



Knowledge and Attitude of Physicians Toward Management of Type 2 Diabetes Mellitus at Benghazi Medical Center

Malak Nasser Hassan¹  Najat Omer Buzaid^{2,3}

¹Department of Medicine, Al Hawari General Hospital, Benghazi, Libya

²Department of Medicine, Faculty of Medicine, University of Benghazi, Benghazi, Libya

³Internal Medicine Department, 7th October Hospital, Benghazi, Libya

Address for correspondence Malak Nasser Hassan, MBChB, MSc, Department of Medicine, Al Hawari General Hospital, Benghazi 3425 + FWC, Libya (e-mail: mamoreader7@gmail.com).

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Abstract

Introduction Type 2 diabetes mellitus (T2DM) is a major public health problem with an increased prevalence; many physicians come into contact with patients with T2DM, thus their knowledge and management attitudes play a vital role in patient care and proper management.

Aim To evaluate the knowledge and attitude of physicians working at Benghazi Medical Center (BMC), toward T2DM and its management, and to identify factors that affect their knowledge and attitude.

Methods A facility-based cross-sectional analysis was conducted at BMC between June 2023 and April 2024, enrolling 140 practicing physicians (excluding endocrinology specialists). Participants completed an adapted 28-item questionnaire evaluating both cognitive knowledge (diagnostic criteria, therapeutic targets) and clinical attitudes (management behaviors). Scoring thresholds classified knowledge as poor (< 50%), moderate (50–75%), or good (> 75%), while attitudes were binary-classified (poor < 70% vs. good ≥ 70%). Statistical testing was performed using SPSS 24, employing chi-square tests for proportions and multivariable regression to identify predictors, with $\alpha = 0.05$ defining significance. Continuous measures appear as mean $\pm$ standard deviation and categorical data as counts/percentages.

Results Among 140 physicians (86.4% female, mean age 36.1 ± 5.39 years), knowledge levels were moderate (52.1%) to good (15%), with significant gaps in lipid targets and hypoglycemia recognition. Notably, 56.4% demonstrated poor management attitudes. Work experience > 10 years predicted superior knowledge ($p < 0.02$), while specialists and residents showed better attitudes than consultants ($p < 0.01$). Correct diagnosis thresholds were known (fasting plasma glucose: 88.6%, hemoglobin A1c: 83.6%), but treatment indications showed variability (insulin: 66.4%). These findings highlight critical knowledge-practice gaps in T2DM management.

Conclusion The majority of participants had a moderate to good level of knowledge about T2DM. A higher percentage had poor attitudes toward T2DM management, while their attitudes toward using antidiabetic medications were average. These findings call for institutional reforms in diabetes training, emphasizing guideline adoption and attitudinal improvement, particularly for senior clinicians.

Keywords

- knowledge
- attitude
- physicians
- T2DM
- management
- Benghazi

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ملخص المقال باللغة العربية

إدارة مرض السكري من النوع الثاني في بنغازي، ليبيا: مسح مقطعي لتقييم معرفة الطبيب واتجاهاته وممارساته

المؤلفون: ملك حسن¹، نجاة أبوزيد²، 1 مستشفى البواري العام - قسم الطب الباطني، 2: قسم الطب الباطني، كلية الطب، جامعة بنغازي، ليبيا.

المؤلف المسؤول: ملك حسن، البريد الإلكتروني: mamoreader7@gmail.com

المقدمة: يعد مرض السكري من النوع الثاني مشكلة صحية عامة كبرى متزايدة الانتشار، حيث يتعامل العديد من الأطباء مع مرضى السكري من النوع الثاني، وبالتالي تلعب معرفتهم واتجاهاتهم المعرفية دوراً حيوياً في رعاية المرضى وحصولهم على الرعاية المطلوبة.

