

DOI: 10.5455/msm.2020.32.57-61

Received: Jan 19 2020; Accepted: Mar 10, 2020

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## ORIGINAL PAPER

Mater Sociomed. 2020 Mar; 32(1): 57-61

# Physician Practice and Knowledge on Diabetes Management During Ramadan in Bosnia and Herzegovina

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**ABSTRACT**

**Introduction:** Ramadan is the holy month of Muslims including fasting sometimes more than 20 hours. Even diabetes patients can be exempted from fasting it has been shown that almost 80% of diabetes type 2 patients intend and do fasting. To avoid acute complications during fasting, different recommendations on diabetes management are available. Considering the fact that there are more than 226 thousand diabetics in Bosnia and Herzegovina, it is important to provide structured support and healthcare service to those who are practicing fast during Ramadan. **Aim:** To evaluate knowledge, practice and attitudes of physicians treating diabetes (diabetologists and endocrinologists) in Bosnia and Herzegovina regarding management of diabetes in fasting patients during Ramadan. **Methods:** A 32 questions survey has been developed, validated and disseminated to the 27 specialists treating diabetes in Bosnia and Herzegovina through online form examining demographic characteristics, current practices and attitudes and knowledge on diabetes management during Ramadan. **Results:** All surveyed physicians deal with patients who are fasting during Ramadan. The majority of surveyed physicians 23 (85,2%) proactively initiate a discussion about planned fasting. More than 63,0% are following their experience and only 18,5% ADA/EASD guidelines on diabetes management during Ramadan. There are no significant differences between gender of the physicians, place of work and specialization when it comes to specific knowledge related to treatment guidelines, but some differences are observed. **Conclusion:** Although overall physicians' knowledge of diabetes management during Ramadan is satisfying there is opportunity in additional specialized education and measures introduction into the practice in order to improve treatment outcomes and standards of care.

**Keywords:** Diabetes, Diabetes management, Muslims, Ramadan fasting.

**1. INTRODUCTION**

Ramadan is the holy month of Muslims, which means all-day fasting, from sunrise to sunset and represents one of the five pillars of Islam (1). Fasting requires abstinence from food, drink and oral medication during this period ranging from a few to more than 20 hours depending on the geographical location and season (2). Even fasting during the Ramadan is obligatory, certain groups of believers are relieved of this obligation like people with a medical condition, elderly and pre-pubescent children, menstruating women while those in battle and travelers who intend to spend fewer than five days away from home but temporary, and it is required to make up for the missed days after the month of Ramadan is over and before the next Ramadan arrives (3). Diabetics and nursing or pregnant women are usually not expected to fast. However, many exempt Muslim patients with diabetes may still choose to fast (3). They may discontinue their medications or alter treatment regimens to fast with/out consulting their health care professionals. All these changes in treatment regimen and physiological conditions caused by fasting can result in serious complications, such as dehydration, hypoglycemia, hyperglycemia, diabetic ketoacidosis, and others (4).

The muslim population is growing worldwide and it is estimated that in 2019, 1.9 billion or about 24.4% of the world population are Muslims (5). The approximate number of Muslims with diabetes is around 4.6%; we can estimate that more than 50 million people with diabetes

mellitus observe fasting during the month of Ramadan (4).

According to the latest Census of Bosnia and Herzegovina conducted in 2013, 1.7 million people have declared themselves members of the Islamic religion. Considering the prevalence of diabetes in Bosnia and Herzegovina, which is 12.63%, we come to the number of about 226 thousand diabetics of Islamic religion, assuming that a significant number is fasting or intend to (6, 7).

Fasting for patients with diabetes represents an important personal decision so physicians are faced with different dilemmas and have to take into consideration all associated risks. The main challenge for practicing physicians is related to overcoming complications that can occur during fasting and adaptation of the treatment regimens. Even a large number of guidelines and studies have been published to assist clinicians in managing patients with diabetes during Ramadan (1) there is currently no gold standard based on comprehensive, up-to-date, evidence-based recommendations and different challenges related to specific treatment regimens.

## 2. AIM

The main objective of our study is to evaluate knowledge, practice and attitudes of diabetologists in Bosnia and Herzegovina regarding the management of diabetes in fasting patients during Ramadan.

## 3. METHODS

We have conducted an online survey among physicians dealing with diabetes including endocrinologists and diabetologists practicing in clinical centers, hospitals and primary healthcare centers. The survey consisted of 32 questions prepared on published literature review with similar topics, international guidelines on diabetes treatment in fasting population and local specificities. The initial survey has been evaluated with three physicians on content and understanding of questions and proposed answer options before the final version has been disseminated. An online survey has been created in MS Forms and sent to e-mail addresses of physicians who have provided previous approval to be interviewed during September 2019. The collected responses were statistically processed in the SPSS® software (IBM Inc).

