



Barriers to Insulin Therapy in Adult Patients with Type Two Diabetes Mellitus at Family Medicine Health Centers

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Abstract

Background: Type Two Diabetes Mellitus (T2DM) is a progressive disease by nature so most of patients will inevitably require insulin therapy to maintain adequate glycemic control. Unfortunately, initiation of insulin is delayed in many patients who would benefit from it. There are a number of patient's beliefs and false views regarding insulin therapy which creates barriers to starting insulin.

Aim: To study the barriers to insulin initiation from the patient's perspective.

Materials and Methods: This was cross sectional design in East Nile locality Khartoum, between 2019 to 2020. A questionnaire inquiring demographic features, status of insulin initiation, barriers to insulin initiation and knowledge about insulin therapy of T2DM was administered during face-to-face interviews.

Results: The study included 307 participants, the majority was females and their ages were range between 45 to 56 years. About (57.7%) of patients had uncontrolled BG with HbA1c more than 7. The commonest barrier to insulin therapy was fear of patients from hypoglycemia (72.0%), followed by insulin should be a final option that when started should not be stopped (64.5%) sixty percent thought that insulin lead to weight gain and (59.9%) of them had needle phobia.

Conclusion: Patients concerns and beliefs regarding insulin use are multiple. Lack of adequate information and misconception relating to insulin use, such as benefits and side-effects, appears to be a major factor behind diabetes patient refusal of initiation this therapy.

Keywords: Barriers; Insulin therapy; Type 2 DM; Family medicine health centers

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Introduction

Diabetes is one of the concerning health challenges of this century, with the number of adults with diabetes increasing to over three times over the past 20 years.

There is an increase in the population of diabetic patients. In 2000, the global estimate of adults living with diabetes was 151 million. By 2009 it had increased by 88% to 285 million. Today, 9.3% of adults aged 20 to 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 exceeded 25 million. The International Diabetes Federation (IDF) estimates that there will be 578 million adults with diabetes by 2030, and 700 million by 2045. The IDF Africa (AFR) Region has the lowest age-adjusted prevalence in 2019, 2030 and 2045 (4.7%, 5.1% and 5.2%), which can be due to lower levels of urbanization, under-nutrition and adequate weight. However, the number of people with diabetes is expected to increase in 143% by 2045 the largest percentage increase, and the prevalence in Sudan was about 18% [1].

Type 2 diabetes accounts for more than 90% of diabetes in Sub-Saharan Africa, and population prevalence proportions ranged from 1% in rural Uganda to 12% in urban Kenya [2].

Diabetes is a chronic illness that requires continuing medical care and continuous patient self-management education and support to prevent complications. This standard of cares should be provided by an expert team, to reduce side effects such as hypoglycemia [2]. The importance of this approach has been shown from evidence from clinical and epidemiological studies where the reduced incidence of micro and macro-vascular complications was apparent with intensive glycemic control, and confirmed in meta-analysis of observational studies [3-5].

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

When managing type 2 diabetes the general focus is on achieving and maintaining good glycemic control mainly by using anti-diabetic agents. Patients have been found to ultimately require insulin in the long run because diabetes is characterized by insulin resistance and or deficiency.

For the management of type two diabetes, there are many Oral Antidiabetic agents [OAA] that are available worldwide, either use as mono therapy or in combination with or without insulin according to recommendations of many diabetes management guidelines like American Diabetes Association [ADA].

Insulin is usually started in patients with type 2 diabetes when they have not achieved acceptable HbA1c with maximum doses, multiple OAA in the setting of reduced beta cell function with progression of the disease [6].

Delay in initiation and intensification of insulin therapy due to patient inertia can be a major issue in failure to achieve target blood glucose levels and hence the hyperglycemia may lead to avoidable complications that can be a burden on the health system and negatively affect the economy of the country [7].

