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Original Research Article

EVALUATION OF SUCCESS RATE AND SIDE EFFECTS OF COVID-19 VACCINATION IN DIABETIC PATIENTS OF DERA GHAZI KHAN DHQ HOSPITAL PAKISTAN

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Abstract: The primary objective of this study was to determine the efficacy and potential adverse effects of the COVID-19 vaccination in patients with diabetes attended at the Allama Iqbal Teaching Hospital Dera Ghazi Khan Hospital. This study used a cross-sectional design.The number of participants was 200. Using a random sampling procedure, we collected patient information.We received this data by analysing medical records and conducting surveys.We utilised an interview that they made themselves to get information from the participants. The research recorded the participants' demographic information, such as their age, gender, co-occurring disorders, vaccination type and dosages, prior to COVID-19 infection, and the presence of both neighbourhood and general side effects following the initial and second administrations of medicine. We utilised SPSS for Windows, version 26.0 (released in 2019), to analyse the data. Gender, vaccine type, treatment frequency, success rate, and systemic and localised side effects were among the demographic variables that we quantified. We used the chi-square test to find out the frequency of adverse effects in type-1 vs type-2 diabetics. With a p-value below 0.05, we said that the results were statistically significant.Several side effects were reported by 98 persons (18–40 years old) after receiving the COVID-19 vaccination, and 72 individuals (56–70 years old) had comparable symptoms.Younger individuals were more likely to report negative side effects, according to one study. Following administration of the COVID-19 vaccination, the following percentages of patients showed improvement: 42 with a 70% completion rate, 60 with the same success rate, 24 with an 80% completion rate, 40 with an 85% success rate, 3 with a 90% completion rate, and 31 with a 100% success rate. The COVID-19 vaccination was well-received by 64 type-2 diabetes patients and 50 type-1 diabetic patients; moderately well-received by 30type-1 diabetes patients and 40 type-2 diabetic patients.It can be concluded that COVID-19 vaccination was well tolerated by diabetic patients.

Keywords: Diabetes; COVID-19; vaccination

INTRODUCTION

On December 8, 2019, the first instances of pneumonia with a mysterious basis were stated in Hubei Province of Wuhan China. Since then, a new coronavirus identified as SARS-CoV-2 has been found, producing COVID-19 . The increasing number of coronaviruses found in bats and their potential spread to humans raises concerns about the persistence of zoonotic transmission [1-2.] Barron found that alterations in superoxide production in the mitochondria of the lining cells of both large and small capillaries are related with metabolic issues caused by oxidative damage.Impaired neutrophil function, aberrant cytokine responses, and suppression of leukocyte recruitment are all possible outcomes of chronic hyperglycemic conditions. An response by the immune system during an acute viral infection might exacerbate the symptoms of chronic hypoglycemia. This is because hyperglycemia and insulin resistance are consequences of systemic diabetes [3.]The severity of COVID-19 is likely to worsen in individuals with elevated blood sugar. In contrast to hemoglobin A1c (HbA1c), glucose monitoring to detect increasing hyperglycemia was a stronger predictor of SARS and DM infections in individuals. Our results suggest that hyperglycemia may start quickly in people with endothelial dysfunction and previous vasculopathy, which might cause their symptoms to develop quickly . The prognosis is quite dismal for those who have both COVID-19 or type 2 diabetic hyperglycemia (T2DM). There are a number of theories put forward to account for the poor COVID-19 prognosis in diabetics. Several factors contribute to the increased infection rate in diabetics, including an inflammatory cytokine response, impaired viral clearance, and the prevalence of related complications [4-5]. Patients with type 2 diabetes mellitus (T2DM) are at enhanced danger for evolving severe COVID-19 infections, and their inflammatory markers, including C-reactivity protein, ferritin, procalcitonin, dehydrating acid of lactate, and d-dimer, are much greater than in non-diabetic individuals. Diabetes is up to three times as many common among COVID-19 patients hospitalized, and the death rate for patients with diabetes is double that of patients without the disease. A higher risk of death, invasive respiratory support, and intensive care unit hospitalization were linked to recent diabetes diagnoses, as reported by Menon .These findings designate that diabetes of the type 2 variety is a self-determining forecaster of a suboptimal response to therapy in COVID-19 individuals. The development of effective treatment strategies requires an in-depth understanding of the interconnections between these two illnesses. Additional research is necessary to fully comprehend the impact diabetes can have on COVID-19 patient estimates and possible techniques to alter these pathways for better patient outcomes [6-7]..Among persons with T1DM, a population-based cohort research investigated possible COVID-19-related causes of death. The death rate from COVID-19 was higher among older men. The number of fatalities caused by COVID-19 rose sharply. In addition, the impoverished have a much higher death rate than the middle class and the wealthy.

