

Barriers to Insulin Therapy Initiation by Adult Type 2 Diabetics at Family Health Centers in Sudan

Dr. Safa Awadelkarim Suliman (MD, SMSB)¹, Dr. Sulaf Ibrahim Abdelaziz (MD, FRCP, FACE)^{2*}

¹Specialist Family Medicine Al Waab Health Centre Primary Health Care Corporation State of Qatar

²Consultant Internal Medicine and Endocrinology Soba University Hospital University of Khartoum

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*Corresponding author: Dr. Safa Awadelkarim Suliman

Specialist Family Medicine Al Waab Health Centre Primary Health Care Corporation State of Qatar

Abstract

Original Research Article

Type Two Diabetes Mellitus is a progressive disease by nature so most patients will inevitably require insulin therapy to maintain adequate glycaemic control. Insulin use is delayed in many patients who would benefit from such treatment. Patient's beliefs and perceptions regarding insulin therapy create barriers contributing to the delay in its initiation. Aimed to study the barriers to insulin initiation from a patient's perspective, by performing a Cross-sectional study in the East Nile locality Khartoum; between February 2019 to May 2020. A questionnaire included demographic features, the status of insulin initiation, barriers to insulin initiation and knowledge about insulin therapy for Type 2 diabetes were administered during face-to-face interviews, which resulted in the majority of 307 participants being females aged 45 – 56, (57.7%) of them had HbA1c higher than 7. The commonest barrier to insulin use was found to be fear of hypoglycemia (72.0%), followed by insulin should be a final option and when started should not be stopped (64.5%) 60% thought that insulin leads to weight gain and (59.9%) of them had needle phobia. The conclusion is that Patients' concerns and beliefs regarding insulin use are multiple. a major factor behind diabetes patients' refusal of initiation of this therapy appears to be a lack of adequate information and misconceptions relating to insulin use, such as benefits and side effects.

Keywords: Type Two Diabetes Mellitus, Insulin therapy, Barriers to insulin initiation, Fear of hypoglycemia, Needle phobia.

ADA: American Diabetes Association

GDM: Gestational Diabetes Mellitus

HbA1c: Glycosylated Hemoglobin

HCP: Health Care Provider

IDF: International Diabetes Federation

MODY: Maturity Onset Diabetes of Young

NICE: National Institute for Health and Clinical Excellence

OAA: Oral Anti-diabetic Agents

T1DM: Type One Diabetes Mellitus

T2DM: Type 2 Diabetes Mellitus.

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INTRODUCTION

Diabetes is one of the fastest-growing health challenges of the 21st century, with the number of adults living with diabetes having more than tripled over the past 20 years.

Globally there is an increase in the population of diabetic patients, today, it is estimated that 9.3% of adults aged 20–79 years – 463 million people – are living with diabetes.

A decade ago, in 2010, the global projection for diabetes in 2025 was 438 million. With over five years still to go, that prediction has already been surpassed by 25 million. International Diabetes Federation (IDF) estimates that there will be 578 million adults with diabetes by 2030, and 700 million by 2045, and the prevalence in Sudan was about 18% [1].

Type 2 diabetes accounts for well over 90% of diabetes in Sub-Saharan Africa, with population

prevalence proportions ranging from 1% in rural Uganda to 12% in urban Kenya [2].

Diabetes is a chronic illness that requires continuing medical care and ongoing patient self-management, education and support to prevent complications, these standards of care should be provided by a collaborative, integrated team with expertise in diabetes. The management plan should be written with input from the patient and family, physician and other members of the health care team [2]. To minimize the potential for adverse events such as hypoglycemia, the value of this approach has been shown by evidence gained from clinical and epidemiological studies, where the reduction in the incidence of micro and macrovascular complications was apparent with intensive glycemic control⁽³⁻⁴⁾, and confirmed in meta-analysis observational study [5].

To achieve these goals of reduction in the incidence of complications the UK guidelines of the National Institute for Health and Clinical Excellence {NICE} recommend target glycosylated hemoglobin {HbA1c} level between 6.5-7.5%.

For the management of type 2 diabetes, there are various oral Anti Diabetic agents [OAA] that are available worldwide, either used as monotherapy or in combination with or without insulin according to the recommendation of many diabetes management guidelines like the American Diabetes Association [ADA].

Insulin is typically recommended for patients with type two diabetes if they have failed to achieve adequate glycemic control with multiple oral hypoglycemic agents at maximal dose especially when beta cell function declines down the course of the disease [6].

One of the main problems associated with insulin therapy is a delay in initiation and intensification of treatment with insulin up to complete refusal by the patient (Inertia) due to different causes and health beliefs, this results in developing complications which inflict a huge burden on the patients' health care budget as well as the economy of the country [7].

Clinical inertia is defined as failure to intensify or initiate treatment when glycemic targets are not met for two to three months [8].

For patients immediately initiating insulin it increases life expectancy by 0.61 years and quality-adjusted life expectancy by 0.134 quality. Adjusted life years versus delaying initiation for 8 years, there were also substantial reductions in the cumulative incidence and time of onset of all diabetes-related complications immediately when compared to delayed insulin initiation [9].

In addition, continuous education as well as practical and emotional support from others were found to be valuable for insulin acceptance [10].

