



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Contents available at ScienceDirect

Diabetes Research  
and Clinical Practicejournal homepage: [www.elsevier.com/locate/diabres](http://www.elsevier.com/locate/diabres)International  
Diabetes  
Federation

# The effect of COVID-19 on Ramadan fasting in people with diabetes in East London 2020: The East London diabetes in Ramadan survey

Halima Khan<sup>a</sup>, Aisha Chowdhury<sup>a</sup>, Shawarna S Lasker<sup>b</sup>, Tahseen A. Chowdhury<sup>a,\*</sup>

<sup>a</sup>Department of Diabetes and Metabolism, Royal London Hospital, London E1 1BB, UK

<sup>b</sup>Kings Medical Centre, Buckhurst Hill, Essex, UK

## ARTICLE INFO

### Article history:

Received 16 July 2020

Received in revised form

15 September 2020

Accepted 21 September 2020

Available online 28 September 2020

### Keywords:

Diabetes

Ramadan

Fasting

COVID-19

## ABSTRACT

**Aims:** Fasting during the COVID-19 crisis was challenging for Muslim people with diabetes during Ramadan. We aimed to survey the experiences of patients with Type 2 diabetes (T2D) during Ramadan 2020.

**Methods:** Telephone survey of Muslim patients with T2D in Tower Hamlets, London. Patients were surveyed on the effects of COVID-19 on their fast, discussions with a health-care professional (HCP) before Ramadan, whether they followed advice, number of fasts undertaken, medication changes and adverse events.

**Results:** 829 participated. 334 (40.2%) discussed fasting with a HCP; 198 (59.3%) were advised not to fast; 171 (86.3%) elected not to fast. 12 (1.4%) were admitted to hospital during Ramadan – one fasting related severe hypoglycaemia, one non-fasting cerebrovascular accident, and 10 (four fasting and six non-fasting) with COVID-19 symptoms. 34 (8.2%) patients in the fasting group developed COVID-19 symptoms before or during Ramadan; 30 (7.2%) in the non-fasting cohort. 311 (37.5%) patients said COVID-19 had significantly influenced their decision not to fast. Compared to Ramadan 2016, in Ramadan 2020 fewer people fasted (50.1% vs 55.4%), fewer people discussed fasting with a HCP (40.2% vs 52%), more patients who discussed fasting with their HCP were advised not to fast (59.3% vs 33.8%), and fewer patients fasted against medical advice (13.7% vs. 19.3%).

**Conclusions:** COVID-19 had an impact on people with diabetes and their fasting intentions during Ramadan 2020. Most people who were advised not to fast did not fast; there were few adverse outcomes from fasting. COVID-19 was not more common amongst people who fasted.

Crown Copyright © 2020 Published by Elsevier B.V. All rights reserved.

## 1. Introduction

Coronavirus disease 2019 (COVID-19) caused by the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), is a

global public health emergency, leading to over a million deaths worldwide [1]. Diabetes is a more slowly evolving pandemic, causing 4.2 million deaths worldwide in 2019 [2]. Type 2 diabetes (T2D) disproportionately affects Muslim communi-

\* Corresponding author at: Consultant in Diabetes, 7th Floor, John Harrison House, The Royal London Hospital, Whitechapel, London E1 1BB, UK.

E-mail address: [Tahseen.Chowdhury@nhs.net](mailto:Tahseen.Chowdhury@nhs.net) (T.A. Chowdhury).

<https://doi.org/10.1016/j.diabres.2020.108476>

0168-8227/Crown Copyright © 2020 Published by Elsevier B.V. All rights reserved.

ties across the world, with many Muslims with diabetes seeking to fast during the month of Ramadan [3]. Fasting during Ramadan is a requirement for all healthy adult Muslims, and entails complete abstinence from food and fluids during daylight hours. Islamic authorities state that health problems that are likely to worsen during fasting provide a clear exemption from fasting [4]. A number of high quality evidence based guidelines exist to enable health professionals to risk stratify Muslim people with diabetes, and on how to manage their diet and medication whilst fasting [5,6].

The COVID-19 epidemic represents an additional concern for Muslim people with diabetes wishing to fast for a number of reasons. Firstly, diabetes and central obesity, common amongst Muslim people, appears to be significant risk factor for adverse outcomes of COVID-19 [7–10]. T2D and obesity are independent risk factors for mortality or severity of respiratory disease. Secondly, people of Black, Asian and minority ethnic (BAME) background also appear to have poorer outcomes and higher mortality with SARS-CoV-2 infection [11].

Some guidance has suggested that Muslims with diabetes should be actively discouraged from fasting during the COVID-19 pandemic [12], whilst other guidance suggests that fasting is likely to be safe, and only to desist from fasting if COVID-19 symptoms develop, or a household member develops symptoms [13].

