Original Research Article

TO DETERMINE THE IMPACT OF TYPE-2 DIABETES MELLITUS ON THE OUTCOME AMONG PATIENTS HAVING COVID-19 AT PMC HOSPITAL NAWABSHAH.

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ABSTRACT

OBJECTIVE: To find out impact of type-2 diabetes mellitus T2DM on the outcome among patients having COVID-19 at PMC hospital Nawabshah. **STUDY DESIGN:** A single center observational study. **PLACE AND DURATION OF THE STUDY:** This study was conducted at PMC hospital NAWABSHAH from 1st June 2020 to 30th December 2020. **MATERIAL AND METHODS:** A total of 120 patients aged above 18 years and diagnosed as COVID-19 positive were included. Demographic details along with presenting features were recorded among all patients. Clinical examination, relevant laboratory investigations and radiological studies were done. Presence of T2DM was noted according to ADA diagnostic criteria. Qualitative data like gender, presenting complaints, comorbidities, complications and outcome were represented as frequency and percentages. Quantitative data like age was represented as mean and standard deviation. Impact of diabetes on the outcome was noted using chi square test. P-value$\leq$0.05 was taken as significant. **RESULTS:** Out of a total of 120 patients, 107 89.2% were male and 13 10.8% female. Overall, mean age was noted to be 44.56$\pm$15.57 years ranging between 18 to 78 years. Hypertension was the most frequent comorbidity followed by T2DM 30 25.0%. Complications were reported among 64 5.3% patients while acute lung injury or respiratory distress syndrome were the most frequent complication seen among 41 34.2% patients while septic shock was observed among 14 11.7%. Significant association of T2DM was noted with the mortality p=0.004. Increasing age was found to have significant relationship with mortality p=0.004. Male gender was also found to have significant relationship with mortality as 66.7% of T2DM patients who died were males p=0.004. **CONCLUSION:** Type-2 diabetes mellitus was to have significant association with mortality among COVID-19 infected patients. Increasing age and male gender were also noted to have signification relation mortality.

KEYWORDS: Type-2 diabetes mellitus, COVID-19, mortality, hypertension.

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INTRODUCTION

Corona is a highly disseminating viral disease imparted by severe acute respiratory syndrome coronavirus 2 SARS-COV-2.[1,2] On 18 March 2020, novel coronavirus COVID-19 patients had been registered in all over Pakistan.[3] In Asia, Pakistan is presently ranked 4th as confirmed number of COVID-19 infected cases, the second-largest number of confirmed cases in South Asia, coming after India.[4] As worldwide prevalence of diabetes is estimated to be around 9.3%,[5] it is not very surprising to note that diabetes has come out as one of the commonest comorbidity 2nd only to hypertension noted among people with COVID-19.[6] Individuals with type-2 diabetes mellitus T2DM are considered to have increased susceptibility to infections in general but also need to be hospitalized often.[7,8] Researchers have reported raised chances intensive care admissions and worse prognosis among patients of diabetes who contracted COVID-19.[9] Some researchers have already pointed out increased chances of death

in individuals accompanying diabetes with COVID-19.[10] Data from USA highlighted that out of 373 patients of COVID-19, 40.2% had diabetes while unadjusted odds ratio for poor outcome death was noted to be 2.31 95% CI: 1.34-4.00.[11] A study from Chinese city Wuhan evaluating COVID-19 found out that 24.9% were having diabetes with hazard ratio of 1.53 95% CI: 1.02-2.30.[6] On the other hand, a study from Italy estimated proportion of patients of diabetes to be 12.9% among COVID-19 affected patients.[12] Heterogeneity among different studies could be because of local variation regarding the prevalence of diabetes and differences in characteristics of people having diabetes in different parts of the world. Most studies lack data regarding outcomes among patients having diabetes and COVID-19 while its relation with other predisposing and demographic factors is yet to be explored fully. The present study was planned to find out impact of T2DM on the outcome among patients having COVID-19 at a tertiary care hospital of Pakistan.

MATERIAL and METHODS
This single center observational study was conducted at PMC hospital NAWABSHAH from 1st June 2020 to 30th December 2020.
Approval from "institutional ethics committee" was taken. Written consent was sought from all study participants. A total of 120 patients aged above 18 years and diagnosed as COVID-19 positive adopting either nasopharyngeal or oropharyngeal swab for real-time PCR were included. Demographic details along with presenting features were recorded among all patients. Clinical examination, relevant laboratory investigations and radiological studies were done. Patients with mild signs and symptoms were admitted to isolation portion allocated for COVID-19 patients in the ward while those with moderate to severe disease were admitted in the intensive care unit.

During the course of the patients stay, complications were monitored and managed as per institutional protocol. Patients who remained or turned asymptomatic were discharged for home isolation even in the absence of PCR negative. Criteria for discharge was 2 consecutive negative PCR for COVID-19. Presence of T2DM was noted according to ADA diagnostic criteria.[13] Outcome was recorded in the form of discharged to home or death.

SPSS version 26.0 was used for data analysis. Qualitative data like gender, presenting complaints, comorbidities, complications and outcome were represented as frequency and percentages. Quantitative data like age was represented as mean and standard deviation. Impact of diabetes on the outcome was noted using chi square test. P-value$\leq$0.05 was taken as significant.

RESULTS
Out of a total of 120 patients, 107 89.2% were male and 13 10.8% female. Overall, mean age was noted to be 44.56$\pm$15.57 years ranging between 18 to 78 years. Table 1 is showing characteristics of all the patients.