الهدف: تقييم معرفة واتجاهات الأطباء العاملين في المركز الطبي في بنغازي تجاه مرض السكري من النوع الثاني وإدارته، وتحديد العوامل التي تؤثر على معرفتهم واتجاهاتهم. **الطرق:** تم إجراء تحليل مقطعي قائم على منشأة المركز الطبي في بنغازي بين يونيو 2023 وأبريل 2024، حيث شمل 140 طبيباً ممارساً (باستثناء أخصائيي الغدد الصماء)، أكمل المشاركون استبياناً معدلاً مكوناً من 28 بنداً يقيم كل من المعرفة الإدراكية (معايير التشخيص، الأهداف العلاجية) والاتجاهات السريرية (سلوكيات الإدارة)، صنفت عتبات التسجيل المعرفة على أنها غير كافية (<50%)، أو متوسطة (50-75%)، أو كافية (>75%)، بينما تم تصنيف الاتجاهات بشكل ثنائي (ضعيفة <70% مقابل كافية >70%). تم إجراء الاختبارات الإحصائية باستخدام SPSS 24، مع استخدام اختبارات χ^2 للنسب وتحليل الانحدار المتعدد لتحديد العوامل التنبؤية، مع تحديد مستوى الدلالة عند $\alpha=0.05$ تم عرض المقاييس المستمرة كمتوسط $\pm$ الانحراف المعياري، والبيانات الفئوية كأعداد/نسب مئوية.

النتائج: ما بين 140 طبيباً (86.4% إناث، متوسط العمر 5.39 ± 36.1 سنة)، كانت مستويات المعرفة متوسطة (52.1%) إلى جيدة (15%)، مع وجود فجوات واضحة في معرفة أهداف الدهون وتعريف نقص سكر الدم. أظهر 56.4% من المشاركين اتجاهات ضعيفة نحو إدارة المرض. كانت الخبرة العملية لأكثر من 10 سنوات مؤشراً على معرفة أعلى ($p=0.02$)، بينما أظهر الأخصائيون والمقيمون اتجاهات أفضل مقارنة بالاستشاريين ($p=0.01$). كانت معايير التشخيص معروفة جيداً (سكر الصيام: 88.6%، الهيموغلوبين السكري: 83.6%)، لكن ظهر تباين في مؤشرات العلاج (الأنسولين: 66.4%). هذه النتائج تسلط الضوء على فجوات حرجية بين المعرفة والممارسة في إدارة السكري من النوع الثاني.

الاستنتاج: أظهر غالبية المشاركين مستوى معتدلاً إلى جيد من المعرفة حول مرض السكري من النوع الثاني. كانت نسبة أعلى لديهم اتجاهات ضعيفة تجاه إدارة مرض السكري من النوع الثاني، بينما كانت اتجاهاتهم نحو استخدام الأدوية المضادة للسكري متوسطة. تدعو هذه النتائج إلى إصلاحات مؤسسية في تدريب السكري، مع التركيز على اعتماد المبادئ التوجيهية وتحسين الاتجاهات، خاصة لدى الأطباء الأكبر سناً.

الكلمات المفتاحية: المعرفة، الاتجاهات، الأطباء، السكري من النوع الثاني، الإدارة، بنغازي.

Introduction

Diabetes mellitus (DM) is a major public health problem with social and economic burden and increasing morbidity and mortality.

According to the International Diabetes Federation, an estimated 537 million adults aged 20 to 79 years were living with diabetes in 2021, an estimated 24 million people were in Africa, and it is predicted to increase by 129% by the year 2045.¹ Type 2 DM (T2DM) has been growing along with the fast urbanization, and it accounts for 90% of cases of diabetes.²

The level of knowledge and attitude of physicians toward T2DM management plays a vital role in patient care and outcome of management, and has a good impact on diabetes control. Similarly, poor knowledge and attitude of physicians can make a barrier to getting patients proper care and consequently lead to poor outcomes. Physicians who are working in hospitals and emergency departments might be in contact with a considerable number of patients with T2DM, and their knowledge and attitude toward T2DM management will affect the outcomes of those patients.

The study evaluated the knowledge of physicians working in Benghazi Medical Center (BMC) toward T2DM and their attitude toward its management and determined the factors that impact their knowledge and attitude.

