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Review Article

Diabetes Management during the COVID-19 Pandemic: An Iranian Expert Opinion Statement

Mojtaba Malek, MD[1]; Farhad Hosseinpanah, MD[2]; Hamid Reza Aghaei Meybodi, MD[3]; Seyed Adel Jahed, MD[4]; Farzad Hadaegh, MD[5]; Sasan Sharghi, MD[3]; Alireza Esteghamati, MD[6]; Mohammad E. Khamseh, MD[7*]

[1]Research Center for Prevention of Cardiovascular Disease, Institute of Endocrinology & Metabolism, Iran University of Medical Sciences, Tehran, Iran

[2]Obesity Research Center, Research Institute for Endocrine Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran

[3]Endocrinology and Metabolism Research Institute (EMRI) Tehran University of Medical Sciences (TUMS), Tehran, Iran

[4]Gabric Diabetes Education Association, Tehran, Iran

[5]Prevention of Metabolic Disorders Research Center, Research Institute for Endocrine Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran

[6]Endocrine Research Center, Valiasr Hospital, Tehran University of Medical Sciences, Tehran, Iran

[7]Endocrine Research Center, Institute of Endocrinology and Metabolism, Iran University of Medical Sciences (IUMS), Tehran, Iran

Abstract

The coronavirus infection is an evolving pandemic with high morbidity and mortality, especially in people with comorbidities. The case fatality rate (CFR) is 9.2% in the presence of diabetes, while it is 1.4% in those without any comorbidity. Diabetes is a prevalent disease globally; hence, healthcare professionals are highly concerned about severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic progression. Current evidence does not support higher incidence of coronavirus disease 2019 (COVID-19) in people with diabetes (PWD). However, people with diabetes are considered high risk for developing complications. Optimal metabolic control is a challenging concept, especially in the presence of an acute and severe respiratory viral infection. In this consensus, we considered the challenging issues in management of patients with diabetes during the COVID-19 pandemic. The consensus covers various aspects of outpatient as well as inpatient care based on the current evidence.

Keywords: COVID-19, Diabetes management, Expert opinion

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Introduction

The coronavirus disease 2019 (COVID-19) infection was first identified in December 2019 in Wuhan, China. The World health organization (WHO) reported 2,883,603 confirmed cases and 198,842 confirmed deaths in 213 countries up to April 22, 2020.[1] The coronavirus infection is an evolving pandemic associated with high morbidity and mortality, especially in people with comorbidities. The highest mortality is reported among people over 80 years. Moreover, presence of comorbidities is associated with higher case fatality rates (CFRs). The CFR is 13.2%, 9.2%, and 8.4% in the presence of cardiovascular disease (CVD), diabetes, and hypertension, while it is 1.4% in those without any comorbidity.[2]

Diabetes is a prevalent disease globally; hence, healthcare professionals are highly concerned about severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic progression. Current evidence does not support higher incidence of COVID-19 in people with diabetes (PWD). However, the risk of complications and death is reported to be greater in PWD.[3-6]

The pathogenesis mechanisms describing the role of uncontrolled diabetes in prognosis of respiratory viral infections include high local glucose level in airway secretions that promotes viral replication,[7] suppression of antiviral immune response, and increased permeability of alveolar epithelium vasculature[8].

Therefore, glycemic control could improve clinical outcomes in patients with coexisting diabetes and COVID-19. However, appropriate metabolic control is a challenging concept, especially in the presence of an acute and severe respiratory viral infection. Furthermore, as diabetes is frequently associated with hypertension and CVD, one should also be mindful of optimally controlling other coexisting cardio-metabolic risk factors.

In this consensus, we considered the challenging issues in management of PWD during the COVID-19 infection. The consensus covers various aspects of outpatient as well as inpatient care based on the current evidence.

***Corresponding Author:** Mohammad Ebrahim Khamseh, MD; Endocrine Research Center, Institute of Endocrinology and Metabolism, No. 10, Firoozeh St., Valiasr Ave., Vali-asr Sq., Tehran Iran. Tel: +98-21-88945172, Fax: 98-21-88945173, Email: khamseh.m@iums.ac.ir.

