

# Determine the Outcomes in Covid-19 Patients with Type II Diabetes Mellitus

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## ABSTRACT

**Objective:** The purpose of this study is to determine the outcomes in patients with type II diabetes mellitus.

**Study Design:** Retrospective/Observational study

**Place and Duration:** Medicine department of Mardan Medical Complex/ Bacha Khan Medical College, Mardan and Avicenna Medical & Dental College and Hospital, Lahore during the period from May, 2021 to October, 2021.

**Methods:** Participants in this research ranged in age from 18 to 80 and were split between males and females who were either diabetic or not. Patients' demographics including age, gender, BMI, and socioeconomic status were recorded upon receipt of informed written consent. All individuals with a radiographic or polymerase chain reaction-confirmed diagnosis of COVID-19 were included in the study. Adverse outcomes among all cases were measured. In order to evaluate all of our data, we used SPSS 24.

**Results:** Among 120 cases, 75 (62.5%) males and 45 (37.5%) were females. There were 70 (58.3%) cases diabetic and 50 (41.7%) were non-diabetic. Among 70 cases of diabetic, 20 were newly diagnosed to diabetes mellitus II. Mean age of the patients was 48.14±16.51 years and had mean BMI 30.02±6.36 kg/m<sup>2</sup>. Hypertension was found in 52 (43.3%) and cardiovascular disease in 39 (32.5%) cases. Hospital stay in patients of diabetes mellitus II was significantly higher as compared to non-diabetic cases. Mortality rate in diabetes patients was higher found in 40 (57.1%) cases as compared to non-diabetic cases 11 (22%).

**Conclusion:** People with COVID-19 who were diabetic had a much higher mortality rate than those who weren't diabetics. Consequently, diabetes patients must be taught about the dangers of infection-related hyperglycemia, the need of adhering to sick-day rules, and the effects of social isolation.

**Keywords:** Diabetes Mellitus II, Covid-19, Hypertension, Mortality

## INTRODUCTION

Hubei province's provincial capital Wuhan was the site of the first confirmed cases of pneumonia of undetermined origin in early December 2019. An enveloped RNA beta-coronavirus-2, dubbed SARS-CoV-2 because of its phylogenetic resemblance to SARS-CoV, was discovered as the new pathogen [1]. At first, the epidemic was attributed to a zoonotic transmission that occurred in the market for live animals and seafood. It was quickly discovered that efficient transmission from person to person was also taking place [2]. Wuhan has seen a fast spread of the illness to neighboring cities. The World Health Organization (WHO) will declare a pandemic by March 11, 2020 [3]. According to the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University, there have been 103,201,340 confirmed cases of COVID-19 worldwide as of February 3, 2021, including 2,237,636 fatalities. In light of COVID-19's fast expansion and high death rate, it is vital to examine the probable risk factors impacting the course of illness in COVID-19 patients [4].

From the absence of symptoms or low fever to the requirement for hospitalisation in an intensive care unit (ICU) for pneumonia, sepsis or respiratory failure, the disease's spectrum is exceedingly variable (ARDS). It's becoming more and more clear that ARDS and respiratory failure in COVID-19 may be the result of a defective immune response, characterized by rapid proliferation and hyperactivation of T lymphocytes and macrophages, as well as an overproduction of more than 150 chemical mediators (the "cytokines storm"), including pro-inflammatory cytokines (TNF-, IFN-), and chemokines (CCL-2, CCL-3, CCL-5, CXCL-8), which leads to an increased vasodilation. Increased levels of IL-6 may also harm the cardiovascular system, increasing the risk of cardiomyopathy and myocardial insufficiency via these mechanisms. Endothelial dysfunction, hypotension, and coagulopathy may arise from the cytokine storm, which is also responsible for the more severe clinical course of COVID-19 [6]. Recent clinical studies for COVID-19 pneumonia have shown good results with the monoclonal antibody inhibitor of IL-6 receptor

(tocilizumab). Myocardial infarction, cardiomyopathy, heart failure, arrhythmias and venous thromboembolic events have been linked to SARS-CoV-2, which has also been linked to an elevated risk of acute cardiovascular events.

