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Role of HbA1c in the prognosis of the patients of Covid-19 in a tertiary health care centre in the periphery.

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Background & Method: *COVID19 has emerged as a global pandemic and a cause of death to a large number of people in many countries. Poor outcomes of corona virus disease 2019 (COVID19) have been linked to diabetes mellitus, but its relation to pre-infection glycaemic control is still unclear. The present study aims to find a relation between HbA1c levels at the time of admission and severity and outcome of COVID19 disease in a tertiary health centre in periphery in India.*

Our study was conducted at Index Medical College Hospital and Research Centre, Indore (Madhya Pradesh) from 15 July 2020 to 15 September 2020. Retrospective evaluation of treatment records of 62 patients was carried out who were admitted to our health care centre with a diagnosis of COVID-19. Association of HbA1c levels at admission was studied with the severity of the disease, need for ICU admission and the final outcome of treatment. Informed consents were taken from the patients prior to the admission itself.

Results: *Our study showed that 35/62 patients had normal HbA1c levels (<6.5) at the time of admission while 27/62 patients showed raised levels (>6.5). Patients with higher HBA1c levels were associated with increased disease severity, increased need for ICU admission as well as worse outcomes following treatment.*

Conclusion: *In conclusion, this study suggests that increased HbA1c levels are associated with increased severity as well as worsening outcomes in patients with COVID-19 disease. Attention should be paid to monitor HbA1c levels as a new prognostic marker for diagnosed Covid19 patients.*

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I. Introduction

Corona Virus Disease (COVID-19) is caused by Severe Acute Respiratory Syndrome Corona Virus 2 (SARS-CoV-2) with primary damage to lungs through immune mediated damage.(1) COVID19 has emerged as a global pandemic and a cause of death to a large number of people in many countries. COVID19 may manifest itself in a variety of clinical symptoms, ranging from mild (fever, myalgia, dry cough) to severe (acute respiratory distress, septic shock, multiorgan failure).(2) Poor outcomes of corona virus disease 2019 (COVID-19) have been linked to diabetes mellitus, but its relation to pre-infection glycemic control is still unclear. Several studies have indicated poor glycemic control during hospital stay as a risk factor for increased severity of COVID-19 disease and worse outcome.(3–9) Despite these, the relation between pre-hospitalization glycaemic control and the severity of disease remains unclear. The present study aims to find a relation between HbA1c levels at the time of admission and severity and outcome of COVID19 disease in a tertiary health center in periphery in India.

II. Materials And Methods

Aim of our study was "To Study Role of HbA1c in the prognosis of Covid-19 patients in a tertiary health care center in the periphery". This study was conducted at Index Medical College Hospital and Research Centre, Indore (Madhya Pradesh) from 15 July 2020 to 15 September 2020. Retrospective evaluation of treatment records of 62 patients was carried out who were admitted to our health care center with a diagnosis of COVID-19. Diagnosis of COVID-19 was based on the WHO Guidelines. HbA1c levels were calculated at the time of admission and severity of disease noted along with category of admission (ward / ICU). Any added co-morbidity was also noted along with the final outcome following treatment. Informed consent was taken for the study and inclusion criteria included all patients above 18 years of age diagnosed with COVID19 disease requiring admission to our facility.

Statistical Analysis

Categorical variables are expressed in terms of frequency and percentage, and were compared using the Chi-square test. The statistical analysis was carried out using SPSS software.

III. Results

Table No 01: Age Distribution

Age	No.	Percentage
18-30	13	20.96
31-45	19	30.64
46-60	15	24.19
61-75	14	22.58
More than 76	01	01.61

Table No 02: HbA1c Levels (at the time of admission)

HbA1c%	No.	Percentage
4-6.5	35	56.45
6.6-15	27	43.55

Table No 03: Discharge/Death

Discharge/Death	No.	Percentage	PValue
Discharge	25	40.32	0.01817
Death	20	32.27	
ICU	04	6.45	
Shift to ICU	06	9.67	
Stay	07	11.29	

In our study we found, maximum case in 31-45 age group (30.64%) followed by 46-60 age group (24.19%). The sample also showed a male predominance with 67.7 percent and 32.3 percent female patients.

35/62 patients had normal HbA1c levels (<6.5) at the time of admission while 27/62 patients showed raised levels (>6.5). It was noted that patients with higher HBA1c level at admission showed increased severity of disease with 25/27 patients being admitted to ICU due to the severity of disease and only 2/27 being admitted to ward. In contrast, 6/35 patients with normal HBA1c needed ICU admissions, out of which only 4 had associated comorbidities.

The outcome also showed significant association with HbA1c levels with 18/20 deaths occurring in patients with high HbA1c levels and only 2/20 in patients with low HbA1c levels. The need for prolonged stay was also lower in patients with low HbA1c levels.

Table No 04: Severity of Disease

Severity of Disease	No.	Percentage	P-Value
Mild	26	41.93	0.00039
Moderate	07	11.29	
Severe	29	46.78	

Table No 05: Covid ward / ICU

Severity of Disease	No.	Percentage	P-Value
ICU	34	54.83	0.97098
Ward	28	45.17	

IV. Discussion

In our study, we observed that COVID-19 patients with higher HbA1c level exhibited relatively higher level of severity. This was in concurrence with other studies conducted at different centres.[4,10] Previous studies have also found that in Severe Acute Respiratory Syndrome (SARS) patients, even those with mild symptoms had higher fasting blood glucose levels.[4,10,11] In our study, the HbA1c level of 27/62 patients was higher than normal (4.0–6.5%). There are some limitations in this study. First, it was a retrospective study and the bias caused by excluding the patients may have affected the results. Second, due to the limitation caused by the number of deaths, multi variant regression analysis could not be performed to determine whether the increase in HbA1c level was an independent risk factor for the death of COVID-19 patients. Third, after 3 years of follow-up of SARS patients, Yang et al. found that the fasting blood glucose, post prandial blood glucose, and insulin levels of the SARS group and their paired healthy non-SARS siblings were similar, suggesting that SARS-CoV2 related islet damage and insulin resistance is for a short duration.[12] Similarly, whether the increase in HBA1c level in COVID-19 patients is transient is also uncertain due to the short observation time; hence, further investigations are required. In conclusion, HbA1c is associated with inflammation, hypercoagulability, and low

SpO2 in COVID-19 patients and the mortality rate is higher in diabetic patients. Performing the HbA1c test after admission is helpful for assessing inflammation, hypercoagulability and prognosis.

V. Conclusions

In conclusion, this study suggests that increased HbA1c levels are associated with increased severity as well as worsening outcomes in patients with COVID-19 disease. Attention should be paid to monitor HbA1c levels as a new prognostic marker for diagnosed COVID-19 patients.

To summarize, admission HbA1c level is a key biomarker to stratify risk and guide the clinical management of COVID-19 patients, with or without known diabetes. Thus, it is essential that all COVID19 patients be screened upon admission so that early and appropriate treatment can be initiated as required. HbA1c also assists in identifying patients with newly diagnosed diabetes which area high-risk group, and should be closely monitored for the emergence of cardio-metabolic disorders in the long term.

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