Deregulation of the AGE-RAGE axis, which involves an upregulation of AGE production and an upregulation of RAGE receptor installation, may hasten vascular injury..It was unclear how diabetes related to COVID-19, but aberrant immune responses might hasten the onset of agul and ischemia consequences, which lead to multiorgan failure as well as advanced death rates in hyperglycemia [8-9].High blood glucose levels are a hallmark of T2DM, a chronic metabolic disease. It is possible that COVID-19 contributes to the increased infection rate in persons with T2DM. First, diabetes may reduce the body's ability to fight against infections by lowering immune system activity (--). The characteristic of diabetes, chronic hyperglycemia, may inhibit the meaning of neutrophils as well as macrophages, which are immune cells.A higher risk of catastrophic COVID-19 outcomes is connected with concomitant diseases in people suffering from diabetes, including obesity and cardiovascular disease. Obesity is connected with an enhanced danger of evolving both T2DM as well as severe COVID-19. Symptoms include low-grade inflammation and abnormal immune responses, which might make the patient more vulnerable to infections.When thinking about the correlation between COVID-19 and type 2 diabetes, hyperglycemia at hospital admission is a better predictor than hemoglobin A1c. Evidence suggests that those sick with COVID-19 have higher amounts of an enzyme known as an ACE2. Their blood sugar levels spike unexpectedly, leading to oxidative stress, inflammation, damaged endothelial cells, and thrombosis.This could increase the virus's virulence, illness susceptibility, and potential lethality by making it easier for the virus to penetrate cells and target certain organs. The inability of pancreatic B-cells to produce enough insulin may be due, in part, to the impact of COVID-19.[10-11].An estimated 0.5–1.3% of COVID-19 instances would result in fatalities. This number rises sharply with increasing age, peaking at 18.40 percent in hospitalized patients older than 80.0 years old. Diabetes is quickly rising to the position of a member of the most critical issues in public health due to the many serious complications it causes. The prevalence of diabetes is on the rise globally, and several factors are to blame. These include being overweight, not exercising enough, living in cities, and having unhealthy eating habits .From 451.0 million in 2017 to 693.0 million in 2045, the predicted number of people living with diabetes would more than double, according to forecasts [12.] .Patients infected with COVID-19 had a 0.15 to 28.9% increased chance of acquiring type 1 diabetes mellitus. Consequences of COVID-19 have included hyperglycemia. Nearly one-fifth of patients also reported experiencing coldness, loose stools, diminished taste and odor, and chest and stomach discomfort. The most prevalent adverse outcome in these COVID-19 patients with type 1 diabetes was ketoacidosis; the most common concurrent conditions include obesity (39.4% of cases) and cardiovascular disorder /hypertension (12.1% of individuals) .[13]

