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Original Research Article

The clinical features and prognosis of COVID-19 in diabetic patients

Ashok Kumar Behera[1], Saubhagya Chhotaray[2], Sabitri Beshra[3], Chhatray Marndi[1]*, Gopabandhu Patra[4]

[1]Department of General Medicine, Bhima Bhoi Medical College and Hospital, Balangir, Odisha, India
[2]Department of Emergency Medicine, Bhima Bhoi Medical College and Hospital, Balangir, Odisha, India
[3]Department of Pharmacology, Bhima Bhoi Medical College and Hospital, Balangir, Odisha, India
[4]Department of Orthopaedics, Bhima Bhoi Medical College and Hospital, Balangir, Odisha, India

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***Correspondence:**
Dr. Chhatray Marndi,
E-mail: ramdas07482@gmail.com

ABSTRACT

Background: It is well-recognized that uncontrolled glycemia reflects the severity and mortality rates of respiratory virus epidemics. The aim of the study was to report the features and course of therapy of diabetic individuals admitted to a tertiary care facility with COVID-19 infection. Additionally, we tried to assess how hyperglycemia affected the clinical results.
Methods: This study used observational methods to conduct a retrospective chart review of 125 cases from October 2021 to March 2022 at a single center.
Results: Males made up 94.6% of the 125 examined cases. Within the age range of 21 to 78 years, the study group's average age was 49.6±10.4 years. Of the patients, 66.4% had prior knowledge of diabetes. When compared to pre-existing diabetes individuals with the newly diagnosed diabetes individuals, the latter had a higher death rate (p=0.03) and needed mechanical breathing (p=0.02).
Conclusions: Hyperglycemia that is uncontrolled harms COVID-19-infected patients. There is an increased risk of hyperglycemia problems that have been discovered or unknown.to screen for cases of undiscovered diabetes in hospital patients, which may be especially relevant during the COVID-19 pandemic, optimal glycemia optimization is essential.

Keywords: Hyperglycemia, COVID-19, RT-PCR, Diabetes

INTRODUCTION

A sharp rise in the number of infected cases was brought on by the COVID-19 global outbreak in 2020.[1] Numerous investigations carried out in different countries have demonstrated that diabetes is a significant risk factor for the start of severe COVID-19 infection outcomes.[1-3]

It is necessary to voice concerns over the high rates of diabetes incidence and SARS-CoV-2 transmission. The severity and mortality of past respiratory virus epidemics, such as MERS-CoV, SARS-CoV, and the 2009 pandemic influenza (H1N1), have been reliably identified by uncontrolled glycemia.[4-6]

Diabetes and the severity of an infection are related in several ways. The acute inflammatory response can be brought on, worsened, or prolonged by hyperglycemia.[7] Additionally, it causes an imbalance between coagulation and fibrinolysis, which promotes a pro-coagulant state by blocking the fibrinolytic system and increasing clotting factor levels.[8]

Furthermore, it is believed that the islets of Langerhans contain ACE2 entrance receptors, which are used by SARS-CoV-2. These cells may be mild to severely damaged. This can lead to a variety of clinical conditions, such as diabetic ketoacidosis, which can be fatal, and benign hyperglycemia.[9] In the Middle East and Gulf

region, type 2 diabetes and prediabetes are common conditions. However, statistics for these regions could be more.[10]

Aim

The aim of the study was to use information from one of the tertiary care facilities to look into the connection between diabetes and COVID-19, which has seen a significant influx of patients since the pandemic's discovery in February 2020.

METHODS

Study design

This was an observational recursive study of adult diabetic individuals who were admitted between October 2021 and March 2022 at Bhima Bhoi Medical College and Hospital in Balangir, Odisha, India and who, following WHO interim recommendations, had a COVID-19 diagnosis confirmed in the laboratory using real-time polymerase chain reaction (RT-PCR) tests using swabs from the nose or throat. The acquired information was found in the patient's electronic health records.

