



Lessons from the Voluntary Shawwal Fasting by People with Type 2 Diabetes: Individuals' Characteristics and Implications for Ramadan Fasting

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Abstract

Background Fasting during Ramadan for people with type 2 diabetes (T2D) can be challenging and may increase the risk of complications. Short period of voluntary fasting during Shawwal has not been studied. Its prevalence and characteristics remain unclear. We hypothesized that individuals who continue fasting into Shawwal represent a self-selected subgroup with greater fasting resilience and safer Ramadan experiences.

Methods We analyzed data from the 2020 and 2022 Diabetes and Ramadan (DAR) Global Surveys. Participants with T2D who fasted during Ramadan were divided into two groups: Group 1 ($n = 2,845$) continued fasting in Shawwal, and Group 2 ($n = 6,536$) did not. All variables in this analysis reflect only Ramadan experiences, including demographics, self-monitoring of blood glucose (SMBG), treatment use, and fasting-related complications. Findings were summarized descriptively to characterize Ramadan profiles associated with the intention to fast in Shawwal.

Results Nearly one in three participants (30.3%) reported voluntary Shawwal fasting. Compared with Group 2, Group 1 participants were slightly older (55 ± 11.1 vs. 53.3 ± 11.6 years, $p = 0.08$) and had longer diabetes duration (12.3 ± 5.2 vs. 10.8 ± 4.9 years, $p < 0.01$). Hypertension (57.9 vs. 42.9%, $p = 0.05$) and hyperlipidemia (55.5 vs. 38.5%, $p = 0.019$) were more commonly reported in Group 1. During Ramadan, individuals who later fasted in Shawwal reported lower frequencies of recurrent hypoglycemia (7.3 vs. 12.1%, $p = 0.01$), fewer breaks in fasting due to hypoglycemia (50.4 vs. 61.1%, $p = 0.03$), and higher SMBG adherence (16.8 vs. 10.3%, $p = 0.01$). Hyperglycemia rates were similar between groups (15.2 vs. 14.3%, $p = 0.7$). These findings reflect experiences during Ramadan and do not represent Shawwal outcomes.

Keywords

- ▶ type 2 diabetes
- ▶ Ramadan fasting
- ▶ Shawwal fasting
- ▶ voluntary fasting
- ▶ hypoglycemia
- ▶ hyperglycemia
- ▶ self-monitoring of blood glucose
- ▶ diabetes education

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Conclusion Voluntary Shawwal fasting was reported by nearly one-third of individuals with T2D who had fasted during Ramadan. Those who intended to fast in Shawwal exhibited distinct Ramadan characteristics, including fewer reported hypoglycemia-related disruptions and slightly greater SMBG adherence. These descriptive observations likely reflect self-selection and prior Ramadan experiences rather than any effect of Shawwal fasting itself. Clinicians should acknowledge voluntary fasting practices such as Shawwal when counseling patients with T2D and reinforce individualized education and SMBG guidance.

Introduction

Fasting during Ramadan is an obligatory religious practice for all healthy adult Muslims, involving complete abstinence from food and drink from dawn to sunset. However, fasting poses physiological and metabolic challenges for some individuals with type 2 diabetes (T2D), as extended fasting hours and altered eating patterns can lead to glycemic fluctuations, dehydration, and even ketoacidosis.^{1,2}

The month of Shawwal, which immediately follows Ramadan, includes an additional voluntary practice of fasting 6 days, believed to provide spiritual rewards equivalent to fasting for an entire year.³ Shawwal fasting represents one of several voluntary Islamic fasting practices, alongside the twice-weekly Sunnah fasts (Mondays and Thursdays) and the three "white days" each lunar month. Many people with T2D observe voluntary fasts in Shawwal, yet scientific data on which individuals choose to fast in Shawwal—and how their Ramadan experiences differ—are scarce.⁴

Large studies such as EPIDIAR (Epidemiology of Diabetes and Ramadan) have shown that around 80% of individuals with T2D fast during Ramadan, with hypoglycemia and hyperglycemia being the most common complications.⁵ In contrast, evidence on voluntary fasting beyond Ramadan, including Shawwal, is almost nonexistent, despite its widespread observance in many Muslim communities. Because no clinical data are collected during Shawwal in the Diabetes and Ramadan (DAR) Global Surveys, the only available information comes from Ramadan, allowing researchers to describe the Ramadan characteristics of individuals who later report voluntary fasting in Shawwal. Understanding this subgroup may provide insight into fasting-related behaviors and self-management patterns among people with T2D.

