Print ISSN: 2321-6379
Online ISSN: 2321-595X
DOI: 10.17354/ijss/2018/297

Original Article

Practice and Attitude of Insulin Therapy Initiation for Type 2 Diabetes Mellitus Patients among General Practitioners and Family Physicians in Primary Health-Care Setting in Al-Ahsa

Hasan Mohammad Al-Haddad[1]*, Sadiq Ahmed Al-Ali[1], Ali Mohammad Al-Drees[1], Abdullah Mahdi Al-Ramdhan[2]

[1]Senior Resident, Postgraduate Center of Family Medicine, Ministry of Health, Saudi Board of Family Medicine, Alahsa Province, Saudi Arabia, [2]Consultant, Postgraduate Center of Family Medicine, Ministry of Health, Saudi Board of Family Medicine, Alahsa Province, Saudi Arabia

Abstract

Introduction: Many patients with Type 2 diabetes mellitus (T2DM) in Saudi Arabia have inadequate glycemic control. Still, some primary health-care (PHC) physicians show hesitancy regarding the initiation of insulin.

Aim: This study aims to assess the practices and attitudes of insulin initiation by primary care physicians (PCPs) and to determine the factors that contribute to delay insulin initiation for Type 2 diabetic patients in PHC setting in Al-Ahsa.

Methodology: A cross-sectional study was done using a self-administered anonymous online questionnaire, distributed among a convenient sample of PCPs from various PHC centers belonging to the ministry of health in Al-Ahsa city, between February and May 2018.

Results: A total of 164 physicians have participated in the study with a response rate of 100%. Insulin initiation was found to be affected by years of practice and experience in the management of T2DM. The majority of participants (73.1%) showed positive confidence regarding their ability to initiate insulin therapy for T2DM when it is needed, while half of the PCPs who do not have the competency to start insulin admitted that the primary barrier preventing them from initiating insulin is lack of experience. Most of the PCPs (86.6%) believe that the level of HbA1C is considered the leading indicator to start insulin therapy. 84.1% of the participants agreed that most worrying issue for the patients regarding insulin initiation is the fear of injection.

Conclusion: Many PCPs aware of the importance of insulin therapy initiation in the PHC setting, and they are confident enough to implement that in their practice. However, clinical experience and years of practice play significant roles in the initiation of insulin among PCPs.

Keywords: Barriers, Delay, Diabetes mellitus, Family physicians, General practitioners, Insulin, Initiation, Primary care physicians, Saudi Arabia

BACKGROUND

During the recent decades, the prevalence of patients with Type 2 diabetes mellitus (T2DM) has increased significantly in Kingdom of Saudi Arabia and that makes KSA one of the highest around the world in the prevalence of T2DM.[1] Diabetes mellitus is a chronic disease caused by disturbances in the utilization of glucose and that affects several systems of the body and results in a number of complications, which is usually divided into microvascular complications that include retinopathy, neuropathy, and nephropathy and macrovascular complications which include cardiovascular disease, cerebrovascular disease, and peripheral vascular disease.[2] Pathogenesis of T2DM is multifactorial and highly complex. Both beta-cell dysfunction and insulin resistance induce hyperglycemia and therefore increase insulin demand. Rising blood

Access this article online

www.ijss-sn.com

Month of Submission : 09-2018
Month of Peer Review : 10-2018
Month of Acceptance : 11-2018
Month of Publishing : 11-2018

Corresponding Author: Dr. Hasan Mohammad Al-Haddad, 6811 - Al-Baseerah, Unit No. 4, Hofuf 36364-3440, Alahsa Province, Saudi Arabia. Phone: 966556130097. E-mail: dr.hasan.haddad@gmail.com

glucose level above the normal range and the reduction in peripheral insulin sensitivity result in hyperglycemia. Moreover, persistently elevated blood glucose level will accelerate the occurrence of complications.[3]

According to a recent study published in July 2015, the prevalence of T2DM among 30–70 years individuals in Saudi Arabia estimated to be around 23.7%, most of those patients managed in primary health care (PHC).[4] Based on the recommendation of the American Diabetes Association, a reduction in the progression of complications can be achieved by strict glycemic control (HbA1C ≤ 7%) [5,6].