Clinical inertia is failure to initiate or intensify treatment when glycemic targets are not met for two to three months [8]. Increase in life expectancy of 0.61 years was seen in patients with early insulin initiation, and quality adjusted life expectancy of 0.134 quality adjusted life years as well as substantial reduction in cumulative incidence and time to onset of all diabetes related complications with immediate insulin initiation versus delayed initiation [9].

Patients with diabetes may refuse insulin for many reasons. Some patients have injection and needle phobia, social stigma, worries about hypoglycemia and hyperphagia as well as false concepts like blindness or renal failure.

Refusal and reluctance to start insulin is a worldwide problem, a study conducted in Korea showed that insulin refusal rate was 33.6%. In 2014, it has been estimated that the prevalence of insulin refusal among type 2 diabetic patients in Saudi Arabia was 34.6% [10] and a study conducted in London by Khan et al. [11], among Bangladeshi patients with poorly controlled type 2 diabetes showed that 20.3% refused to start insulin therapy and in another study conducted by Karter et al. [12], in the US 35% refused to take insulin.

It was evident that those patients given moral and emotional support with diabetes-based education accepted the idea of starting insulin [13]. In addition, understanding the goal of therapy, satisfactory patient-doctor communication builds good trusting relationship with the doctor and helps accomplish better treatment goals [14].

Diabetes is a multi-system, chronic, metabolic disorder characterized by hyperglycemia. However, 50% to 85% of diabetics are undiagnosed and 67% of those diagnosed have HbA1c levels above target (7%). At diagnosis, 20% already have complications. The disease affects 8.3% of all adults across the world with the greatest number of people suffering between the ages of 40 to 59 years [15].

The addition of insulin to Oral Antidiabetic Agents [OAAs] has

been shown to improve HA1c in patients who were not controlled with OAAs alone.

Insulin therapy still continues to be under used despite its well-known benefits. Reluctance to initiate insulin therapy may be a function of both patient and doctor inertia [16]. Patients may see insulin therapy as complex and difficult and may not accept or afford home glucose monitoring. Generally insulin therapy is regarded as a punishment or threat to the patient when they fail to follow instructions and ask for a second chance when put on insulin. It is emphasized that patients have to be made aware from the diagnosis of diabetes that insulin therapy is one of the choices in the treatment options due to the natural history of the disease and its progression. This will help the patient to accept and comply with insulin treatment [17]. It is important to consider shared and satisfactory patient-doctor communication and include the patient in decision making [18].

In T2DM (which account for 90% of diabetes) progression, without adequate control, can lead to macro and micro-vascular complications, for example, the 10 year follow up of the UK Prospective Diabetes Study showed that intensive blood-glucose control with insulin therapy or OAAs decreases progression of micro-vascular 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, $p=0.011$) [19].

Therapeutic inertia in T2DM is a problem for patients and Health Care Provider (HCP). This inertia increases when considering addition of insulin, particularly in insulin naïve patients. Delayed insulin initiation which is also known as initiation inertia, can be the cause for delayed accomplishment of glycemic targets. Intensification inertia is also part of therapeutic inertia.

There are a number of patient related factors that contribute to refusal of insulin therapy. Of those, injection phobia due to painful needle stick, fear from hypoglycemia, hyperphagia and weight gain. In addition, social stigma, non-compliance with self-monitoring and self-injection can be a barrier. There are also false beliefs that insulin can cause renal failure, blindness and death. All these issues need to be wisely addressed by physicians and diabetic educators and nurses.

Studies

There are a large number of studies that found evidence of insulin inertia as reviewed by Haque et al. in 2005. They examined barriers to initiating insulin therapy in poorly controlled type 2 diabetes patients on maximum oral ADAs in Community Care Health Centers (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 inadequate use of protocols related to insulin therapy, language barriers between doctor and patients, and fear of hypoglycemia. Patient barriers were mistaken beliefs about insulin, noncompliance, lack of understanding of diabetes, use of traditional herbs, and fear of injections, and poor socioeconomic conditions that impacted affordability of medicines. System barriers included less patient-doctor contact time, inadequate time, abstinence from follow-up and financial issues. Suggestions to overcome these barriers include workshops and tutorials for treating physicians to further improve management skills. Organization of the health system to improve patient-doctor contact and communication, make use of guidelines, improve patient knowledge and address false

concepts. All will lead to better outcome [20].