Unlike Ramadan, fasting in Shawwal is voluntary and usually less structured, making its medical implications distinct and worthy of separate consideration.^{6,7} However, due to limited clinical data, Shawwal fasting must be approached from a descriptive and behavioral perspective rather than a physiological one.

The Diabetes and Ramadan Practical Guidelines (IDF-DAR 2021) emphasize individualized risk assessment, structured education, and self-monitoring of blood glucose (SMBG) as essential strategies to reduce complications.² However, these recommendations primarily address Ramadan, leaving a gap

in evidence-based guidance for voluntary fasting, including in Shawwal.

Therefore, this study analyzes the data from 2020 and 2022 Diabetes and Ramadan (DAR) Global Surveys^{8,9} to describe the prevalence of voluntary Shawwal fasting among people with T2D and to compare the Ramadan characteristics of those who reported Shawwal fasting with those who did not. Because all data reflect experiences during Ramadan, the analysis is descriptive and does not evaluate the physiological effects or safety of Shawwal fasting. We hypothesized that individuals who extended fasting into Shawwal represent a self-selected subgroup with greater fasting resilience, safer Ramadan experiences, and stronger adherence to self-management practices.

Patients and Methods

Study Design and Setting

This retrospective cross-sectional analysis was conducted using data from the DAR Global Surveys of 2020 and 2022, multinational studies spanning Southeast Asia, the Indian Subcontinent, the Gulf region and the Middle East, Türkiye, North Africa, Sub-Saharan Africa, and the UK. The surveys were approved by Local Ethics Committees where required, and participation was voluntary; completion of the survey was considered implied informed consent in accordance with local regulations.

Because Shawwal follows Ramadan, all clinical and behavioral variables in this dataset reflect only Ramadan experiences. This analysis compares individuals who later reported fasting during Shawwal with those who did not. The design was descriptive and exploratory, aimed at identifying demographic, clinical, and behavioral characteristics associated with voluntary post-Ramadan fasting intentions rather than determining causality or evaluating Shawwal fasting outcomes.

Data Collection

Data were collected retrospectively through physician-administered structured questionnaires, which may introduce recall bias. The questionnaires captured several fields:

- *Demographic and clinical characteristics:* age, sex, duration of diabetes, comorbidities, and diabetes-related

complications (e.g., neuropathy, retinopathy, nephropathy, cardiovascular disease).

- **Fasting behavior:** total days fasted during Ramadan and Shawwal, and breaks due to hypoglycemia or other medical reasons, and self-reported intention or practice of voluntary fasting in Shawwal.
- **Glycemic complications:** self-reported episodes of hypoglycemia and hyperglycemia, as well as hospital admissions or emergency visits related to these complications.
- **Self-management and education:** adherence to SMBG and participation in structured diabetes education programs.

Handling of missing data: Variables with substantial missingness ($\geq 10\%$) were excluded from analysis. For all other variables, a complete-case approach was applied.

Definitions

- **Hypoglycemia:** blood glucose < 70 mg/dL, or typical hypoglycemia symptoms relieved by glucose.
- **Recurrent hypoglycemia:** more than 8 days of hypoglycemia within the fasting month.
- **Hospitalization for hypoglycemia:** admission to hospital for the management of severe hypoglycemia, as reported by the treating physician (not independently verified by records).
- **Hyperglycemia:** blood glucose > 300 mg/dL, or symptoms consistent with hyperglycemia requiring medical attention.

Treatment Details

Information was collected on medication use, including second- and third-generation sulfonylureas, different insulin types (basal, premixed, and rapid-acting analogues), and other oral or injectable antidiabetic therapies. Nephropathy risk was assessed through physician-reported diagnoses and, where available, estimated glomerular filtration rate.

Statistical Analysis

All analyses were conducted using SPSS v26 (IBM, United States). Pearson's Chi-square test was used to compare

categorical variables, and Bonferroni correction was applied for multiple comparisons. Continuous variables were summarized using means \pm standard deviation or medians (interquartile range) as appropriate. Given the descriptive and observational nature of this analysis, all findings are presented as unadjusted comparisons without inference of causality. Only p -values ≤ 0.05 after correction were considered statistically significant.

Results

This analysis descriptively compares two groups of patients with T2D: those who observed Ramadan fasting and later reported fasting during Shawwal (Group 1, $n = 2,845$) and those who did not fast in Shawwal (Group 2, $n = 6,536$). All findings summarized below reflect only Ramadan experiences. The results describe demographic and clinical characteristics, fasting patterns, self-monitoring behaviors, treatment regimens, cardiovascular risk factors, and glycemic complications reported during Ramadan.

