

To Assess the Awareness, Attitude, and Practice of Family Medicine Registrars of the Sudan Medical Specialization Board about Diabetes and Ramadan Guidelines in 2022

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Abstract

Background: Diabetes mellitus (DM) is a metabolic disease, involving inappropriately elevated blood glucose levels. The risks facing people with diabetes are heightened during Ramadan. These include hypoglycaemia, hyperosmolar hyperglycaemia, diabetic ketoacidosis (DKA), dehydration and thrombosis. Family Medicine Registrars play a major role in managing diabetes in Ramadan, and educating patients who intend to fast.

Objectives: To assess the awareness, attitude and practice of family medicine registrars of the Sudan Medical Specialization Board about diabetes and Ramadan guidelines in 2022.

Methods: A descriptive cross-sectional internet-based study of random sample, was conducted among 285 family medicine registrars between October 2022 and December 2022 and the data was analyzed using SPSS program version 24.0.

Results: The majority of participants in our sample (88.8%) were females with 57.2% in the 4th year of rotation. Nearly two-thirds (64.9%) of participants work in health centers, while only one third (35.1%) work in hospitals. Slightly more than half (56.5%) practicing 7 years or more. Only 17.2% were fully confident to manage diabetes in Ramadan, while, the majority 56.1% were both just or fairly confident. More than one third of the participants (37.2%) follow their common sense and good clinical practice as guidelines for management of diabetes during Ramadan, (24.6%) follow their reading and research in literature using multiple sources, and only (22.8%) follow ADA reports. While their awareness of the different categories of management strategies was variable.

Conclusion: Family Medicine Registrars in Sudanese Medical Specifications Board demonstrated variable levels of knowledge, attitude and practice about care of patients with diabetes during Ramadan, but the overall assessment shows that 53.3% of them had low level of knowledge.

Keywords: Diabetes Mellitus (DM); Diabetic Ketoacidosis (DKA); Ramadan Guidelines

Introduction

In Islam, Ramadan is the holy month of fasting and falls on the ninth month of the lunar calendar and varies in its timing from year to year. It is one of the five main pillars of Islam and is obligatory for all healthy adult Muslims [1]. However, the Holy Quran exempts those who are sick, medically unfit, or traveling from fasting during the holy month: "Yet if one among you is sick or is on a journey, [such a person

shall then fast] the same number of other days” (Surat AlBaqarah, 2:185). There are around 1.9 billion Muslims worldwide distributed across more than 200 countries and territories and accounting for 25% of the world’s population [2]. Consequently, projections point towards a large number of people with diabetes seeking to fast during Ramadan [1]. Fasting during Ramadan may provide enduring benefits. It can be an opportunity for a better lifestyle, weight loss and the cessation of unhealthy habits such as smoking [3]. The global diabetes prevalence in 2019 was estimated at 9.3% (463 million people) [4]. Besides, the population-based Epidemiology of Diabetes and Ramadan 2001 study, which included 12,243 patients with diabetes from 13 Islamic countries, estimated that about 79% of patients with type 2 diabetes (T2DM) and about 43% of patients with type 1 diabetes (T1DM) fast during Ramadan [5]. This means that about 70 million (50 - 90 million) people with diabetes worldwide may practice fasting during Ramadan. A retrospective observational study including 3,394 evaluable diabetes cases from 13 countries, found that 64% of patients reported fasting every day, and 94.2% fasted for at least 15 days [6].

A majority of Muslim people with diabetes see this fast as a deeply meaningful, spiritual experience; therefore, most still participate, even against medical advice [7]. Fasting during Ramadan dictates complete abstinence from food and drink (including water) from dawn to sunset. This encompasses a period of 10-21h [8] depending on the geographical location and solar season that crosses with the lunar month and continues for 29 - 30 consecutive days. This abstinence also extends to medications used by patients who choose to fast during the holy month. This may require changes in the timing and possibly medication dose according to the dawn-to-sunset fasting time.