Glycated haemoglobin (HbA1c) is a serum-based glycemic test that measures average blood glucose levels over the course of 2–3 months in persons with type 2 diabetes.

[9] In order to better reflect the long-term impact of diabetes (and associated chronic comorbidities), longitudinal HbA1c over a longer period may be more therapeutically meaningful than plasma glucose level or a single-point HbA1c assessed at the time of admission. People with Type 2 Diabetes (T2D) are more likely to have a bone fracture in the next two years if their HbA1c levels are high for two years in a row. [10] For persons with T2D, our hypothesis is that a 2-year longitudinal HbA1c has a greater impact on the severity of COVID-19 than a single-point HbA1c or plasma glucose level.

Diabetes mellitus (DM) increases the chance of developing SARS-CoV-2 symptoms or infection, in addition to the huge number of sensitive diabetics. Because diabetics are more vulnerable to infection, both DM1 and DM2 patients are at higher risk of developing mucous membrane infection when exposed to infection-causing agents [11]. Second, assume SARS-CoV-2 is transmitted to diabetic people. Diabetic individuals have a reduced rate of viral clearance and a greater affinity of the pathogen to cellular binding, which increases the likelihood of a severe form of COVID-19. Glucagon-like peptide-1 receptor agonists, for example, may increase the amount of angiotensin-converting enzyme 2 (ACE2) receptors in organs such as the liver, which may improve the affinity of SARS-CoV-2, since the stated receptor is discovered to be responsible for the viral binding [13]. There is an increased risk of respiratory illness in people with diabetes mellitus (DM), which makes it an important comorbidity to consider while dealing with the present COVID-19 epidemic. Diabetic COVID-19 patients must have both diseases managed together.

Epidemiological studies imply that diabetes is a role in viral infections like COVID-19 since diabetics come in different forms and sizes. The clinical features and death rates of diabetic individuals admitted to the hospital with COVID-19 were examined as part of this research.

**MATERIAL AND METHODS**

This retrospective/observational study was conducted at Medicine department of Mardan Medical Complex/ Bacha Khan Medical College, Mardan and Avicenna Medical & Dental College and Hospital, Lahore during the period from May, 2021 to October, 2021. The study was consisted of 120 patients having covid 19 illness. After getting written consent, the demographics of enrolled patients, including age, gender, BMI, and socioeconomic status, were gathered. Pregnant women and those who did not sign a formal consent form were not allowed to participate in this study.

Those who took part in the study were between the ages of 18 and 80. RT-PCR was used to confirm the presence of COVID-19 in the swabs taken from the nose and throat. With just minor symptoms and normal vital signs, they were allowed to return to their own houses. Medical personnels monitored the confined patients daily to ensure that their vital signs were within acceptable limits" (pulse, respiration rate, and blood pressure). Breathing problems and an oxygen saturation level less than 90% led to the patient's hospitalization. Most patients require hospitalization or isolation at home, depending on the doctors' judgement and other clinical reasons. A comparison of the demographics and symptoms of diabetics and non-diabetics was then made, as well as the impact of comorbid conditions on mortality and survival. Diabetic and non-diabetic patients were compared in terms of their clinical symptoms and co-occurring diseases. SPSS 24 was used to analyze the entire dataset.