Prevalence of Shawwal Fasting

Of the 9,381 participants with T2D who fasted during Ramadan, 2,845 (30.3%) also reported fasting during Shawwal (Group 1), while 6,536 (69.7%) did not (Group 2). Thus, approximately one in three individuals extended fasting beyond Ramadan into the voluntary month of Shawwal.

Patient Characteristics

The mean age in Group 1 was slightly higher at 55 ± 11.1 years compared with 53.3 ± 11.6 years in Group 2, though this difference was not statistically significant ($p = 0.08$). The duration of diabetes was significantly longer in Group 1 (12.3 ± 5.2 years) than in Group 2 (10.8 ± 4.9 years; $p < 0.01$). Females comprised a greater proportion of Group 1 (58.6%) than Group 2 (48.6%, $p < 0.0001$). Hypertension (57.9 vs. 42.9%, $p = 0.05$) and hyperlipidemia (55.5 vs. 38.5%, $p = 0.019$) were more common in Group 1, although the association with hypertension was borderline (\rightarrow **Table 1**). These variables describe baseline characteristics only and do not imply differences during Shawwal.

Table 1 Baseline characteristics of study participants

Variable	Group 1 (Fasted in Shawwal) ($n = 2,845$)	Group 2 (Did not fast in Shawwal) ($n = 6,536$)	p -Value
Prevalence within cohort (%)	30.3	69.7	NA
Age (years, mean \pm SD)	55.0 ± 11.1	53.3 ± 11.6	0.08 (NS)
Diabetes duration (years, mean \pm SD)	12.3 ± 5.2	10.8 ± 4.9	0.009
Female (%)	58.6%	48.6%	<0.0001
BMI (kg/m^2 , Mean \pm SD)	29.1 ± 4.6	28.5 ± 4.2	0.09 (NS)
Hypertension (%)	57.9%	42.9%	0.05
Hyperlipidemia (%)	55.5%	38.5%	0.019

Abbreviations: BMI, body mass index; NA, p -Value not available due to dataset limitations; NS, not significant ($p > 0.05$; SD, standard deviations). Note: $p \leq 0.05$ is considered statistically significant.

Table 2 Fasting patterns and glycemic findings during Ramadan, and self-monitoring of blood glucose (SMBG) practices according to Shawwal fasting status

Variable	Group 1 (Fasted in Shawwal) (n = 2,845)	Group 2 (Did not fast in Shawwal) (n = 6,536)	p-Value
Completed 30 d of Ramadan fasting (%)	76.6%	59.2%	0.04
Hypoglycemia episodes (%)	13.8%	15.7%	0.50 (NS)
Recurrent hypoglycemia episodes >8 d/mo (%)	7.3%	12.1%	0.01
Broke fast due to hypoglycemia (%)	50.4%	61.1%	0.03
Hospitalization for hypoglycemia (%)	0.38%	0.64%	0.002
Hyperglycemia episodes (%)	15.2%	14.3%	0.70 (NS)
Recurrent hyperglycemia episodes >8 d/mo (>300 mg/dL) (%)	24.1%	28.7%	0.30 (NS)
Emergency department visits for hyperglycemia-related issues (%)	2.8%	4.1%	0.08 (NS)
Increased SMBG during Ramadan (%)	16.8%	10.3%	0.01

Abbreviations: NS, not significant; SMBG, self-monitoring of blood glucose.

Note: NS = $p > 0.05$; Borderline = $p = 0.05$. All findings reflect Ramadan-reported experiences only and do not represent Shawwal outcomes.

Fasting Patterns and Glycemic Outcomes

Patients in Group 1 were more likely to complete 30 consecutive days of Ramadan fasting than those in Group 2 (76.6 vs. 59.2%, $p = 0.04$). Breaks in fasting due to hypoglycemia were reported in both groups. Overall, hypoglycemia prevalence was similar (13.8% in Group 1 vs. 15.7% in Group 2, $p = 0.5$). However, Group 1 reported lower frequencies of recurrent hypoglycemia (>8 days/month) (7.3 vs. 12.1%, $p = 0.01$). Group 1 also reported fewer fasting breaks due to hypoglycemia (50.4 vs. 61.1%, $p = 0.03$) and lower hypoglycemia-related hospitalizations during Ramadan (0.38 vs. 0.64%, $p = 0.002$) (►Table 2).

In Group 1, most hypoglycemia episodes occurred later in the day (between 3 PM and sunset, 56.5%). Hyperglycemia events during Ramadan were comparable between groups (15.2 vs. 14.3%, $p = 0.7$), and the frequency of recurrent hyperglycemia (>8 days) was not significantly different (24.1 vs. 28.7%, $p = 0.3$). These findings reflect differences reported during Ramadan and are not outcomes of Shawwal fasting.

