



# COVID-19, Diabetes and Ramadan

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Coronavirus disease 2019 (COVID-19) caused by the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) is a newly emerged disease that has become a global public health emergency and has led to the implementation of extraordinary public health measures throughout the world in a short space of time [1]. At the time of writing, over a quarter of a million deaths have been reported worldwide

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[2]. Diabetes is a more slowly evolving pandemic, causing 4.2 million deaths worldwide in 2019 [3]. It is estimated that there are currently around 425 million people living with the condition, and a further 352 million with high risk of diabetes from impaired glucose regulation [3].

Type 2 diabetes mellitus (T2DM) affects many Muslims across the world, and a significant number of Muslims with diabetes seek to fast during the month of Ramadan [4]. The fast requires, for those adult Muslims without religiously acknowledged mitigating circumstances (e.g. significant acute or chronic illness and old age), the abstinence from food and water from dawn to dusk, which in the UK, depending on geographical location, is currently between 16 and 19 hours in duration [5]. People with diabetes need to take special care during Ramadan

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as they risk dehydration, hypo- or hyperglycaemia and, if severe, potential physiological decompensation [6]. There are a number of evidence-based and very recent independent, national and international guidelines on the management of diabetes during Ramadan [7–9]. The present COVID-19 epidemic represents an additional concern for Muslim people with diabetes wishing to fast.

Muslims with any form of diabetes mellitus (DM), particularly T2DM, may be at significant risk of adverse outcomes of COVID-19 for three reasons. Firstly, it is now clear that the presence of T2DM and hypertension are amongst the strongest risk factors for severity of SARS-CoV-2 infection [10–12]. T2DM as a comorbidity is a significant risk factor for mortality, risk of admission to intensive care, or severity of respiratory disease. This was also seen with previous pandemics (SARS, Middle East respiratory syndrome [MERS], influenza A H1N1) which also showed that the presence of diabetes was an important risk marker for adverse outcomes [13, 14]. Secondly, the presence of central obesity, common amongst Muslim people with diabetes [15], increases risk of adverse outcomes of COVID-19 [16–18]. Thirdly, there is growing evidence that SARS-CoV-2 infections disproportionately affect people of a Black and Minority Ethnic (BAME) background, and many Muslims are from these high-risk ethnic groups [19, 20].

Therefore, the present pandemic may imply some additional risk for people of Muslim faith with diabetes who plan to fast. So how should they be advised during this period?

All guidelines suggest that people with diabetes who plan to fast should discuss their plan with a healthcare professional who can guide them on their risk [7–9]. Risk stratification is the cornerstone of advice for people with diabetes, and is based on their co-morbidities, current level of glucose control, and risk of adverse events. Further, recent novel informative guidance from the UK has provided similar advice for patients to include other chronic conditions (including general and relevant disease-specific guidance relating to COVID-19) [21]; at the time of publication, this has formal endorsement and signposting from respective

authoritative associations and bodies including respiratory, renal, gastroenterology, diabetes and as well as the Royal College of General Practitioners [22–26, 27]. People at high risk or very high risk of fasting should be discouraged from doing so and seek alternatives to fasting, particularly during the longer fasts in the summer. These alternatives include delaying fasting until the shorter fasting hours of winter [28], or if a perpetual reason debarring safe fasting exists, then arranging for the feeding of poor people (fidyah) [5, 8]. Patients may wish to speak to a trusted religious authority to discuss these options, if preferred.

Clearly if an individual insists on fasting, they should be supported to do so. Ideally, plans for fasting should be made at least 4–6 weeks before Ramadan, so that careful nutritional advice and medication adjustments can be made, in particular to therapy that may induce hypoglycaemia (insulin or sulfonylurea). The healthcare professional should discuss how they managed their fast the previous year and any changes to medication that were made that year. Attendance at Ramadan-focussed education classes has been proven to improve outcomes of fasting and reduce adverse events, and patients should be encouraged to attend if available [29]. People on medication that may induce hypoglycaemia (insulin or sulfonylureas) should be encouraged to monitor capillary blood or interstitial glucose levels regularly during fasting, and should be advised to break the fast if their glucose levels are below 4.0 mmol/l (5.0 mmol/l if on insulin or a sulfonylurea and driving is necessary) or above 16.7 mmol/l at any time during the fast [5, 8].

So how should advice for Muslims fasting during Ramadan differ this year compared to previous years? During the present COVID-19 pandemic, there is some concern that the risk of dehydration may increase the risk of adverse outcomes of the condition. There is evidence that acute kidney injury (AKI) can lead to significantly poorer outcomes in people with COVID-19 [30]. There is, however, no evidence that fasting or mild dehydration increases risk of developing COVID-19 [31]. Therefore, advice about fasting may be very similar to previous years, but tempered with clear and firm advice

about ceasing fasting immediately should the patient develop any symptoms of COVID-19, such as fever, cough, malaise, or diarrhoea [21, 31, 32]. The presence of anosmia should make an individual monitor their health very closely and they should cease from fasting immediately if any further deterioration in health is experienced, even if mild. One of these guidance documents suggests that fasting should cease immediately should anyone in the household develop COVID-19 symptoms [32]. However, our opinion is that if a person with diabetes is in the low/moderate risk category, if they have contact with people with COVID-19, it is probably safe for them to fast providing they can safely isolate and are asymptomatic, but that they should cease fasting should they develop recognised symptoms or become unwell [21, 31].

Furthermore, if a person with diabetes were to develop COVID-19 symptoms whilst fasting, they should be told to break the fast immediately, hydrate, monitor capillary blood glucose (CBG) regularly, and if becoming more unwell, they should be encouraged to have a plasma ketone check, as there is some evidence that ketosis, and ketoacidosis, is more common amongst people with diabetes and COVID-19 [33]. This particularly applies to patients on sodium glucose transporter 2 inhibitors (SGLT2i) which are rarely reported to cause euglycaemic ketoacidosis [34]. If a patient remains unwell with COVID-19 symptoms, they may require hospital admission as they are at high risk of deterioration. There is guidance to suggest that metformin and SGLT2i should be stopped in all patients with diabetes and suspected COVID-19 who require admission to hospital [35].

A further important point to consider is that recent data suggests that poor glucose control in people with diabetes appears to increase the risk of adverse outcomes of COVID-19 infection [36]. Therefore, improving glucose control in patients with diabetes at this time is important. There is some evidence to suggest that people with stronger religious faith may have better glucose control [27], in which case people with diabetes who fast may elicit some protection from adverse outcomes of COVID-19 infection.

In summary, during the COVID-19 pandemic, Muslims with diabetes who are planning to fast require careful evaluation of their risks of fasting. If they are at high risk of fasting, they should be discouraged from doing so. If they insist on continuing with fasting, then they should be supported to undertake this in the safest manner possible and strongly encouraged to cease fasting should they develop any symptoms of possible COVID-19, seek medical attention should their condition deteriorate, and only resume when well and have discussed this with their supervising clinician.

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