**RESULTS**

Among 120 cases, 75 (62.5%) males and 45 (37.5%) were females.(fig 1)

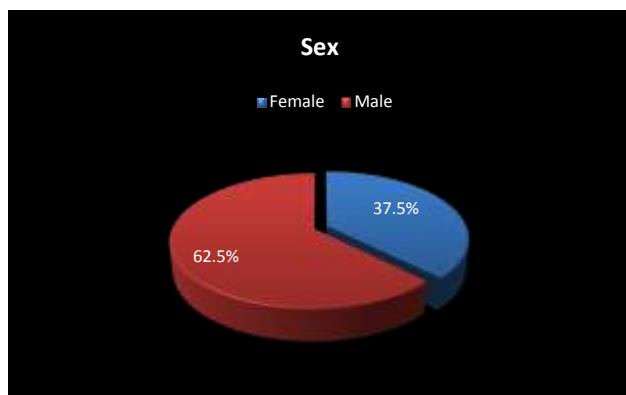


Figure-1: Gender distribution among all cases

Table-1: Baseline details of enrolled cases

Variables	Frequency	Percentage
Mean age (years)	48.14±16.51	
Mean BMI (kg/m <sup>2</sup> )	30.02±6.36	
Education status		
literate	65	54.2
Un-educated	55	45.8
Socio-economic status		
Poor	71	59.2
Normal	49	40.8
Residency		
Urban	80	66.7
Rural	40	33.3

Mean age of the patients was 48.14±16.51 years and had mean BMI 30.02±6.36 kg/m<sup>2</sup>.We found that 65 (54.2%) patients

were literate and 55 (45.8%) were un-educated. There were 71 (59.2%) patients had poor socio-economic status. Among 120 cases, 80 patients were from urban areas and 40 patients were from rural areas.(table 1)

There were 70 (58.3%) cases diabetic and 50 (41.7%) were non-diabetic. Among 70 cases of diabetic, 20 were newly diagnosed to diabetes mellitus II.(table 2)

Table-2: Association of diabetes among all cases

Variables	Frequency	Percentage
Diabetes		
Yes	70	58.3
No	50	41.7
Newly Diagnosed Diabetes II		
Yes	20	28.6
No	50	71.4

Hypertension was found in 52 (43.3%). cardiovascular disease in 39 (32.5%) cases, chronic kidney disease in 19 (15.8%) cases and HIV/AIDS in 10 (8.3%) cases.(fig2)

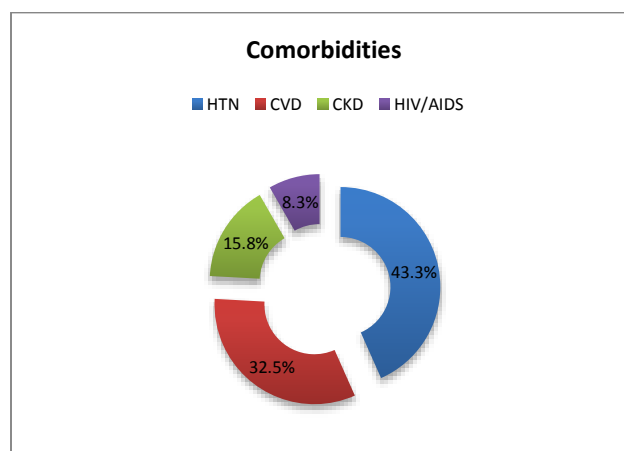


Figure-2: Included patients with association of other comorbidities

Hospital stay in patients of diabetes mellitus II was significantly higher as compared to non-diabetic cases. Mortality rate in diabetes patients was higher found in 40 (57.1%) cases as compared to non-diabetic cases 11 (22%).(table 2)

Table-2: Prevalence of death rate among cases

Variables	Diabetes	Non-Diabetes
Mean Hospital stay (days)	22.11±11.76	14.9±13.32
Death		
Yes	40 (57.1%)	11 (22%)
No	30 (42.9%)	39 (78%)
Total	70 (100)	50 (100)

Our research participants had considerably higher blood sugar levels at the time of admission if they had previously been diagnosed with type-2 diabetes (271±176 mg/dL vs 202±56 mg/dL, respectively).(table 3)

Table-3: Comparison of blood sugar levels among all cases

Variables	Pre-diabetic	Newly Diagnosed Diabetes
Mean Blood Sugar levels (mg/dL)	271±176	202±56
Mean CRP	147.5±177.92	180.8±125.41
Serum creatinine	2.56±6.42	1.88±8.73