At present, insulin is considered one of the most effective old treatments used for the management of both T1DM and T2DM.[17] "Although initially developed to treat the insulin-dependent Type 1 diabetic patient, in whom it is lifesaving, insulin was used early to treat the insulin-resistant form of diabetes recognized by Himsworth and Kerr."[18] Regarding several studies, the best agent that controls HbA1C to the therapeutic level is insulin when used in appropriate doses.[19]

Most patients with T2DM usually start insulin therapy within the first 10 years of diagnosis to prevent complications.[7] Unfortunately, according to a cross-sectional study conducted in the Al-Ahsa region, most of the patients with T2DM (67%) who attend PHC have poor glycemic control (A1C ≥ 7%).[8] Several suggested reasons may explain this issue; one of them is delaying insulin initiation. Although insulin is considered the best available treatment to achieve good glycemic goals.[3] Two studies conducted in the same field concluded that this delaying might be related to one of the following aspects: Patient-, physician-, or system-related barriers.[9,10] Patient-related barriers to insulin use include fearing injury from injections, side effects that may result such as hypoglycemia, impact on social life, and uncertainty about its effectiveness.[9-11] While the physician-related barriers toward prescribing insulin include the level of physician's knowledge about the guidelines of insulin initiation, and perceptions regarding patient's negative attitudes towards insulin therapy.[9,11,12]

Literature Review

In a study conducted in Spain by Escalada *et al.* published in October 2016, that demonstrates the result of a 340 completed questionnaires (34.7% of them were by general practitioners (GPs), 24.8% were endocrinologists, 25.1% were internists, and the remaining 15.5% were nurses), has revealed that, in poorly controlled diabetic patients, 46% of GPs versus 43.2% of internists and 31.3% of endocrinologists waited for 3–6 months before starting insulin. However, the most admitted barriers to starting insulin according to the study participants are the need for time management and the interference of the therapy with the patient's social life, in addition to the "fear of needles" as the primary patient barrier to initiate insulin therapy.[13]

In another study done in Lebanon by Lakkis et al. published in June 2013. Which included a survey involved the family physicians practicing in Arab member countries, has stated that, according to 122 family physicians who completed the questionnaire 73.6% of them reported their preference to postpone the starting of insulin therapy until trial of the oral hypoglycemic agents with maximal doses. While 59.0% has informed that they commonly start insulin for T2DM patients, whereas 34.0% they tend to refer their patients to an endocrinologist, and only a 21.6% consider that insulin should be started by the endocrinologist and not by a family physician.

63.9% of the family physicians who participated in the study were reluctant to start insulin therapy mainly due to patient factors as per physicians opinion.

The barriers that were related to the patients, as reported by reluctant physicians, involved the fear of needle injections (79.5%), hypoglycemia (24.4%), and weight gain (17.9%), the thought that initiation of insulin as a personal failure in controlling their disease (37.2%), threat to the quality of life (57.7%), and lack of confidence in their capability to manage insulin therapy (44.9%).[14]

A study conducted in Turkey by Muharrem *et al.* published in April 2015, involved 87 volunteers of family physicians participated in the study, there was a statistically significant difference ($P = 0.0027$) between the family physicians who think that there is no an actual difference existed between insulin therapy and oral hypoglycemic agents in treating Type 2 diabetes as far as the long-term outcomes are concerned (46.0%). Moreover, those who had not enough time to educate their patients about insulin use (47.0%).

In addition, 40.2% of the physicians thought about patient-related barriers which make them hesitant to start insulin therapy, whereas 34.5% believed that patients were not compliant on insulin therapy, and 43.7% thought about hypoglycemia as an adverse effect was a barrier to initiate insulin therapy, while 43.7% of the physicians stated some reservation to use insulin in patients above the age of 65 years due to possible hypoglycemia, and 50.6% of the physicians thought about injection as a way of administration was a barrier for some patients to initiate insulin treatment.[15]