METHODOLOGY

A cross-sectional study was conducted in Dera Ghazi Khan Allama Iqbal Teaching Hospital DGkhan to evaluate the success rate and side effects of COVID-19 vaccination in diabetic patients.The study was done in Allama Iqbal Teaching Hospital DGkhan.The type-1 and type-2 diabetic patients who received COVID-19 vaccination were included in the study. The sample size was 200 (n=200) calculated by Epi info software. The random sampling technique was utilized to collect the data of the patients.the study include both male and female patients aged between 18 and 70 years.patient diagoned with type 1 or type 2 diabetes mellitus were enrlled .only those patients who had been exposed to COVID-19 infection and had received COVID-19 vaccination were included.all selected participants were registered patient of allama Iqbal teaching hospital dgkhan.patient younger than 18 years or older than 70 years were excluded from the study.non-diabetic individuals and patients with other significant co-morbidities were not included.patient who were exposed COVID-19 vaccination were excluded.The data was collected from the medical records of the patients and there was distributed questionnaire.Factors such as age, gender, history of type 1 and type 2 diabetes, status as a COVID-19 vaccine recipient, and any adverse effects associated with the immunization were retrieved from patients' medical records.We determined whether the COVID-19 vaccine improved diabetes symptoms or worsened them as a result of side effects by analyzing this data. In order to collect data from the participants, I used a form that I had created myself. The study's demographic information documented the following: participants' ages, genders, co-occurring disorders, vaccine types and doses, history of COVID-19 infection, and records of both local and general adverse effects from the first and second medicine administrations. In addition, I made note of how satisfied the participants were.For this data analysis, I consulted IBM SPSS in Windows, version 26.0 (2019; IBM Corporation., Armonk, Southern New York, USA). I calculated a number of demographic variables, including gender, vaccination type, total doses, success rate, which services were administered, and systemic and local side effects.To determine how often side effects occurred in type 1 and type 2 diabetics, I used the chi-square test. An independent t-test was used to compare the means of demographic factors, such as success rate and age. I claimed there was statistical significance as the p-value was less than 0.05.In order to get ethical approval before to collecting data from the chosen patients, I informed the medical officer at Allama Iqbal Teaching Hospital Dgkhan.I ensured the secrecy of their initial data.

RESULTS

Table 4.1. Frequency-wise distribution of patients

Gender	Frequency	Percent
Male	83.0	41.500%
Female	117.0	58.500%
	200.0	100.000%

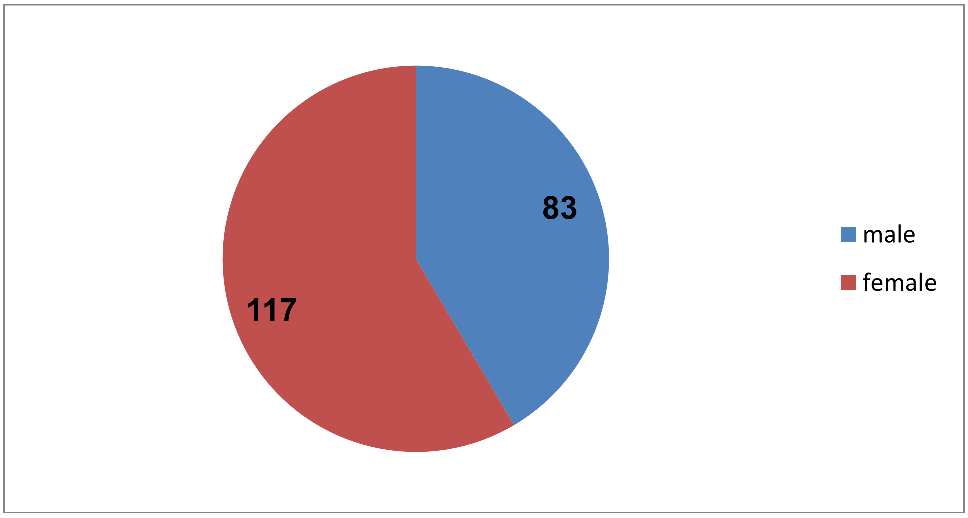

Figure 4.1. Graph showing the distribution of patients by gender.

Table 4.1 showed that out of a total of 200 patients, 41.50 percent were men and 58.50 percent were female.The bulk of those were women.

Table 4.2. Age-wise distribution of patients.

Age	Frequency	Percent
18-40	98	49.00%
41-55	72	36.00%
56-70	30	15.00%
	200	100.00%