## 4. RESULTS

The study included 27 physicians; 20 (74.1%) females and 7 (25.9%) males. Detailed demographic characteristics are presented in Table 1.

Analysis of responses to a set of questions regarding diabetes management during Ramadan is presented in Table 2.

All surveyed physicians deal with patients who are fasting during Ramadan and that they discuss and have questions from the patients about diabetes treatment during this month.

Out of 11 (40.7%) of physicians have <50% and 50-100 % of patients who are fasting while 5 (18.5%) of them have 100% of patients treat-

Variable	Category	N	%
Gender	Male	20	74.1
	Female	7	29.5
Specialization	Internal medicine	12	44.4
	Internal medicine/Diabetologist	6	22.2
	Endocrinologist/Diabetologist	9	33.3
Practice	Clinical center	7	25.9
	Hospital	10	37.
	Primary healthcare center	8	29,6
	Other (private practice, etc)	2	7.4

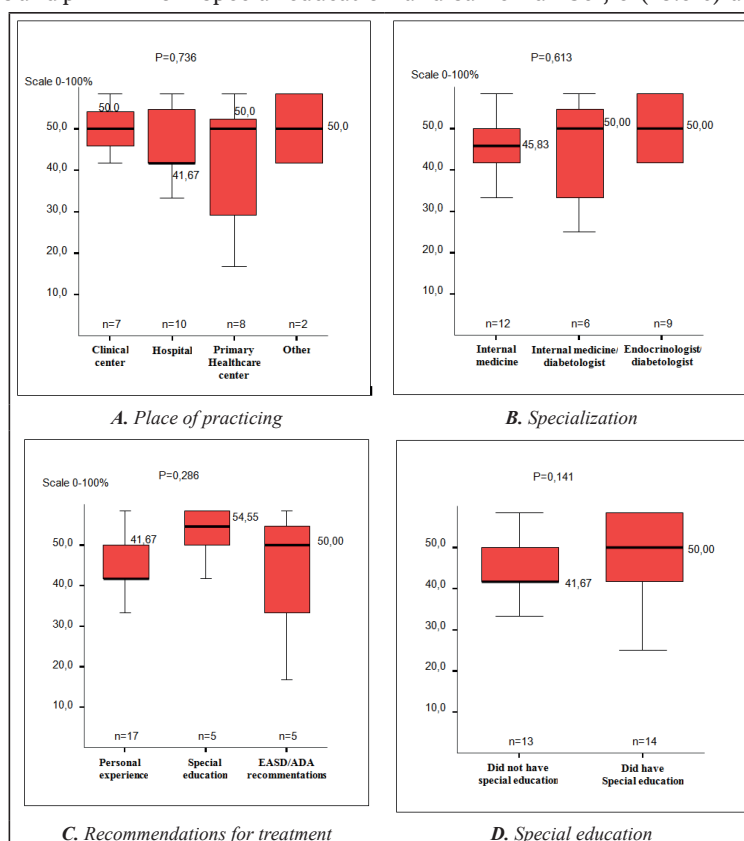
Table 1. Demographic characteristics of participating physicians

ing during Ramadan. The majority of surveyed physicians 23 (85.2%) proactively initiate discussion about planned fasting while only 4 (14.8%) do not.

All of the respondents discuss with patients about potential risks and complications that can occur and majority of them 14 (51.9%) consider hypoglycemia as the major risk, followed by 11 (40.7%) consider equal risks of hypoglycemia, hyperglycemia, ketoacidosis and thromboembolism. Only 2 (7.4%) consider dehydration as the main risk.

A 19 (70.4%) feels self-confident in treatment management during Ramadan fast while equal number of them, 4 (14.8%), answered they do not feel enough or totally confident.

When it comes to treatment guidelines that they follow in everyday practice, 17 (63,0%) are following their experience, 5 (18.5%) base their decisions on information gathered from special education and same number, 5 (18.5%) are



Graph 1. Correlation of average percentage of correct answers and some of the physician characteristics