However, people with diabetes and Healthcare Professionals (HCPs) face challenges during Ramadan. For those that fast, the onset of Ramadan can lead to a sudden change to one’s usual lifestyle - this can include a shift in mealtimes and diet, changes to usual sleeping schedules and adjustments to physical activity patterns. For people with diabetes further changes are also required, these may involve a need for education, a knowledge of diabetes management plans and adaptations to self-monitoring of blood glucose (SMBG) schedules and medication regimens. Moreover, due to the varying and metabolic nature of diabetes, people living with it are also at greater risk of complications from large changes in food and fluid intake. Potential health hazards include hypoglycaemia, hyperglycaemia, dehydration and acute metabolic complications such as diabetic ketoacidosis (DKA) [9].

For HCPs the challenges involve ensuring that individuals with diabetes that are seeking to fast can do so safely. In order for HCPs to help provide safety, a greater evidence-based understanding of diabetes and Ramadan is required and an established set of guidance to help inform the best management strategies for during Ramadan are needed [10].

Materials and Methods

Study design: The study comprised cross-sectional, observational research using an electronic questionnaire.

Study area: Sudan Medical Specialization Board (SMSB). This board consist of multiple councils, all the major specialties and even many subspecialties, family Medicine specialty is one of them.

Study duration: The study conducted between August 2022 and December 2022.

Study population: The total number of registrars rotated in family medicine council in SMSB are 696 at the time of the study. The training program of the council consist of 4 years, during this period the registrars train how to deal with different emergency cases, follow patients in refer clinics in different specialties in hospitals, and how to deal with chronic diseases and emergency cases in health centers and how to refer them to secondary care. All family medicine registrars distributed in different hospitals and health centers in Sudan.

Inclusion criteria: All family medicine rotating Registrars.

Exclusion criteria:

- Registrars whom they sit for selection exam of family Medicine but not Rotated.
- Rotated registrars but stopped at this time.

Sample size: The sample size was calculating using the following formula:

$$n = Z^2 (p)(1-p) / c^2$$

Where:

n = Sample size

z = Standard normal deviation set at 95% confidence level

p = Expected awareness (22%, The overall awareness in previous study) [10]

c = precision (0.05).

Then the sample size will be

$$1.96 * 1.96 * 0.22 (1-0.22) / 0.05 * 0.05 = 285.$$

Sampling technique

Initially registrars of family Medicine Council subdivided according to Training Committee of the council into 4 WhatsApp subgroups, each group contains contacts numbers of one level of rotation, which was considered stratified sampling, we calculate the percentage of registrars in each level of rotation from total number of registrars (696) see below, then we calculate each percentage from total number of sample size (285). Then we use simple random sampling to choose our Sample from each level via RESAHER RANDOMIZER (Internet application).

Data collection tools and method

Tool: The questionnaire will be used to collect data, it's standardized coded without name of participant, contain multiple options questions.

Method: Self-administered online questionnaire (principal investigator) used to collect data during study period.

Variables

Independent:

- Age.
- Gender.
- Rotation level.
- Location of work.

Dependent: Evaluation of the awareness, attitude and practice of family physicians Registrars about Diabetes in Ramadan guidelines.

Data analysis and management: Data was formulated from the questionnaire for all parameters and will be analyzed by SPSS 24.0 (SPSS Inc., USA). P-values of ≤ 0.05 are considered statistically significant, with 95% confidence intervals for all correlation analyses.

Ethical approval:

- Ethical approval was sought from the Family medicine council, research Committee of Sudanese Medical Specializations Board (SMSB), ethical committee of Education and Development center (EDC)-SMSB.
- Participation is voluntary and informed written consent will be obtained from each study participant before participation (attached).
- Research purpose and objectives will be explained to each participant in clear simple words.
- Each participant has right to benefit from researcher’s knowledge related to study topic and has the right to withdraw at any time without any deprivation or negative consequences.
- Participants has the right to no harm as privacy and confidentiality will be maintained through using coding system of all information related to them and their information will be used for purpose of research only.