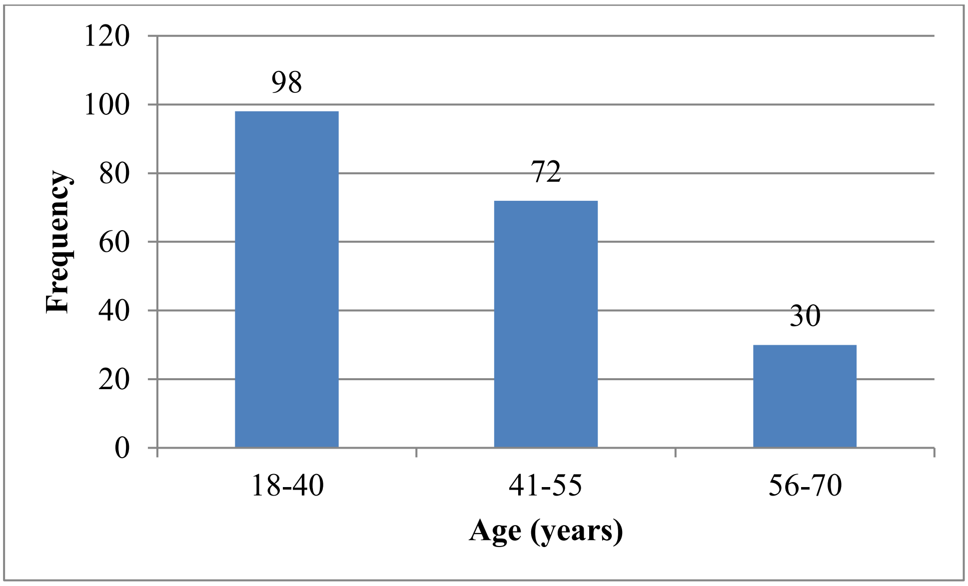

Figure 4.2. Graph showing the distribution of patients by age.

In table 4.2, we can see that there were 98.0 patients in the 18–40 age range, 72.0 in the 41–55 age range, and 30 in the 56–70 age range.Accordingly, the age range of the patients was 25–40.

Table 4.3. Gender wise distribution of diabetes types.

	Diabetes type	
	Type-1	**Type-2**
Male	40	43
%	48.20%	51.80%
Female	51	66
%	43.60%	56.40%

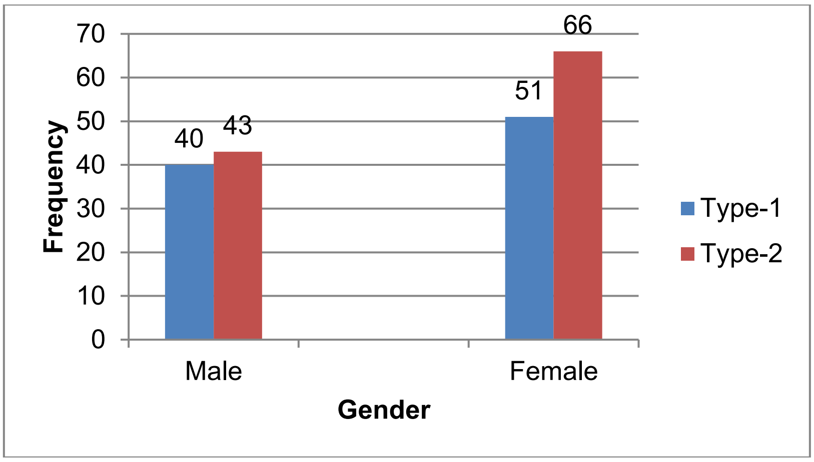

Figure 4.3. Graphical representation of gender wise distribution of diabetes types.

Among the 200 COVID-19 vaccinees who took part in the trial, 91 (45.5%) suffered type-1 DM & 109 (58.5%) experienced type-2 DM, as shown in table 4.3. There were 40 men (48.2%) and 51 women (43.6%) in the group of people with type-1 DM, and in the group of people with type-2 DM, there were 43 men (51.8%) and 66 women. (56.4%) were females.

Table 4.4. Descriptive data of different paramaters.

	N	Mean	Standard deviation	Minimum	Maximum
Age	200	42.05	10.81	25	65
Diabetes type	200	1.54	0.5	1	2
Number of doses	200	1.44	0.5	1	2

It can be observed in table 4.4 that mean age of patients was 42.05±10.81(mean±standard deviation) years.The mean of diabetes type was 1.54±0.50 and mean value of number of doses was 1.44±0.50.

Table 4.5. Types of vaccines used in diabetes types.

		Diabetes type	
Type of vaccine		**Type-1**	**Type-2**
Astrazeneca	Count	20	34
	%	37.00%	63.00%
Pfizer	Count	24	19
	%	55.80%	44.20%
Sinopharm	Count	29	28
	%	50.90%	49.10%
Sinovac	Count	18	28
	%	39.10%	60.90%

Table 4.5 showed that out of the total number of diabetic patients, 20 (or 37.0%) have type 1 and 34 (or 64.0%) have type 2 diabetes. We utilized the AstraZeneca vaccination. Within the group of diabetic patients, 24 (55.80%) had type 1 and 19 (44.80%) had type 2 diabetes. We utilized the Pfizer vaccination. Of the individuals with diabetes, 29 (or 50.90%) had type 1 and 28 (or 49.10%) had type 2. We utilized Sinopharm vaccination. In a group of individuals with diabetes, 18 had type 1 (39.10%) and 28 had type 2 (60.90%). Utilized was the Sinovac vaccine.