A sufficient understanding of the goal of therapy, proper communication of physicians with the patients, and trusting the healthcare provider have been shown to alleviate patients' discomfort and increase their adherence to treatment [11].

LITERATURE REVIEW

Again the NICE guidelines recommended offering structured education to adults with T2DM and or their family members or caregiver (as appropriate) at and around the time of diagnosis, with annual reinforcement and review regarding the course of disease and management [12].

Despite it is established benefits, however, insulin therapy continues to be underused and people remain above target for several years before treatment intensification. The reluctance to initiate insulin therapy is often related to both health care provider [HCP] and patient misperceptions about insulin efficacy and side effects, as well as the perceived complexity of the treatment regimen, in addition, insulin therapy may viewed as a last resort treatment option for severe disease or as (punishment) for patients failure to manage their disease, however patient should be made aware from the time of diagnosis that diabetes is a progressive disease and that it is likely that insulin will be required at some point during the course of the disease. So, should be approached positively and should be presented as an effective and flexible way to achieve glycaemic goals for any patient at any time during therapy [13].

Subjects failing to initiate prescribed insulin reported misconceptions regarding insulin risk commonly [14], so primary adherence to insulin may be improved through better provider communication regarding risk, shared decision making and self-management training.

In T2DM (which accounts for 90% of diabetes) progression, without adequate control, can lead to macro and microvascular complications, for example, the 10-year follow-up of the UK Prospective Diabetes Study showed that intensive blood-glucose control with insulin therapy or OAs decreases progression of microvascular disease and may also reduce the risk of heart attacks, it had risk reductions of 32% (95% CI 13-47, p=0.002) for any diabetes-related endpoint, 42% for diabetes-related death (9-63, p=0.017), and 36% for all-cause mortality (9-55, p=0.011) [15].

Poor glycaemic control can be partly attributed to delayed insulin initiation which is known as initiation inertia, lack of dose adjustment known as titration inertia and delay in intensification is intensification inertia, all of which constitute therapeutic inertia.

There are a large number of studies that found evidence of insulin inertia as reviewed by Haque M *et al.*, and carried out in 2005, examined barriers to initiating insulin therapy in poorly controlled type 2 diabetes patients on maximum oral ADAs in community care health centres (CHCs) in Cape Town, the results identified doctor, patient, and system barriers to initiating insulin therapy. Doctors' barriers include lack of knowledge, lack of experience with and use of guidelines related to insulin therapy, language barriers between doctors and patients, and fear of hypoglycemia. Patient barriers were mistaken beliefs about insulin, non-compliance, lack of understanding of diabetes, use of traditional herbs, fear of injections, and poor socioeconomic conditions. System barriers were inadequate time, lack of continuity of care and financial constraints. The Suggestions for overcoming barriers include further education of doctors on insulin initiation and the use of standardized guidelines. In addition, a patient-centred approach with better communication between doctors and patients, which may be achieved by reorganizing aspects of the health system, may improve patient knowledge, address mistaken beliefs, improve compliance and help overcome barriers. Further research is needed to investigate these recommendations and assess patients' and nurses' perceptions of initiating insulin therapy [16].

Also study in London by Khan H *et al.*, in 2008 was done to determine the prevalence and reasons for refusal to commence insulin in Bangladeshi patients with Type 2 diabetes. The result showed (22.1%) started insulin within 6 months and (20.3%) refused to commence insulin despite repeated counselling, so insulin refusal is common in Bangladeshi subjects with type 2 diabetes and poor glycemic control. several factors contribute to this, and methods to overcome the barriers to insulin therapy need to be sought [17].

A study carried out in 2012 by Monirul Haque *et al.*, Diabetes Attitudes, Wishes and Needs (DAWN JAPAN) was conducted in an attempt to identify specific patient- and physician-related factors which contribute to the delay of insulin initiation among Japanese patients with diabetes.

The study examined barriers to initiating insulin therapy in poorly controlled T2DM patients on maximum OADAs. The DAWN JAPAN study is a multicenter, questionnaire-based survey, conducted between 2004 and 2005. Participating physicians were categorized based on their expertise, to assess physician barriers to insulin initiation, and to explore patients' attitudes and beliefs contributing to their decision to start insulin therapy, in conclusion, the results suggest that education about the benefits of insulin therapy may help patients who are not ready to initiate insulin overcome their barrier to early initiation [18].

This a result of a study done by DM Nadasen and M Naidoo in 2012 among uncontrolled patients with type 2 diabetes on maximum oral therapy in a public health clinic in Durban, South Africa. they reach, as a fear of injections and needles was the only significant factor that was associated with the refusal to initiate insulin therapy (p-value < 0.001), health professionals need to address this during patient education, to initiate insulin treatment successfully and timeously., were interviewed using face-to-face interviews with open- and closed-ended questions [19].

In 2014 in Saudi Arabia, a study was conducted by Batais M and Chanter P. to determine the prevalence of unwillingness to use insulin and its associated attitudes among participants with type 2 diabetes in Saudi Arabia, the result in conclusion shows participants have several negative attitudes concerning initiating insulin therapy.

Exploring the reasons for participant reluctance to commence insulin can help address his or her specific concerns and beliefs, and promote the future uptake of insulin [20].