Results

Variables		Frequency	Percent %
Gender	Male	32	11.2
	Female	253	88.8
	Total	285	100
Age (yrs.)	25-30	36	12.6
	31-35	108	37.9
	36-40	96	33.7
	> 40	45	15.8
	Total	285	100
Year of rotation	R1	22	7.7
	R2	43	15.1
	R3	57	20
	R4	163	57.2
	Total	285	100
Location of practice	Health center	185	64.9
	Hospital	100	35.1
	Total	285	100
Years of practice from graduation	1-2	18	6.3
	3-4	42	14.7
	5-6	64	22.5
	> 7	161	56.5
	Total	285	100

Table 1: Demographic data of participating respondents.

The majority (88.8%) of participants in the sample were females. Nearly more than one third (37.9%) of participants were between 31-35 years of age. The majority of participants (57.2%) were in the 4th year of rotation. More than half of participants (56.5%) practiced 7 years or more.

Attitude

Confidence level	Frequency	Percent %
Fully confident	49	17.2
Fairly confident	75	26.3
Just confident	85	29.8
Not sure	67	23.5
Not at all confident	9	3.2
Total	285	100.0

Table 2: Shows the confidence level of the respondents with the management of diabetic patients who fast during Ramadan.

Only (17.2%) of participants said they were fully confident with the management of diabetic patients who fast during Ramadan.

Risk	N	Percent %
Hypoglycemia	267	93.7%
Dehydration	206	72.3%
Hyperosmolar hyperglycemic coma (HONK)	108	37.9%
Diabetic ketoacidosis (DKA)	121	42.5%
Thromboembolic disease	104	36.5%

Table 3: Shows what the respondents thought of the risks associated with fasting during Ramadan in people with diabetes.

Most of the respondents (93.7%) considered hypoglycemia is an associated risk with fasting during Ramadan among diabetic patients, (72.3%) considered dehydration, (37.9%) considered hyperglycemia, (42.5%) considered DKA, while only (36.5%) of them considered risk of thrombosis.

Year of rotation		Level of attitude		P value
		Poor attitude	Good attitude	
R1	Observed	12	10	0.006
	% within row	54.5%	45.5%	
R2	Observed	34	9	
	% within row	79.1%	20.9%	
R3	Observed	37	20	
	% within row	64.9%	35.1%	
R4	Observed	83	80	
	% within row	50.9%	49.1%	

Table 4: Shows the association between the year of rotation of the participants and the level of attitude.

*P-value considered significant at less than 0.05 levels.

The majority of rotation levels shows poor attitude, only participants from R4 shows nearly equal percentages in attitude, p value is insignificant.

Years of practice		Level of attitude		P value
		Poor attitude	Good attitude	
1-2	Observed	10	8	0.463
	% within row	55.6%	44.4%	
3-4	Observed	26	16	
	% within row	61.9%	38.1%	
5-6	Observed	42	22	
	% within row	65.6%	34.4%	
7 and more	Observed	88	73	
	% within row	54.7%	45.3%	

Table 5: Shows the association between the years of practice of the participants and the level of attitude.

*P-value considered significant at less than 0.05 levels.

No improvement in level of attitude with increase in years of practice, the majority of the respondents shows poor attitude, p value is insignificant.

Predictor	Estimate	SE	Z	p
Intercept	0.537	0.761	0.705	0.481
Gender				
Female - Male	-0.323	0.398	-0.812	0.417
Age				
31-35 - 25-30	-0.531	0.455	-1.167	0.243
36-40 - 25-30	0.141	0.468	0.300	0.764
> 40 - 25-30	0.160	0.523	0.307	0.759
Year of rotation				
R2 - R1	-1.060	0.592	-1.790	0.074
R3 - R1	-0.232	0.550	-0.422	0.673
R4 - R1	0.366	0.513	0.713	0.476
Location of practice				
Health center - Hospital	-0.177	0.312	-0.568	0.570
Year of practice				
3-4 - 1-2	-0.311	0.622	-0.500	0.617
5-6 - 1-2	-0.614	0.585	-1.048	0.295
7 and more - 1-2	-0.349	0.553	-0.630	0.528

Table 6: Model coefficients - Level of attitude.