Table 4.6. Chi-square results of vaccine types in type-1 and type-2 diabetics.

Table: Chi-Square Tests			
	Value	df	Asymptotic Sig. (2-tailed)
Pearson Chi-Square value	4.82	3	0.185
Likelihood Ratio	4.84	3	0.184
Number of Valid Cases	200		

There was little variation in the success rate or consequences of vaccination of COVID-19 with the first type as well as type-2 people with diabetes at Allama Iqbal Teaching Hospital Dgkhan, according to the null hypothesis, and the chi-square outcomes showed that the probability value was higher than 0.05, so we rejected the alternative hypothesis.

Table 4.7. COVID-19 vaccination side-effects in diabetes types.

		Diabetes type	
Side effects		**Type-1**	**Type-2**
Anxiety,sore throat,flu	Count	13	8
	%	61.90%	38.10%
Chest pain	Count	10	11
	%	47.60%	52.40%
Fever	Count	7	14
	%	33.30%	66.70%
Flu,cough	Count	10	11
	%	47.60%	52.40%
Headache	Count	10	12

	%	45.50%	54.50%
Joint pain	Count	9	12
	%	42.90%	57.10%
Lymphadenopathy	Count	11	10
	%	52.40%	47.60%
Muscle pain,fever,headache	Count	10	11
	%	47.60%	52.40%
No	Count	11	20
	%	35.50%	64.50%

In table 4.7, we can see that 13 type-1 diabetes patients as well as 8 individuals with type-2 diabetes had adverse effects such as nervousness, sore throat, and flu after receiving the COVID-19 vaccination. Ten patients with type 1 and eleven with T2DM reported chest pain, seven with type 1 and fourteen with type 2 diabetes reported fever, ten with type 1 and eleven with T2DM reported flu and cough, ten with type 1 and twelve with type 2 diabetes reported headaches, nine with type 1 and twelve with type 2 diabetes reported joint pain, eleven with type 1 and ten with T2DM reported lymphadenopathy, and ten with type 1 and eleven with T2DM reported muscle pain, fever, and headaches. The COVID-19 vaccine did not cause any unwanted effects in eleven T1DM and twenty T2DM.

Table 4.8. Success rate of COVID-19 vaccine in diabetic patients.

	Diabetes type	
Success rate in %	**Type-1**	**Type-2**
70	20	22
75	30	30
80	9	15
85	19	21
90	2	1
100	11	20

Table 4.8 shows that after COVID-19 vaccination, a total of 31 patients had a 100% success rate, whereas 42 patients achieved a 70% success rate, 60 patients achieved a 75% success rate, 24 patients achieved an 80% success rate, 40 patients achieved an 85% success rate, 3 patients achieved a 90% success rate, and 31 patients had no success at all.

Table 4.9. Level of satisfaction of diabetic patients with COVID-19 vaccination.

Level of satisfaction	**Diabetes types**	
	Type-1	**Type-2**
Dissatisfied	2	3
Do not know	4	7
Satisfied	30	40
Very satisfied	50	64

According to table 4.9, a total of 64 type-2 diabetic patients and 50 T1DM reported high levels of satisfaction with the COVID-19 vaccine, while 30 T1DM and 40 T2DM reported moderate levels of satisfaction. Thus, it is safe to assume that the immunization met the expectations of the majority of patients.

Table 4.10. COVID-19 vaccination unwanted effects in different age category.

	Unwanted effects								
Age	**Anxiety, sore throat, flu**	**Chest pain**	**Fever**	**Flu, cough**	**Head ache**	**Joint pain**	**Lymphade nopathy**	**Muscle pain, fever, head ache**	**No**
18-40	8	9	10	10	11	11	12	10	17
41-55	9	8	10	10	8	5	4	9	9
56-70	4	4	1	1	3	5	5	2	5

Table 4.10 showed that most adverse effects occurred in individuals between the ages of 18 and 40.After getting the COVID-19 vaccine, 98 individuals (ranging in age from 18 to 40) reported various adverse effects; 72 people (ranging in age from 56 to 70) reported similar symptoms.

