1).

For the type of vaccine, 70% was Pfizer, 23% was Sinopharm and 7% was AstraZeneca, (Figure 1).

Only fever and dyspnea were higher in first group with statistically significant difference (p value 0.047 and 0.011, respectively), while other clinical features were not statistically significant difference between the two groups, (Table 2).

The association of vaccination with oxygen saturation (SpO₂) and duration of symptoms, showed that SpO₂ was lower in

first than second group with statistically significant difference (p value 0.001). While the duration of symptoms was 1-9 days in first and 1-10 days in second group with statistically no significant difference between the two groups, (Table 3).

Regarding the demographic characteristics of vaccinated group according to the type of vaccine, there was no statistically significant difference between the three vaccine types regarding the age, gender, risk factors, and smoking status (p value ≥ 0.05), (Table 4).

For the association of different types of vaccines with clinical findings, the only statistically significant difference with rhinorrhea between the three vaccine types which was 56.52% in Sinopharm type, while 34.29% in Pfizer type, and 0% in AstraZeneca type, (Table 5).

About the association of different types of vaccines with SpO₂ and duration of symptoms, there was no statistically significant difference for both SpO₂ and duration of symptoms in the three vaccine types, (Table 6).

Table 1: Demographic characteristics of vaccinated and non-vaccinated patients.

Variables	Non-vaccinated (n=100)	Vaccinated (n=100)	p-value
Age, years			
Mean± SD	44.78±17.47	40.2±14.36	0.053
Gender			
Male	40(40%)	55(55%)	0.034
Female	60(60%)	45(45%)	
Risk factors			
Hypertension	36(36%)	24(24%)	0.064
Diabetes mellitus	17(17%)	17(17%)	1.00
IHD	3(3%)	3(3%)	1.00
Hypothyroidism	1(1%)	5(5%)	0.212
Smoking	16(16%)	23(23%)	0.212
Others	2(2%)	5(5%)	0.445

Other risk factors included one case for each of Crohn's disease, palpitation, epilepsy, pregnancy, Adison disease, asthma and chronic pulmonary obstructive disease. IHD = ischemic heart disease.

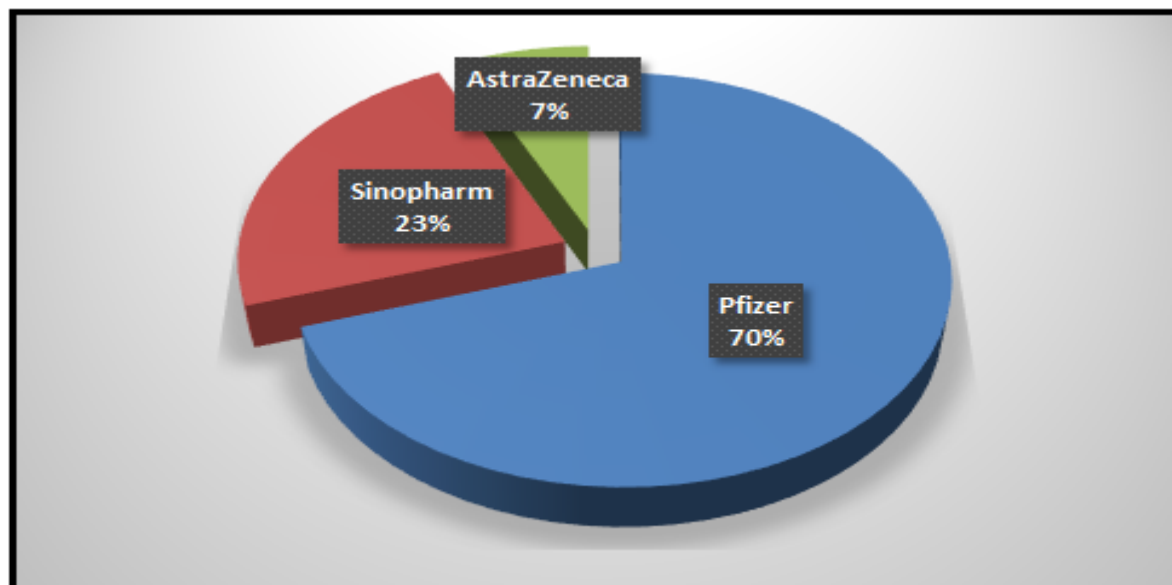


Figure 1: Type of vaccines.