Another study in London by Khan et al. in 2008 was done to determine the prevalence and reasons for refusal to start 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 counseling, so insulin refusal was common in Bangladeshi subjects with type 2 diabetes and poor glycemic control. A number of factors that have to be addressed contributed to this [11].

A study carried out in 2012 by Monirul Haque et al. [21], Diabetes Attitudes, Wishes and Needs (DAWN JAPAN) identified specific patient- and physician-related factors which contribute to 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 [22,23].

Another study done by Nadasen DM and Naidoo M in 2012 among uncontrolled patients with type 2 diabetes on maximum oral therapy in a public health clinic in Durban, South African. They found that fear of injections and needles was the only significant factor that was associated with the refusal to initiate insulin therapy (p-value <0.001), this issue has to be considered when meeting with patients in the clinics [24].

In 2014 in Saudi Arabia a study conducted by Batais M and Chanter P to determine the prevalence of reluctance to use insulin and its associated attitudes amongst participants with type 2 diabetes in Saudi Arabia. It was concluded that there was negative attitude, concerning initiating insulin therapy that need to be sorted [10].

A study has done in a Turkish primary care by Ahmet Yilmaz et al. in 2016, studied factors influencing insulin usage among type 2 diabetes mellitus patients. They studied ninety-four patients (57.4% females, 42.6% males). Most patients (57.4%) considered that insulin was a drug of last resort. Among all patients, 34.1% thought that insulin caused severe hypoglycemia and 14.9% disagreed. The patients thought that self-injection was difficult (27.6%), required someone else to administer the injection (27.6%), insulin injection was found to be painful by (33.0%). 59.6% of all patients believed that their religion did not restrict the use of insulin, 52.1% stated that their family physicians had sufficiently informed them, so in conclusion: There is 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 [25].

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 Bahawalpur, Pakistan, by Ahsan Saleem et al. [26]. They studied (T2DM) patients attending an outpatient

department in a public sector tertiary-level hospital in the city. They 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, genders, level of education and monthly income have a significant impact on the insulin perception scores of insulin-naïve T2DM patients. Therefore, in the Pakistani health care setting, it is essential for the attending physicians to focus on insulin-naïve patients for minimizing their false perceptions by providing and equipping them with sufficient disease and treatment related knowledge.

A study done in Omdurman, Sudan by Hyder Mirghani et al. [27], discussed the clinical inertia and barriers to insulin injection among Sudanese patients with type 2 diabetes mellitus. They concluded that 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 found regarding other patient characteristics. The commonest negative attitude towards insulin was keeping insulin as a last resort so this study recommended that target intervention targeting their fears and misconception are highly needed.

A Korean study by Kim 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 to initiation of insulin therapy, the result showed that insulin refusal rate was 33.6%, and in conclusion insulin initiation was delayed in patients with type 2 diabetes uncontrolled on two or more OADAs in Korea. Patient - and physician-related factors associated with this delay need to be addressed for better diabetes management [28].

Objective

To Study barriers to insulin therapy in adult patients with type two diabetes mellitus at family medicine health centers. Poor glycemic control in (T2DM) is a global problem despite the availability of numerous glucose lowering therapies (including insulin) and clear guidelines for T2D management. Despite this patients refuse take insulin once advised so by their health care provider. We would like to study the causes of patients' refusal and reluctance to take insulin and address their issues for better blood glucose control and prevent future complications.