Methods

Study Design

It is a cross-sectional analytic study.

Study Setting

This study was conducted at the Benghazi Medical Center.

Study Population

Physicians with different professional degrees were working at the medical department of BMC, while endocrinologists and physicians who were working in diabetes outpatient clinics were excluded from the study.

Sampling Technique and Sample Size

The participants were chosen using a stratified sampling technique, 165 questionnaires were distributed during the period of the study, and 140 participants responded, and the response rate was 84.8%.

The total number of physicians who were working in the medical department was 375. The number of endocrinologists and physicians working in outpatient clinics who were excluded from the study was 41.

Data Collection Tool and Procedure

To collect data, a modified predesigned questionnaire (self-administered questionnaire) was used,³⁻⁵ and to verify the validity and reliability of the questionnaire and to identify any logistic problems, a pilot study was conducted and included 10 physicians working at BMC. Nine of them participated and finished all the questions of the questionnaire, the response rate was 90%. Through pilot study, no changes had done on questionnaire and by a split-half test method, the questionnaire demonstrated good internal consistency and reliability of responses with Cronbach's α coefficient of 0.702 and 0.729 for each split group, and a

correlation between groups of 0.788 indicating good reliability.

The data were collected through face-to-face interviews with each participant. After obtaining verbal consent from participants, they filled in their answers to the questionnaire on their own and without consulting materials, textbooks, the internet, or other sources of help in the presence of the researcher.

Questionnaire

It consisted of 28 questions and included both open-ended questions and multiple choice questions. It was divided into three sections:

Section 1: consisted of six questions that included socio-demographic information and professional characteristics of the participants.

Section 2: consisted of 16 questions that assessed physicians' knowledge about risk factors of T2DM, diagnostic criteria, complications, glycemic monitoring, goal blood pressure, lipid profile, and therapy use. The obtained answers were scored as zero for wrong answers, 0.5 for incomplete answers to open-ended questions, and 1 for right and full answers. The total scoring of the knowledge questions was < 50% score (poor knowledge), 50 to 75% score (moderate knowledge), and > 75% score (good knowledge).

Section 3: consisted of six questions that assessed physicians' attitudes toward T2DM diagnosis, including the clinical presentation, laboratory investigations, screening for complications, drug therapy, patients' education, and referral attitude.

The answers were scored as zero for a wrong answer and 1 for the right answer. For the total attitude scoring, < 70% was considered as a poor attitude, and $\geq 70\%$ as a good attitude.

Statistical Analysis

Data were encoded and entered into a computer and analyzed using the Statistical Package of Social Sciences (SPSS) version 24 (Chicago, Illinois, United States). The data were expressed as mean $\pm$ standard deviation (SD), and frequencies and percentages. For the categorical variables, the chi-square test analysis was performed to test differences in the proportions of categorical variables between two or more groups. In 2×2 tables, the Fisher's exact test (two-tailed) was used instead of chi-square, when the sample size was small. We considered the $p < 0.05$ level as the cutoff value of significance.

Multiple linear regression analysis model was used to evaluate the predictive factors of knowledge level, and binary logistic regression was used to find out predictive factors for level of attitude. This study was performed after the approval of the Research Ethical Board at BMC.

Results

To our knowledge, this was the first study to assess physicians' knowledge and attitude toward T2DM management in our country. We had a high response rate, and the sample was representative.

Sociodemographic and Professional Characteristics of Participating Physicians

The study included 140 physicians in the final analysis, with a mean age of 36.1 years $\pm$ SD 5.39, female participants were predominant (86.4%). The majority of participants (71.4%) had just a bachelor's degree, while more than two-thirds (73.6%) had work experience ≤ 10 years duration. About half of the participants (50.7%) were resident physicians, 22.1% were specialists, and 5.7% were consultants, and less than half of them (43.6%) had never contribute to diabetes workshops since graduation (**Table 1**).