One additional study conducted in the United States by Hayes *et al.* published in June 2008. In this study, ≥66% of the primary care physicians (PCPs) surveyed have agreed

on that the fear of injections affect the patients' acceptance of insulin therapy and also the reluctance of some patients on oral hypoglycemic agents to start insulin is found to be a barrier toward initiating insulin therapy by the PCPs. They also agreed that they would prescribe insulin more frequently if the route of administration did not involve injection. Moreover, initiating insulin is one of the most difficult aspects in the management of Type 2 diabetic patients. While the majority have said that neither the risk of weight gain nor the fear of side effects were the greatest barriers for patients' acceptance of insulin.[9]

The Rationale of the Study

After reviewing the previous researches on the same topic, we have found that there are considerable apparent barriers for the PCPs to initiate insulin therapy for T2DM patients in PHC settings in different regions. Moreover, as there is lack of similar studies in our area, we found it an important issue to conduct this study to know the practices and attitudes of the PCPs and to identify the possible barriers that prevent GPs from being fully involved in dealing with insulin therapy in the PHC setting.

Objectives

The aim of the study

This study aims to assess the practices of insulin therapy initiation by GPs and family physician for T2DM patients in the PHC setting in Al-Ahsa, Eastern Saudi Arabia

Specific objectives

The specific objectives of this study were as follows:

- To explore the proportion of PCPs who frequently initiate insulin therapy for T2DM patients in PHC setting.
- To identify important barriers that prevent PCPs from initiating insulin therapy for T2DM patients in PHC setting.
- To assess the difference between medical school postgraduates and board-certified family physicians in the practice of insulin therapy initiation in PHC setting.
- To assess the differences between Saudi and non-Saudi PCPs in the practice of insulin therapy initiation in PHC setting.

METHODOLOGY

Research Design and Methods

Study area

The study has been conducted at multiple PHC physicians belonging to the public health department of the ministry of health in Al-Ahsa city in Eastern Saudi Arabia between February and May 2018.

Inclusion criteria for the study participants

The following criteria were included in the study:

- Saudi and non-Saudi PCPs.
- Medical school postgraduate or family medicine board-certified PCPs.

Exclusion criteria for the study participants

- PCPs who are entirely assigned at the antenatal care and pediatrics clinics are excluded from the study.
- PCPs who are entirely assigned for administrative issues (e.g., medical directors, program directors, etc.) are excluded from the study.

Procedure

The target population was invited to participate by phone calls followed by direct and personal messages to fill out a self-administered anonymous online questionnaire in English which has been validated by a pilot study.

Sample size

The estimated total population of PCPs who practice in PHC centers in Al-Ahsa is 280 physicians after excluding the dentists and applying the exclusion and inclusion criteria. This number based on the last census from the Statistical Yearbook of MOH 2016G.[20] By considering a 95% confidence interval and a 5% margin of error, the most appropriate estimated sample size is 160 participants.

Sampling technique

The sample was obtained through both stratified and simple random sampling techniques. It has been collected from the three different PHC sectors that administrate 70 PHC centers distributed geographically over Al-Ahsa city. Moreover, according to the public health administration, the total number of PCPs in Al-Hofuf sector is 104, Al-Mubarazz sector is 90, and Al-Omran sector is 84.

Data collection tool and technique

The questionnaire involved items covering demographic characteristics, qualifications, number of years in primary care practice, attitudes, beliefs, perceived physicians barriers associated with the delay in the initiation of insulin therapy in patients with T2DM, as well as the encountered patients' related barriers to insulin therapy initiation. These items were structured based on a review of the literature[14-16] and included 5-point Likert-type scale questions and two multiple choice questions. The later questions explored the reasons behind physicians reluctance to initiate insulin for T2DM patients and physicians' beliefs regarding the patients' barriers to insulin therapy.

Data management and analysis

After collecting the data, data were entered into a personal computer, and then, the statistical analysis was conducted using (Statistical Package for the Social Sciences

Version 19.0). Moreover, all variables were coded and checked before analysis.

Attitude score

The attitude score was computed by the addition of Likert scale points. Then, the median was calculated, and it was 25 and considered as the cutoff for good and poor attitude.

Statistical methods

Frequency distribution of demographic data, practices, and attitude scores was constructed and expressed as numbers and percentages.

Chi-squared test was used to assess the relation between the demographic data, practices, and attitude scores, where $P < 0.05$ used as an indicator of statistical significance.