Materials and Methods

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

Study area: This study was conducted at Family Medicine Health Centers in the East Nile locality of Khartoum State. These are six centers namely, Helat kuku, Elshheeda Nuda, Elwehda, ElwadiElakhdr, Om Doom and Al Elalfon distributed according to the population and distances, these centers provide primary health care to the citizen, in a form of acute and chronic illness clinic, antenatal care, nutrition and vaccination, 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 come for routine follow up at family medicine health centers East Nile locality Khartoum state.

Inclusion criteria:

- Adult patients with type two diabetes using insulin.
- Adult patients with uncontrolled type 2 diabetes not using insulin.

Exclusion criteria:

Adult with type 2 diabetes who are critically ill or in diabetes emergency.

Sample size and sampling technique: Sample size calculated from patients with type two diabetes attending outpatient referral clinics.

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

$$n = [z^2 * p * (1-p)/e^2] / [1 + (z^2 * p * (1-p)/(e^2 * N))]$$

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

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

$$n = [1.96^2 * 0.5 * (1-0.5)/0.05^2] / [1 + (1.96^2 * 0.5 * (1-0.5)/(0.05^2 * 1510))]$$

$$n = 384.16/1.2544 = 306.247$$

$$n \approx 307$$

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 2 diabetes attending the clinic of six centers and who fulfilled the inclusion criteria until the target sample size achieved.

Data collection methods and tools: To ensure the quality of the information gathered from the patients, face to face interviews were done, all of the interviews conduct by me. I use to interview patients and fill out a pre-tested well-structured questionnaire. The questionnaire is divided into three sections: Socio-demographic information, medical history and perceived barriers to use insulin, multiple-choice questions on knowledge to insulin initiation and belief in it is benefits and using, according to information's get from previous studies, I will read out the questions (in Arabic).

Study variables:

Dependent variable: Initiation of insulin therapy in adult patient with T2DM.

Independent variables: Gender, Education level, Believes toward insulin, Barriers regarding initiating insulin therapy.

Data entry: Collected data analyzed using the Statistical Package for Social Sciences {SPSSs} program version 26. The questions can be categorized into three groups according to the learning objectives. Seven questions measured the knowledge level relating to insulin, 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'.

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

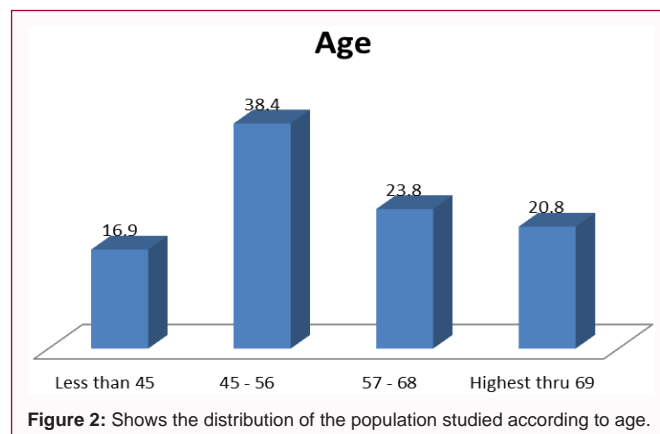
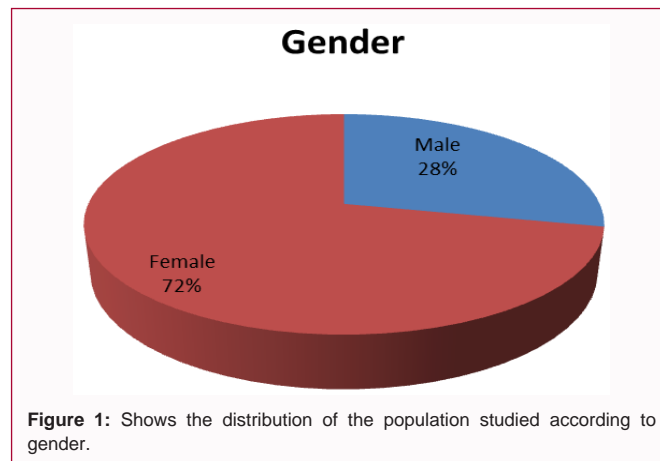
Ethical considerations: Ethical committee of research in Sudan Medical Specialization Board {SMSB} and state ministry of health approve the study. Administrative approvals from regional health authorities and health centers obtained. The objectives and aims of the study were explained in simple words. All the participants have right to benefit from researcher information's immediately. All the participants were informed about their right to withdraw at any time without mention the reasons. The confidentiality of the participants was established by coding of the questionnaire, and the data was saved from been used again without new consent.