Table 1: Characteristics of patients n=120

Characteristics		Number %
Gender	Male	107 89.2%
	Female	13 10.8%
Age years	<30	24 20.0%
	30-44	37 30.8%
	45-59	30 25.0%
	60+	29 24.2%
History of Smoking		33 27.5%

Table 2 is showing frequency of chief presenting complaints and comorbidities. Fever was the most frequent chief presenting complaint noted among 75 62.5% patients followed by cough 55.0% and shortness of breath 60 50.0%. In terms of comorbid conditions, hypertension was the most frequent comorbidity followed by T2DM 30 25.0%.

Table 2: Frequency of Chief Presenting Complaints and Comorbidities n=120

Chief Presenting Complaint	Number %
Fever	75 62.5%
Fatigue	9 7.5%
Cough	66 55.0%
Shortness of Breath	60 50.0%
Chest Pain	3 2.5%
None	25 20.8%
Comorbidities	**Number %**
Asthma	12 10.0%
Hypertension	34 28.3%
Diabetes Mellitus	30 25.0%
Coronary Heart Disease	4 3.3%
Chronic Kidney Disease	1 0.8%
Chronic Liver Disease	2 1.7%

Complications were reported among 64 5.3% patients while acute lung injury or respiratory distress syndrome were the most frequent complication seen among 41 34.2% patients while septic shock was observed among 14 11.7%.

In terms of outcome, 103 85.8% patients were successfully discharged while death was reported in 17 14.2%. Among patients who died, septic shock and acute lung injury were the main complications causing death in 9 patients, 5 due acute lung injury, 2 due to diabetic ketoacidosis and 1 because of hyperosmolar hyperglycemic state. Table 3 is showing association of comorbidities with respect to outcome and significant association of T2DM was noted with the mortality p=0.004.

Table 3: Relationship of Outcome with regards to Comorbidities

Comorbidities	Outcome		P-Value
	Discharged n=103	Death n=17	
Asthma	11 10.7%	1 5.9%	0.541
Hypertension	28 27.2%	6 35.3%	0.492
Type-2 DM	21 20.4%	9 52.9%	0.004

Coronary Heart Disease	3 2.9%	1 5.9%	0.527
Chronic Kidney Disease	1 1.0%	0 0%	0.683
Chronic Liver Disease	1 1.0%	1 5.9%	0.143

Table 4 is highlighting relationship of characteristics of patients with T2DM and outcome. Survival was significantly better in younger age groups while increasing age was found to have significant relationship with mortality p=0.004. Male gender was also found to have significant relationship with mortality as 66.7% of T2DM who died were males p=0.004.

Table 4: Comparison of Gender and Age with respect to outcomes among Patients having COVID-19 and T2DM n=30

Characteristics		Outcome		P-Value
		Discharged n=21	Died n=9	
Age	<30	1 4.8%	0 0%	0.004
	30-44	5 23.8%	1 11.1%	
	45-59	5 23.8%	5 71.4%	
	60+	10 47.6%	3 33.3%	
Gender	Male	17 81.0%	6 66.7%	0.004
	Female	4 19.0%	3 33.3%	

DISCUSSION

Studies done globally have found COVID-19 to be infecting older population most frequently while most frequent comorbidity seems to be hypertension followed by diabetes and cardiovascular disorders.[13] We noted similar patterns as hypertension was the commonest comorbidity noted among 28.3% followed by T2DM in 25% patients. Fever, fatigue, dry cough, muscle pain and dyspnea are the most frequently described manifestations accompanying patients infected with COVID-19.[14,15] In this study, we noted fever 62.5%, cough 55.0% and shortness of breath 50.0% as the most frequently noted chief complaints. Some researchers have also presented gastrointestinal symptoms to form a major portion of presenting complaints among patients of COVID-19 but this was not very visible in this study.[16] Our findings are similar to those found in another local study from Karachi where they noted 83% of patients to have fever or dry cough 52% at the time of presentation.[17] In the present study, presence of T2DM was noted to have significant influence on the outcome. Patients with T2DM were noted to have significantly increased mortality as 52.9% of the patients who died had T2DM. A study from Wuhan China described significantly increased mortality rates among individuals with diabetes in comparison to those without diabetes 80% vs. 58%, p=0.005.[18] These observations suggest that presence of diabetes can significantly reduce the survival among COVI-19 patients. A study involving large set of data from the United Kingdom n>19000 suggested T2DM to be an independent and strong prognostic factor influencing outcome in the severe COVID-19 cases requiring critical care treatment.[19]

Data from neighboring Iran found 28.3% of COVID-19 deaths to have existence of diabetes while researchers also stated linkage of raised mortality rates among COVID-19 patients who had diabetes as well.[20] A meta-analysis evaluating diabetes as cause of mortality among COVID-19 patients suggested that diabetes is thought to play a major role contributing to mortality among hospitalized cases.[21] It is very important for all clinicians dealing COVID-19 hospitalized cases that they clearly understand factors contributing to poor prognosis. Information regarding clinical progression of COVID-19 among patients having diabetes is not clearly explained but whatever data is available, it is pointing towards significant role of diabetes in worsening the outcome among patients with diabetes. Further studies are required to highlight relationship of clinical as well as biochemical parameters affecting COVID-19 infected patients with diabetes which will help us in strategizing appropriate management strategies.

CONCLUSION

Type-2 diabetes mellitus was to have significant association with mortality among COVID-19 infected patients. Increasing age and male gender were also noted to have signification relation mortality. Optimization of blood glucose profile coupled with proper thrombotic complications prevention strategy should be routine practice along with respiratory support and specific treatment approach especially among male patients.

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