Logistic regression has been used to assess the relation between the dependent variable (ability of insulin therapy initiation) and the independent variables (gender, age, and years of experience) that were statistically significant in the cross-tabulation.

Ethical considerations

All study procedures were conducted after the approval of the Ethical Committee of the public health department in the Al-Ahsa Health Affairs General Directorate. Moreover, the necessary permissions were taken from the concerned authorities. All data were used only for research purposes.

RESULTS

Sample Characteristic

Demographic characteristics

A total of 164 (100%) participants were enrolled and completed the study. The analysis of demographic variables is summarized in Table 1. Among the 164 study participants, 103 (62.8%) were male. More than two-thirds of the study participants (70.7%) were Saudi. The mean age for the total sample was 34.9 ± 7.6 years, 63.4% of them are > 30 years old [Figure 1].

Table 1: Frequency of demographic data among a sample of PCPs in Al-Ahsa

Variable	Frequency (%)
Gender	
Male	103 (62.8)
Female	61 (37.2)
Age	
30 years and less	60 (36.6)
>30 years	104 (63.4)
Nationality	
Saudi	116 (70.7)
Non-Saudi	48 (29.3)

PCP: Primary care physicians

Professional characteristics

Regarding the years of experience, 50.6% of participants have < 5-year experience. The majority of the respondents were GPs (70.1%), while 29.9% of them were family medicine board certified [Table 2].

Insulin Initiation Practices

The ability of insulin therapy initiation

Regarding insulin therapy initiation for T2DM, the majority of participants (71.3%) believe that they can start insulin therapy for T2DM when it is needed [Table 3]. However, 28.7% of them think that they are unable to initiate insulin therapy, and the possible causes of that are shown in Figure 2. Almost half of the participants admit that the primary barrier preventing them from starting insulin is lack of experience, while vast majority disagree that the issue is related to frequent unavailability of insulin in the PHC

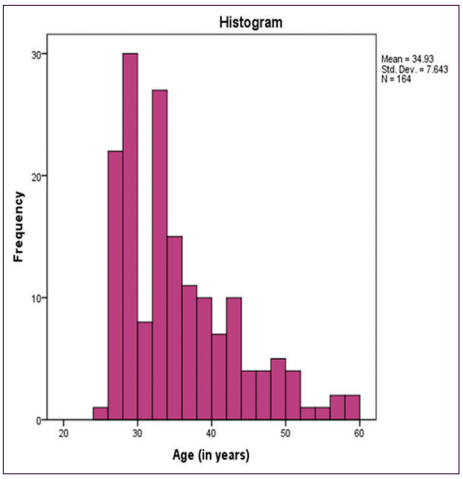

Figure 1: Age distribution among participants

Table 2: Professional data of a sample of PCPs in Al-Ahsa

Variable	Frequency (%)
Qualification	
MBBS	115 (70.1)
Board certified	49 (29.9)
Year of experience	
<5 years	83 (50.6)
5 years and more	81 (49.4)

PCPs: Primary care physicians

Table 3: Physicians' belief of their ability for insulin therapy initiation for T2DM among a sample of PCPs in Al-Ahsa

Variable	Frequency (%)
Do you initiate insulin therapy?	117 (71.3)
Yes	47 (28.7)
No	