Questions/Claims regarding diabetes management during Ramadan	Category	N	%
Are there among your patients those who fast during Ramadan?	Yes	27	100
	No	0	0
How many of your patients fast during Ramadan?	<50	11	40.7
	50-100	11	40.7
	>100	5	18.5
Did you have special education on diabetes management at Ramadan fasting patients?	Yes	13	48.1
	No	14	51.9
Do you proactively ask your patients if they are planning to fast?	Yes	4	14.8
	No	23	85.2
Do patients ask you about treatment before they start fasting?	Yes	0	0
	No	27	100
Do you adjust oral hypoglycemic agents' doses before they start fasting?	Yes	2	7.4
	No	25	92.6
Do you make a specific food and diet recommendations to patients who are planning to fast?	Yes	0	0
	No	27	100
Do you discuss specific complications/risk that can occur during fasting?	Yes	0	0
	No	27	100
Do you discuss specific circumstances when a patient should break their fast?	Yes	2	7.4
	No	25	92.6
Do you advice more often blood glucose monitoring while fasting?	Yes	27	100
	No	0	0
How do you feel self-confident in diabetes management during Ramadan?	Insufficient	4	14.8
	Satisfying	19	70.4
	Completely	4	14.8
	All	11	40.7
What do you consider as the major complication/risk for patients fasting during Ramadan?	Dehydration	2	7.4
	Hypoglycemia	14	51.9
	Hyperglycemia	0	0
	Ketoacidosis	0	0
	Thromboembolism	0	0
Which recommendations do you follow in diabetes management during Ramadan?	Personal experience	17	63.0
	Information from specific education	5	18.5
	EASD/ADA recommendations	5	18.5

Table 2. Answers to the set of questions regarding diabetes management during Ramadan

following EASD and/or ADA recommendations regarding this population.

The third part of the survey was consisted of twelve claims regarding knowledge on practical issues regarding diabetes management during Ramadan. We have analyzed correct answers to the questions provided and details overview is presented in Table 3. In Table 4 we presented

Question/Claim	Number of physicians who provided correct answer	%
Specific "Ramadan-focused education" is associated with better outcomes and less complications.	5	19
Patients with type 1 diabetes are not exempt from fasting and should not refrain from fasting.	7	26
Most hypoglycemic episodes occur during the last 2-3 hours of the fast.	24	96
Pregnant diabetic women should be advised to avoid observing the fast.	27	100
DDP-IV inhibitors have been shown to lead to less hypoglycemic episodes than sulphonylureas in general.	12	44
All sulphonylureas carry the same hypoglycemic risk potential.	23	85
SGLT2 inhibitors need to be used carefully in elderly patients and those with increased risk of dehydration.	0	00
"LIRA-Ramadan Study" concluded that GLP-1 therapy should never be used during Ramadan fasting.	6	22
If a patient who is observing the fast on insulin develops confirmed hypoglycemia, he should break the fast immediately.	19	70
Premixed insulin dose should be inverted with higher doses before <i>Iftar</i> (sunset meal) and reduced doses before <i>Suhoor</i> (dawn meal).	14	52
It is prudent to reduce the doses of basal insulin to avoid day time hypoglycemia.	3	11
Patients on any type of insulin should not monitor their blood glucose during the day time as blood testing breaks the fast.	4	15

Table 3. Physicians' knowledge of the principles and practice of management of diabetes during Ramadan

Number of respondents	Average of correct answers (%)						
					Percentiles		
	Mean	S. D.	Min	Max	25th	50th (Median)	75th
27	45.9	12.80	16.67	63.64	41.66	50.00	54.54

Table 4. Overview of correct answers provided

average correct answers to the questions/claims regarding knowledge on diabetes management during Ramadan.

Analyzing correct answer to the questions in regards to different categories of physicians there are no significant differences between gender of the physicians, place of work and specialization as presented in Table 5. However, the least correct answers are found among physicians working in hospitals, 41.6%, while those practicing in other institutions had on average 50% of correct answers (Graph 1A). Analyzing correlations between answers and specialization, the lowest number of correct answers is observed among internal medicine specialist 45.8% (41.6-50%), while diabetologists and endocrinologists provided correct answers 50% (41.6-58.3%) with no significant difference (Graph 1B).

Difference in average number of correct answers in cor-

Variable	Variable category	Of 100% correct (portion of correct answers)			p
		25th	50 (median)	75th	
Gender	Male	41.66	50.00	57.38	0.685*
	Female	41.66	50.00	50.00	
Specialization	Internal medicine	41.67	45.83	50.00	0.613**
	Internal medicine/ Diabetologist	31.25	50.00	55.49	
	Endocrinologist/ Diabetologist	41.67	50.00	58.33	
Practice	Clinical center	41.67	50.00	58.33	0.736**
	Hospital	39.58	41.67	55.49	
	Primary healthcare center	27.08	50.00	53.41	
	Other (private practice, etc.)	31.25	50.00	52.08	
Which recommendations do you follow in diabetes management during Ramadan?	Personal experience	41.67	41.67	50.00	0.286**
	Information from specific education	45.83	54.55	58.33	
	EASD/ADA recommendations	25.00	50.00	56.44	
Did you have special education on diabetes management during Ramadan fasting?	No	41.67	41.67	50.00	0.141*
	Yes	39.58	50.00	58.33	

Table 5. Correlation of some physician categories and correct answers, Mann-Whitney U\*; Kruskal Wallis Test\*\*

relation to the diabetes management recommendations followed by physicians is not significant. The lowest number of correct answers is found at the group of physicians who follow personal experience 41.67 % (41.67-50.00%), followed by those who follow ADA/EASD recommendations 50.00% (25.00-56.44%) and the highest is found among those who had special education on this topic 54.55% (45.83-58.33%) (Graph 1C).