Study population

Inclusion criteria

All adult patients diagnosed with COVID-19 infection and hyperglycemia (defined as known diabetes, prediabetes, or hyperglycemia present at index admission) who had been treated between October 2021 and March 2022 are included.

Exclusion criteria

Everyone who never had diabetes before was excluded (both new and elderly). Individuals with diabetes who are immunosuppressed, have an advanced stage of renal failure and are receiving dialysis, have a chronic lung Illness (bronchiectasis and pulmonary fibrosis), have liver cirrhosis, or neither of these conditions were also eliminated.

Study assessment

The main objective was to evaluate the impact of hyperglycemia on clinical outcomes and markers of disease severity. We evaluated both the length of hospital stay and the outcome (release or death). The following baseline data was collected for each patient: age, gender, BMI, smoking history, and the existence of additional comorbidities.

This study looked at the following laboratory indicators of illness severity: ferritin, D-dimer, lymphocyte count, lactate dehydrogenase, and C-reactive protein. Admitted patients must take these tests and extra questions as part of the hospital's COVID-19 program.

Upon presentation, every patient underwent an electrocardiogram, blood grouping, and chest radiograph (CXR) as mandated by the hospital's admissions protocol. Any patient with a known history of diabetes or a random plasma glucose reading of more than 140 mg/dL at admission was ordered to undergo an HbA1c. A recent diagnosis of diabetes was characterized as having an HbA1c>6.5% and no prior medical history of the illness.

Based on CXR results, the COVID-19 infection's severity was determined. Individuals with normal CXR but URTI symptoms and signs were classified as mildly infected. According to CXR, less than 50% of the lung parenchyma had moderate infections, while over 50% had severe infections.[11]

Based on their medical history of diabetes, there were two patient groups: those with a history of diabetes and those with a recent diagnosis (during the index stay). The discrepancies in the groups' performance were examined.

Statistical analysis

The mean±SD for average distribution data and the skewed data's median with interquartile range (IQR) were used when evaluating quantitative variables. The qualitative factors were categorized using a total number along with percentages. SPSS v20.0 was made available for statistical analysis and data entry by IBM Corp, USA, Armonk, N.Y. For continuous data with a standard distribution, the findings were analyzed using the Mann-Whitney and independent sample T-test (IST), and for qualitative variables, the $\chi 2$ test. The statistical significance was determined using a P value of less than 0.05.

RESULTS

94% of the 125 cases that were evaluated included men. The study group included individuals aged 21 to 78, with a mean age of 49.6±10.4 years. Sixty-four percent of the patients already had diabetes. 9.2% of the individuals had known ischemic heart disease, while 32% of the cases had hypertension. This cohort's mean BMI was 28.2±5.1 kg/m^2.Five days was the median number of symptoms before visiting the hospital (IQR: three to seven days). Within the study group, 49.2% of patients were hospitalized due to mild to moderate pneumonia, while 19.4% had mild COVID-19 without pneumonia-like symptoms. Of the sample, 31.6% had severe pneumonia at presentation. In 50% of the cases, patients received oxygen via nasal cannula, whereas 28% were treated with non-rebreather masks. Of the patients, 22% needed to have their mechanical ventilation managed. By the time the study was finished, 64.4% of patients were still inpatient, 14.8% had been transferred to other medical institutions, and 68.8% had been released to their homes. The

discharged patients had a median length of stay of 19 days (14.5-28). The following were the parameters of the laboratory: median ferritin: 885 (IQR, 458-1,494), median lactate dehydrogenase: 338 (IQR, 249-452), median C-reactive protein: 95 (IQR, 35-159), and median D-dimer: 0.88 [(IQR, 0.54-1.55), range 0.11-20]. Blood group O comprised the most significant percentage of patients (30.8%), while blood group AB was the least prevalent (8.8%). Individuals who had just received a diabetes diagnosis needed artificial breathing more frequently (p=0.002), and they also died more frequently (p=0.002). In the research group, there was a 10% death rate.