T2DM-Related Knowledge among Participants

Nearly all participants had contact with patients with diabetes (99.3%), and 70.7% of them referred patients to a diabetes clinic. Participants who answered correctly about DM diagnosis using cutoff levels of fasting plasma glucose (FPG) and hemoglobin A1c (HbA1c) were at 88.6 and 83.6%, respectively, and 77.9% of them gave right answers about minimum fasting hours needed to test FPG. However, 95% of participants correctly answered about modifiable risk factors of T2DM and 98.6% of them answered correctly about its complications. Correct knowledge of symptoms of

Table 1 Distribution of 140 participants according to sociodemographic and professional characteristics

Variables	Frequency (%)
Gender	
Male	19 (13.6)
Female	121 (86.4)
Educational level (qualification)	
Bachelor	100 (71.4)
Master	17 (12.1)
PhD	5 (3.6)
MD	14 (10.0)
Fellowship	4 (2.9)
Work experience (mean $\pm$ SD)	(1.26 $\pm$ 0.44)
≤ 10 y	103 (73.6)
> 10 y	37 (26.4)
Job title	
Newly graduated	30 (21.4)
Resident physician	71 (50.7)
Specialist	31 (22.1)
Consultant	8 (5.7)
Last time did you participate in diabetes workshops	
Never	61 (43.6)
Past 1–2 y	42 (30.0)
Past 3–4 y	18 (12.9)
≥ 5 y	19 (13.6)
Age (mean $\pm$ SD), y	36.1 $\pm$ 5.39

Abbreviation: SD, standard deviation.

Table 2 Distribution of participants according to their knowledge toward T2DM management

Variables	Frequency (%)
Have you ever been in contact with diabetic patients?	
Yes	139 (99.3)
No	1 (0.7)
Usual deal with diabetic patient	
Treat himself	28 (20.0)
Refer to diabetic clinic	99 (70.7)
Refer to endocrinologist	13 (9.3)
Correctly answered of hours need to fast to investigate FPG	109 (77.9)
Correctly answered fasting blood glucose to diagnose T2DM	124 (88.6)
Correctly answered HbA1c to diagnose T2DM	117 (83.6)
Correctly answered modifiable risk factors in T2DM	133 (95)
Correctly answered common complications in T2DM	138 (98.6)
Correctly answered symptoms of hypoglycemia	139 (99.3)
Correctly defined hypoglycemia	47 (33.6)
Correctly answered target HbA1c level in T2DM	95 (67.9)
Correctly answered target blood pressure in T2DM	99 (70.7)
Correctly answered target HDL cholesterol in T2DM	25 (17.9)
Correctly answered target LDL cholesterol in T2DM	58 (41.1)
Correctly answered target triglyceride in T2DM	38 (27.1)
Correctly answered target non-HDL cholesterol in T2DM	3 (2.1)
Correctly answered indications to start insulin in T2DM	93 (66.4)

Abbreviations: FPG, fasting plasma glucose; HbA1c, hemoglobin A1c; HDL, high-density lipoprotein; LDL, low-density lipoprotein; T2DM, type 2 diabetes mellitus.

Note: Percentage from 140 participants.

hypoglycemia was reported by 99.3% of participants, whereas only 33.6% correctly defined hypoglycemia, more than two-thirds of participants (67.9%), and 70.7% correctly answered target HbA1c and target blood pressure, respectively. Moreover, the knowledge of participants about the correct targets of lipid profile was low, and 66.4% of them answered correct indications of insulin therapy (► **Table 2**).

The knowledge assessment of the studied group revealed that 52.1% had a moderate knowledge score, 32.9% had poor knowledge, and 15% had good knowledge regarding the management of T2DM (► **Table 3**).