Factors influencing insulin usage among type 2 diabetes mellitus patients: this study was done in Turkish primary care, by Ahmet Yilmaz *et al.*, in 2016, it explored ninety-four patients (57.4% females, 42.6% males) were recruited for this study. Most patients (57.4%) considered that insulin was a drug of last resort. among all patients, 34.1% thought that insulin lowered blood glucose levels to an extreme degree and 14.9% disagreed. The patients thought that self-injection was hard (27.6%), required someone else to administer the injection (27.6%), and insulin injection was painful (33.0%). 59.6% of all patients believed that their religion did not restrict the use of insulin, and 52.1% stated that their family physicians had sufficiently informed them, so in conclusion: there is a lack of adequate information relating to insulin which appears to be the major factor behind DM patients' refusal of insulin treatment. The fact that patients consider insulin treatment as a final solution to DM could be related to resistance to the initiation of insulin therapy [21]. They said that diabetic patients' awareness of insulin and education on diabetes treatment is crucial in the treatment and follow-up of patients with diabetes mellitus, and family physicians play a major role in the education and follow-up regarding the management of patients with diabetes mellitus.

Literature suggests that insulin-naïve T2DM patients demonstrate several concerns regarding insulin therapy, and the refusal rate for insulin therapy is high.

A study was conducted in Pakistan, by Ahsan Saleem *et al.*, in 2016. Insulin Perception among insulin-naïve type 2 diabetes mellitus in Pakistan. (T2DM) patients attending an outpatient department in a public

sector tertiary-level hospital in the city of Bahawalpur, Pakistan, were approached. It is concluded that more than half of insulin-naïve T2DM patients are not willing to initiate insulin therapy. Most of the patients have a negative perception regarding insulin therapy. In addition, gender, level of education and monthly income have a significant impact on the insulin perception scores of insulin-naïve T2DM patients. Therefore, in the Pakistani healthcare setting, the attending physicians need to focus on and pay attention to insulin-naïve patients to minimize their false perceptions by providing and equipping them with sufficient disease and treatment-related knowledge. In addition, policymakers should play their role in promoting health literacy and health equity in lower strata of society [22].

Diabetes is a major health problem in Sudan and is a leading cause of morbidity and mortality. many studies done to evaluate this problem one of them is a Population study done by Elmadhon W.M *et al.*, Glycemic control in Sudanese individuals with type 2 diabetes the objective of this study was to determine the prevalence of glycemic control among individuals with type 2 diabetes across different cities in Sudan, the result shows a high prevalence of uncontrolled diabetes (85%) is noted in Sudanese individuals with type 2 diabetes [23].

In another study here in Sudan by Heitham Awadalla and co-authors: Diabetes complications in Sudanese individuals with type 2 diabetes, in this study individuals with type two diabetes who have been on treatment for at least one year and volunteered to participate, were selected from two diabetes centres in Sudan (Khartoum and Atbara). the results in the conclusion show high prevalence of complications of type 2 diabetes was observed especially in those with a longer duration of diabetes and poor control [24], so the recommendation is to improve glycemic control.

Another one in Sudan was similar to our study, published by Hyder Mirghani, Clinical Inertia and Barriers to Insulin Injection among Sudanese Patients with Type 2 Diabetes Mellitus, this study was conducted at a diabetes clinic in Omdurman, Sudan during the period from June to December 2017. the study aimed to assess the clinical inertia and patients' attitudes towards insulin among patients with type 2 diabetes. In conclusion, clinical inertia to insulin was found in nearly half of Sudanese patients with type 2 diabetes. Patients with clinical inertia had higher HbA1c compared to their counterparts, but no differences were evident regarding other patient characteristics. The commonest negative attitude towards insulin was keeping insulin as a last resort [25], so this study recommended that target intervention targeting their fears and misconceptions is highly needed.

Another study in Korea by Kim SG *et al.*, in 2017 on the delay of insulin initiation in patients with

type 2 diabetes mellitus inadequately controlled with oral hypoglycemic agents analysis of patient and physician-related factors. It was an observational study to assess the time of initiation of insulin therapy, the result showed that the insulin refusal rate was 33.6%, and in conclusion, insulin initiation was delayed in patients with type 2 diabetes uncontrolled by two or more OAs in Korea. Patient - and physician-related factors associated with this delay need to be addressed for better diabetes management [26].

METHODOLOGY

Study Design: This is a facility-based descriptive cross-sectional study.

Study Area:

This study was conducted at all Family Medicine Health Centers in the East Nile locality of Khartoum State. These are six centres namely, Helat Kuku, Elshheeda Nuda, Elwehda, Elwadi Elakhdr, Om Doom and Al Elalfon, these centres provide primary health care services to the citizens, in the form of acute and chronic illness clinics, antenatal care, nutrition and immunization, pharmacy and laboratory services.

Study Duration: The study covered the period from February 2019 to May 2020.

Study Population: This study was conducted among participants with type two diabetes mellitus who came for routine follow-up at the above six family health centres.

Inclusion Criteria: Adult patients with type two diabetes using insulin.

Adult patients with uncontrolled type 2 diabetes do not use insulin.

Exclusion Criteria: Adults with type 2 diabetes who are critically ill or in a diabetes emergency.

Sample size and Sampling Technique: Sample size was calculated from patients with type two diabetes attending outpatient referral clinics.