**DISCUSSION**

It is possible that people with COVID-19 infection and co-existing chronic conditions such hypertension or cancer may be more at risk of mortality from their infections [14,15]. Furthermore, diabetes has been linked to both an increased mortality risk and a higher

rate of co-morbidity with COVID-19 infection in previous studies. COVID-19 infection has been hypothesized by several researchers to have an effect on diabetes patients' susceptibility to infection and death. Diabetics were more likely to develop hyperinflammation and cytokine storm syndrome, as well as decreased virus clearance rates and an increased risk of cardiovascular disease, when compared to healthy patients without COVID-19. People with diabetes are more likely to die from COVID-19, according to these studies.[15]

There were 120 patients with ages 18-80 years were presented in this study. Among 120 cases, 75 (62.5%) males and 45 (37.5%) were females. Mean age of the patients was 48.14±16.51 years and had mean BMI 30.02±6.36 kg/m<sup>2</sup>. We found that 65 (54.2%) patients were literate and 55 (45.8%) were uneducated. There were 71 (59.2%) patients had poor socio-economic status. Among 120 cases, 80 patients were from urban areas and 40 patients were from rural areas. These findings were in line with the previous some researches.[16,17] There were 70 (58.3%) cases diabetic and 50 (41.7%) were non-diabetic. Among 70 cases of diabetic, 20 were newly diagnosed to diabetes mellitus II.[18]

Hypertension was found in 52 (43.3%). cardiovascular disease in 39 (32.5%) cases, chronic kidney disease in 19 (15.8%) cases and HIV/AIDS in 10 (8.3%) cases.[19] Diabetics exhibited worse clinical conditions and more comorbidities than non-diabetics, in accordance with previous studies [20]. Other risk variables, such as cardiovascular and renal comorbidities, smoking/smoking cessation, neurological diseases, and others, were connected to intubation and mortality rates. On the other hand, in a univariate analysis of diabetic patients, CKD and the need for prisma were associated with an increased risk of death and intubation outcomes. Chronic kidney disease (CKD) remains a major predictor of the requirement for intubation in multivariate studies. Diet and renal disease are both associated with an increased risk of early death in diabetics with COVID-19, according to the Coronado study[21].

Premature ageing has been linked to increased risk of death and disease severity in the COVID-19 pandemic [22] from the start of the outbreak. Studying more than half a million COVID-19-infected people from five nations found that death rate increased dramatically in those over 50 and was greatest among octogenarians. According to this previously reported data, older people are more likely to die than younger people.[23] Data from throughout the world reveal that older individuals die at higher rates than younger people, but the rates are not uniformly higher. The existence of other comorbid disorders, such as COVID-19, is likely to have a significant impact in these individuals' higher mortality.

Hospital stay in patients of diabetes mellitus II was significantly higher as compared to non-diabetic cases. Mortality rate in diabetes patients was higher found in 40 (57.1%) cases as compared to non-diabetic cases 11 (22%). According to prior studies, diabetics have worse clinical conditions and more comorbidities than non-diabetics. Risk variables such as cardiovascular and renal comorbidities, smoking cessation, and neurological disorders were also connected to intubation and mortality rates[24]. The usage of prisma, diabetes, and renal illness were all revealed to be risk factors for death and intubation outcomes in a univariate investigation of diabetics. CKD, according to a multivariate analysis, still has a substantial effect. Diabetic patients with COVID-19 had a lower renal function, which was linked to an increased risk of dying earlier than predicted. [25] Our research participants had considerably higher blood sugar levels at the time of admission if they had previously been diagnosed with type-2 diabetes (271±176 mg/dL vs 202±56 mg/dL, respectively).[24]

## CONCLUSION

People with COVID-19 who were diabetic had a much higher mortality rate than those who weren't diabetics. Consequently,

diabetes patients must be taught about the dangers of infection-related hyperglycemia, the need of adhering to sick-day rules, and the effects of social isolation.

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