T2DM: Type 2 diabetes mellitus, PCPs: Primary care physicians

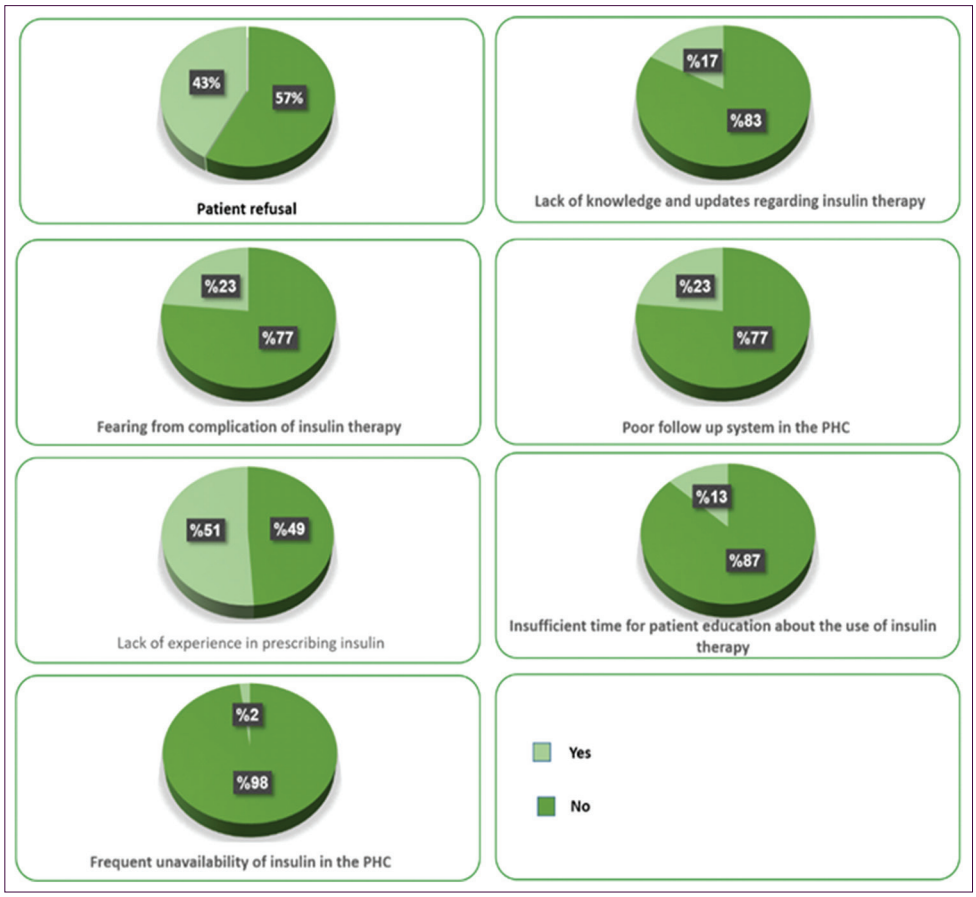

Figure 2: Frequencies of barriers for insulin therapy initiation among physicians who do not initiate insulin therapy for Type 2 diabetes mellitus in the primary health-care centers in Al-Ahsa

or due to insufficient time for patient education about the use of insulin therapy (51%, 98%, and 87%, respectively).

The results of the survey related to participants' opinion about the main indicators of insulin therapy initiation for patients with T2DM are shown in Table 4. Most of the participants (86.6%) believe that insulin therapy initiation should be based on the level of HbA1C. Neither fasting blood glucose level, patient preference, nor the development of disease complications are considered as main indicators for insulin initiation [Table 4].

Encountered patients' barriers to insulin therapy initiation

In respect to the encountered patients' barriers to insulin therapy initiation, 84.1% of participants believe that most worrying issue for patients regarding insulin initiation is the fear of injection. However, most of them believe that fear of weight gain or hypoglycemia not considered as major encountered patients' barriers (85.4% and 56.7%, respectively) [Table 5].

Attitudes toward insulin therapy initiation

Regarding participants attitude toward starting insulin therapy, the results of the Likert-type scale questions are shown in Figure 3. Overall, 51.2% of participants have a good attitude toward insulin therapy initiation as shown in Table 6.

Table 4: Physicians' reasons for initiating insulin therapy for T2DM among a sample of PCPs in Al-Ahsa

Variable	Frequency (%)
Fasting blood glucose level	
Yes	67 (40.9)
No	97 (59.1)
HbA1C	
Yes	142 (86.6)
No	22 (13.4)
Patient preference	
Yes	29 (17.7)
No	135 (82.3)
Development complication	
Yes	61 (37.2)
No	103 (62.8)

T2DM: Type 2 diabetes mellitus, PCPs: Primary care physicians

Variables related to physicians' belief of their ability to initiate insulin therapy

Demographic data were cross-tabbed with physicians' belief of their ability to initiate insulin therapy for T2DM

Table 5: Participants' beliefs of encountered patients' barriers to insulin therapy initiation