Patients with recently diagnosed diabetes required more mechanical breathing (p=0.002), and they also had a higher mortality rate (p=0.002). The comparative subgroup analysis is displayed in (Table 1).

Table 1: Analysis of subgroups depending on a history of diabetes.

Variables	Newly diagnosed (%)	Known diabetes (%)	P value
Severity of illness			
Mild illness with no pneumonia	11	22.9	0.053
Moderate illness with pneumonia	48.8	49.4	
Severe illness with severe pneumonia	39.3	27.7	
Mechanical ventilation			
Required	29.8	18.1	0.002
Not required	70.2	89.9	
Outcome			
Deceased	16.7	6.6	0.002

DISCUSSION

With an average age of 49, the 125 patients in our sample are primarily male. Compared to data from other nations, the comparatively young age indicates the demographic trends in our community.[12-15] It is not unexpected that the patients are in the working age range, given that the community primarily comprises migrant expats.

In a patient with a respiratory illness, additional variables could exacerbate their pre-existing hyperglycemic condition. This includes employing steroids, especially if taken for a long time and ceasing glucose sensitizers in patients who have considerable insulin resistance. Conversely, the co-occurrence of obesity, metabolic syndrome, and diabetes deleterious lung function by reducing forced vital capacity and expiratory volume, affecting injured lung tissue's ability to heal from infections. Moreover, increased ectopic fat deposition raises the likelihood of severe illness by aggravating the immunological dysregulation that promotes the development of multi-organ failure and critical disease.[12] Unsettling data were uncovered by the first focused investigation on hospitalized individuals with COVID-19 and diabetes published in the journal Diabetologia in late May.[13] Within the first seven days of their admission, 10% of the research participants with diabetes passed away from the coronavirus. Moreover, 1 in 5 diabetics underwent mechanical ventilation and intubation in the same amount of time.[13] Relatively good glycemic management in a cohort of COVID-19 patients had lower morbidity and death, as Zhu et al reassuringly reported.[14]

In less than three months, our facility admitted a staggering number of COVID-19 cases with diabetes, primarily due to the higher incidence of diabetes in the Middle East and the elevated risk of hospitalization for these patients.[15] Of the patients in our sample, 66.4% had a diabetes diagnosis at admission, compared to about 33.6% who did not. A third of the patients in our region were unaware that they had diabetes as a co-occurring disease, which highlights the high number of undiagnosed cases.

Whether their diabetes was mainly brought on by COVID-19-related pancreatic damage or was only identified as a result of their infection is still up for debate. We plan to intensively monitor this patient subset to ascertain the course of their diabetes status and to keep an eye on their glycemic management. Out of the patients in the hospitalized group, 80.8% had moderate-to-severe sickness, whereas only 19.4% had mild illness without any pneumonia-like symptoms. To create room for more severe cases and mild cases, those who did not require oxygen were moved to hospital temporary isolation units. Of the patients admitted to the hospital, 22% needed mechanical ventilation.

Despite studies indicating that those with blood type O have a much lower risk of catching COVID-19, blood group O was the most common blood type in our population.[15] The research doesn't have any conclusive evidence that blood type increases the likelihood of COVID-19 infection-related problems.

Limitations

There are different limits to our investigation. First, as the information was gathered from just one Bhima Bhoi Medical College and Hospital location in Balangir, Odisha, India it could only partially be representative of the population. Additionally, as the epidemic spread and the likelihood of our hospital facilities being overrun grew, the government moved quickly to set up temporary institutions, to which significant mild cases were moved.

CONCLUSION

This study highlights the complex interplay between diabetes patients and COVID-19. Every healthcare system must give this considerable thought. Because diabetic populations are already at risk for both acute and long-term problems, extra care must be given to them. There is an increased risk of serious illness with newly diagnosed hyperglycemia. To identify untreated instances, our study highlights the need for public health surveillance to optimize glycemia in hospitalized patients.

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