The Effect of Severity of Diabetes Mellitus on the Clinical Outcome of Patients Admitted with COVID-19 in a Tertiary Care Hospital

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Abstract

Objective: To determine the effect of the severity of diabetes mellitus on the outcome of diabetic people who had contracted the COVID-19 virus.

Method: This retrospective cross-sectional study was conducted from November 2020 to March 2021. 300 patients were confirmed cases of COVID-19 via RT-PCR. Demographic, clinical lab data, and outcome were collected and analyzed using SPSSv20.0 along with Chi Square.

Results: The average age of the participants was 56.95 12.856 years. Males made up the majority of our study's participants (60.7 percent). Diabetes (66.67%) was present in patients with moderate or mild disease (33.33%) and severe disease (33. 33%).Patients with mild to intermediate diabetes had an overall discharge rate of 80.8% and a death rate of 19.2%. Patients with severe diabetes were discharged at a rate of 58.7%, but 41.3% of them died as a result of their disease. 103 (66%) of the diabetics who had improved clinically maintained stable circumstances, compared to 53 (34%) of the diabetics who had stabilized.

Conclusion: In patients infected with COVID-19, uncontrolled hyperglycemia has a negative impact on the body's ability to fight infection. Patients with SARS-CoV-2 who are properly cared for and are taking appropriate medication may be able to keep their condition under control.

Keywords: diabetes mellitus, covid-19, mortality, hyperglycemia,

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Introduction

The new coronavirus, formerly known as the severe acute respiratory syndrome coronavirus-2, was given the designation "coronavirus disease 2019" (Covid-19) by the WHO in February of 2020. (SARS-Cov-2).[1] It was once thought that a unique coronavirus was to blame for an outbreak of pneumonia with an unknown source in China, but scientists found this on January 7, 2020. On March 11, 2020, the World Health Organization (WHO) proclaimed COVID-19 a pandemic.[2] The WHO reports that as of January 2, 2021, more than 82.5 million people had been infected by the COVID-19 virus, with 1,818,849 deaths. The number of confirmed cases in Pakistan was 482,178, with 10,176 deaths.[3]

Patients with COVID-19 exhibit a variety of symptoms, ranging from mild upper respiratory tract infections to severe pneumonia. Headaches, a loss of taste and smell, a fever, cough, body aches and shortness of breath are among the most common symptoms of COVID-19. Additionally, 5% of patients will experience a life-threatening condition characterized by multiple organ failure, respiratory failure, heart damage, and septic shock.[4] Covid 19's mortality and severity are influenced by a variety of circumstances. Many studies have shown a link between hypertension and the development of serious illness or mortality. Chronic renal disease, chro-

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nic pulmonary disease, diabetes, cerebrovascular accidents, and smoking have all been connected.[5] According to one study, more patients admitted to the ICU with known comorbidities were admitted to the ICU than those who were otherwise in perfect health.[6] Hypertension is the most common common co-morbidity among Covid-19 users, followed by diabetes. Generally, patients with diabetes are susceptible to more infections and hospital admissions, and a similar tendency has been reported in diabetics who have been infected with the COVID-19 virus.[7] Several studies have found that more than one-fifth of COVID-19 diabetics have severe or critical illness.[7] A patient with COVID-19 must have their blood sugar under control at all times. Studying SARS and influenza H1N1 has shown that poor glycemic control can lead to serious consequences and even death, but the data on COVID-19's blood glucose levels are scarce.[8] A study also showed that COVID-19 might increase the blood sugar levels of people whose blood sugar levels were otherwise within the usual limit.[9] Diabetes mellitus plays an important part in determining a patient's prognosis. It is imperative that this function be well understood in order to maintain a healthy blood sugar level. Patients infected with the COVID-19 virus had varied outcomes based on the severity of their disease.

Our aim was to determine the effect of the severity of diabetes mellitus on the outcome of diabetic people who had contracted the COVID-19 virus.

Methods

This retrospective cross-sectional study was conducted at a tertiary care hospital in Hazara Division. The total sample size collected was 300 patients during the time frame of November 2020 to March 2021. RT-PCR was used to confirm the cases of coronavirus infection. Ethical approval was taken from the concerned department of Ayub Teaching Hospital. Confirmed COVID-19 cases were included in the study. Those with suspected COVID-19 infection but no laboratory confirmation was excluded from the study. Demographic, clinical lab data, and outcome (survival or death) were collected from patient records and recorded on self-designed Performa. Data was analysed via SPSSv20.0. The Chi square test was used to assess the significance between the severity of diabetes mellitus and COVID-19 patients. Patients with blood glucose levels between 180 and 190mg/dl were classified as having mild COVID symptoms, while those with blood glucose levels above 200 mg/dl were classified as having moderate to severe disease. Data was analysed via SPSSv20.0. The Chi square test was used to assess the significance between the severity of diabetes mellitus and COVID-19 patients.

Results

The study had 300 participants with a mean age of 56.95 +/-12.856. Table I shows that the male gender predominated in our study (60.7%). Out of the 300 patients, 156 (52%) had diabetes mellitus, almost one-third of them (36.6%) had hypertension as a comorbidity, and the rest (15.7%) had a history of IHD. Table 1 further shows that out of 300 patients, almost two-thirds of them (69%) got discharged while around one-third (31%) got expired.