Table 2: Association of clinical findings in vaccinated and non-vaccinated patients.

Variables	Non-vaccinated (n=100)	Vaccinated (n=100)	p-value
Fever	82(82%)	70(70%)	0.047
Cough	69(69%)	76(76%)	0.268
Sore throat	55(55%)	57(57%)	0.776
Rhinorrhea	34(34%)	37(37%)	0.658
Generalized weakness	72(72%)	59(59%)	0.053
Headache	70(70%)	64(64%)	0.367
Generalized pain	49(49%)	38(38%)	0.117
Nausea/vomiting	33(33%)	26(26%)	0.278
Diarrhea	12(12%)	18(18%)	0.235
Dyspnea	16(16%)	5(5%)	0.011
Loss of smell and taste	3(3%)	4(4%)	1.00
Sweating	3(3%)	4(4%)	1.00

Table 3: Association of vaccination with SpO₂ and duration of symptoms.

Variables	Non-vaccinated (n=100)	Vaccinated (n=100)	p-value
SpO ₂ , %			
Mean± SD	95.97±2.86	97.07±1.59	0.001
Range	82-100	90-100	
Duration of symptoms/ days			
Mean± SD	3.99±2.05	3.63±2.1	0.221
Range	1-9	1-10	

Table 4: Demographic factors of patients according to the type of vaccination.

Variables	Pfizer (n=70)	Sinopharm (n=23)	AstraZeneca (n=7)	p-value
Age, years				
Mean± SD	39.62±14.93	38.95±13.2	50.5±8.17	0.189
Range	17-75	16-74	43-66	
Gender				
Male	40(57.14%)	12(5.22%)	3(42.86%)	0.607
Female	30(42.86%)	11(47.83%)	4(57.14%)	
Risk factors				
Hypertension	17(24.29%)	6(26.09%)	1(14.29%)	0.810
DM	14(20%)	3(13.04%)	0(0%)	0.344
IHD	2(2.86%)	1(4.35%)	0(0%)	0.833
Hypothyroidism	3(4.29%)	1(4.35%)	1(14.29%)	0.505
Smoking	18(25.71%)	4(17.39%)	1(14.29%)	0.607
Others	5(7.14%)	0(0%)	0(0%)	0.324

DM = Diabetes mellitus, IHD = Ischemic heart disease.

Table 5: Association of different type COVID-19 vaccines with clinical findings.

Variables	Pfizer (n=70)	Sinopharm (n=23)	AstraZeneca (n=7)	p-value
Fever	46(65.71%)	20(86.96%)	4(57.14%)	0.116
Cough	52(74.29%)	19(82.6%)	5(71.43%)	0.689
Sore throat	40(57.14%)	13(56.52%)	4(57.14%)	1.00
Rhinorrhea	24(34.29%)	13(56.52%)	0(0%)	0.017
Generalized weakness	38(54.29%)	16(69.57%)	5(71.43%)	0.341
Headache	49(70%)	13(56.52%)	2(28.57%)	0.065
Generalized pain	27(38.57%)	9(39.13%)	2(28.57%)	0.867
Nausea/vomiting	19(27.14%)	6(26.09%)	1(14.29%)	0.761
Diarrhea	11(15.71%)	4(17.39%)	3(42.86%)	0.204
Dyspnea	2(2.86%)	2(8.7%)	1(14.29%)	0.271
Loss of smell and taste	2(2.86%)	2(8.7%)	0(0%)	0.396
Sweating	2(2.86%)	1(4.35%)	1(14.29%)	0.337

Table 6: Association of different type COVID-19 vaccines with SpO₂ and duration of symptoms.

Type of vaccine	SpO ₂ %	Duration of symptoms
Pfizer (n=70)	96.94±1.64 90-99	3.5±1.99 1-10
Sinopharm (n=23)	97.45±1.47 93-100	4.13±2.47 1-8
AstraZeneca (n=7)	97.14±1.46 94-98	3.29±1.8 2-7
P-value	0.417	0.421

Data were expressed as mean ± SD and range.