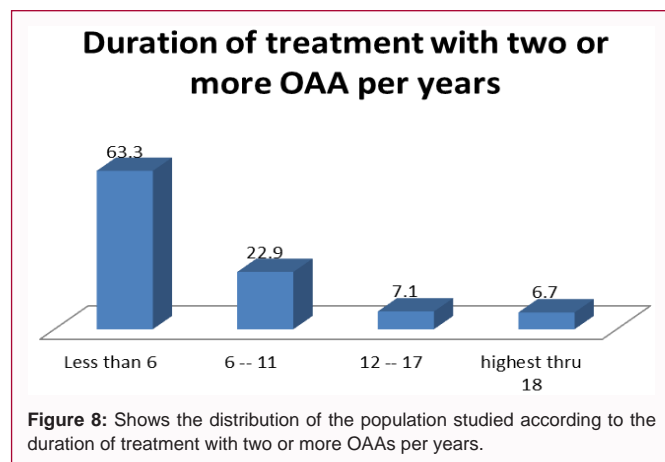
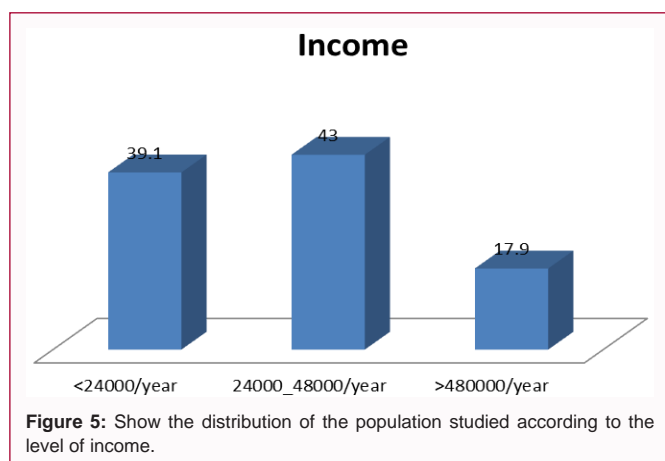
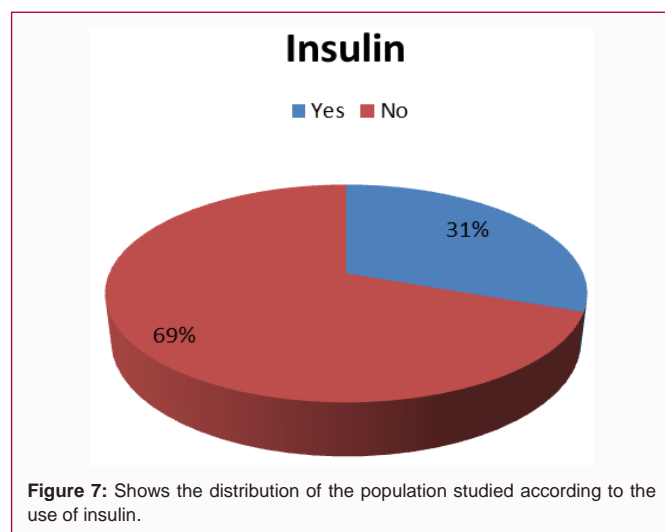
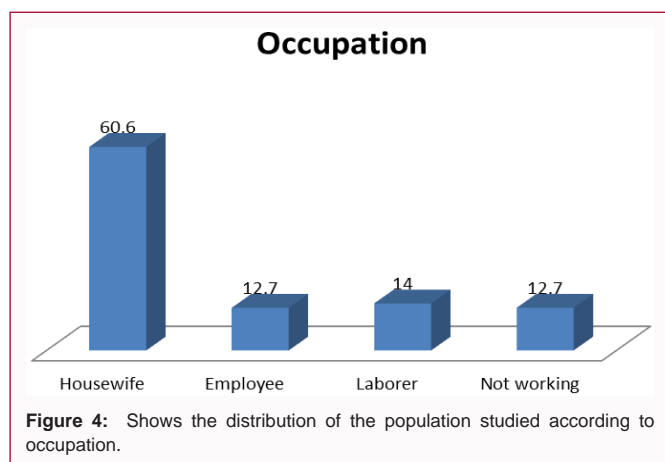
