

Association of Diabetes Mellitus with Covid 19, Their Risk, Mortality and Management

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ABSTRACT: We hope to cover the majority of the current research on the relationship between diabetes and COVID 19 infection, risk, mortality, and the role of an antidiabetic medication in diabetes patients. Utilizing a database, we examined the most recent data on COVID 19 and diabetes mellitus. We talked about the latest proof of diabetes mellitus and Coronavirus with respect to take a chance with factors, mortality and the board. In COVID 19 infected patients, diabetes mellitus is linked to a significant risk of complications, prolonged hospitalization, and death.

KEYWORDS: Diabetes, Covid19, Risk, Mortality, Management, Pathophysiology.

I. INTRODUCTION

A well-known risk factor for poorer clinical outcomes in individuals with Corona virus Disease 2019 (COVID-19) is diabetes mellitus. As of May 14, 2020, the COVID-19 pandemic produced by the SARS-CoV-2 virus had infected more than 4.2 million individuals and resulted in close to 300,000 fatalities worldwide [1]. Patients with diabetes mellitus have experienced major blood glucose control issues as a result of the current COVID-19 epidemic. Direct impacts (those directly connected to the viral infection) and indirect effects can be used to categorize the outcomes of this effect (those related to the impact of the pandemic on the management of blood glucose or the use of proposed treatments for the infection that also affect glucose homeostasis). The COVID-19 infection has a direct impact on patients' metabolism, leading to noticeable rises in blood glucose. Inflammatory mediators and cytokines were released more often, which enhanced insulin resistance and the resulting hyperglycemia [2]. Moreover, it has been hypothesized that COVID-19, which targets ACE2 receptors in pancreatic islets and causes pancreatic

damage, may contribute to the development of acute diabetes mellitus in some patients [3].

Those with diabetes have a much higher risk of both severity and death, according to studies in patients with the COVID-19 pandemic. This risk is further exacerbated by higher mortality with increasing age and body mass index. The purpose of this paper is to present a narrative evaluation of the pertinent research in order to determine the risk, severity, and mortality relationships between diabetes and COVID-19. We also examined the association between glycolic control and COVID-19's severity and mortality, and we placed the effects of anti-diabetes medications into perspective.

1.1 PATHOPHYSIOLOGY OF COVID 19 AND DIABETES MELLITUS

COVID-19 infection predisposes infected individuals to hyperglycemia, which leads to hyperglycosylation of ACE2 and increased viral replication. [4]. Exacerbation of hyperglycemia induces inflammation, endothelial dysfunction and thrombosis, producing oxidative stress that further impairs glucose metabolism and hypercoagulation [5].

DM is considered the equivalent of vasculopathy, as both macro- and micro vascular damage is associated with disease progression. . Chronic hyperglycemia and insulin resistance promote vasculopathy through different mechanisms. These include abnormal AGE-RAGE signaling and oxidative damage. Increased formation of advanced glycation end products (AGE) and activation of receptors for advanced glycation end products (RAGE) in the AGE-RAGE axis can accelerate vascular damage [6].

Changes in innate and adaptive immunity, including abnormal cytokine responses, inhibition of Leukocyte proliferation and neutrophil dysfunction also result from chronic hyperglycemia

[7]. Complications of chronic hyperglycemia are increased in acute viral infections, as activated immune responses can promote systemic insulin resistance and exacerbation of hyperglycemia [8]. Severe progression of COVID-19 is associated with significantly elevated blood glucose levels [9]. In the context of co-infection with SARS-CoV-2 and DM, blood glucose monitoring has more predictive value than hemoglobin A1c (HbA1c) in these patients to monitor worsening hyperglycemia. These findings suggest that worsening hyperglycemia occurs acutely and may cause rapid clinical deterioration in patients with preexisting vasculopathy and endothelial dysfunction. [10].