The aim of this study was to undertake a survey of patients with T2D in East London to determine the outcomes of their fast, and whether the COVID-19 pandemic had any impact on their intentions to fast or outcomes of fasting.

## 2. Methods

The London Borough of Tower Hamlets has a high prevalence of T2D, with over 18,000 patients registered on primary care systems. The area also has a high number of Muslim residents. We undertook a telephone survey of Muslim patients with exclusively T2D in Tower Hamlets. Patients were identified from primary care registers randomly, and surveyed during a four week period between May and June 2020, shortly after the end of Ramadan (23rd April – 23rd May 2020). Patients were surveyed in English or Bengali concerning their discussion of fasting with a health professional prior to Ramadan, whether they followed advice given, and whether the COVID-19 pandemic affected their decision to fast. They were asked whether they had suffered from symptoms of COVID-19 before or during Ramadan. If they had fasted, they were asked to recall how many fasts they had undertaken and whether they changed medication doses. They were asked about adverse events, including hypoglycaemia, attendance to accident and emergency, or admission to hospital for any reason. Differences in demographic characteristics between fasting and non-fasting patients were tested using chi-squared analysis.

## 3. Results

A total of 1121 people were contacted, and 829 (73.9%) agreed to participate in the survey. 414 (49.9%) were female. Median age was 53.4 years (26–85), and median diabetes duration

was 12.3 years (0.5–41). 72 (8.7%) patients were treated with diet alone, 518 (62.5%) oral antidiabetic therapy alone and 239 (28.8%) treated with insulin with or without tablets.

Of 829 patients surveyed 416 (50.2%) fasted at least one day of Ramadan. There were no differences in characteristics of patients who fasted, compared to non-fasters, although significant fewer patients on insulin fasted (Table 1). Of 416 patients who fasted, median number of days fasted was 20 (1–30). Most patients who fasted made changes to therapy (358 [86.0%]).

Of the 829 patients surveyed, 334 (40.1%) had discussed fasting with a health professional prior to Ramadan. Of these 334 patients, 198 (59.3%) were advised not to fast due to being at high risk of adverse effects. Compared to the 136 patients who had spoken with a health professional and been allowed to fast, those who were advised not to fast were significantly older, had significantly more treatment with insulin or had significantly more cardiovascular or renal disease compared to the 198 patients advised not to fast. Of 198 patients advised not to fast, 171 (86.3%) elected not to fast at all, whilst 17 patients elected to fast some days despite medical advice. Of the 17 patients who elected to fast despite medical advice, 10 of them were on insulin therapy, and the remaining were on oral therapy. Of these patients, three reported at least one episode of hypoglycaemia, none of which required third party assistance.

Amongst 416 patients who fasted at least one day during Ramadan, 12 (2.9%) patients reported at least one episode of hypoglycaemia, of whom three (0.7%) patients required third party assistance, one of who required hospital admission.

A total of 12 patients (1.4%) of the 829 surveyed were admitted to hospital during Ramadan. One patient was admitted with a fasting related severe hypoglycaemic event. This patient developed acute hypoglycaemia on day 11 of his fast, and required paramedic assistance, and a subsequent two day admission. He made a full recovery, and opted not to fast for the rest of the month. One non-fasting patient was admitted with a cerebrovascular accident, and 10 patients (four fasting and six non-fasting) were admitted with COVID-19 related symptoms (nine of who were confirmed COVID-19 positive), none of whom required intensive care. Of the four fasting patients in this group, one of them was previously advised not to fast by their HCP.

Regarding the effect of COVID-19 on intentions and outcomes of fasting, a total of 34 (8.2%) patients in the fasting group developed COVID-19 symptoms before or during Ramadan. 12 of those patients developed COVID-19 symptoms during Ramadan, all of whom ceased fasting as soon as they developed symptoms. In the non-fasting cohort, 30 (7.2%) developed COVID-19 symptoms.

On questioning the whole cohort about whether the COVID-19 pandemic had influenced their choice on whether or not to fast, 311 (37.5%) patients said it had significantly influenced their decision not to fast, although of these, 228 (73.3%) stated they would not have fasted anyway due to health related issues or guidance from their health care professional. Of the 198 patients advised not to fast by their health care professional, COVID-19 was cited as a reason not to fast in 56 (28.3%).