Practical Recommendations for PWD without Symptoms and Signs Suggestive of COVID-19

General Preventive Measures

1. Instructions should be given about personal hygiene, hand washing, wearing face masks, and avoidance of touching face, nose, and eyes.
2. Patients should be asked to avoid unnecessary travel.
3. Patients are encouraged to participate in virtual and online visits in order to comply with the social distancing rules.
4. PWD should self-quarantine and self-monitor for 14 days, if they have been exposed to someone with the COVID-19 infection.
5. PWD should not take the responsibility of giving care to another family member (if it is possible) who is suspected of having the COVID-19 infection.
6. Newly diagnosed patients with diabetes should refer to the nearest health care center.
7. Self-quarantine provides a great opportunity to expand our knowledge on diabetes.

The following links would be useful for patients to find relevant information: https://idiapp.app.link/, http://gabric.ir/covid19/.

Specific Diabetes-Related Measures

Maintaining Good Glycemic Control

We recommend continuing current oral glucose lowering drugs (OGLDs)/ injectable therapy if glucose control is optimal. The risk of diabetes-related complications increases with fluctuation of blood glucose level. In addition, the risk of diabetic ketoacidosis/hyperosmolar state coma and hypoglycemia increases significantly in the presence of an acute severe respiratory tract infection. We suggest more frequent self-monitoring of blood glucose (SMBG) to maintain good glycemic control. However, the frequency of SMBG is determined based on type of diabetes and treatment protocol. More frequent monitoring should be considered in type 1 and type 2 diabetes mellitus (T2DM) on insulin therapy. The timing and intervals of SMBG need justification from the treating physician. Injection sites and finger-stick sites should be cleaned with soap or alcohol. Dry skin and finger cracking might occur due to using rubbing alcohol.

Healthy Life Style

Patients should receive instructions to drink adequate amount of fluids and do aerobic exercises while staying at home. The importance of adequate protein intake cannot be overemphasized. Moreover, smoking should be avoided, as the manifestations of the coronavirus infection are more severe in smokers.

Treatment of CVD Risk Factors

T2DM and hypertension coexist frequently. Hence, the usual anti-hypertensive medications should be continued. Considering lack of robust evidence against use of ACE inhibitors or angiotensin receptor blockers, they should be continued in patients with the COVID-19 infection. Furthermore, statins should be continued if indicated.

Diabetes and Fasting during Ramadan

Considering the pandemic of COVID-19, instructions on fasting during Ramadan should be highly individualized. Treating physicians should take into account important variables, namely age, glycemic control status, presence and severity of associated co-morbidities, and type of regimen for glycemic control, as discussed extensively in international resources.[9]

Supplements and Vitamins

Serum vitamin D concentration is generally low in many populations, especially in the elderly.[10, 11] Moreover, the reduced level of $1,25(OH)_2$ D affects the immune system. Also, vitamin D has a protective function in acute lung injury.[12,13]

Supplementing vitamin D-deficient individuals may boost the immune system to fight respiratory tract infection and reduce its severity, especially in people with associated co-morbidities. According to the joint statement of Iran Endocrine Society and Iranian Rheumatology Association, those who are taking monthly vitamin D supplements are suggested to continue their monthly 50,000-unit vitamin D. For those who were not taking vitamin D supplements, they recommend taking 50,000-unit vitamin D weekly for four consecutive weeks, followed by a monthly schedule.[14]

Telehealth during the COVID-19 Pandemic

The COVID-19 outbreak is a potential stimulus for our health care system to re-design the rules. Policymakers look for ways to ensure that patients can still access care while reducing the risk of coronavirus transmission. In this context, the healthcare system needs to develop new policies for telehealth services. Barriers to virtual care should be removed. Moreover, funding mechanisms need to adequately provide for the new situation.

Practical Recommendations for PWD with Uncomplicated COVID-19 Infection

Patients may suffer from symptoms such as fever, cough, sore throat, nasal congestion, malaise, and headache. The onset of symptoms is gradual. Although cough and fever are common, sore throat and runny nose are unusual. Dyspnea is a sign of disease severity.

How to Manage the Patients during Sick Days?

1. Patients should self-quarantine and self-monitor for 14 days at home. They should wear a surgical mask and be isolated in a separate area.
2. Suggest adequate hydration. If they have trouble keeping oral intake, smaller portions every 15 minutes

could help to avoid dehydration.