Self-Monitoring of Blood Glucose

During Ramadan, SMBG frequency increased more often in Group 1 (16.8%) than in Group 2 (10.3%; $p = 0.01$). Similar proportions in both groups maintained their usual SMBG frequency (45.8 vs. 49.9%, $p = 0.6$). A slightly higher proportion of patients in Group 2 did not perform SMBG at all (26.1 vs. 24.4%), though this difference was not significant ($p = 0.7$). This suggests that those who later fasted in Shawwal demonstrated slightly higher adherence to SMBG during Ramadan, reflecting more proactive self-management.

Medication Use

There were no significant between-group differences in the use of oral antidiabetic agents (metformin, sulfonylureas,

DPP-4 inhibitors, and SGLT-2 inhibitors). Similarly, insulin use was comparable (42.7 vs. 40.6%, $p = 0.7$) (►Table 3). These findings describe treatment patterns during Ramadan and are not related to Shawwal fasting practices.

Cardiovascular Risk Factors and Diabetes Complications

Consistent with baseline characteristics, hyperlipidemia was more prevalent in Group 1 (55.5 vs. 38.5%, $p = 0.019$), and hypertension was more common (57.9 vs. 42.9%, $p = 0.05$). However, the rates of microvascular complications such as neuropathy and retinopathy did not differ significantly between groups. All values represent baseline physician-reported characteristics rather than fasting outcomes.

Discussion

This study provides a descriptive comparison of characteristics, glycemic outcomes, cardiovascular risk factors, and self-management behaviors in individuals with T2D who later reported fasting during Shawwal compared with those who did not. Because all clinical variables were collected during Ramadan, the differences presented reflect Ramadan experiences only and should not be interpreted as outcomes of Shawwal fasting itself. By focusing on this voluntary Islamic fasting practice, the study adds new insights to a literature that has been almost exclusively centered on obligatory Ramadan fasting.

A particularly noteworthy observation is the high rate of voluntary Shawwal fasting: nearly one in three patients who fasted during Ramadan also reported fasting in Shawwal. This represents the first large-scale estimate of Shawwal fasting prevalence among people with T2D. Comparable rates have been reported for other non-obligatory Islamic fasts, such as the twice-weekly Sunnah fasts, where 37% of

Table 3 Medication use, cardiovascular risk factors, and diabetes complications (baseline physician-reported characteristics)

Variable	Group 1 (Fasted in Shawwal) (n = 2,845)	Group 2 (Did not fast in Shawwal) (n = 6,536)	p-Value
Metformin use (%)	78.1%	79.5%	0.62 (NS)
Sulfonylurea use (%)	32.6%	35.2%	0.57 (NS)
DPP-4 inhibitors use (%)	20.4%	19.9%	0.71 (NS)
SGLT-2 inhibitors use (%)	15.2%	14.3%	0.68 (NS)
Insulin use (%)	40.6%	42.7%	0.70 (NS)
Hypertension (%)	57.9%	42.9%	NA
Hyperlipidemia (%)	55.5%	38.5%	NA
Neuropathy (%)	21.3%	22.7%	NA
Retinopathy (%)	18.5%	19.1%	NA

Abbreviations: DPP, dipeptidyl peptidase-4; NA, not applicable; NS, not significant; SGLT, sodium–glucose cotransporter-2.

Note: These values represent baseline physician-reported characteristics already presented in **Table 1**. As they are duplicates, statistical testing was not repeated to avoid redundancy; NS = $p > 0.05$.

Emirati women with T2D practiced this pattern regularly.⁷ Taken together, these findings highlight that voluntary fasting beyond Ramadan is widespread but under-recognized. Recognizing its prevalence is clinically important, as it extends the period in which patients may engage in fasting-related decision-making. Data from the DAR Global Surveys—large, multinational observational studies with broad geographic representation—support the relevance of understanding real-world fasting behaviors beyond Ramadan.^{8,9} Clinicians may therefore consider addressing voluntary fasts, such as Shawwal, during education and counseling alongside Ramadan.