Table 4.11. Side-effects profile of different vaccine types administered to the patients.

	Side effects								
	Anxiety sore throat, flu	**Chest pain**	**Fever**	**Flu, cough**	**Heada che**	**joint pain**	**Lymphad eno pathy**	**Muscle pain,fever headache**	**No**
Astra zeneca	3	11	10	5	5	3	7	3	7
Pfizer	2	3	4	9	8	5	2	3	7
Sino pharm	12	5	5	2	4	5	9	5	10
Sino Vac	4	2	2	5	5	8	3	10	7

Table 4.11 showed that after administration of the Astrazeneca vaccine, the majority of patients reported fever (10.0) & chest tightness (11.0).In contrast to the flu, cough, and headaches reported by Pfizer COVID-19 vaccine recipients, Sinopharm immunization recipients reported anxiety, sore throat, flu, and lymphadenopathy.Patients who had the Sinovac COVID-19 vaccine reported aches and pains in their muscles, fever, headache, and joints.

Table 4.12. Success rate of different vaccine types.

	Success rate in %					
	70	**75**	**80**	**85**	**90**	**100**
Astrazeneca	10	16	8	12	1	7
Pfizer	8	12	4	12	0	7
Sinopharm	14	18	6	7	2	10
Sinovac	10	14	6	9	0	7

Table 4.12 showed that after getting the Sinopharm COVID-19 vaccination, the majority of patients (10.0) achieved a success rate of 100%. While the number of patients who had a success rate after immunization with Astrazeneca, Pfizer, and Sinocav COVID-19 was 7.0.

DISCUSSION

Patients with chronic diseases, such diabetes, may greatly decrease their danger of evolving the COVID-19 virus by getting the SARS-CoV-2 vaccine. Researchers did not see any major side effects in studies that vaccinated diabetic individuals against SARS-CoV-2 (Baden et al., 2021). Both groups of diabetics had negative outcomes after receiving the COVID-19 vaccine, as shown in this study.

Signs of illness were most prevalent among children aged 25–40.Several side effects were reported by 98 persons (25–40 years old) after receiving the COVID-19 vaccination, and 72 individuals (56–70 years old) had comparable symptoms.Younger individuals were more likely to report negative unwanted effects, according to one study.Findings from this study corroborated those from a study by Khan et al. (2023) that indicated younger people were more vulnerable to negative impacts than older ones.

Those with type 2 diabetes reported 8% anxiety, throat discomfort, and flu-like symptoms after receiving the COVID-19 vaccine, whereas 14% of type 1 diabetes did the same. An equal number of T2DM (14.0) T1DM (11.0) reported chest pain, fever (14.0) and flu and cough (11.0) and headaches (10.0) and joint pain (9.0) and lymphadenopathy (11.0) and type-2 diabetic patients (11.0) and type-2 diabetic patients (12.0) and type-2 diabetic patients (12.0) reported fever, muscle pain, and lymphadenopathy, flu, and cough, respectively. Eleven percent of people with type 1 and twenty percent of those with type 2 diabetes reported no side effects after getting the COVID-19 vaccination. Consistent with other studies, this one discovered that a patient's medical history greatly increased the risk of post-vaccination complications (comorbidities). (Ali et al., 2021). Patients with diabetes were more likely to have flu-like symptoms and higher temperatures after immunization (p=0.049).

We found that women made up 58.5% of the sample, while men accounted for 41.5%.Consequently, the majority of the patients were female. The subgroup experiencing type-2 DM consisted of 66 females (56.4% of the total) and 43 males (51.8%), whereas the group with type-1 DM consisted of 51 females (43.6%) and 40 men (48.2%).Shera et al. (2015)

found that 12.14% of males and 9.83% of females had diabetes; this finding contradicted their findings. Consistent with our findings, a study by (Hussain et al., 2019)found that women experienced it at a 15.83% higher frequency than men (14.05%-22.63%), however in male 14.80% (9.83%-20.59%).