Variable	Frequency (%)
The fear of injection	
Yes	138 (84.1)
No	26 (15.9)
The fear of weight gain	
Yes	24 (14.6)
No	104 (85.4)
The fear of hypoglycemia	
Yes	71 (43.3)
No	93 (56.7)
The perception of the initiation of insulin as a personal failure in controlling T2DM	
Yes	43 (26.2)
No	121 (73.8)
The perception of the initiation of insulin therapy as a threat to their quality of life	
Yes	67 (40.9)
No	97 (59.1)
Worsening of the disease	
Yes	36 (22)
No	128 (78)
The doubt about insulin efficacy	
Yes	17 (10.4)
No	147 (89.6)
Lack of confidence	
Yes	74 (45.1)
No	90 (54.9)

T2DM: Type 2 diabetes mellitus

as a dependent variable, of which age and gender variables showed significant association with physicians' belief of their ability to start insulin therapy ($P < 0.037$ and $P < 0.049$, respectively). However, there was no significant association between nationality and physicians' belief in their ability to initiate insulin [Table 7].

Regarding the ability to start insulin therapy for T2DM patients and its relation with professional characteristics, qualification, and practice years, there was a significant association between practice years and the ability of the physician to initiate insulin. However, having family medicine board certification does not show any significant difference regarding the ability of insulin therapy initiation [Table 8].

Variables related to attitudes toward insulin therapy initiation

Among age, gender, nationality, qualification, and years of experience, there was no significant difference in attitudes toward insulin therapy initiation [Tables 9 and 10].

Logistic regression analysis of variables related to the ability of insulin therapy initiation

Among the variables that showed significant association in cross-tabulation with ability of insulin therapy initiation,

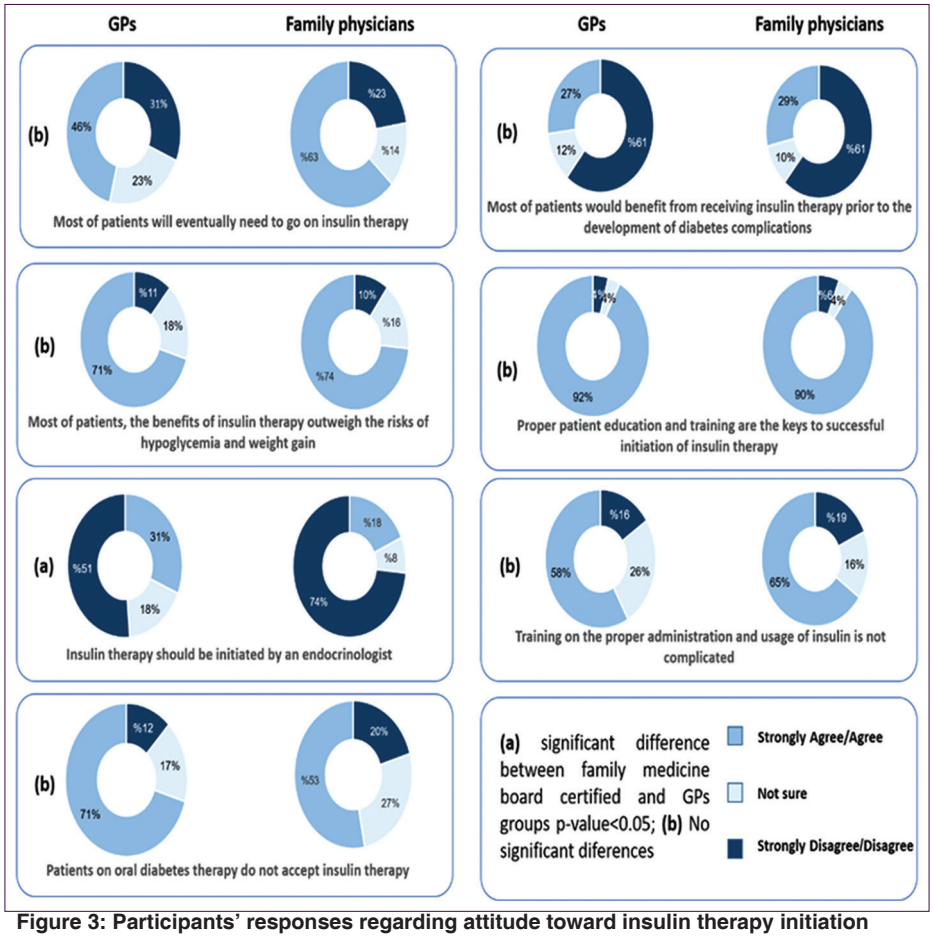

Figure 3: Participants' responses regarding attitude toward insulin therapy initiation