The sample size (n) is calculated according to the formula:

$$n = \left[\frac{z^2 * p * (1 - p) / e^2}{1 + (z^2 * p * (1 - p) / (e^2 * N))} \right]$$

Where: z = 1.96 for a confidence level (α) of 95%, p = proportion (expressed as a decimal), N = population size, e = margin of error.

$$z = 1.96, p = 0.5, N = 1510, e = 0.05$$

$$n = \left[\frac{1.96^2 * 0.5 * (1 - 0.5) / 0.05^2}{1 + (1.96^2 * 0.5 * (1 - 0.5) / (0.05^2 * 1510))} \right]$$

$$n = 384.16 / 1.2544 = 306.247$$

$$n \approx 307$$

The sample size (with finite population correction) is equal to 307.

The data was collected from each clinic three times per week from all patients with type two diabetes attending the clinic in the six centres and who fulfilled the inclusion criteria until the target sample size was achieved.

Data Collection Methods and Tools

To ensure the quality of the information gathered from the patients, face-to-face interviews were done, and all of the interviews were conducted by myself.

Patients were individually interviewed and filled out the pre-tested well-structured questionnaire. The questionnaire is divided into three sections: socio-demographic information, medical history and perceived barriers to using insulin. The questions were categorized into three groups according to the learning objectives, seven questions measured the knowledge level relating to insulin, and three questions concerned the knowledge of insulin use. Answers to three-point Likert-type scales were consolidated by combining 'strongly agree' with 'agree' and 'strongly disagree' with 'disagree'.

Study Variables

❖ Dependent Variable

- Use of insulin therapy.

❖ Independent Variables

- Gender.
- Education level.
- Believes in insulin.
- Barriers regarding initiating insulin therapy.

❖ Data Analysis

- **Data Entry:** Collected data analyzed using the Statistical Package for Social Sciences {SPSSs} program version 26.

➤ Statistical Significant Test:

The chi-square test was used to find any association between the acceptance of insulin therapy and independent variables, and the frequency distributions of the answers relating to insulin therapy were given. A P-value of 0.05 was considered an indication of statistical significance.

❖ Ethical Considerations

- The ethical committee of research in Sudan Medical Specialization Board {SMSB} and the state ministry of health approved the study.
- Administrative approvals from regional health authorities and health centres were obtained.
- A written voluntary informed consent was obtained from all participants.
- All the participants were informed about their right to withdraw at any time without mentioning the reasons and had the right to benefit from the researcher's pieces of information immediately.

The confidentiality of the participants was established by coding the questionnaire, and the data was saved from being us

DISCUSSION

This is perhaps the second study of it is kind in Sudan, the first one was done in a diabetic clinic in the city of Omdurman.

This study explored barriers and perceptions of diabetics toward insulin therapy, Delay in initiating insulin was one of the main causes of uncontrolled glycemic status and hence development of complications. Many patients lack accurate information on the advantages and disadvantages of insulin, most of them believe that insulin lowers the blood glucose too much and causes hypoglycemia. Inadequate and wrong information enhanced the reluctance to use insulin. Insulin inertia was found in 73.6% of patients, which is in line with previous studies elsewhere. In the Singaporean study insulin inertia was 70%, compared to Khan *et al.*, [17], who reported more than half 57%, and Ahsan Saleem *et al.*, [22], where inertia was 65%. It is higher when compared with the previous study done in Omdurman [25], which concluded inertia in nearly half the patients 47.1%.

The current data showed that the concern of hypoglycemia is the most common barrier (72%), followed by the belief that insulin is the end of medication in diabetes treatment (64.5%), The present findings are similar to previous studies [20-25], carried out in Saudi Arabia and Sudan respectively, Another study conducted in five countries Germany, Sweden, Netherland, UK and USA [26], also provided the similar conclusion that insulin is the end of the road as a barrier to use.

A large number of participants were reluctant to use insulin due to their negative concerns about insulin injections. Anxiety related to fear of injection is very common, reported by 59.9% who have injection phobia. Patients were concerned about pain due to glucometer needle 60.9% or insulin injection 55.2%. similarly to Hizlinda *et al.*, [10], that reported 71% among insulin naïve diabetics. DM Nadasen *et al.*, in their study [19], reached the same result that fear of injections and needles had a significant value.

The concerns about the impacts of insulin use on the participants' work and social life made them refuse insulin, almost half of the patients felt that it harms their work as well as on life as indicated by Hizlinda *et al.*, [10], they found the same results.

In the current study significant statistical differences were evident between patients with insulin inertia and education level, occupation and income, Mirghani H *et al.*, in a study [25], in Omdurman, observed a significant difference between patient inertia

and age, sex, occupation and level of education, and both studies similarly in the relation to the factor the time since diagnosis.

Moreover, the present study shows that T2DM patients were concerned regarding other adverse effects of insulin such as weight gain, blindness amputation and heart disease. They also lack of confidence to self-inject insulin to them self. These findings are consistent with some previous studies [27].

Finally, the possibility of negative perception in the majority of T2DM patients 66.8% of patients could be due to their low health education and the lack of effective communication between physicians and patients. This statement has been recently studied by Rehan Sarwar *et al.*, [28], they reported that the average consultation time was 1.2 min only rather than the standard of 10 min duration. This suggests the correlation between consultation time and the negative perception of patients regarding insulin therapy.