Physicians who had special education on diabetes treatment during Ramadan had 50% (39.5-58.3%) average percentage of correct answers while those who did not had 41.6% (41.6-50%) with small and insignificant difference (Graph 1D).

## 5. DISCUSSION

Diabetes management in patients who are fasting is challenging from many reasons such as risk of different complications, treatment adjustment and additional adherence to suggestions regarding food intake and dietary regimen. Considering the fact that significant number of patients with diabetes in Bosnia and Herzegovina are Muslims and that potentially certain number of them practice fasting, it is important to understand current practices and knowledge about this topic among healthcare professionals who are treating them.

It is important to notice that significant number, almost 19% of respondents claimed that more than 100 patients they treat are practicing Ramadan fasting. This is consistent with data provided in EPIDIAR (The Epidemiology of Diabetes and Ramadan) study that 79% of Muslims with type

2 diabetes fasted for more than 2 weeks during the month of Ramadan (4).

Since diabetes care and access to diabetes treatment vary between regions in Bosnia and Herzegovina, due to lack of reimbursement or reimbursement status (8), access to diabetologists different specialists are dealing with management of diabetes including internal medicine specialists, diabetologists-internal medicine specialists with additional education in diabetes treatment and endocrinologists (9), it is important to understand knowledge and practices regarding diabetes management in this population.

Our findings suggested that there are no significant differences regarding the practice and knowledge between gender, specialization and place of work between subgroups of the surveyed physicians, even some differences are found. In a first place, the lowest average correct answers are recorded among internal medicine specialists working in hospitals.

Among 12 questions provided the one related to SGLT-2i was the most problematic. Even these drugs are registered in Bosnia and Herzegovina for a few years; they are not reimbursed so physicians have very low knowledge and experience

on these medicines (10).

For the majority of the physicians hypoglycemia is the most risk for the patients whether this is pointed as the only major risk or one among other which could be chosen. Since hypoglycemia is one of the risk-assessment factors stratifying patients when conducting pre-fasting assessment and counseling of the patients this is important to bear in mind. It is reported that patients are lacking on awareness of increased risks of complications during fasting specially hypoglycemia and there was an extremely high incidence of self-reported hypoglycemic episodes during the previous fasting month (11). It has been confirmed that patient pre-fasting education could significantly reduce their risk of hypoglycemia by up to 50% (12).

Even there are numerous treatment guidelines published, more than 63% of respondents stated that they make decisions based on their practice and experiences. There is a huge room for improvement of such approach in order to standardize diabetes management care and approach to the patients and it could be useful to develop local guidelines on this topic.

One of the important recommendations is pre-Ramadan structured education of the patients as well as risk stratification in advising patients before starting the fast which can lead to improved treatment outcomes and prevention of complications that can occur (13,2).

Those physicians who had been specially educated on diabetes management had much more average correct answers indicating that such educational programs should be put in place more often or regularly through continuing



medical education programs. Ramadan-focused structured educational programs are not for patients only, but they should also include healthcare professionals to raise awareness about fasting and disease management (14).

Almost half of our respondents did not have structured education indicating that this could be interesting to put in place in future.

Patient counseling is important in chronic disease management, especially diabetes and it has been confirmed that majority of the patients and physicians are initiating discussion on treatment management before fasting start. Not just physicians who are treating diabetes patients, but also other healthcare professionals should be more engaged.

## 6. CONCLUSIONS

It is confirmed that significant number of patients with diabetes in Bosnia and Herzegovina are practice Ramadan fasting and that there is a certain level of knowledge on diabetes management among physicians it is important to develop specialized educational programs for physicians and structured education for the patients. Majority of physicians are not following available treatment recommendations even they feel self-confident in this field.

There is an opportunity to develop interventions to improve the quality of care for patients with diabetes who fast during Ramadan.

- **Author's contribution:** Both authors gave substantial contribution to the conception or design of the work and in the acquisition, analysis and interpretation of data for the work. Each author had role in drafting the work and revising it critically for important intellectual content. Each author gave final approval of the version to be published and they agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.
- **Conflict of interest:** None declared.
- **Financial support and sponsorship:** Nil.

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