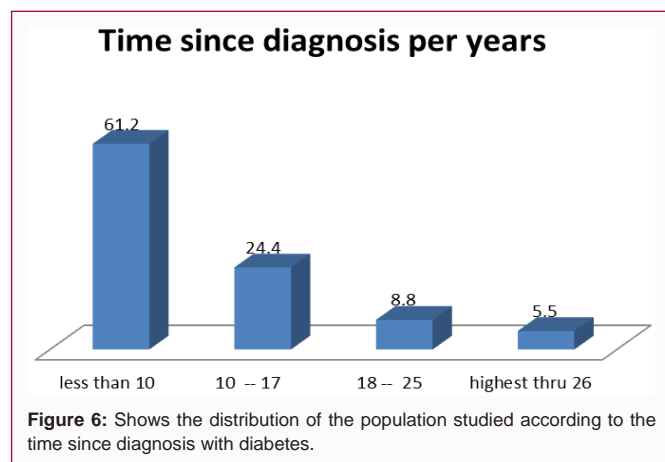
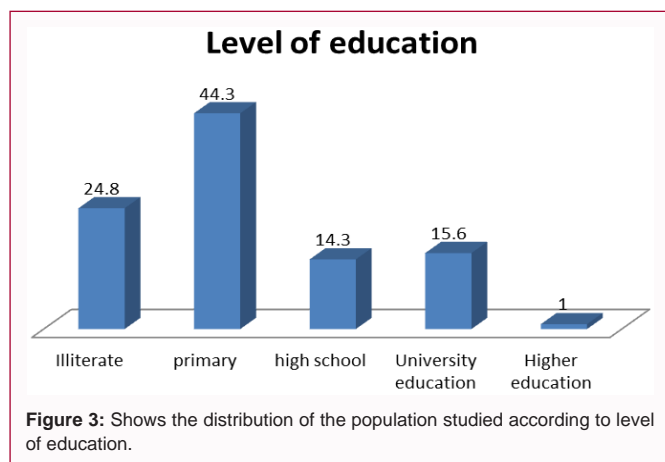
Informed consent: A written voluntary informed consent was obtained from all participants.