The present study has several limitations. Firstly, it adopted a cross-sectional design that only gives a snapshot. Secondly, the study population was from one locality, therefore these findings are not generalizable

throughout the county. Lastly, other types of diabetes were not studied.

RESULTS

A total of 307 adult patients with type 2 diabetes mellitus were enrolled and participated in the study, females were the dominant 220 (71.7%). The average age was 55+_12.149 years ranging between 45-56. The BMI of the patients was measured and the average value was 27.56+_4.51. Overall, primary education was found to be the highest level of education among the participants (44.3%) and nearly (25%) were illiterate. More than half 186 (60.6%) of them were housewives, while 12.7% not working. About 132 (43%) participants had a yearly income of 24000_48000. The mean duration of diabetes diagnosis per year and the mean HbA1c were 10.32 (+_8.384) and 7.97 (+_2.356) respectively.

Further assessment showed that 177 (57.7%) of patients had HbA1c higher than 7. The combination of metformin and Amaryl was the most prescribed ODA, while just 91(29.6%) of patients used insulin, the mixed type was the most, 86 (94.4%). Nearly half of patients 133 (43%) were treated with 2 or more of OAAs in a period between 6_11 years and insulin was added in a time of 8_14 years from the diagnosis.

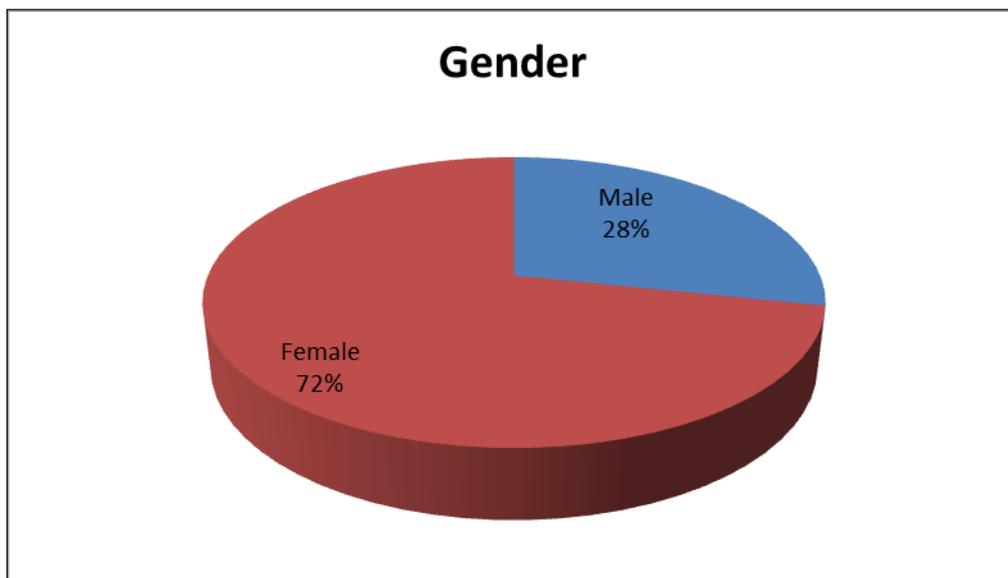


Figure 1: The distribution of the patients by gender

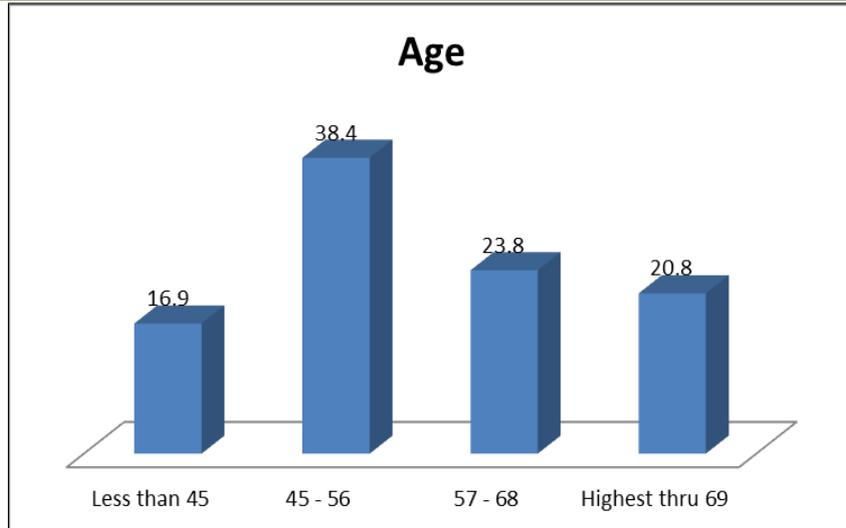


Figure 2: The distribution of the patients by age

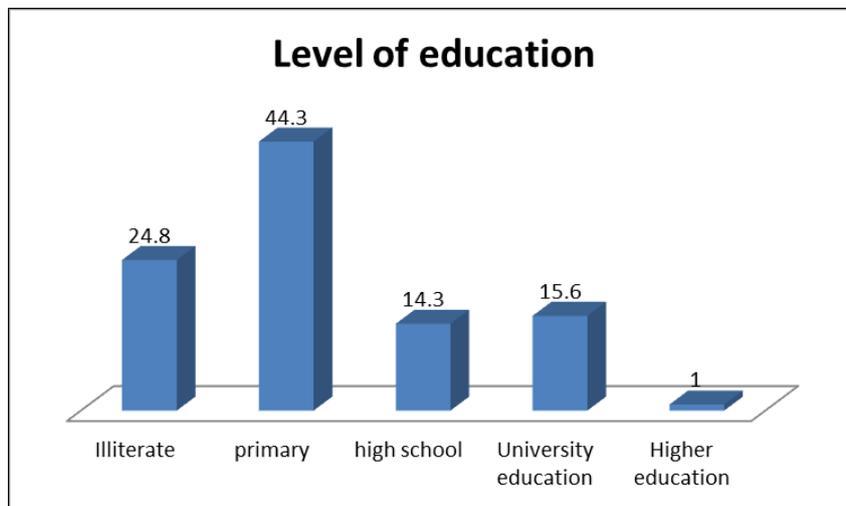


Figure 3: The distribution of the patients by level of education

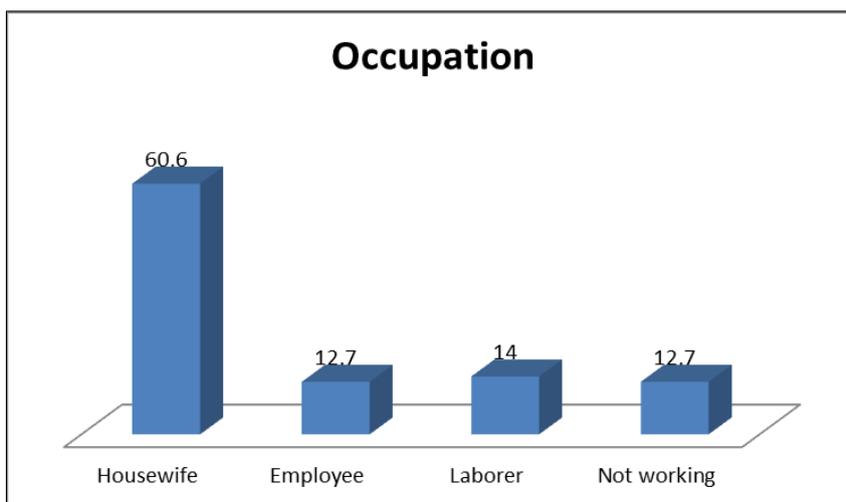


Figure 4: The distribution of the patients by occupation

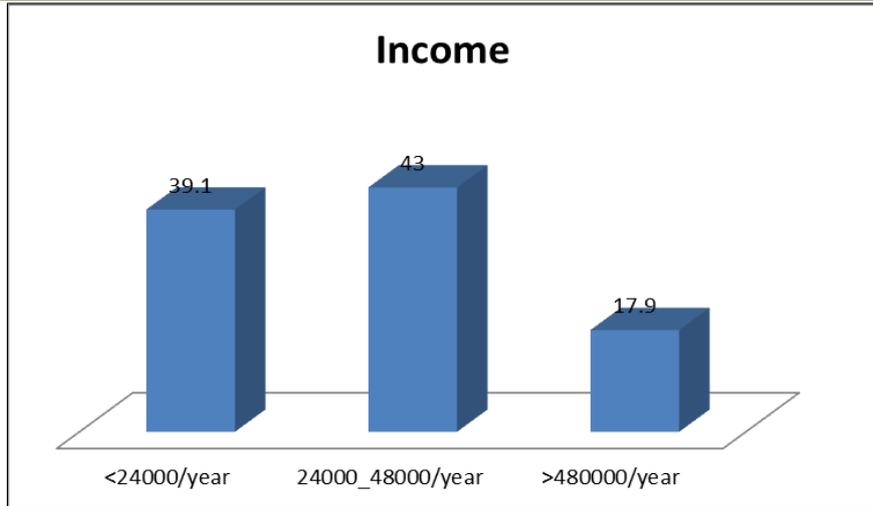


Figure 5: The distribution of the patients by the level of income

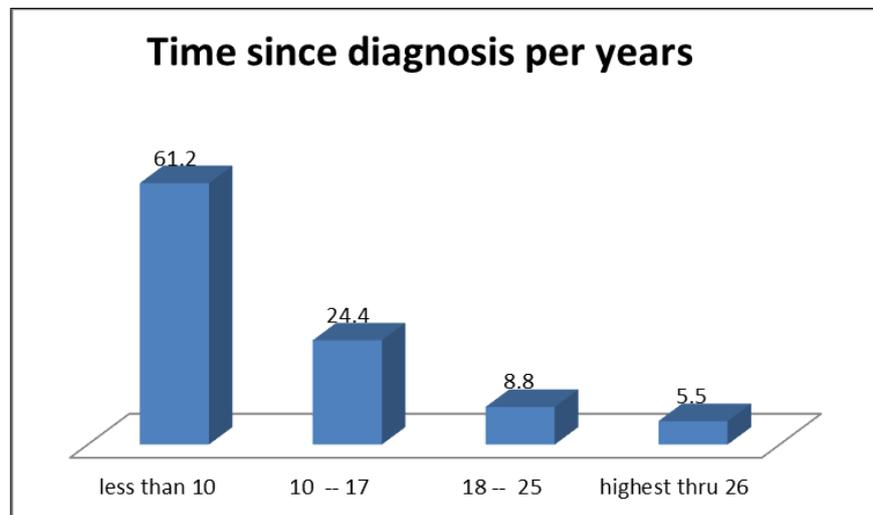


Figure 6: The distribution of the patients by the time since diagnosis with diabetes

