Review Article

Glycemic variation in patients with diabetes fasting during Ramadan

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This observational study was done to assess the glycaemic variations among people with diabetes who follow fasting during the month of Ramadan, and try and understand the reason behind these variations. For 52 patients, who gave informed consent, the demographic data, along with their fasting glycaemic values were recorded; the prior (non-Ramadan) HbA1c including other biochemical data were collected from hospital database. The mean fasting blood glucose levels were 11.00±5.34 mmol/L. Though hypoglycaemia was expected, we found hyperglycaemia as a more common occurrence in the study. The mean prior (non-Ramadan) HbA1c available for 41 patients) was 8.7±2.3%. Pre-Ramadan assessment or HbA1c was not conducted in any of the patients. This study, though restricted to a single hospital, highlights the gap between guidelines, recommendations and its implementation in real world management of patients with diabetes during Ramadan fasting.

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Key words **: Ramadan, fasting, diabetes, glycaemic profile, hyperglycaemia, hypoglycaemia.**

- **Glycemic variation especially hyperglycemia is common during Ramadan.**
- **Development of comprehensive plan at national level is needed for the Ramadan focused management.**
- **Proper education about fasting, diet, exercise, and regular CBG monitoring is required.**
- **Assessment of preexisting complications with modification of treatment regime is essential to prevent complications.**

Ramadan, the ninth month of the lunar calendar, is a holy month for Muslims, where Muslims fast from dawn to sunset, with absolute self-refrainment from food, drinks, and sex. It is one of the five main pillars of Islam. While all healthy Muslims must observe the Ramadan fasts, Islam exempts certain people, including those with diabetes, from Ramadan fasting. Despite this, most people with diabetes insist on fasting in Ramadan, for various psychological and religious reasons[1]. Worldwide, over 50 million people with diabetes fast during Ramadan. The daily fasting, ranging from 14-18 hours, is particularly challenging in people with diabetes, due to high risk of acute metabolic complications[2].

Objective :

We conducted an observational study to audit the glycaemic variation among patients with diabetes who were fasting during Ramadan.

Methodology :

Royal Oman Police Hospital is a secondary care multispecialty hospital in Oman that caters to the Police force. This study was conducted at the outpatient department of General Practice (GP) in Royal Oman Police Hospital. Approval was taken from the Director General of Directorate of Medical Service and the core ethics team of Royal Oman Police Hospital.

Eligible subjects were Type 1 (T1DM) and Type 2 diabetes (T2DM) patients in age group of 21-70 years, who visited the GP clinic, and had been fasting during the ongoing month of Ramadan (17.06.2015 - 16.07.2015). An informed written consent was taken from patients who agreed to be included in the study, and their blood glucose along with other relevant information was recorded in a registry. Exclusion criteria was patients with diabetes not fasting, those with a history of complications such as diabetic ketoacidosis or severe hypoglycaemia prior to Ramadan, and pregnant women.

The data included demographic (age and sex) and medical parameters (such as type of diabetes, pre-Ramadan assessment, and medications such as oral antidiabetic agents and/or insulin), which was collected in a pre-set format of questionnaire. Other data like prior (non-Ramadan) HbA1c was collected from the hospital database.

Fasting was considered as no calorie intake for at least eight hours. Hypoglycaemia was defined as blood glucose ≤3.9 mmol/L or symptoms of hypoglycaemia, while hyperglycaemia was defined as blood glucose >11 mmol/L. An HbA1c of 7.0% was considered as normal. Data was

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analyzed for mean blood glucose levels (expressed as mean ± standard deviation), and percentage of patients with hypoglycaemia and hyperglycaemia were also determined.

Results :

Overall, 52 (n=52) patients were finally included in the study (mean age: 52±8.4 years), 28 (53.8%) of which were males and 24 females (46.2%). Patients had mainly visited the GP clinic for minor illnesses. Majority (n=51) of the patients had T2DM, while one patient had T1DM.

The glycaemic profile of the enrolled patients is presented in Table 1; and the distribution of blood glucose levels is shown in Fig 1. The mean blood glucose was 11.00±5.34mmol/L. Of the 52 patients, 32 (61.5%) had normal glycaemic levels. While hypoglycaemia is commonly expected in fasting states, only two patients (3.8%) in our study had hypoglycaemia. On the contrary, 18 patients (34.6%) had hyperglycaemia (Fig 1).