Results

A total of 307 adult patients with type 2 diabetes mellitus were enrolled and participated in the study, of these patients, the females were the dominance 220 (71.7%) (Figure 1). The average age was 55 ± 12.149 years range between 45 to 56 (Figure 2). 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 participant (44.3%) and nearly (25%) were illiterate (Figure 3). More than half 186 (60.6%) of them were housewives, while 12.7% not working. About 132 (43%) participant had a yearly income of 24,000 to 48,000 (Figure 4, 5). The mean duration of diabetes diagnosis per year and the mean HbA1c were $10.32 (\pm 8.384)$ and $7.97 (\pm 2.356)$ respectively (Figure 6).

Further assessment showed that 177 (57.7%) of patient had HbA1c higher than 7. And the combination of metformin and amaryl





was the most prescribed ODAs, while just 91 (29.6%) from patient used insulin, mixed type was the most one 86 (94.4%). Nearly half of patients 133 (43%) were treated with 2 or more of OAAs in a period between 6 to 11 years and insulin was added in a time of 8 to 14 years from the diagnosis (Figure 7, 8).

Table 1 explores various perception and barriers of patients with type 2 diabetes regarding insulin therapy, the commonest barrier to insulin was fear of hypoglycemia (72.0%), followed by once on insulin it 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.

Regarding knowledge about insulin use as explore in Table 2, it is appear very poor in this data, near half of patients (48,9%) disagree that insulin can control blood glucose better and only (38.4) belief in insulin role in preventing complication. Fortunately patients taking insulin without eating cause hypoglycemia and they know where to storage insulin in a good percentage. At the end patients refused using insulin in (66.8%).

Further analysis revealed that insulin perception was more positive in patient with good yearly income. Female T2DM patients scored higher than male. Again the insulin perception score higher

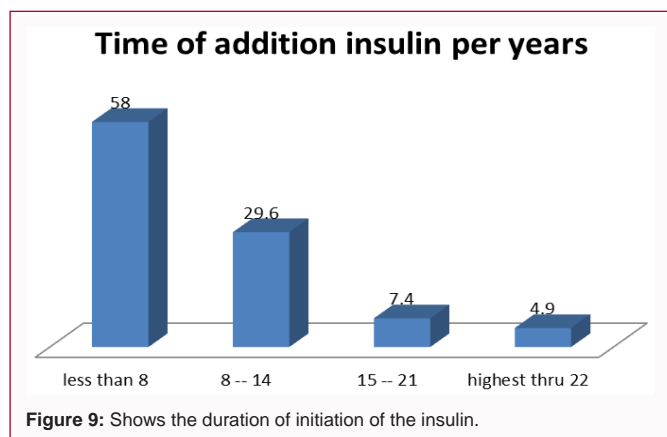


Figure 9: Shows the duration of initiation of the insulin.

Table 1: Shows the distribution of the population studied according to the patient's barriers to insulin therapy.

Barrier	Agree	No idea	Disagree
Insulin injection is a painful process	169	39	98
	55.40%	12.70%	31.90%
The self injection of insulin is difficult	171	28	108
	55.70%	9.10%	35.20%
Injection phobia	184	22	101
	59.90%	7.20%	32.90%
I dont have any relative to inject insulin If someone does the injections i would use it	89	92	126
	29.00%	30.00%	41.00%
I am concerned about the pain of needle of glucometer testing	187	39	81
	60.90%	12.70%	26.40%
I am concerned about hypoglycemia	221	64	22
	72.00%	20.80%	7.20%
Insulin leads to gain weight	198	63	46
	60.30%	10.70%	28.70%
Insulin has a negative impact on work	166	84	57
	54.10%	27.40%	18.00%
Insulin has a negative impact on social relationships	162	85	60
	52.80%	27.70%	19.50%
Insulin can cause harm like blindness heart attack and amputation	178	73	55
	58.00%	23.80%	17.90%
Once on insulin it cannot be stopped	185	33	88
	64.50%	20.50%	15.00%

in patients with higher education, followed by secondary, while the primary and illiterate patients scored significantly lower perception scores ($p < 0.000$). Insulin not acceptance significantly in obese patients more than other ($p = 0.003$) and also in housewife rather than other (Tables 3-5).

Discussion

In this population -based study we were able to explore barriers and perceptions of diabetics toward insulin therapy, were delay of initiating insulin was one of the main causes of uncontrolled glycemic status and hence development of complications. Many patients lack accurate information on advantages and disadvantages of insulin, most of them believe that insulin lower the blood glucose too much and cause hypoglycemia. Inadequate and wrong information

Table 2: Shows the distribution of the population studied according to their knowledge about insulin therapy.