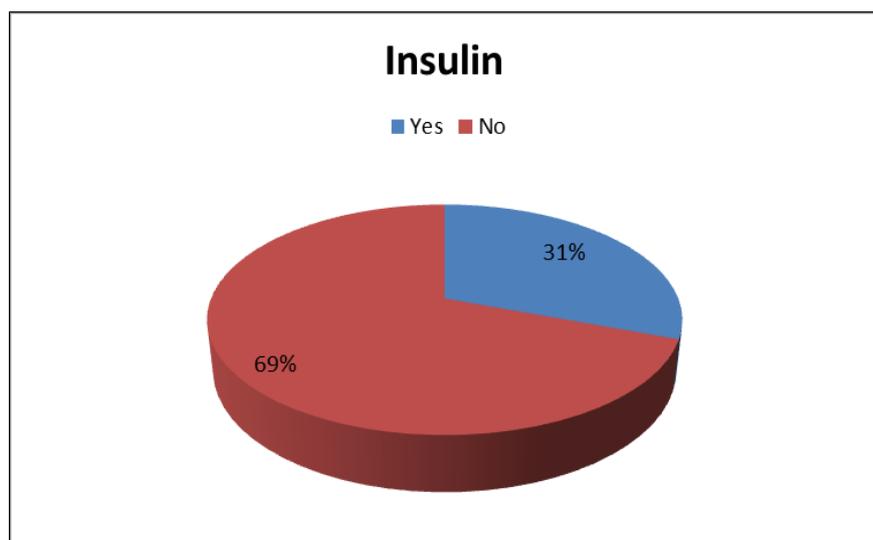


Figure 7: The distribution of the patients by the use of insulin

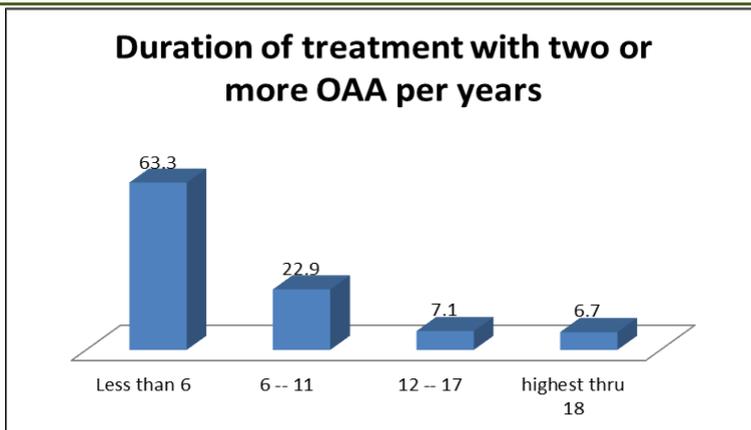


Figure 8: The distribution of the patients by the duration of treatment with two or more OAAs per year

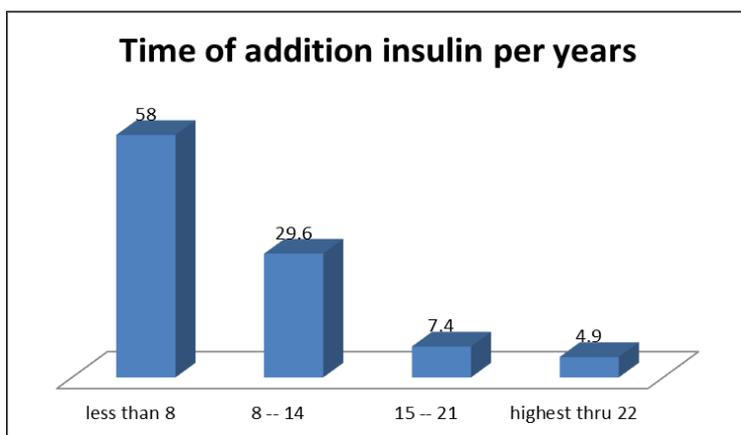


Figure 9: The duration of initiation of the insulin

Table 1 shows that the commonest barrier to insulin was fear of hypoglycemia (72.0%), followed by insulin can't be stopped (64.5%) and concerned about needle pain and weight gain, and a more than half of

them agreed that insulin is harmful and may cause blindness, reason for amputation, renal problems and heart attack.