The prior (non-Ramadan) HbA1c data, obtained from their past medical records, were available for 41 patients; the mean HbA1c in these patients was 8.7±2.3%. Only 10 of these 41 patients had their prior (non-Ramadan) HbA1c ≤7.0%. However, none of the patients in the study had a Pre-Ramadan assessment or recent HbA1c (<3 months).

Discussion

Advances in Knowledge :

Despite the strong emphasis on the recommendations, guidelines and need for pre-Ramadan assessment, there is a huge gap between knowledge and its implementation. Recommendation by Diabetes and Ramadan group (DAR) and American Diabetes Association (ADA), South Asian Federation of Endocrine Society (SAFES) have been formulated, but still majority of patients in our study had not undergone any pre-Ramadan health education or assessment. This highlighted the need for local guidelines or implementation of international recommendation in the management of diabetes during Ramadan.

Contrary to the general notion of feared hypoglycaemia during Ramadan fasting, hyperglycaemia was more commonly noted in our study.

Table 1 — *Glycaemic profile of 52 patients included in the study*

Mean blood glucose levels :	
Overall (n=52)	11.00±5.34 mmol/L
Males (n=28)	10.51±5.2 mmol/L
Females (n=24)	11.58±5.6mmol/L
Distribution of glycemic levels :	
Normoglycaemia	32
Hypoglycaemia	2
Hyperglycaemia	18
Mean prior (non-Ramadan) HbA1c (n=41)	8.7±2.3%

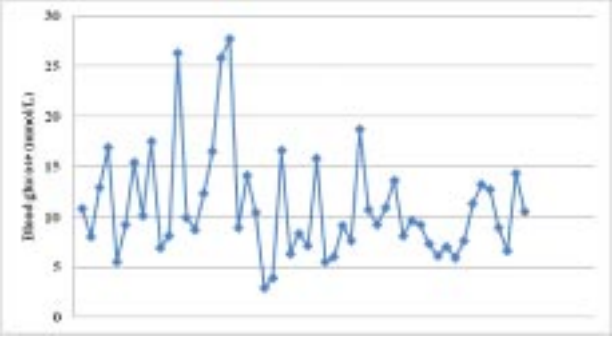

Fig 1 — Distribution of blood glucose levels in 52 patients

Application to Patient Care :

This small observational study highlights the glycemic variation of diabetic patients who fast during Ramadan and probable reason behind this. Better glycemic control during Ramadan can be achieved by creating a national consensus on management of diabetes patient fasting in Ramadan. Besides forming local guidelines or utilizing an International recommendation, there is an urgent need for awareness amongst the health care workers and patients regarding importance of pre-Ramadan health education and assessment.

A proactive patient education, focused on diet and lifestyle changes with glucose monitoring can help limit the glycaemic variability and prevent acute complication related to fasting during Ramadan and achieve long term stable glycemic profile after Ramadan.

This one-point small study, restricted to a single hospital, provides insight that while glycaemic variation is a common observation in diabetic people who fast in Ramadan, hyperglycaemia was more prevalent (35%) during Ramadan fasting. Although logic dictates that hypoglycemia is the expected presentation in Ramadan, facts showed otherwise.

The EPIDAR study stated that in people with T2DM, hospitalization due to hyperglycaemia during Ramadan fasting is 5 times higher than pre-Ramadan period[3]. Another study from Dhahira region in Oman reported poor glycaemic control during Ramadan, with an average fasting blood glucose of 10.4±3.7 mmol/L[4]. A higher incidence of hyperglycaemia might be attributed to the excessive reduction in the dosages of antidiabetic medications due to the fear of hypoglycemia[3]. Additionally, high consumption of calories due to overeating in the post-fasting period, called Iftar, may also contribute to hyperglycaemia[2].

It was also noted that none of the patients had pre-Ramadan assessment. A lack of pre-Ramadan counseling to patients and pre-Ramadan medication adjustment, may also have contributed to the high incidence of hyperglycaemia in our study. Pre-Ramadan advice by physicians, and further implementation of the suggestions, has been reported to vary across countries. According to a multi-country, retrospective, observational study on the

management and outcomes of patients with Type 2 diabetes during Ramadan in 2010 (CREED), almost all physicians (96.2%) reported providing fasting-specific advice to patients, and 62.6% physicians had used guidelines/recommendations for diabetes management during Ramadan fasting. In 39.3% of patients, the treatment regimens were modified before Ramadan[5]. The Ramadan Perspective Epidemiology and Education in Diabetes (RAPEED) study, conducted in Bangladesh, reported that more than half of the fasting people (60.6%) received physicians advice for Ramadan fasting and changed diabetes medication (69.90%) during Ramadan[6]. Another study from Dammam, Saudi Arabia, demonstrated that only 30% of the patients with diabetes had received pre-Ramadan education delivered by physicians/diabetes educators[7].