3. Self-quarantine interferes with the healthy life style frequently recommended for PWD. In this context, more frequent SMBG is reasonable. In type 1 diabetes, monitoring of blood glucose should be done optimally at least every four hours, including during the night. The frequency of SMBG in T2DM depends on the medications used to treat diabetes. People with type 2 diabetes who are taking oral glucose lowering drugs or basal insulin should monitor their blood glucose twice per day. Those on multiple daily injections of insulin should monitor blood glucose every four hours, the same as for type 1 diabetes. Persistently high or low glucose level is an indication for hospitalization.
4. OGLDs could be continued if patients could tolerate oral intake.
5. Metformin should be discontinued if dyspnea and high grade fever, and/or vomiting persists despite receiving supportive care.
6. In the presence of vomiting and loss of appetite, in order to prevent dehydration, we recommend against the use of sodium glucose transporter 2 inhibitors.
7. DPP4 inhibitors are reported to be well tolerated and can be continued, except in the presence of vomiting, abdominal pain, and oral feeding intolerance.
8. Considering the risk of blood glucose fluctuations, we recommend dose adjustment for sulfonylureas based on glucose profile. To reduce the risk of hypoglycemia, i.e. in the presence of vomiting and loss of appetite, discontinuing treatment is recommended.
9. To reduce the risk of hypoglycemia, we recommend switching glibenclamide to an acceptable alternative, namely gliclazide.
10. Thiazolidinediones could be continued except for those at risk of heart failure.
11. GLP1RA can be continued in clinically stable patients. It should be discontinued in the presence of nausea, vomiting, abdominal pain, or oral feeding intolerance.
12. For most patients, basal insulin is the best regimen for insulin initiation, if fasting glucose remains above goal despite optimal doses of OGLDs. Basal insulin analogues are safe and convenient as they are associated with lower risk of hypoglycemia.
13. Patients on insulin therapy should continue their treatment. Dose adjustment should be done based on SMBG diary.
14. Patients should be instructed about the warning symptoms of severe disease. Hospitalization is indicated for any of the following conditions: progressing dyspnea, ketone smell while breathing, altered consciousness, or persistently elevated blood glucose, i.e. BG >270 mg/dL.
15. To reduce the risk of transmission, patients are asked to take their own glucometer device, if hospitalization is necessary.

Treatment of Associated Co-morbidities

Blood pressure control is an essential part of managing diabetes. Angiotensin converting enzyme inhibitors (ACE-i) or Angiotensin Receptor Blockers (ARBs) are often recommended in patients with T2DM with hypertension, albuminuria, and/or CVD. At the present time, there is no evidence that these medications are associated with the risk of COVID-19 infection or its complications.[15] We recommend neither stopping nor changing any of these medications. However, for patients at risk of dehydration, discontinuation of diuretics should be considered. On the other hand, statins can usually be continued in most cases.[16]

If hydroxychloroquine is being used as an off-label treatment in patients with moderate to severe COVID-19 infection, clinicians should be cognizant of the risk of hypoglycemia. [4]

Practical Recommendations for PWD with Severe COVID-19 Infection

1. Fighting against COVID-19 is a multidisciplinary task. The multidisciplinary teams should comprise nutritionists, infectious disease specialists, diabetologists, and respiratory disease specialists.
2. As PWD have worse outcomes, HCPs should be notified to manage hyperglycemia strictly, even if the patient has not been diagnosed with diabetes.
3. Frequent SMBG is recommended based on disease severity, tolerance of oral intake, and level of consciousness.
4. Considering disease severity, OGLDs should be discontinued and either basal-bullous insulin regimen or insulin infusion is recommended. Insulin infusion is the method of choice for glycemic control in the ICU setting. We recommend against the sliding scale regimen.
5. Cardiac and renal functions need close monitoring, while the patient's condition remains critical. We recommend neither stopping nor changing ACE-I or ARBs.
6. Discharged patients should follow national rules on social isolation, self-care, and returning to work after COVID-19 illness.

Summary

The coronavirus infection is an evolving pandemic associated with increased morbidity and mortality, especially in PWD. Appropriate preventive practice and intervention strategies can reduce the risk of infection and its mortality.

General preventive measures including personal hygiene, hand washing, and wearing face masks should be followed by all patients. Diabetes-specific measures, namely adequate glycemic control, frequent SMBG, healthy life style, and treatment of associated comorbidities especially hypertension, cannot be overemphasized.

In patients with uncomplicated COVID-19, routine care should be continued. However, in the presence of severe disease, sick day rules should be applied.

Authors' Contribution

MM and MEK contributed substantially to the conception of the study and drafted the article. FH, HRAM, SAJ, FH, SS, and AE provided critical revision of the article. All authors provided final approval of the version to publish.

Conflict of Interest Disclosures

The authors declare that they have no conflicts of interest.

Ethical Statement

We reviewed current literature on diabetes management during COVID-19 pandemic and cited the related articles.

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