Attitude of Participants toward T2DM Management

The correct answers regarding blood pressure measurement were obtained by 98.6% and diabetic foot screening by 80%, as part of the clinical evaluation of patients with T2DM. However, fundus eye examination and calculation of body mass index (BMI) were answered correctly by 67.1% and 61.4%, respectively. For routine laboratory evaluation, HbA1c, lipid profile, serum urea, and creatinine were answered correctly by almost all the participants. Meanwhile, 31.4% of them correctly answered that an electrocardiogram (ECG) is not recommended in routine evaluation of patients with T2DM. Regarding counseling for patients with diabetes, 97.9% of participants correctly answered on lifestyle modification,

the importance of medication adherence (95.7%), symptoms and management of hypoglycemia (96.4%), and foot care (81.4%). Most of the participants correctly answered about using annual fundus examination, serum urea and creatinine-microalbuminuria, and lipid profile for screening of diabetic complications. Whereas an echocardiography was not considered a routine evaluation in T2DM was correctly chosen by 35.7%. In relation to the criteria for referring patients with diabetes to specialists, 90.7% of respondents indicated that poor glycemic control warranted such referrals, 85.7% answered that the development of chronic complications is a sufficient indication for referral, and 78.6% noted that advanced complications necessitated referral. Conversely, 40% of participants reported that they did not refer patients with diabetes to specialists to start treatment (► **Table 4**).

The most frequent answers about antidiabetic drugs were insulin (70%), metformin (63.6%), and sulfonylurea (57.1%).

Overall, a poor attitude score (< 70% correct answers) toward the management of T2DM was reported in 56.4% of participants, while a good attitude score (≥ 70% correct answers) was reported in 43.5% (► **Table 3**).

There was a statistically significant difference between the total knowledge score and duration of work experience, where participants with a work experience of > 10 years had

Table 3 Comparison of knowledge score and attitude score according to different variables

Variable	Knowledge			p-Value	Attitude		p-Value
	Poor	Moderate	Good		Poor	Good	
Overall score percentage	32.9%	52.1%	15%		56.4%	43.5%	
Gender							
Male	5 (26.3%)	11 (57.9%)	3 (15.8%)	0.805	11 (57.9%)	8 (42.1%)	0.547
Female	41 (33.9%)	62 (51.2%)	18 (14.9%)		68 (56.2%)	53 (43.8%)	
Age category, y							
25-34	16 (32.7%)	24 (49%)	9 (18.4%)	0.467	25 (51%)	24 (49%)	0.585
35-44	29 (36.3%)	42 (52.5%)	9 (11.3)		48 (60%)	32 (40%)	
45-54	1 (10%)	6 (60%)	3 (30%)		5 (50%)	5 (50%)	
> 55	0 (0%)	1 (100%)	0 (0%)		1 (100%)	0 (0%)	
Educational level							
Bachelors	39 (39%)	49 (49%)	12 (12%)	0.133	39 (39%)	61 (61%)	0.06
Master	5 (29.4%)	8 (47.1%)	4 (23.5%)		13 (76.5%)	4 (23.5%)	
PhD	0 (0%)	4 (80%)	1 (20%)		2 (40%)	3 (60%)	
MD	2 (14.3%)	10 (71.4%)	2 (14.3%)		6 (42.9%)	8 (57.1%)	
Fellowship	0 (0%)	2 (50%)	2 (50%)		1 (25%)	3 (75%)	
Job title							
Newly graduated physicians	13 (43.3%)	13 (43.3%)	4 (13.3%)	0.398	23 (76.7%)	7 (23.3%)	0.01 ^a
Resident physicians	24 (33.8%)	38 (53.5%)	9 (12.7%)		40 (56.3%)	31 (43.7%)	
Specialist	8 (25.8%)	18 (58.1%)	5 (16.1%)		11 (35.5%)	20 (64.5%)	
Consultant	1 (12.5%)	4 (50%)	3 (37.5%)		5 (62.5%)	3 (37.5%)	
Work experience, y							
≤ 10	39 (39.9%)	53 (51.5%)	11 (10.7%)	0.02 ^a	42 (40.8%)	19 (51.4%)	0.266
>10	7 (18.9%)	20 (54.1%)	10 (27%)		61 (59.2%)	18 (48.6%)	
(Mean ± SD)	(7.71 ± 1.80)				(18.66 ± 2.55)		

Abbreviation: SD, standard deviation.