Note: Estimates represent the log odds of "Level of attitude = good attitude" vs. "Level of attitude = poor attitude".

The logistic regression model examines various predictors for their association with having a “good attitude” compared to a “poor attitude.” None of the predictors, including gender, age, year of rotation, location of practice, or years of practice, show statistically significant effects on attitude (all p-values > 0.05). The most substantial effect is observed in the comparison between second-year (R2) and first-year (R1) rotations, where individuals in their second year have lower odds of a good attitude (Estimate = -1.060, p = 0.074).

Practice

Which guidelines do you mostly follow for management of DM during Ramadan?	Frequency	Percent %
ADA workshop report/IDF guidelines	75	26.3
My own reading and research of the literature using multiple sources	70	24.6
Expert opinions I heard in recent CME	34	11.9
Lectures; Common sense and general good clinical practice as applied to the fasting state.	106	37.2
Total	285	100.0

Table 7: Shows the guidelines mostly followed by registrars in management of diabetes during Ramadan.

More than one third of the participants (37.2%) follow their common sense and good clinical practice as guidelines for management of diabetes during Ramadan, (26.3%) follow ADA reports.

	N	Percent %
Make blood sugar monitoring recommendations	206	72.3
Make food and diet recommendations	206	72.3
Discuss medical risks of fasting with patient	197	69.1
Discuss specific circumstances when a patient should break their fast	173	60.7
Adjust insulin use	118	41.4
Adjust oral hypoglycemic agents	139	48.8

Table 8: Shows the clinical practice during the previous month of Ramadan.

During the last month of Ramadan (72.3%) of the respondents make blood glucose monitoring and diet recommendations for their patients, (41.4%) adjust insulin use, (48.8%) adjust oral hypoglycemic agents.

Year of rotation		Level of practice		P value
		Poor practice	Good practice	
R1	Observed	13	9	
	% within row	59.1%	40.9%	
R2	Observed	30	13	
	% within row	69.8%	30.2%	0.612
R3	Observed	37	20	
	% within row	64.9%	35.1%	
R4	Observed	97	66	
	% within row	59.5%	40.5%	

Table 9: Shows the association between the year of rotation of the participants and the level of practice.

*P-value considered significant at less than 0.05 levels.

The majority of the respondents shows bad practice, no improvement in practice with higher levels of rotation, p value is insignificant.

Year of practice		Level of practice		P value
		Poor practice	Good practice	
1-2	Observed	13	5	
	% within row	72.2%	27.8%	
3-4	Observed	30	12	
	% within row	71.4%	28.6%	0.104
5-6	Observed	44	20	
	% within row	68.8%	31.3%	
7 and more	Observed	90	71	
	% within row	55.9%	44.1%	

Table 10: Shows the association between the years of practice of the participants and the level of practice.

*P-value considered significant at less than 0.05 levels.

The majority of the participants shows bad practice, no improvement in level of practice with increase in years of practice, p value is insignificant.

Predictor	Estimate	SE	Z	p
Intercept	-1.886	0.831	-2.271	0.023
Gender				
Female - Male	0.790	0.434	1.819	0.069
Age				
31-35 - 25-30	0.443	0.483	0.919	0.358
36-40 - 25-30	0.319	0.503	0.634	0.526
> 40 - 25-30	0.825	0.549	1.504	0.133
Year of Rotation				
R2 - R1	-0.600	0.588	-1.021	0.307
R3 - R1	-0.592	0.569	-1.040	0.298
R4 - R1	-0.560	0.532	-1.054	0.292
Location of practice				
Health center - Hospital	0.333	0.313	1.064	0.287
Year of practice				
3-4 - 1-2	0.246	0.667	0.368	0.713
5-6 - 1-2	0.334	0.622	0.536	0.592
7 and more - 1-2	0.812	0.593	1.370	0.171

Table 11: Model coefficients - level of practice.