**Table 1 – Demographic characteristics of patients who fasted compared to patients who did not fast during Ramadan 2020.**

	Fasting Patients	Non-fasting Patients	P value
Number (%)	416 (50.1)	413 (49.8)	–
Female n (%)	200 (48.0)	214 (51.8)	NS
Age median (range) yrs	53.2 (28–85)	54.1 (26–83)	NS
Diabetes duration median (range) yrs	12.4 (0.5–41)	12.2 (1–41)	NS
Treatment regimen n (%)			
Diet only treated	35 (8.4)	37 (8.9)	NS
Oral hypoglycaemic only treated	280 (67.3)	238 (57.6)	<0.05
Insulin alone or with orals	101 (24.2)	138 (33.4)	<0.05
COVID-19 symptoms before or during Ramadan	34 (8.2%)	30 (7.2%)	NS

#### 4. Discussion

Fasting during Ramadan is challenging for people with diabetes, particularly those treated with medication that may induce hypoglycaemia (insulin or sulfonylureas). National and international guidelines suggest that people with diabetes who plan to fast should discuss their plan with a health care professional who can guide them on their risk [5,6]. 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. People at high risk or very high risk of fasting should be discouraged from doing so and seek alternatives, which might include delaying fasting until the shorter fasting hours of winter, or arranging for the feeding of poor people (fidyah). Ideally, plans for fasting should be made at least six weeks before Ramadan, so that nutrition and medication adjustment advice can be given. Ramadan focussed education classes have been shown to improve outcomes of fasting and reduce adverse events [14], and these have been run successfully in Tower Hamlets for many years [15].

Previous epidemiological studies of outcomes of Ramadan have shown that the main risk of fasting is that of hypoglycaemia. The EPIdemiology of DIAbetes and Ramadan (EPIDIAR) study surveyed over 13,000 patients with diabetes in 13 Muslim countries, showing that 79% of patients with T2D fasted during Ramadan, but the risk of severe hypoglycaemia increased 7.5 fold in patients with T2D (0.4 to 3 events per 100 persons per month) [16]. The CREED study reported a retrospective, observational survey of 3250 patients from 13 countries with T2D in 2010 [17]. They found that 39.3% of patients had treatment modified before Ramadan, 64% fasted everyday of Ramadan and 94.2% fasted for at least 15 days. 8.8% of patients reported at least one episode of hypoglycaemia, and 0.25% reported a diabetes related hospitalisation during the month.

Outcomes of the present study contrast significantly with those of our previous East London Diabetes in Ramadan Survey from 2016, surveying 718 patients [18]. This survey was done when Ramadan was at the height of summer in the UK, (June–July 2016) with duration of fast up to 20 h. Results showed that 55.4% of patients fasted during 2016, compared to 50.1% during Ramadan 2020 ( $p = 0.048$ ), despite the fast being two hours shorter 2020. In 2016, 52% of people had dis-

cussed fasting with a health professional, compared to only 40.2% in 2020 ( $p = 0.011$ ). In previous years, Ramadan focussed education was run in community settings for three months prior to Ramadan. These were completely cancelled due to the COVID-19 crisis and redeployment or self isolation of staff. In addition, access to primary healthcare professionals had also been curtailed during the period to predominantly an emergency or online only service. Furthermore, a number of patients stated that they had previously been advised not to fast by a health care professional and hence did not fast this year. More patients who discussed fasting with their healthcare professional were advised not to fast during Ramadan 2020 compared to Ramadan 2016 (59.3% vs 33.8%,  $p = 0.013$ ), perhaps due to the perceived higher risk of fasting during the COVID-19 crisis, particularly with the perceived risk of dehydration and potential acute kidney injury, which is a significant adverse risk marker in COVID-19 [19]. Fewer patients fasted against medical advice in 2020 compared to 2016 (13.7% vs. 19.3%,  $p = 0.037$ ).

More hospital admissions occurred during Ramadan 2020, although these were predominantly COVID-19 related rather than diabetes or hypoglycaemia related. This may reflect the fact that people with T2D are at higher risk of adverse outcomes from COVID-19. In our 2016 survey, no hospital admissions occurred amongst the 718 patients surveyed, whilst two non-COVID related admissions occurred in the 829 patients surveyed in 2020, which was a non-significant difference. In our cohort, no death occurred, although this is unsurprising as our patients were selected for telephone contact after the end of Ramadan. Another limitation of the study includes the fact that it was a retrospective survey, relying on patients memories of events over Ramadan.

In summary, we report a survey of outcomes of fasting amongst a large UK Muslim population with T2D during the COVID-19 pandemic. We found that fewer patients with diabetes fasted, compared to 2016, despite the fast being shorter duration. We also found fewer patients accessed healthcare professional advice prior to Ramadan compared to 2016, probably due to poorer access to advice. Admissions increased during Ramadan 2020, but predominantly for COVID-19 related problems rather than diabetes issues. Only a small number of patients fasted against medical advice, fewer than in 2016.