^ap-Value < 0.05 considered significant.

higher knowledge scores compared with those with a work experience of ≤ 10 years ($p = 0.02$). Regarding attitude level, a statistically significant difference was demonstrated between the total attitude score and job title, where specialist and resident physicians had better attitudes compared with consultants and newly graduated physicians ($p = 0.01$) (► **Table 3**).

Predictive Factors for the Knowledge Level of Participants toward T2DM Management

In the multiple linear regression model, duration of work experience of >10 years was the only significant predictor for a good knowledge score at a p -value of < 0.05 (► **Table 5**).

Predictive Factors for Attitude of Participants toward T2DM Management

The model of the binary logistic analysis revealed that specialists and resident physicians were more likely to have better attitudes toward T2DM management, as compared with newly graduated physicians (odds ratio [OR] 16.1; $p = 0.004$ and OR 3.32; $p = 0.03$), respectively. Partic-

ipants in the age group of 35 to 44 years had lower attitude scores as compared with those aged < 35 years (OR 0.20; $p = 0.02$), and there was no statistically significant difference in attitude scores between participants aged < 35 and > 44 years (► **Table 6**).

Discussion

In the present study, most of the studied participants were females, had just a bachelor's degree, and more than half of them worked as resident physicians with work experience of ≤ 10 years.

In addition, just over half of the studied group had previous participation in diabetes lectures and workshops, this was better than studies in Nigeria and Saudi Arabia, where over two-thirds of participants had never participated in diabetes workshops.^{5,6} This might be related to continuous diabetes scientific programs in BMC.

In this study, most of the participants had correct knowledge regarding glycemic cutoffs of FPG, HbA1c, and the number of fasting hours to test FPG for diagnosis of

Table 4 Distribution of participants according to their attitude toward T2DM management

Variable	Answers	Frequency (%)
Initial clinical evaluation of new T2DM patients		
Blood pressure	Yes	138 (98.6)
	No	2 (1.4)
BMI	Yes	86 (61.4)
	No	54 (38.6)
Foot examination	Yes	112 (80)
	No	28 (20)
Fundus eye examination	Yes	94 (67.1)
	No	46 (32.9)
Initial laboratory evaluation of new T2DM patients		
HbA1c	Yes	138 (98.6)
	No	2 (1.4)
Lipid profile	Yes	139 (99.3)
	No	1 (0.7)
Serum urea and creatinine	Yes	134 (95.7)
	No	6 (4.3)
Electrocardiogram	Yes	96 (68.6)
	No	44 (31.4)
Counseling provided to T2DM patients		
Lifestyle modification	Yes	137 (97.9)
	No	3 (2.1)
Medication adherence	Yes	134 (95.9)
	No	6 (4.3)
Hypoglycemia symptoms and management	Yes	135 (96.4)
	No	5 (3.6)
Foot care	Yes	114 (81.4)
	No	26 (18.6)
Screening for complications		
Annual fundus examination	Yes	126 (90)
	No	14 (10)
Annual lipid profile	Yes	121 (86)
	No	19 (13.6)
Annual serum urea and creatinine-microalbuminuria	Yes	125 (89.3)
	No	15 (10.7)
Echocardiography	Yes	90 (64.3)
	No	50 (35.7)
Sufficient indications for referral to diabetologist		
To start treatment	Yes	84 (60)
	No	56 (40)
Poor glycemic control	Yes	127 (90.7)
	No	13 (9.3)
As soon as chronic complications are noticed	Yes	120 (85.7)
	No	20 (14.3)

(Continued)

Table 4 (Continued)

Variable	Answers	Frequency (%)
When complications are advanced	Yes	110 (78.6)
	No	30 (21.7)

Abbreviations: HbA1c, hemoglobin A1c; T2DM, type 2 diabetes mellitus.

Note: Percentage from 140 participants.

Table 5 Model of multiple linear regression results for factors affecting level of knowledge of physicians toward T2DM managements

Variable	Knowledge score				
	Beta	p-Value	t-test	95% CI	
				Lower	Upper
Duration of work experience > 10 y	0.233	0.006 ^a	2.318	0.6010	0.1048

Abbreviations: CI, confidence interval; T2DM, type 2 diabetes mellitus.