Note: Estimates represent the log odds of "level of practice = good practice" vs. "level of practice = poor practice".

The logistic regression model evaluates the association between various predictors and having a good practice level compared to poor practice. None of the predictors, including age, year of rotation, location of practice, or years of practice, show statistically significant effects (all p-values > 0.05). Gender shows a near-significant effect, with females having higher odds of good practice compared to males (Estimate = 0.790, p = 0.069). Log is express the likelihood of an event happening compared to it not happening. E.g. Good practice in female compared to male. The rest of the variable same to this example. If log more than 1 the event more likely. If log less than 1 less likely. If log equal to 1 equal to both values.

Knowledge

	Correct answer	Participant's response	
	Correct answer	Answered correctly	Answered incorrectly
1. Regarding the general management of diabetes			
Special "Ramadan-focused education" is associated with better outcomes and less complications	True	80.7%	19.3%
Attention should be paid equally to the effects of fasting in the day time and to feasting in the evening time and after Ramadan	True	45.3%	54.7%
Pregnant diabetic women should be advised to avoid the fasting	True	58.2%	41.8%
Most hypoglycemic episodes occur during the last 2-3 hours of the fast	True	51.9%	48.1%
Patients with type 1 diabetes are NOT exempt from fasting and should NOT stop fasting except under special circumstances	False	13.7%	86.3%
2. T2DM patients fasting on oral anti-diabetic drugs			
Doses of sulphonylureas have traditionally been reduced and given before the evening meal	True	50.9%	49.1%
Patients on metformin and pioglitazone may continue same total daily doses	True	58.2%	41.8%
DDP-IV inhibitors have been shown to lead to less hypoglycemic episodes than sulphonylureas in general	True	37.5%	62.5%
SGLT2 inhibitors need to be used carefully in elderly patients and those with increased risk of dehydration	True	36.1%	62.5%
All sulphonylureas carry the same hypoglycemic risk potential	False	36.1%	62.5%
3. T2DM patients fasting on injectable anti-diabetic therapies			
If a patient who is fasting on insulin develops confirmed hypoglycemia, he should break the fast immediately,	True	88.1%	11.9%
Doses of premixed insulin should be inverted with a higher dose before after (sunset) and reduced doses before sun (dawn)	False	40.4%	59.6%
It is prudent to reduce the doses of basal insulin to avoid day time hypoglycemia	True	38.2%	61.8%
LIRA-Ramadan study concluded that GLP-1 therapy should never be used during Ramadan fasting	False	7.0%	93.0%
Patients on any type of insulin should not monitor their blood glucose during the day time as blood testing breaks the fast	False	3.9%	96.1%
4. Whom do you think is low risk for fasting during Ramadan?			
Poorly controlled type 1 diabetes	False	8.8%	91.2%
Acute hyperglycemic state	False	4.6%	95.4%