Discussion

In this study, the non-vaccinated patients (first group) mean (SD) age was 44.78±17.47 years and vaccinated patients (second group) 40.2±14.36 years, in

Sashindran study⁽¹⁵⁾ mean ages were 40.36 ±11.27 years and 37.18 ±9.38 years, respectively. Regarding gender included 40 (40%) men and 60 (60%) women in the first group and 55 (55%) men and 45 (45%) women in the second group, in Sashindran

study⁽¹⁵⁾ 140 (83.3%) men and 28 (16.7%) women in vaccinated group and 31 (73.8%) men and 11 (26.2%) women in comparative group. In Michela study⁽¹⁶⁾ females were higher than males in those infected peoples after first and second doses vaccinated groups. The difference in results may be due to differences in numbers of patients in the two studies. For the risk factors in this study hypertension was the most common comorbidities in both groups followed by diabetes mellitus then ischemic heart disease, in Woo study⁽¹⁷⁾ also showed hypertension is the most common comorbidities in both vaccinated and non-vaccinated groups followed by diabetes mellitus then cardiovascular disease.

For the type of vaccine, 70% was Pfizer and 23% was Sinopharm and 7% was AstraZenec, the type of vaccination depend on local policy of each country.

Fever is the most common symptom on both groups higher in non-vaccinated group with statistically significant difference (p value 0.047) followed by cough but p value 0.268. Dyspnea was higher in non-vaccinated group with statistically significant difference (p value 0.011). In previous study in Iraq also showed that fever is the most common symptom⁽¹⁸⁾, in study⁽¹⁹⁾ showed that the risk of febrile symptom was lower when comparing vaccinated to the unvaccinated individuals, other study showed almost all individual symptoms of COVID-19 were less common in vaccinated versus unvaccinated participants, and more people in the vaccinated than in the unvaccinated groups were completely asymptomatic⁽¹⁸⁾. In Sashindran study⁽²⁰⁾ showed fever is the most common symptom (75.1%) and shortness of breath is lower in vaccinated group with statistically significant difference. In other studies showed no statistically significant difference on clinical manifestations between vaccinated and non- vaccinated group⁽²¹⁾ the difference in the results may be due to the type of vaccine or number of patients in each study or the type of SARS- COV-2 strain.

In this study oxygen saturation was lower in non-vaccinated group than vaccinated

group with statistically significant difference. In Ganesh study⁽²²⁾ showed lower oxygen saturation in non-vaccinated than vaccinated group especially if two doses of vaccination with p value 0.001

For duration of symptoms no statistically significant difference between the two groups, in Sashindran study⁽²⁰⁾ also no statistically significant difference founded between the two groups.

Regarding the demographic factors of patients according to the type of vaccination, there was no statistically significant difference between the two groups, this may indicate that the three vaccine types in Iraq gave to all people irrespective of age, gender, smoking status or comorbidities

For the association of different type COVID-19 vaccines with clinical findings, only rhinorrhea was higher in Sinopharm than other two types of vaccine with statistically significant difference. The William et al⁽²³⁾ survey explored the differential effects of vaccination with the mRNA technology (Pfizer and Moderna) compared to the adenoviral-vectored vaccine (AstraZeneca). Appeared to have an advantage for those who received the mRNA vaccinations compared to adenoviral vector vaccines. This was most notable for the symptoms of fatigue and myalgia.

About the association of different types of vaccines with SpO₂ and duration of symptoms, there was no statistically significant difference for both SpO₂ and duration of symptoms in the three vaccine types. This may indicate that all three types of vaccine have similar effect on oxygen saturation on patients who received vaccination and then got infection. Paddy study⁽²⁴⁾ showed that vaccination can be effected against severe COVID-19.

Limitation of the study, the strains of the virus didn't determine, as type of strain may affect the clinical features of disease,

In conclusion the patients with COVID 19 who previously received vaccine have less symptoms than those without vaccination especially fever and dyspnea. Also, oxygen saturation was lower in those with non-

vaccinated group than vaccinated one. Rhinorrhea was more in Sinopharm vaccinated group than other vaccine types.

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