The AstraZeneca vaccine was administered to fourteen individuals with diabetes of any kind (63.1% of the total) and twenty those with diabetes type 1 (37.0%). Pfizer vaccinated thirteen people with diabetes that is type 1 including nineteen people with type 2 diabetes. Out of all the patients who got the Sinopharm vaccination, 29 had diabetes of the type 1 and 28 had type 2 diabetes; these two groups accounted for 50.90% with 49.10% of the altogether, respectively. Of the total number of patients vaccinated, 60.90 percent were those with diabetes of some sort and 18.10 percent had type 1 diabetes.Both sets of findings corroborated those of Ali et co., 2021, who found that participants in the Sinopharm vaccination, which ranged in age from 23 to 55, had a positive experience overall and saw no serious side effects.Xia et al. (2020) found that 39.5% of the respondents (81/205) experienced headaches or migraines as an adverse impact of the vaccination, whereas 45.4% of children (93/205) suffered weariness or malaise. While 14.3% of participants experienced regional pain и 2.4% reported fever, the Chinese research using Sinopharm, a comparable vaccination, did not find any adverse effects such as tiredness, headache, fever, or muscle discomfort.

We found that the Pfizer vaccine was the one with the lowest uptake among those with diabetes.100 (18.6%) DM and 111 (18.2%) non-DM participants received the Levitra immunization, making it the least offered vaccination according to the particular Mahabharata et al., 2021). These results go counter to the study's conclusions. On the initial dose, the majority of patients experienced burning at the injection site; however, diabetics also reported fever, muscular pain, and swelling at the injection site.

The COVID-19 vaccination was well-received by 64 type-2 diabetes patients and 50 type-1 diabetic patients; moderately well-received by 30 type-1 individuals with diabetes and 40 type-2 diabetic patients. If most patients were OK with the vaccine, we may say that it was effective.Our findings were consistent with those of a Chinese study that examined the incidence of SARS-CoV-2 vaccine reluctance among diabetes patients.Vaccine confidence was low among 483 people, or 56.4% (273/483). Of them, 158.2% were confused and 41.8% were hesitant (159/273). Concerns about side effects were the leading reason for people to reconsider receiving the SARS-CoV-2 vaccine (Wang et al., 2022). The current study's findings indicating 345 from the 639 those diagnosed were pleased with their immunizations and would obtain another one without hesitation are quite similar to those reported by the previous study. The presence of unwanted effects, however, left 12 DM (2.2%) unhappy.

We found that after administration of the COVID-19 vaccination, the following percentages of patients had success: 42 patients at 70%, 60 at 75%, 24 at 80%, 40 at 85%, 3 at 90%, and 31 at 100%.Consistent with these findings, a study conducted by van den Berg, who is et al., 2022, determined that the efficacy of the vaccine for infections caused by SARS-CoV-2, a symptom of COVID-19, hospitalization, or mortality ranged from 33% to 97% in the general population, with a lower efficacy in diabetics.

5. Conclusion:

Examining the pros and cons of the COVID-19 vaccination in patients with diabetes who visited the Dera Ghazi Center allama iqbal teaching hospital was the primary objective of this study. The majority of individuals experiencing unpleasant symptoms were in the younger age group of 18–40 years.Several side effects were reported by 98 persons (18–40 years old) after receiving the COVID-19 vaccination, and 72 individuals (56–70 years old) had comparable symptoms.Younger individuals were more likely to report negative side effects, according to one study. Following administration of the COVID-19 vaccination, the following percentages of patients showed improvement: 42 with a 70% completion rate, 60 with the same success rate, 24 with an 80% completion rate, 40 with an 85% excels rate, 3 with a 90% completion rate, and 31 with a 100% success rate. The COVID-19 vaccination was well-received by 64 type-2 diabetes patients and 50 type-1 diabetic patients; moderately well-received by 30 T1DM and 40 T2DM patients.Among the people with diabetes, we used the AstraZeneca vaccine in 24 cases (63.000%) of type 2 and 21 cases (37.0%) of type 1 diabetes. Type 1 diabetes affected 24 individuals (55.0%), whereas type 2 affected 19 patients (44.0%). We used the vaccine that Pfizer makes. Just 29 people (or 50.90%) got type 1 diabetes, while 28 people (or 49.10%) developed type 2 diabetes. We vaccinated using Sinopharm. Eighteen people with diabetes (39% of the total) had type 1, and twenty-eight had type 2, which are (60.90%). We used the Sinovac vaccination.

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