^ap-Value < 0.05 considered significant.

Table 6 Model of binary logistic regression results for factors affecting attitude score of participating physicians

Variable	Attitude score		
	Beta	OR	p-Value
Job title			
Newly graduated physicians	Reference		
Resident physicians	1.202	3.327	0.031 ^a
Specialists	2.781	16.13	0.004 ^a
Consultants	2.139	8.49	0.170
Age category, y			
25–34	Reference		
35–44	–1.608	0.200	0.024 ^a
45–54	–2.252	0.105	0.233
≥ 55	–23.620	0.000	1.000

Abbreviation: OR, odds ratio.

^ap-Value < 0.05 considered significant.

diabetes; this was similar to findings of other studies conducted in Yemen, Saudi Arabia, and Egypt,^{7–9} while other studies in South Nigeria, Sri Lanka, Cameron, and China demonstrated lower knowledge compared with the present study.^{5,10–12}

Concerning participants' knowledge about risk factors, microvascular and macrovascular complications of diabetes, almost all had correct knowledge, similar findings were observed in the study by Babelgaith et al,⁷ while these findings were higher than those reported by Ugwu et al in which only 34.4% had correct knowledge of modifiable diabetes risk factors.⁵ Regarding knowledge of HbA1c and blood pressure targets in patients with T2DM, over half of the participants had correct knowledge which was higher than that observed by Jingi et al and Niroomand et al where only one-fourth of their participants had correct knowledge.^{11,13} In the current study, a good knowledge of symptoms of

hypoglycemia was demonstrated by most of the participants, despite that only 33.6% of them defined hypoglycemia according to the last laboratory definition by American Diabetes Association of < 70 mg/dL,⁴ this could be explained by the lack of pursuing for diabetes guidelines. Less than half of the studied group correctly answered targets of lipid profile, near to results of studies by Aghili et al and Alzaidi et al,^{14,15} this was a reflection of inadequate update of their knowledge.

Overall, the present study revealed that the knowledge score of the studied groups was distributed between moderate (52.1%) and good (15%), and the highest score of knowledge was reported among participants who had work experience of >10 years. While 32.9% had poor knowledge scores, similar to the study by Alsaleem, which demonstrated that 48.6% of participants had a moderate score of knowledge and 23.9% of them had good knowledge scores,

while 27.5% had poor knowledge scores,¹⁶ other studies reported levels of knowledge near to the current study.^{6,13,15,17,18} Longer work experience had better knowledge in the current study, which was similar to other studies,^{8,9,19} while systemic review studies of Khan et al and Haghighinejad et al did not support the present study findings.^{6,20} Nevertheless, a much higher knowledge score compared with the current study was found in two studies in Yemen and Saudi Arabia where 97.3 and 84.5% of their participants had good knowledge of T2DM management, respectively.^{7,21} However, the current study was in contrast to those studies in South Nigeria, Sri Lanka, Cameroon, China, Iran, and Egypt which reported significant deficits in diabetes knowledge among participating physicians.^{5,10–13,19} The better knowledge level of the studied group could be explained by the fact that most of them were resident physicians in BMC, where more specialized educational programs and training are provided compared with those working in primary care settings.