Table 1: *Patient Demographics & Co-morbid*

Variable		n (%)
Gender	Male	182 (60.7)
	Female	118 (39.3)
Diabetic	Yes	156 (52)
	No	144 (48)
Hypertensive	Yes	110 (36.6)
	No	190 (63.3)
IHD	Yes	47 (15.7)
	No	253 (84.3)
Clinical outcome	Discharged	207 (69)
	Expired	93 (31)

Table 2: *Severity of Diabetes Mellitus in association with its outcome*

Variable			Clinical outcome?		P value
			Discharged	Expired	
severity of diabetes	mild to moderate	Number (n)	42	10	0.010
		Percentage (%)	80.8%	19.2%	
	Severe	Number (n)	61	43	
		Percentage (%)	58.7%	41.3%	

Table 3: *Clinical Outcome in patients of Diabetes Mellitus*

Variable			Clinical outcome?		P value
			Discharged	Expired	
Do you have Diabete	Yes	Number (n)	103	53	1.344
		Percentage (%)	66.0%	34.0%	
	No	Number (n)	104	40	
		Percentage (%)	72.2%	27.8%	

Those patients who had diabetes were divided into two categories: those with moderate or mild disease (33.33%) and those with severe disease (66.67%), as shown in table II. The clinical outcome of those who had mild to moderate diabetes mellitus was such that the majority

(80.8%) of patients were discharged, and fewer (19.2%) patients expired. More than half (58.7%) of the patients who had severe diabetes mellitus were discharged, while 41.3% expired. The statistical association between the severity of diabetes mellitus and the outcome of the disease was significant with a p value of 0.010.

Discussion

In this study, fewer than a quarter (27.2%) of patients without diabetes died after being discharged from the hospital, while the majority (72.2 percent) were in stable health. We discovered that more individuals with severe diabetes than those who had mild to moderate diabetes died, we discovered. Patients with mild to moderate diabetes, as opposed to those with severe diabetes, were discharged in greater numbers. As can be shown, diabetes severity has a significant impact on how well diabetics fare after contracting the COVID-19 virus.

There has been no other study to date that looked at the relationship between diabetes severity and clinical outcomes of the COVID-19. Therefore, ours is unique. However, our findings are in line with those of other research that has looked at this population. In a study by Fadini et al., patients with a mean blood glucose level of 192.6 88.2 mg/dl (a mild to moderate form of diabetes) were more likely to be discharged alive (56.1 percent) than to be dead. According to the same research, more patients (78.8%) with no diabetes were discharged than were euthanized.[10]

According to Bode B et al., severely diabetic patients (71.2 percent) were more likely to be released from the hospital alive than dead, with a mean blood glucose level of 115.6 mg/dl (28.8 percent), according to Bode B et al. The number of patients with no diabetes who were released alive was high (93.8 percent), while the number of patients who died was lower (6.2 percent), just as we found in our study.[11]

Diabetes and hyperglycemia cause a disorder known as "diabetic lung," which results in decreased lung capacity. Patients with hyperglycemia have a worse prognosis because of abnormalities in the lungs.[13] Coagulopathies and systemic inflammation caused by hyperglycemic pulmonary microangiopathy,[14–15] have been established as common risk factors for diabetic lung. Because Covid-19 causes systemic inflammation and coagulopathy, it stands to reason that hyperglycemia and Covid-19 clinical outcomes are linked.[17] Research from the United Arab Emirates demonstrates that uncontrolled hyperglycemia has a negative impact on COVID-19 patients. Complications are more likely in cases of newly diagnosed or previously undetected hyperglycemia. For patients in the hospital, optimising glycemia and screening for undetected diabetes may be particularly essential in the context of the COVID-19 pandemic.[17] The same may be said for an early pandemic study conducted in north India, which came to the same conclusion. Comorbidities such as diabetes, hypertension, cardiovascular disease (CAD), chronic kidney disease (CKD), and cancer are substantially associated with death in the COVID-19 infection. These patients' clinical results can be improved by early triaging and intensive treatment.[18]

There were many changes in the clinical profile of the COVID-19 patients in Karachi during their hospital stay, which affected their prognosis, according to a case series analysis. Tocilizumab, remdesivir, doxycycline, ivermectin, enoxaparin sodium, and steroids have been identified as prospective therapeutic alternatives for COV ID-19 because of their ability to alter disease severity and recovery rate.[19]

In elderly patients who already have serious and critical infections, COVID-19 infection is an even more serious concern. In diabetics, immunoresponse abnormalities play a crucial part in escalating the disease's severity. Diabetic patients may be more susceptible to COVI-19 if they have obesity, cardiovascular disease, and hypertension. [20]

Conclusion

In patients infected with COVID-19, uncontrolled hyperglycemia has a negative impact. Glycemic control in hospitalized patients is critical. Patients with SARS-CoV-2 who are properly cared for and are taking appropriate medication may be able to keep their condition under control.

Conflict of Interest *None*

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Authors Contribution

NJ: Conceptualization of Project
QMW: Data Collection
NTA : Literature Search
SAA, HM: Drafting, Revision
SA: Writing of Manuscript