Table 6: The attitude of primary health-care physicians toward insulin therapy initiation

Variable	Poor attitude (%)	Good attitude (%)
Overall attitude score	80 (48.8)	84 (51.2)

Table 7: The relation between the ability of insulin therapy initiation and demographic characteristic of a sample of PCPs in Al-Ahsa

Variable	Able to initiate insulin therapy (%)	Unable to initiate insulin therapy (%)	*P* value
Gender			
Male	79 (76.7)	24 (23.3)	0.049
Female	38 (62.3)	23 (37.7)	
Age			
30 years and less	37 (61.7)	23 (38.3)	0.037
>30 years	80 (76.9)	24 (23.1)	
Nationality			
Saudi	82 (70.7)	34 (29.3)	0.774
Non-Saudi	35 (72.9)	13 (27.1)	

PCPs: Primary care physicians

Table 8: The relation between the ability of insulin therapy initiation and professional characteristics of a sample of PCPs in Al-Ahsa

Variable	Able to initiate insulin therapy (%)	Unable to initiate insulin therapy (%)	*P* value
Qualification			
MBBS	80 (69.6)	35 (30.4)	0.441
Board certified	37 (75.5)	12 (24.5)	
Year of experience			
<5 years	50 (60.2)	33 (39.8)	0.001
5 years and more	67 (82.7)	14 (17.3)	

PCPs: Primary care physicians

when they analyzed through regression model, the only variable that showed a significant association is the number of years of practice (odds ratio = 3.6, $P < 0.013$) [Table 11].

DISCUSSION

The results of our study revealed that most of the PCPs are aware of the importance of insulin therapy in the treatment of T2DM. Moreover, they are able to initiate insulin therapy. Although there was no significant difference between MBBS physicians and board-certified family physicians in their ability to start insulin therapy, our study showed that more years of experience reflected by patient exposure have a significant effect on the PCPs ability to initiate insulin which means that the experienced MBBS physicians are confident enough as the board-certified family physicians in insulin therapy initiation.

Both Saudi and non-Saudi physicians show no significant difference regarding insulin initiation.

Table 9: Relation of attitudes toward insulin therapy initiation and demographic characteristic of a sample of PCPs in Al-Ahsa

Variable	Poor attitude (%)	Good attitude (%)	*P* value
Gender			
Male	50 (48.5)	53 (51.5)	0.937
Female	30 (49.2)	31 (50.8)	
Age			
30 years and less	32 (53.3)	28 (46.7)	0.376
>30 years	48 (46.2)	56 (53.8)	
Nationality			
Saudi	57 (49.1)	59 (50.9)	0.887
Non-Saudi	23 (47.9)	25 (52.1)	

PCPs: Primary care physicians

Table 10: Relation of attitudes toward insulin therapy initiation and professional characteristics of a sample of PCPs in Al-Ahsa

Variable	Poor attitude (%)	Good attitude (%)	*P* value
Qualification			
MBBS	57 (49.6)	58 (50.4)	0.758
Board certified	23 (46.9)	26 (53.1)	
Year of experience			
<5 years	44 (53.0)	39 (47.0)	0.272
5 years and more	36 (44.4)	45 (55.6)	

PCPs: Primary care physicians

Table 11: Logistic regression of variables affecting the ability of insulin therapy initiation

Variables	Odds ratio	*P* value	95% confidence interval	
Age	0.706	0.496	0.259	1.925
Gender	0.607	0.186	0.290	1.273
Year of experience	3.623	0.013	1.318	9.962

Regarding physician-related factors, lack of experience is considered as a significant barrier for the PCPs to initiate insulin. Furthermore, it will affect the confidence of most of the physicians. Moreover, most of the PHCs in our area do not have senior physicians from whom the junior physicians may get a benefit. In contrast, lack of skill, knowledge, and training were reported as the main physician-related barriers in other studies.[14,21,22,24]

The majority of PCPs disagree that patient refusal is a barrier to initiate insulin. Moreover, this could be explained by either the ability of the PCPs to convince their patients easily to accept insulin therapy or by lack of a patient-centered approach in their practice.