II. RISK AND MORTALITY IN PATIENTS WITH DM AND COVID 19

2.1 RISK OF COVID 19 IN PATIENTS WITH DIABETES

Huang et al.'s case series of 41 COVID-19-infected patients is the first of its kind in China. [11] reported a diabetes prevalence of nearly 20%, while subsequent retrospective Chinese studies [12][13] reported a diabetes prevalence of 7–21%. Guan et al. [From China's larger case-series (n = 1099)[14] reported a diabetes prevalence of nearly 7%, while the largest reported database from the Chinese Center for Disease Control and Prevention (CCDC) (n = 20,982) showed a diabetes prevalence of approximately 5% among COVID-19 patients [15]. According to data from 122,653 COVID-19 cases, diabetes was the most common comorbidity in about 10% of the 7162 patients with comorbidities [16]. Grasselli and others [17] found that among the 1043 COVID-19 patients with comorbidities from Lombardy, Italy, diabetes was present at around 17%. Uncompliance with diabetes was found in 19% of 16,749 COVID-19 cases, according to prospective observational data from the United Kingdom [18]. The most recent Spanish study, which included data from 121,263 COVID-19 patients, found a 10% prevalence of diabetes [19]. Bello-Chavolla and others reported a diabetes prevalence of nearly 18% among 15,529 Mexican cases [20]. .

2.2 MORTALITY IN PATIENTS WITH COVID 19

DM patients are known to have a substantially higher cumulative mortality rate, primarily due to cardiovascular and renal disease. DM is also associated with the prognosis of previously SARS-infected patients associated with poorly diagnosed related cytokines such as

interleukin-6 (IL-6) were found to be higher in DM COVID-19 patients, and DM_COVID-19 suggest the presence of an underlying pro-inflammatory environment as a mechanism that exacerbates patient outcomes. An association with an increased risk of death from acute severe respiratory infections in patients with diabetes mellitus has been widely reported, especially for acute respiratory syndrome caused by SARS-CoV-1 .

In the Mexican population, diabetes mellitus is the leading cause of morbidity and accounts for the majority of mortality risk. Her risk of death from COVID-19 in younger patients indicates that early-onset diabetes is a significant risk factor for death from her COVID-19 and higher severity of infection in younger patients [21].

Three meta-analyses examining mortality outcomes show a significant increase in mortality in diabetic patients with COVID-19, two- to three-fold higher than his. This meta-analysis by Roncon et al. [22] from pooled data, four studies found a significantly higher risk of death (OR 3.21; 95% CI 1.82–5.64).

III. CHOOSING ANTIDIABETIC DRUG DURING COVID 19

3.1 METFORMIN

Most people with type 2 diabetes who have oral hypoglycemia take metformin alone or in combination with other medications. Metformin is the first drug recommended for the treatment of type 2 diabetes. Metformin therapy may be associated with lactic acidosis. This is rare in the absence of other predisposing factors for lactic acidosis, but can occur in patients with renal dysfunction, severe infections, or sepsis [23]. Metformin can be continued in asymptomatic her COVID-19 patients or those with mild symptoms. However, metformin should be discontinued in patients hospitalized with severe COVID-19 infection because of the risk of lactic acidosis [24]. It was hypothesized that metformin may inhibit viral cell entry through activation of adenosine monophosphate (AMP)-activated protein kinase and the mammalian target of rapamycin (mTOR) signaling pathway. [25].

3.2 PIOGLITAZONE

Pioglitazone increases angiotensin-converting enzyme 2 (ACE-2) in rat tissues , leading to concerns that it may increase the severity

of COVID-19. Because ACE2 acts as a receptor for severe acute respiratory syndrome, the coronavirus 2 (SARS-CoV-2) enters cells. Wu et al. showed that pioglitazone could be a potent inhibitor of chymotrypsin-like protease 3, which is important for RNA synthesis and replication of SARS CoV-2, by virtual computer screening [26]. However, this claim requires both in vitro and in vivo validation. Diabetics infected with COVID-19 are at increased risk of developing cytokine storm. Pioglitazone inhibits the secretion of proinflammatory cytokines and thus can stop the cytokine storm .

3.3 SULFONYL UREAS

Sulfonylureas can cause hypoglycemia, so it is safer to limit their use in patients with severe COVID-19 whose oral intake is inadequate. In addition, simultaneous use of hydroxychloroquine may increase the risk of hypoglycemia [27].