## 5. Funding sources

None

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## REFERENCES

- [1] Munster VJ, Koopmans M, van Doremalen N, van Riel D, de Wit E. A novel coronavirus emerging in China—key questions for impact assessment. *N Engl J Med*. 2020;382:692–4. <https://doi.org/10.1056/NEJMp2000929>.
- [2] <https://www.idf.org/e-library/epidemiology-research/diabetes-atlas/134-idf-diabetes-atlas-8th-edition.html>, Accessed 11.06.20
- [3] <https://www.idf.org/our-activities/education/diabetes-and-ramadan.html>, Accessed 11.06.20
- [4] Beshyah S. Fasting during the month of ramadan for people with diabetes: Medicine and fiqh united at last. *Ibnosina J Med Biomed Sci* 2009;1:58.
- [5] Hassanein M, Al-Arouj M, Hamdy O, Bebakar WMW, Jabbar A, Al-Madani A, et al. International Diabetes Federation (IDF), in collaboration with the Diabetes and Ramadan (DAR) International Alliance. Diabetes and Ramadan: Practical guidelines. *Diabet Res Clin Pract* 2017;126:303–16. <https://doi.org/10.1016/j.diabres.2017.03.003>.
- [6] Hanif W, Patel V, Ali SN, Karamat A, Saeed M, Hassanein M, et al. The South Asian Health Foundation (UK) Guidelines for Managing Diabetes during Ramadan. *Diabetes Res Clin Pract*. 2020;23:108145. <https://doi.org/10.1016/j.diabres.2020.108145>.
- [7] Yang J, Zheng Y, Gou X, et al. Prevalence of comorbidities in the novel Wuhan coronavirus (COVID-19) infection: a systematic review and meta-analysis. *Int J Infect Dis*. 2020. <https://doi.org/10.1016/j.ijid.2020.03.017>. pii: S1201-9712(20) 30136-3.
- [8] Zheng Z, Peng F, Xu B, Zhao J, Liu H, Peng J, et al. Risk factors of critical & mortal COVID-19 cases: A systematic literature review and meta-analysis. *J Infect*. 2020(20):30234–6. <https://doi.org/10.1016/j.jinf.2020.04.021>. S0163-4453(20)30234-6..
- [9] Li B, Yang J, Zhao F, et al. Prevalence and impact of cardiovascular metabolic diseases on COVID-19 in China. *Clin Res Cardiol*. 2020. <https://doi.org/10.1007/s00392-020-01626-9>.
- [10] Yang JK, Feng Y, Yuan MY, et al. Plasma glucose levels and diabetes are independent predictors for mortality and morbidity in patients with SARS. *Diabet Med*. 2006;23:623–8.
- [11] Khunti K, Singh AK, Pareek M, Hanif W. Is ethnicity linked to incidence or outcomes of covid-19?. *BMJ* 2020;20(369). <https://doi.org/10.1136/bmj.m1548>. <https://doi.org/10.1136/bmj.m1548> m1548.
- [12] <https://www.towerhamletsccg.nhs.uk/news/stay-healthy-and-fast-safely-during-ramadan/108412>, Accessed 11.06.20
- [13] Hanif S, Ali SN, Hassanein M, Khunti K, Hanif W. Managing People with Diabetes Fasting for Ramadan During the COVID-19 Pandemic: A South Asian Health Foundation Update. *Diabet Med*. 2020. <https://doi.org/10.1111/dme.14312>.
- [14] Bravis V, Hui E, Salih S, Mehar S, Hassanein M, Devendra D. Ramadan Education and Awareness in Diabetes (READ) programme for Muslims with Type 2 diabetes who fast during Ramadan. *Diabet Med*. 2010;27(3):327–31. <https://doi.org/10.1111/j.1464-5491.2010.02948.x>.
- [15] Chowdhury TA, Hussain HA, Hayes M. Models of good practice. An education class on diabetes self-management during Ramadan. *Practical Diabet* 2003;20(8):306–7.
- [16] Salti I, Benard E, Detournay B. A population-based study of diabetes and its characteristics during the fasting month of Ramadan in 13 countries: results of the epidemiology of diabetes and Ramadan 1422/2001 (EPIDIAR) study. *Diabet Care* 2004;27:2306–11.
- [17] Babineaux SM, Toaima D, Boye KS, Zagar A, Tahbaz A, Jabbar A, et al. Multi-country retrospective observational study of the management and outcomes of patients with Type 2 diabetes during Ramadan in 2010 (CREED). *Diabet Med* 2015;32(6):819–28. <https://doi.org/10.1111/dme.12685>.
- [18] Chowdhury A, Khan H, Lasker SS, Chowdhury TA. A survey of patients with type 2 diabetes and fasting outcomes during Ramadan 2016 in London, UK: The East London Diabetes in Ramadan Survey. *B J Diabet* 2017;17:149–51.
- [19] Pei G, Zhang Z, Peng J, Liu L, Zhang C, Yu C, et al. Xu G.J Renal Involvement and Early Prognosis in Patients with COVID-19 Pneumonia. *Am Soc Nephrol*. 2020. <https://doi.org/10.1681/ASN.2020030276>. ASN.2020030276.