Recurrent hypoglycemia	False	9.1%	90.9%
Advanced macro vascular complications	False	4.6%	95.4%
Type2 DM requiring insulin	False	9.1%	90.9%
Pregnancy in pre-existing diabetes, or gestational DM treated with insulin or Sulfonyl-ureas	False	6.7%	93.3%
Well-controlled Type1 DM	False	30.9%	69.1%
Type2 DM with sustained poor glyceimic control	False	4.6%	95.4%
Stable macro vascular complications of diabetes	False	16.1%	83.9%
Well-controlled Type2 DM	True	75.4%	24.5%
5. Whom do you think moderate risk for fasting during Ramadan?			
Poorly controlled type 1 diabetes	False	8.8%	91.2%
Acute hyperglycemic state	False	24.9%	75.1%
Recurrent hypoglycemia	False	9.5%	90.5%
Advanced macro vascular complications	False	11.6%	88.4%
Type2 DM requiring insulin	False	37.9%	62.1%
Pregnancy in pre-existing diabetes, or Gestational DM treated with insulin or Sulfonyl-ureas	False	16.1%	83.9%
Well-controlled Type1 DM	False	23.2%	76.8%
Type2 DM with sustained poor glyceimic control	True	22.1%	77.9%
Stable macro vascular complications of diabetes	False	31.2%	68.8%
Well-controlled Type2 DM	False	16.8%	83.2%
6. Whom do you think high risk for fasting during Ramadan?			
Poorly controlled type 1 diabetes	True	70.5%	29.5%
Acute hyperglycemic state	True	38.9%	61.1%
Recurrent hypoglycemia	True	78.2%	21.8%
Advanced macro vascular complications	True	56.8%	43.2%
Type2 DM requiring insulin	True	27.7%	72.3%
Pregnancy in pre-existing diabetes, or gestational DM treated with insulin or Sulfonyl-ureas	True	48.4%	51.6%
Well-controlled type1 DM	True	8.4%	91.6%
Type 2 DM with sustained poor glyceimic control	False	40.4%	59.6%
Stable macro vascular complications of diabetes	True	11.6%	88.4%
Well-controlled Type2 DM	False	2.1%	97.9%

Table 12: Shows the registrars response to specific questions on the knowledge of principles and practice of management of diabetes during Ramadan.

The table above shows responses to different questions regarding knowledge of diabetes management during Ramadan, more than 80% of participants know the importance of Ramadan focused education, only 58% know the importance to advise pregnant diabetic patients to avoid fasting. Only 50.9% of participants valued the truth that most hypoglycemic episodes occur in last 2-3 hours, and only

13.7% of them know that patients with type 1 diabetes must exempt from fasting. Over 50% were aware the doses of sulphonylureas should be reduced during fasting, and only 37.5% know that DDP-IV is better than sulphonylureas to avoid hypoglycemic episodes during fasting. 96.1% of participants think blood testing for glucose monitoring during fasting will breaks the fast.

P = 0.172		Knowledge of registrars in diabetes management in Ramadan	
		Low level of knowledge	High level of knowledge
Year of rotation	R1	54.5%	45.5%
	R2	62.8%	37.2%
	R3	61.4%	38.6%
	R4	47.9%	52.1%
Total		53.3%	46.7%

Table 13: Shows the association between the year of rotation and the level of knowledge.

*P-value considered significant at less than 0.05 levels.

P=0.102		Knowledge of registrars in diabetes management in Ramadan	
		Low level of knowledge	High level of knowledge
Years of practice from graduation	1-2	44.4%	55.6%
	3-4	69.0%	31.0%
	5-6	56.3%	43.8%
	> 7	49.1%	50.9%
Total		53.3%	46.7%

Table 14: Shows the association between the years of practice from graduation and the level of knowledge.

*P-value considered significant at less than 0.05 levels.

(69%) of those practicing 3-4 years shows low level of knowledge. The participants practicing 7 years and more, (49.1%) of them shows low level of knowledge.

Discussion

This study was conducted to evaluate the knowledge, attitude, and practice of family medicine registrars in SMSB about the management of diabetics fasting Ramadan.

In this study female respondents (88.8%) predominated in our sample versus (11.2%) were male. The finding is different from study, [36] they found that most respondents are male (55.9%) while women are (44.1%).

More than 90% of respondents acknowledged hypoglycemia is the major risk which is similar to same previous study [36] which is considered high knowledge.

Nearly 40% of them considered hyperglycemia and diabetic ketoacidosis which is considered low when compare with same previous study, [36] showed that two-thirds of participants acknowledged risks of hyperglycemia and diabetic ketoacidosis.

About one third of respondents recognized the increased risks to pregnancy and potential risk of thromboembolic disease with fasting. However, comparable study finding showed nearly half of participants showed increased risks to pregnancy and potential risk of thromboembolic disease [36].