Table 1: Patient's barriers to insulin therapy

Barrier	Agree	No idea	Dis agree
Insulin injection is a painful process	169 55.4%	39 12.7%	98 31.9%
The self-injection of insulin is difficult	171 55.7%	28 9.1%	108 35.2%
Injection phobia	184 59.9%	22 7.2%	101 32.9%
I do not have any relative to inject insulin If someone does the injections I would use it	89 29.0%	92 30.0%	126 41.0%
I am concerned about the pain of the needle in glucometer testing	187 60.9%	39 12.7%	81 26.4%
I am concerned about hypoglycemia	221 72.0%	64 20.8%	22 7.2%
Insulin leads to gain weight	198 60.3%	63 10.7%	46 28.7%
Insulin harms work	166 54.1%	84 27.4%	57 18.0%
Insulin harms social relationships	162 52.8%	85 27.7%	60 19.5%
Insulin can cause harm like blindness heart attack and amputation	178 58.0%	73 23.8%	55 17.9%
Once on insulin, it cannot be stopped	185 64.5%	33 20.5%	88 15.0%

Regarding knowledge about insulin use as explored in Table 2, it appears very poor in this data, nearly half of the patients (48,9%) disagree that insulin can control blood glucose better and only (38.4) believe in insulin's role in preventing complications. Fortunately,

patients taking insulin without eating cause hypoglycemia and they know where to store insulin in a good percentage. In the end, patients refused to use insulin (66.8%).

Table 2: Knowledge about insulin therapy

Question	Agree	No idea	Disagree
Insulin can control blood sugar better	140 45.5%	17 5.6%	150 48.9%
Insulin can prevent or reduce complications of diabetes	118 38.4%	77 25.1%	112 36.5%
Insulin may be used from the time of diagnosis in some circumstances when metabolic control is disturbed by medical illness and surgical procedures	72 23.5%	45 14.7%	190 61.8%
The dose of insulin has to be adjusted according to the monitoring of BG	129 42%	119 38.8%	59 19.2%
Taking Insulin without eating may cause hypoglycemia	191 62.2%	94 30.6%	22 7.2%
Omitting Insulin can cause serious consequences	115 37.5%	108 35.2%	84 27.3%
If you start to use insulin, you may return to your oral drugs	36 11.7%	54 17.6%	21 70.7
Insulin should start at HA1c equal to or more than 9	61 19.9%	187 60.9%	59 19.2%
Insulin storage at extreme temperatures can destroy it	198 64.5%	101 32.9%	8 2.6%
Would you accept insulin therapy if your physician decides to start it	102 33.2%		20 66.8%

Further analysis revealed that insulin perception was more positive in patients with good yearly income. Female T2DM patients scored higher than males. Again the insulin perception score was higher in patients with higher education, followed by secondary, while the

primary and illiterate patients scored significantly lower perception scores ($p<.000$). Insulin is not accepted significantly in obese patients more than others ($p=.003$) and also in housewives rather than others.

Table 3: Acceptance of insulin therapy when prescribed by the physician

Factors	Accept Insulin	Not Accept Insulin	P-Value
Gender			
Male	35.3%	24.9%	.056
Female	64.7%	75.1%	
Education			
Illiterate	21.5%	26.3%	.000
Primary	33.3%	49.8%	
High school	15.7%	13.7%	
University	27.5%	9.8%	
higher	2.0%	4.0%	
Occupation			
Housewife	51.0%	64.4%	.000
Employee	13.7%	21.3%	
Labourer	26.5%	7.8%	
Not working	8.8%	14.6%	
Income			
<24000 year	41.2%	40.5%	.001
24000_48000 year	29.4%	47.1%	
>48000	29.4%	12.4%	
BMI			
<18.5	.0%	2.0%	.003
18.5_24.9	15.7%	32.1	

25_29.9	58.8%	40.5%	
>30	25.5%	25.4%	
HbA1c			.770
<7	41.2%	42.9%	
>7	58.8%	57.1%	
>9	80.0%	71.6%	
>9	20.0%	28.4%	.097
Duration of treatment with 2 or more drugs			
<6yr	56%	67.7%	
6_11yr	37.2%	17.8%	
12_17yr	5.8%	14.5%	.113
When insulin added			
<8yr	53.4%	69.6%	
8_14yr	29.3%	30.4%	
15_21yr	10.4%	0.0%	.194
>22yr	6.9%	0.0%	
Time to initiate insulin from starting OAs			
<7yr	48.0%	67.8%	
7_11yr	28.9%	22.0%	
12_16yr	2.2%	5.8%	
>17yr	20.9%	4.4%	.100
Time since diagnosis			
<10yr	48.0%	67.8%	
10_17yr	29.4%	22.0%	
18_25yr	10.8%	7.8%	.101
>26yr	11.8%	2.4%	

Table 4: The acceptance of insulin therapy when prescribed by the physician by patients barriers

Perception	Insulin acceptance (%)	Insulin rejection (%)	P-value
Insulin injection is a painful process	55.2	32.0	.000
The self-injection of insulin is difficult	55.7	35.2	.000
Injection phobia	59.9	32.9	.000
I do not have any relative to inject insulin If someone does the injections I would use it	29.0	41.0	.000
I am concerned about the pain of the needle in glucometer testing	60.9	26.4	.000
I am concerned about hypoglycemia	72.0	7.2	.000
Insulin leads to gain weight	60.3	28.7	.001
Insulin has a negative impact on work	54.1	18.6	.000
Insulin has a negative impact on social relationships	52.8	19.5	.003
Insulin can cause harm like blindness	58.2	18.0	.003
Once on insulin, it cannot be stopped	64.5	15	.000

CONCLUSION

Patients' concerns and beliefs regarding insulin use are multiple. Lack of adequate information and misconceptions relating to insulin use, such as benefits and side effects, appears to be a major factor behind many diabetes patients' refusal of initiation of this therapy.

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