



## IMPACT OF DIABETES ON OUTCOME OF HOSPITALISED PATIENTS WITH COVID-19 PNEUMONIA: SINGLE CENTRE EXPERIENCE FROM NORTH INDIA.

### Endocrinology

<b>Dr. Rajeev Kasaliwal</b>	MBBS, MD, DM Assistant Professor Department Of Endocrinology Mahatma Gandhi Hospital & Medical College, Jaipur, Rajasthan.
<b>Dr Srishti Jain*</b>	MBBS, MD, FNB(CCM) Assistant Professor, Department Of Critical Care Mahatma Gandhi Hospital & Medical College, Jaipur, Rajasthan.*Corresponding Author
<b>Dr. Naveen Gupta</b>	MBBS, MD, DM Assistant Professor, Clinical Hematology Mahatma Gandhi Hospital & Medical College, Jaipur, Rajasthan.
<b>Dr Nimish Mathur</b>	Mahatma Gandhi Hospital & Medical college, Jaipur, Rajasthan.
<b>Dr. Ashish Jain</b>	MBBS, MD Director Critical Care Associate Professor, Respiratory Medicine Mahatma Gandhi Hospital & Medical college, Jaipur, Rajasthan.
<b>Dr. Puneet Rijhwani</b>	MBBS, MD Professor And Head Of The Department Department Of General Medicine Mahatma Gandhi Hospital & Medical College, Jaipur, Rajasthan.

### ABSTRACT

**Context:** Following rapid spread of COVID-19, WHO on March 11, 2020, declared COVID-19 a global pandemic. Diabetes is known to confer increased risk for various infections. Studies from outside India have shown more aggressive course of COVID 19 Pneumonia in diabetic patients. **Material and methods:** A retrospective observational study was carried out at Mahatma Gandhi Medical College and Hospital, Jaipur. Data from electronic medical records of seven thirty-one patient admitted from 15 October 2020 to 30 November 2020 were reviewed and analysed **Results:** Patients with diabetes had significantly higher need of oxygen therapy and ICU admission. No difference was observed in mortality rates in the two group of patients. **Conclusion:** Diabetes patients appear to be at higher risk of severe illness from COVID-19 than those without diabetes.

### KEYWORDS

Diabetes, COVID-19.

### INTRODUCTION

The novel coronavirus SARS-nCov2 pandemic initiated in Wuhan, China and has now engulfed all parts of the world. As of 31<sup>st</sup> December 2020 there have been more than 18 million documented infections and more than 1.8 million deaths from COVID 19. <sup>1</sup>The morbidity and mortality of the disease has been observed to be higher in patients with comorbid conditions, particularly diabetes, hypertension, obesity, coronary artery disease, malignancy etc. <sup>2</sup>India has been the second most affected country in terms of number of documented cases. Much younger demographic has been proposed as one of the reasons for a comparatively lower mortality in India. However, this advantage can get negated by a high prevalence of diabetes mellitus in the Indian population. Our study aims to assess the impact of diabetes mellitus on the outcomes in hospitalised Indian patients with COVID 19.

### Materials and methods

This was a single-centre retrospective observational study of 731 with COVID-19 pneumonia patients, admitted during the month of October and November 2020 to Mahatma Gandhi Hospital & Medical College, one of the major hospitals designated to provide medical care for COVID-19 patients in Rajasthan. Inclusion criteria were as follows: - Patients aged 18 or above, admitted to the hospital with COVID-19 pneumonia confirmed by positive RT PCR test. Retrospective review of electronic medical record was done for patients admitted from 1/5/2020 to 31/11/2020. Demographic and clinical data was collected and analysed. Patients were classified diabetic and nondiabetic as per presence or absence of past history of diabetes or HBA1C  $\geq 6.5$ . Prior approval from institutional ethics committee was obtained for the study. Data tabulation and analysis was done in MS Excel software. Chi square test was used for qualitative data and t-test was used for quantitative data.

### RESULTS

During the study duration, 767 patients were admitted at our hospital for COVID 19 illness. Data was incomplete for 36 patients and they were excluded and 731 patients were enrolled in the study; out of which 331 patients had pre-existing and/or recently diagnosed diabetes mellitus. The demographic data is presented in table 1. Median age of the study population was 60 years and males were more than twice the number of females. Nearly half of all patients had other comorbidities such as hypertension, coronary artery disease, chronic obstructive pulmonary disease, bronchial asthma, malignancy and

cerebrovascular disease. The prevalence of other comorbidities was significantly higher in diabetic patients as compared with non-diabetics.

Data on patient outcomes is presented in table-2. Patients with diabetes had significantly higher need of oxygen therapy, need of ICU stay. Covid 19 patient with diabetes also had greater requirement of ventilatory support (P value: NS). No difference was observed in mortality rates in the two group of patients. Subgrouping of diabetic patients as per age and HbA1c levels are presented in tables 3 and 4 respectively. When stratifying patients with diabetes mellitus according to age, we observed that diabetic patients with age > 65 years had numerically higher rate of oxygen requirement, need for ICU admission, need for mechanical ventilation as well as higher mortality rate. [ P Value: NS). When stratifying patients with diabetes mellitus according to HbA1c levels, patients with HBA1C > 7 % had significantly higher requirement of ventilatory support while oxygen requirement, need for ICU admission and mortality rate was only numerically high in this group compared to those with HBA1C < 7%.