Over (40%) of the respondents reported that they are fully confident or fairly confident in the management of diabetes during Ramadan, (30%) just confident. Comparable study showed that most providers in primary care clinic did not follow recommendations and felt uncomfortable managing diabetes during Ramadan [33].

Regarding guidelines followed by respondents for management of diabetes during Ramadan, over one third follow common sense and good clinical practice, only (26.3%) of them follow the ADA workshop report, the remaining relied on own research, and expert opinions. Similar results in study showed that more than (63,0%) are following their experience and only (18.5%) follow ADA/EASD guidelines on diabetes management during Ramadan [38]. Another showed only (22%) of the family physicians stated that they were aware of the international guidelines for Ramadan and diabetes management [10].

Nearly (70%) of respondents make blood sugar monitoring, diet and food recommendations and discuss medical risks of fasting with patients. These results are similar to study showed more than (80%) of respondents make blood sugar monitoring, diet and food recommendations [36].

There was wide variation regarding Knowledge of the general management of diabetes in Ramadan. More than (80%) recognized the importance of Ramadan-focused education. Despite most respondents nearly (80%) were senior (R3 and R4 year of rotation); only (13.7%) were aware of the exemption of T1DM, and (45.3%) recognized the importance of glycemic control at nighttime. Comparable study showed over 90% recognized the importance of Ramadan focused education, 75.1% valued the importance of glycemic control at night time, and 71.2% were aware of the exemption of T1DM [36].

Over (50%) were aware with the time of highest risk of hypoglycemia, nearly (60%) knew the exemption of pregnant women with diabetes, which is similar to same study showed, (69.0%) were familiar with the time of highest risk of hypoglycemia, and (62.0%) knew the rulings regarding exemption of pregnant women with diabetes.

There was moderate awareness level of the advantages of DDP-IV inhibitors over sulphonylureas in general. Low percentage of respondents were aware that sulphonylureas carry the different hypoglycemic risk potential, and would use SGLT2 inhibitors carefully in certain groups. Considerable percentage prescribes metformin and pioglitazone in the same and daily doses, and this good knowledge.

Most of respondents were aware the importance of break the fast immediately when patient develop hypoglycemia. Small percentage, about (40%) of respondents recognized the common practice of reversing the insulin doses when premixed insulin between day and night, and need to reduce basal insulin to avoid hypoglycemia. Very small percentage were aware that monitoring blood glucose for patient in insulin during fasting would not break the fast, and GLP1 can be used during fasting.

In our study most of respondents cannot differentiate between low, medium, and high risk for fasting during Ramadan, similar study reported that many PCPs lack adequate knowledge on the principles of Ramadan fasting and that the majority of PCPs feel only slightly comfortable with managing the health of their fasting patients [37]. Similar study showed the mean knowledge level, attitude, and approach scores were determined to be lower than expected, and a significant difference was found between the scores and academic titles [10].

There were no clear association between ages of respondents, year of rotation, location of practice, years of practice since graduation and the level of knowledge, P-value > 0.05, is not significant. The overall assessment shows more than half of respondents had low level of knowledge regarding management of diabetes during Ramadan.

Limitation of the Study

Firstly, it is cross sectional study, secondly it's Internet based. It's KAP study, not containing documented practices.

Conclusion

Based on the study objectives it can be concluded that there are wide variations in levels of knowledge, attitude and practice among family Medicine Registrars in SMSB regarding recognizing some of the concerns of diabetic patients fasting during Ramadan, but the overall assessment shows that more than half of them had low level of knowledge.

Recommendations

- Diabetes and Ramadan guidelines should be well-endorsed to all health care providers, family physicians included, as they are the front-liners in the health care system.
- Training through workshops and tutorials are useful to enhance knowledge, attitude and practical skills.
- Attending conferences and participating in clinical audits and large scale research to improve the practice and identify the deficiencies to fill in the gaps.

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