A notable observation concerns differences in Ramadan experiences between those who later reported fasting in Shawwal and those who did not. Patients who fasted in Shawwal were slightly older and had a longer diabetes duration. However, these baseline factors were not associated with higher rates of adverse Ramadan-reported events in this dataset. Instead, individuals who later reported Shawwal fasting had lower reported frequencies of recurrent hypoglycemia and fewer fasting interruptions during Ramadan, while hyperglycemia rates were similar. These descriptive differences likely reflect self-selection, where individuals who experienced manageable or stable fasting during Ramadan were more willing to undertake additional voluntary fasting afterward. This interpretation is consistent with observations from other Islamic fasting practices, including twice-weekly fasting, where older individuals with longer diabetes duration continued voluntary fasting without evidence of greater Ramadan-reported complications.⁷

Differences observed in SMBG patterns during Ramadan provide additional context. Individuals who later reported voluntary Shawwal fasting showed a slightly higher proportion of increased SMBG frequency during Ramadan. Although these findings cannot be used to infer causality, they suggest that self-monitoring behaviors play a role in overall fasting confidence. Prior research demonstrates that

structured education and regular SMBG can reduce fasting-related complications during Ramadan.^{2,6,10,11} The present findings therefore support the relevance of reinforcing these principles not only for Ramadan but also in discussions about voluntary fasts such as Shawwal.^{2,7,9,12}

Hyperglycemia findings were similar across groups and served as a neutral reference point. Without detailed dietary, medication-adjustment, or Shawwal-specific data, no inference can be made regarding glycemic safety during voluntary fasting. Previous studies have shown that hyperglycemia during Ramadan may be influenced by missed dose adjustments or post-iftar dietary patterns,^{6,13,14} but whether similar factors apply to voluntary fasting periods remains unknown and merits future study.

Cultural and psychosocial factors likely also influence who chooses to fast in Shawwal. In some contexts, women may fast to make up for missed days of Ramadan, and older adults may find voluntary fasting spiritually meaningful.^{4,13} These factors underscore that the decision to fast is shaped not only by medical considerations but also by personal, social, and religious motivations. Understanding these motivations may help clinicians provide more patient-centered support when discussing voluntary fasting practices.

Finally, this study highlights a gap between clinical guidelines and real-world practice. Many patients with T2D voluntarily chose to fast during Shawwal, despite limited evidence or formal recommendations on its safety, similar to other voluntary fasting practices.⁷ Instead of discouraging these practices, clinicians should consider offering individualized education, SMBG reinforcement, and medication review to support safe fasting decisions in accordance with patient preferences and religious commitments.

Overall, by documenting the prevalence and Ramadan-reported characteristics of individuals who practice voluntary Shawwal fasting, this study provides a foundation for future prospective research and highlights the need to

integrate voluntary fasting practices into diabetes counseling frameworks.

Several limitations must be acknowledged. Hypoglycemia and hyperglycemia were self-reported, introducing recall bias, as seen in prior multinational surveys.^{5,15} Moreover, diet, physical activity, and medication adjustments were not recorded, restricting interpretation. Baseline HbA1c values and detailed insulin regimen data were not collected, which limits the ability to contextualize glycemic variability or treatment-related influences. A formal pre-fasting risk assessment using the IDF-DAR risk calculator was not applied, preventing standardized risk classification.

Importantly, all clinical and behavioral findings reflect only Ramadan experiences; no physiological or safety outcomes from Shawwal fasting were collected in the DAR Global Surveys. As a result, this study cannot evaluate the metabolic effects of voluntary Shawwal fasting. In addition, the study was retrospective and descriptive. Because Shawwal follows Ramadan, all comparisons characterize individuals who later reported fasting in Shawwal rather than assessing the impact of Shawwal fasting itself.

Despite these limitations, this study provides the first large-scale dataset describing voluntary Shawwal fasting practices and the Ramadan-reported characteristics associated with them in people with T2D.

Conclusion

Voluntary Shawwal fasting was reported by nearly one-third of patients with T2D who had fasted during Ramadan, highlighting its widespread practice in the real world. Those who later fasted in Shawwal exhibited distinct Ramadan-reported characteristics, including lower frequencies of recurrent hypoglycemia, fewer fasting interruptions, and modestly higher SMBG adherence. At the same time, hyperglycemia rates were similar to those in non-fasters.

These descriptive findings likely reflect self-selection and prior Ramadan experiences rather than any physiological effect of Shawwal fasting. Clinicians should recognize voluntary fasting practices such as Shawwal when counseling patients with T2D and reinforce individualized education, medication review, and SMBG guidance to support informed decision-making.

Authors' Contributions

All authors contributed toward conception, data collection, writing, and final approval of the manuscript.

Statement of Ethics

This study was based on secondary analysis of previously collected data. No ethical approval was required for this analysis. However, the original study was approved by the Dubai Health Authority Medical Research Ethics Commit-

tee, and informed consent was obtained from all participants.

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Conflict of Interest

None declared.

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