### DISCUSSION

The COVID 19 pandemic has been the greatest threat to public health in nearly a century. The risk has been much more acute for the elderly and particularly those with pre-existing comorbidities. <sup>3</sup>India has the dubious distinction of being the diabetes capital of the world. At the same time, diabetic patients in India are much younger than those in the west. We observed a high proportion of diabetic patients in our study population as compared to previous studies. <sup>3,4,5,6,7</sup> This might be due to recruitment bias as only hospitalised patients were included in our stud. Patients with comorbidities like diabetes even with milder illness were more likely to get admission. The diabetic patients in our study population had a higher median age than non-diabetics but was still lower than previously reported studies. <sup>8</sup> The mean HbA1c values in the diabetic group was 7.9%, and almost half of the patients had HbA1C greater than 7.5% at the time of admission.

We observed that patients of COVID19 with diabetes were more likely to need oxygen therapy and requiring ICU stay. But we observed no increase in risk of death in this group. This is in contrast with literature previously reported <sup>3,4,5,6,7</sup> where diabetic patients have been observed to have higher risk for mortality with COVID 19. The reasons for this could be several. Our median age of diabetic patients is 63 years which

is lower than what is reported from the western world.<sup>8</sup> Overall mortality in our cohort was also lower compared to other earlier published studies. It may also explain the lesser difference in mortality rate in our study between diabetic and non-diabetic cohort.<sup>9,10,11</sup> Also, the result suffers from a selection bias as higher proportion of diabetics with mild disease were admitted as compared to those without comorbidities

The reasons why patients with diabetes are at a higher risk of severe and fatal COVID-19 are manifold. First of all, patients tend to be older and have associated comorbidities like hypertension, cardiovascular disease or kidney disease, all of which are factors associated with poor outcomes in COVID-19. Hyperglycaemia contributes to a systemic inflammatory state which can worsen the cytokine storm associated with severe COVID. Lastly, COVID related lung damage has been found to be partly due microvascular thrombosis, a condition which is precipitated and exacerbated in patients with diabetes.<sup>12</sup>

Our study has several limitations. It was a retrospective study involving only hospitalised patients leading to a recruitment bias. The patients were given the best care and treatment as per the discretion of the treating physicians, but that was not uniform as the understanding of the disease and treatment modalities are still evolving. The diabetic patients were older than the non-diabetic and that could have contributed to worse outcomes. Therefore, further well controlled studies with larger sample size are needed in future to establish an independent role of diabetes in COVID-19 as well as impact of glycaemic control.

**Table-1. Demographic data**

	All patients	Diabetic	Non-diabetic
n	731	331(45%)	400 (55%)
Median age (years)	60	63	57
M:F	2.6:1	2.3:1	2.88:1
HbA1c (mean)	7.1%	7.9%	5.75%
Other comorbidities*	364 (49.8%)	221 (66.8%)	143 (35.75%)
Duration of hospital stay (median days)	7 days	8 days	6 days

\*- Hypertension, Coronary artery disease, Chronic obstructive pulmonary disease, Bronchial asthma, Malignancy, Cerebrovascular disease

**Table 2: Outcomes of patients with COVID-19 based on diabetic versus Non-diabetic status**

O2 Therapy	DM (n=331)	Non-DM (n=400)	P value	Odds Ratio	95% CI
Yes	161	140	<0.0001	1.75	1.3-2.3
No	170	260			
ICU Stay	DM (n=331)	Non-DM (n=400)	P value	Odds Ratio	95% CI
Yes	111	92	0.0015	1.69	1.21-2.34
No	220	308			
Ventilator	DM (n=331)	Non-DM (n=400)	P value	Odds Ratio	95% CI
Yes	44	36	0.057	1.57	0.98-2.5
No	283	364			
Outcome	DM (n=331)	Non-DM (n=400)	P value	Odds Ratio	95% CI
Dead	34	32	0.28	1.32	0.79-2.18
Alive	297	368			

**Table 3: Subgroup analysis of diabetic patients with COVID-19 based on age**

O2 Therapy	Age<65 (n=175)	Age≥65 (n=156)	P value	Odds Ratio	95% CI
Yes	83	78	0.64	1.1	0.71-1.70
No	92	78			
ICU Stay	Age<65 (n=175)	Age≥65 (n=156)	P value	Odds Ratio	95% CI
Yes	55	56	0.54	1.22	0.77-1.92
No	120	100			
Ventilator	Age<65 (n=175)	Age≥65 (n=156)	P value	Odds Ratio	95% CI
Yes	20	26	0.17	1.55	0.83-2.90
No	155	130			

Outcome	Age<65 (n=175)	Age≥65 (n=156)	P value	Odds Ratio	95% CI
Dead	15	19	0.28	1.47	0.72-3.02
Alive	160	137			

**Table 4: Subgroup analysis of diabetic patients with COVID-19 based on Glycaemic Control**

O2 Therapy	HbA1c<7 (n=90)	HbA1c ≥7 (n=141)	P value	Odds Ratio	95% CI
Yes	38	70	0.27	1.349	0.79-2.3
no	52	71			
ICU Stay	HbA1c<7 (n=90)	HbA1c ≥7 (n=141)	P value	Odds Ratio	95% CI
Yes	25	44	0.579	1.18	0.65-2.11
No	65	97			
Ventilator	HbA1c<7 (n=90)	HbA1c ≥7 (n=141)	P value	Odds Ratio	95% CI
Yes	4	19	0.033	3.35	1.1-10.1
No	86	122			
Outcome	HbA1c<7 (n=90)	HbA1c ≥7 (n=141)	P value	Odds Ratio	95% CI
Dead	3	14	0.06	3.19	0.89-11.45
Alive	87	127			

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