COVID-19: Diabetes and Obesity
API-CP Recommendations

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BASIC
Nordic human corona virus (SARS-CoV-2) or Nordic human corona Virus (HCV), for the third time in last two decades has threatened to disrupt the planet. The current pandemic may already have claimed over 5 million people and infected 800 million people affected and case fatality rate of 10 % and 0.5% in 2021, Society, our medical system and our social system was overwhelmed. The 2016-2018 pandemic of SARS coronavirus has been virtually conquered successfully. However the fastest evolutionary rate virus is the coronavirus. This virus has shown highest mortality even more than heart disease and cancer in people with MODIC and diabetes. SARS-CoV-2 is a novel virus that is associated with the SARSCoV virus. SARS-CoV and SARS-CoV-2 are two different viruses. Both of SARS and SARS-CoV-2 have a risk factor associated with younger population especially in older people. SARS-CoV-2, a respiratory virus, can lead to severe pneumonia or acute respiratory distress syndrome (ARDS) requiring mechanical ventilation. Transgenic mice of a SARS model showed expression of DPP-4 receptor on the pulmonary alveolar cells. This model showed that SARS corona virus bound to DPP IV receptor being domain of the pulmonary alveolar cells and may have contributed to severe pneumonia in young people. Possibility based on this model assumption was made that diabetics get more pulmonary symptoms which many are severe. It also exhibited severe pulmonary inflammation and response and more severe disease. Even more so kills to 5-15 % of the world’s population. Non medical workers treated for COVID-19 is now above 1000000 and it is in an exces of 30000 to 600000 daily deaths. The current human corona virus is the 8th human corona virus known. There have been 12 coronaviruses known to be infecting humans usually in young people. Coronaviruses are in hands of all people in the world.

DIA-BETES
Incidence of infections is usually higher in patients with Diabetes compared to those without it. Diabetes also have more complications, more severe complications and are more common in obese people. Infection are common in diabetes. Diabetics have clear cut compromised immunity dysregulation. Diabetes and hyperglycemia leads to insulino toxic dysregulation, poor chemotaxis, defective macrophage monocyte function. There is also a group of people called diabetic ketoacidosis (DKA) who have excess ketones due to liver hyperglycemia. Polyfunctional macrophage dysfunction and reduced cytokine response. Mononuclear cells are also exposed to high glucose which affects p38 MAP kinases. This may also induce expression of class 1 MHC on surface of myocardial cells, impairing cell function. Cytokines may also induce expression of ACE2 which is domain of the pulmonary alveolar cells and may induce ACE2. This may increase ACE2 activity which may occur in hyperglycemia and which may increase the susceptibility to infections. A new term called hyperglycemia-induced dysregulation of the immune system has been proposed which may have power glycogen control especially if the HbA1c is above 5 % which harm the alveolar neutrophil function. The sudden rise in glycemia decreases the inflammation in this cell - T cells - leads to severe immune dysfunction. In severe COVID-19 patients had high levels of pro-inflammatory cytokines (IL-6, IL-10, IL-18, TNFα, IFNγ, TGFβ) and low levels of anti-inflammatory cytokines (IL-10, IL-4, IL-13). This suggests that although mortality outcomes of COVID-19 is higher in elderly, lower in children younger than 12 years. The mortality rate is highest if COVID-related pancreatitis exists and acuity data will give us clinical insights for hyperglycemia or its worsening.

DIABETES AND COVID-19
Types of Diabetes - Type 1, Type 2 or pre-diabetic or secondary, do not seem to be linked to the severity of COVID-19. Studies from China showed that among diabetes patients, 30.9% had Type 1 diabetes, 49.7% had Type 2 diabetes, 6.3% had gestational diabetes and 13.1% had secondary diabetes. There were different studies which showed that diabetes is the most common comorbidity reported in patients hospitalised with COVID-19, with studies from China showing that 24% of hospitalised patients had Type 2 diabetes and 17% had Type 1 diabetes. Other studies have also found similar results. However, it is important to note that these studies are observational and do not provide evidence that diabetes is the only cause of COVID-19 severity.

COVID-19 leads to a hypermetabolic state and lead to simple stress hyperglycemia which will alter outcomes. COVID-19 also can unmask latent diabetes mellitus (T2DM), diabetes associated complications, or pernicious conditions like acute pancreatitis. When diabetics are ill, counter regulatory hormones like corticosteroids, growth hormone, catecholamines can increase hepatic glucose production and reduce peripheral glucose uptake and cause hyperglycemia. In children with type 1 diabetes, it is more common to develop diabetic ketoacidosis (DKA) than in adults. DKA is a medical emergency that can cause serious complications like Diabetic ketoacidosis, lactic acidosis and Hyperosmolar hyperglycemic state. Hyperglycemia with ketosis can also be due to acute severe illness or surgery. Hyperglycemia during illness can cause wide fluctuations in the blood glucose levels and increased glycemic variability often leading to life threatening complications. Therefore diabetes and diabetic complications makes the already vulnerable COVID-19 patient even more vulnerable. In intensive care units (ICUs), diabetic ketoacidosis is high. In severe COVID-19 patients, ketosis (blood or urine) monitoring is a key to success. Therefore for diabetes patients in times of COVID-19 epidemic. Diabetes Metab Res Rev. 2020 Mar 19.10.1002/dmrr.3470. [Epub ahead of print].

COVID-19 in adults who are not being treated for diabetes and obese has higher concentrations of pro-inflammatory cytokines. Therefore diabetes and obese diabetes and diabetes prone individuals are at high risk for COVID-19. There are several recommendations for diabetes patients in times of COVID-19 epidemic. Diabetes Metab Res Rev. 2020 Mar 19.10.1002/dmrr.3470. [Epub ahead of print].

RECOMMENDED READING

MANAGEMENT AND SICK DAY MANAGEMENT
General guidelines to manage diabetes during an illness includes frequent monitoring of blood sugar, monitor for infections, know your medications, watch out for diabetic ketoacidosis.

• Diabetes has also been associated with severity of disease
• Diabetes is among the most common comorbidities observed in COVID-19
• Diabetes has also been associated with severity of disease
• Diabetes along with hypertension and coronary heart disease needs to be assessed and managed in COVID-19 patient.

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