Most of the PCPs disagree that lack of knowledge and update regarding insulin therapy are a barrier for them to initiate insulin, whereas different reports showed that lack of knowledge would affect the decision of insulin initiation.[21,24] This difference might be due to that all health practitioners in Saudi Arabia have to update their

knowledge through regular continuing medical education courses, which lead them to increase their knowledge and to be updated.

Poor follow-up system was not considered as a barrier to initiating insulin by most of PCPs. This at may be due to the availability of the PHC in each district and the continuity of care which facilitates the follow-up process in the PHC setting.

In respect to encountered patient barriers, most of the PCPs believe that patients' fear of insulin injection is the most worrying and it is considered the most common reason to avoid or delay insulin initiation by PCPs. A similar result was found by Mostafavian *et al*. which concluded that fear of injection was the most prevalent cause to refuse insulin therapy as reported by the patients.[25] Most of the patients' worries are attributed to the pain from injection or to the ability to use the insulin properly. These worries can be minimized by educating the patient about the proper administration and storage and incorporating disposable insulin pens widely in the PHC.

Both hypoglycemia and weight gain were not considered as significant patient barriers to starting insulin as stated by the majority of the PCPs. Moreover, this finding is discordant to other reports, which revealed that fear of problematic hypoglycemia and weight gain are significant patient-related barriers[23,26,27] which may indicate that there is a lack of awareness among the T2DM patients in our area regarding the common side effects of insulin therapy. Furthermore, the obesity is a common problem in Saudi Arabia, almost one-third of the population is suffering from obesity, and this fact possibly will make the patient not considering weight gain as a problem.

In this report, most of the participants believe that insulin therapy initiation should be based on the level of HbA1C and almost 40% of them would use the fasting blood glucose level for insulin initiation. However, different parameters were found by various studies such as the presence of other comorbidities.[28]

Patient preference and development of complication were not found to be significant factors that affect the decision regarding insulin therapy initiation by most of PCPs. In contrast, A report done by Grant et al. found that patients' preference was a significant factor to initiate insulin.[28] Again, this may point out to the lack of patient-centered approach in PHC practice.

Our study also showed that almost half of the PCPs have a positive attitude toward initiating insulin. Both GPs and family physicians have a shared belief regarding insulin initiation in many aspects. For instance, both groups consider that proper patient education and training is the key for successful initiation of insulin therapy. Furthermore, the majority believe that the benefit of insulin outweighs the risk of hypoglycemia and weight gain. Moreover, a similar conclusion has been found in a previous study.[9]

An interesting finding in our study reveals that most of the PCPs who participated in the survey do not believe in the benefit of insulin therapy at the early stages of T2DM before the development of complications.

It has been revealed by this study that there was a significant difference between board-certified family physicians and GPs in their belief about who should start insulin therapy, most of the board-certified family physicians disagree that the endocrinologist should initiate insulin therapy, in contrast to almost half of the GPs have the same opinion.

CONCLUSION AND RECOMMENDATIONS

Many PCPs are aware of the importance of insulin therapy initiation in the PHC setting in Al-Ahsa Eastern Saudi Arabia, and they are confident enough to implement that in their practice. However, clinical experience and years of practice play significant roles in the initiation of insulin therapy among PCPs. For this reason, we recommend full implementation of clinical training programs in diabetes and encourage the PCPs to be involved in regular courses and educational programs related to medical treatment of T2DM including insulin therapy initiation. We reinforce on the importance of adopting the patient-centered approach in managing diabetic patients. We also recommend more health education programs to increase the awareness of the community, especially T2DM patients regarding the insulin therapy and its side effects.

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How to cite this article: Al-Haddad HM, Al-Ali SA, Al-Drees AM, Al-Ramdhan AM. Practice and Attitude of Insulin Therapy Initiation for Type 2 Diabetes Mellitus Patients among General Practitioners and Family Physicians in Primary Health-Care Setting in Al-Ahsa. Int J Sci Stud 2018;6 (7):1-9.

Source of Support: Nil, **Conflicts of Interest:** None declared.