In this study, just over half of the participants (56.4%) had a poor attitude toward the management of T2DM, whereas 43.5% of them had a good attitude; these findings are consistent with the results of two studies conducted in Egypt which reported that 58.2 and 56.7% of participants had poor attitude regarding diabetes diagnosis and treatment, respectively,^{9,19} and these results were in one line with other studies,^{5,10,11,22} and in contrast to the findings of studies conducted in Saudi Arabia, France, and Oman where the majority of participants had good attitude levels toward the management of T2DM.^{17,23,24} Higher percentage of physicians had poor attitudes in the current study, which could be clarified by the fact that most of them had lower professional levels and less duration of experience, and also this might reflect a lack of strategy to inform physicians about updating DM management guidelines. Regarding routine clinical assessment, measurement of blood pressure and foot examination were answered by the majority of participants in the current study. However, fundus eye examination and calculation of BMI were chosen by two-thirds of them, while a study by Jingi et al showed 27.3 and <35% of participants asked for fundus examination and blood pressure measurement routinely in patients with diabetes.¹¹ Moreover, significant deficits regarding BMI measurement and foot examination were reported by Ugwu et al, Khan et al, and Theban and Bajaba, indicating lower attitude levels of their participants compared with the current study.^{5,6,17} For routine laboratory evaluation, HbA1c, lipid profile, serum urea, and creatinine were correctly answered by almost all participants, which was different from studies by Ugwu et al and Khan et al in that HbA1c was requested routinely by 26.5 and 19.1% of their participants, respectively.^{5,6} In the current study, 31.4% of participants correctly answered that ECG was not routinely requested in patients with diabetes, this was near to the Khan et al's study,⁶ but it was much lower than those reported in the studies by Ugwu et al (79.7%) and Jingi et al (72.7%).^{5,11}

The majority of participants correctly answered about counseling for patients with diabetes on lifestyle modifica-

tion, the importance of medication adherence, symptoms and management of hypoglycemia, and foot care; similar findings were reported by Khan et al and Jehan et al,^{6,24} while much lower results were obtained by Ugwu et al, where 39.1 and 28.1% of participants educate patients about symptoms and management of hypoglycemia and foot care, respectively.⁵ In this study, screening for diabetes complications was answered correctly by most of the participants, almost the same as our results were reported in previous studies.^{10,17} While only 35.7% of the participants correctly answered that echocardiography is not a routine screening test, it is much lower than that reported by Jingi et al (92.4%).¹¹ The majority of the studied group had a high tendency to refer patients to endocrinologists; this was consistent with the results of the Fogelman et al's study,²⁵ while Ugwu et al found that the majority of participants (78.1%) referred patients only when complications were advanced.⁵ Insulin, biguanides (metformin) and sulfonylurea were the most frequently mentioned antidiabetic medications, comparable results were observed from previous studies.^{5,10,11} Concerning the appropriate indications for insulin use in patients with T2DM were correctly identified by less than a quarter of the participants in the study by Ugwu et al,⁵ this finding was notably lower than 66.4% reported in the current study. Such discrepancies may be attributed to inadequate knowledge and inappropriate behavior among physicians regarding the pharmacological management of diabetes. In agreement with other studies in Egypt and Saudi Arabia,^{9,18} the longer duration of work experience of current study participants was positively associated with their knowledge level compared with those with shorter work experience ≤ 10 years; this could be related to the fact that more training were earned with longer duration of work. In studies by Ugwu et al and Niroomand et al, physicians with a shorter practice duration of <10 years were more knowledgeable than those with a longer duration of practice, they explained those findings by the fact that the more recent graduate physicians are probably more conversant with current approaches to T2DM management than more senior physicians.^{5,13}

The age group category of 35 to 44 years was less likely to have better attitude compared with those aged <35 years, similar findings were observed by Alduraibi et al and Niroomand et al^{8,13}; this might be attributed to that younger physicians were more aware of recent guidelines regarding diagnosis and treatment of diabetes, which might be missed among the older aged physicians.

Study Limitations

This study had some limitations, it was a cross-sectional study, the observed associations are not necessarily causal. Nevertheless, it was used to predict factors that could affect knowledge and attitude of participating physicians toward management of T2DM, some physicians might be on vacation and some questions were multiple choice and they might be answered correctly by chance.

Conclusion

This study found that while most physicians at BMC had moderate to good knowledge of T2DM management, significant gaps existed in areas such as lipid targets and hypoglycemia diagnosis. Work experience (> 10 years) was the key predictor of better knowledge, whereas attitudes were often poor (56.4%), particularly among older and less specialized physicians. To improve care, local treatment guidelines should be standardized, and mandatory continuing education should be enforced to bridge knowledge gaps and foster better clinical practices. Future studies should assess diabetes management in high-risk settings such as emergency and surgical departments.

Conflict of Interest

None declared.

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