This audit highlights the need for developing a comprehensive plan to emphasize pre-Ramadan assessment and providing infrastructure for the Ramadan focused management. The International Diabetes Federation (IDF) and Diabetes and Ramadan (DAR) International Alliance have jointly published practical guidelines for diabetes management in Ramadan. These guidelines recommend that all patients with diabetes, who wish to fast during Ramadan, should have a pre-Ramadan assessment, ideally 6-8 weeks before Ramadan. Accordingly, the physician can develop a Ramadan management plan for individual patients, based on their medical history, glycaemic control, risk stratification, and self-management capabilities[8]. The South Asian Consensus Guidelines on use of Insulin in diabetes during Ramadan has simplified the use of Insulin during Ramadan with the intention of providing appropriate insulin cover during fasting and post-prandial phase[9]. The National Institute for Health and Clinical Excellence has approved Ramadan Education and Awareness in Diabetes (READ) program in the United Kingdom, provides structured education to patients with T2DM who want to fast in Ramadan. Accordingly, a significant reduction in hypoglycemic events has been noted in those who received educational advice, compared with those who did not[10].

Since dietary advice is also critically important during Ramadan, tools like Ramadan Nutrition Plan should be utilized by patients and physicians to help deliver patient-specific medical nutrition therapy during Ramadan fasting[11].

Conclusions :

This small, single center audit gives an insight that glycemic variation is not an uncommon observation in patients with diabetes who fast during Ramadan. Hyperglycemia appeared to be more a common presentation in these patients. This paper raises the awareness of a particularly important issue in relation to the management of diabetes mellitus during Ramadan and the need for developing a comprehensive plan at national level that should include educating the health care provider and providing infrastructure for the Ramadan focused management. A Pre-Ramadan assessment with specific patient education about diet, exercise is needed. The assessment should include any pre-existing complications, and lastly modification of treatment regime in line with the guidelines to prevent complications like hypoglycemia, hyperglycemia, dehydration and weight gain during Ramadan.

Conflict of Interest :

No conflict of Interest. There is no funding to declare.

References

1 Elmehdawi R, Ehmida M, Elmagrehi H — Incidence of diabetic ketoacidosis during Ramadan fasting in Bengzahi-Libya. *Oman Med J* 2009; **24:** 99-102.

2 Raveendran AV, Zargar AH — Diabetes control during Ramadan fasting. *Cleve Clin J Med* 2017; **84:** 352–56.

3 Salti I, Benard E, Detournay B, Bianchi-Biscay M, Le Brigand C, Voinet C, *et al* — 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. *Diabetes Care* 2004; **27:** 2306-11.

4 Patel P, Mirakhur A, El-MagdKMA, El-MattyANB, Al-Ghafri D — Type 2 diabetes and its characteristics during Ramadan in Dhahira region, Oman. *Oman Med J* 2007; **22:** 16-23.

5 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:** 819-28.

6 Siddiqui NI, Kamrul-Hasan M, Hossain MA, Chanda PK, Bakar MA, Rahman M, et al — Ramadan Prespective Epidemiology and Education in Diabetes (RAPEED) Study. *Myemensingh Med J* 2017; **26:** 256-65.

7 Al-Musally RM, Al-Sardi MA, Al-ElqZA, Elahi AH, AlduhailanRK, Al-Elq MA, *et al* — Health education to diabetic patients before the start of Ramadan: Experience from a teaching hospital in Dammam. *J Family Community Med* 2017; **24:** 111-7.

8 Hassanein M, Al-Arouj M, Hamdy O, BebakarWMW, Jabbar A, Al-Madani A, *et al* — Diabetes and Ramadan: Practical guidelines. *Diabetes Res Clin Pract* 2017; **126:** 303-16.

9 Pathan MF, Sahay RK, Zargar AH — South Asian Consensus Guideline: Use of insulin in diabetes during Ramadan. *Indian Journal of Endocrinology and Metabolism* 2012; **16:** 499-502. doi:10.4103/2230-8210.97992.

10 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. *Diabetes Med* 2010; **27:** 327-31.

11 DAR International Alliance — Ramadan Nutrition Plan. Available from: http://www.daralliance.org/daralliance/. Accessed on 14 Sep 2017.