3.4 DPP- 4 INHIBITORS

The role of DPP-4I in COVID-19 has resurfaced due to the link between DPP-4 and coronaviruses. Because DPP-4 acted as a functional receptor for MERS-CoV, it was thought that DPP-4I might protect against MERS-CoV infection. In an experimental study, certain DPP-4 polymorphisms were associated with a reduced risk of MERS-CoV infection. It has also been speculated that the presence of DPP-4 protective polymorphisms in Africans may explain the puzzling absence of MERS-CoV cases in Africa [28].

3.5 SGLT-2 INHIBITORS

SGLT2 inhibitors exert potent antiviral effects by decreasing intracellular pH while increasing lactate levels, potentially reducing viral load . Canagliflozin therapy, an SGLT2 inhibitor, can cause decreased levels of interleukin-6 (IL-6), which plays a key role in triggering cytokine release syndrome (CRS) in COVID-19 patients. The DARE-19 study is a recent study aimed at evaluating the role of her SGLT-2 inhibitor in non-critically ill patients hospitalized with COVID-19 infection. This study is a Phase III, double-blind, placebo-controlled study focused on evaluating the effects of dapagliflozin on complication rates and all-cause mortality in respiratory failure in COVID-19-infected patients. It's an exam. Patients with and without diabetes were included in the study.

3.6 INSULIN

Insulin therapy is preferred for hospitalized patients with moderate to severe COVID-19 disease. A basal plus bolus correction regimen with a blood glucose target range of 140–180 mg/dl is recommended for non-critically ill hospitalized patients. Severely COVID-19 diabetic patients in intensive care units will be treated with intravenous insulin infusions.

3.7GLP-1 RECEPTOR AGONIST

GLP-1 agonists can reduce water intake and also cause nausea and vomiting. Thus, GLP-1 agonist therapy is associated with an increased risk of dehydration and aspiration pneumonia . The use of GLP-1 agonists should be limited in patients with severe COVID-19. If GLP-1 agonists are administered to patients with COVID-19, they should be closely monitored and fluid intake should be adequate . GLP-1 agonists can have anti-inflammatory effects and attenuate lung inflammation in rats with respiratory syncytial virus (RSV) infection and experimental lung injury. Whether or not GLP-1 agonists have anti-inflammatory effects in patients with COVID-19 needs further evaluation and assessment.

3.8 EFFECT OF HYPERGLYCEMIA ON COMPLICATION OF COVID 19

Hyperglycemia is a known and established risk factor for mortality due to increased susceptibility to infections, primarily pneumonia. COVID-19 is characterized by pneumonia, which has killed more than 1.65 million people worldwide [29] According to a retrospective observational study of adult patients (n=184) with laboratory-confirmed COVID-19 and uncontrolled hyperglycemia (blood sugar). [BG] >180 mg/dL in any 24-hour period), mortality was 28.8% compared with 6.2% in patients without diabetes or hyperglycemia (n = 386, p and It; 0.001). In addition, 41.7% of patients with uncontrolled hyperglycemia and 14.8% of patients with diabetes died (p <0.001) [30].

IV. CONCLUSION

Although the studies and their meta-analyses found an increased prevalence of diabetes, the data still do not suggest an increased risk of contracting COVID-19 in people with diabetes. However, the available studies clearly suggest that patients with diabetes had a significantly higher severity of COVID-19, as well as a fold higher mortality, longer hospital stay and risk of

complications in patients with COVID-19 compared to non-diabetics cohorts. Data also suggest that poorly controlled diabetes or severe hyperglycemia (blood glucose >180 mg/dL or >10 mmol/L) has a significantly higher risk of severe COVID-19 and higher mortality compared to well-controlled patients with blood glucose (blood glucose level <180 mg/dl or <10 mmol/L). It is important to control blood sugar in patients infected with COVID-19. Every physician should aim to achieve a blood glucose goal of 180 mg/dl without causing hypoglycemia in most diabetic patients or severe hyperglycemia in COVID-19 patients. Although there are currently no comprehensive data on the role of diabetes medications in patients with COVID-19, it is not entirely clear from the available evidence whether any particular medication would have had beneficial or harmful effects in patients with diabetes.

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