Question	Agree	No idea	Disagree
Insulin can control blood sugar better	140	17	150
	45.50%	5.60%	48.90%
Insulin can prevents or reduce complications of diabetes	118	77	112
	38.40%	25.10%	36.50%
Insulin may use from the time of diagnosis in some circumstances, when metabolic control is disturbed by medical illness and surgical procedures	72	45	190
	23.50%	14.70%	61.80%
The dose of insulin has to be adjusted according to the monitoring of BG	129	119	59
	42%	38.80%	19.20%
Taking Insulin without eating may cause hypoglycemia	191	94	22
	62.20%	30.60%	7.20%
Omitting Insulin can cause serious consequences	115	108	84
	37.50%	35.20%	27.30%
If you start to use insulin, you may return back to your oral drugs	36	54	21
	11.70%	17.60%	70.7
Insulin should start at HA1c equal to or more than 9	61	187	59
	19.90%	60.90%	19.20%
Insulin storage at extreme temperatures can destroy it	198	101	8
	64.50%	32.90%	2.60%
Would you accept insulin therapy if your physician decides to start it	102		20
	33.20%		66.80%

enhanced the reluctance to use insulin. In the present study, insulin inertia was found in 73.6% of patients, which in line with previous studies elsewhere. In the Singaporean study where insulin inertia was 70%, comparatively Khan et al. [11], were more than half 57%, and Ahsan Saleem et al. [26] where inertia was 65%. And it is higher when compared with the previous study done in Omdurman [27] which concluded inertia in near half the patients 47.1%.

The current data showed that, the concern of hypoglycemia is the most common barrier (72%), followed by belief that insulin is the end of medication in diabetes treatment (64.5%), the present finding are similar to previous studied in Saudi Arabia and Sudan respectively, another study conducted in five countries Germany, Sweden, Netherland, UK and USA (29) also provided the same conclusion that insulin is the end of the road [10,27].

Large number of participants was reluctant to insulin use as the result to their negative concerns about insulin injection. This anxiety related insulin injection in a form of injection or needle pain and fear of injection is very common, reported in this study as high as 59.9% in injection phobia and 60.9% 55.2% patients concerned about pain of glucometer needle and insulin injection respectively, similarly to study that reported 71% among insulin naïve diabetics [13]. DM Nadasen et al. [24], in their study reach to same result that a fear of injections and needles had a significant value.

In this study, concerns about impacts of insulin use on the participants work and social life made them refused insulin, almost half of patients felt that it has negative impact on their work and left of their life as in a qualitative exploration by Hasliza Abu Hassan et al. [13], of factors influencing insulin acceptance in primary care clinic they found the same results.

Table 3: The Cross-tabulation shows the distribution of the population studied according to the acceptance insulin therapy if the physician decides to start it and all demographic data and treatment information.

Factors	Accept Insulin	Not Accept Insulin	P-Value
Gender			
Male	35.30%	24.90%	0.056
Female	64.70%	75.10%	
Education			
Illiterate	21.50%	26.30%	0
Primary	33.30%	49.80%	
High school	15.70%	13.70%	
University	27.50%	9.80%	
higher	2.00%	4.00%	
Occupation			
House wife	51.00%	64.40%	0
Employee	13.70%	21.30%	
Laborer	26.50%	7.80%	
Not working	8.80%	14.60%	
Income			
<24000 year	41.20%	40.50%	0.001
24000_48000 year	29.40%	47.10%	
>48000	29.40%	12.40%	
BMI			
<18.5	0.00%	2.00%	0.003
18.5_24.9	15.70%	32.1	
25_29.9	58.80%	40.50%	
>30	25.50%	25.40%	
HbA1c			
<7	41.20%	42.90%	0.77
>7	58.80%	57.10%	
>9	80.00%	71.60%	0.097
>9	20.00%	28.40%	
Duration of treatment with 2 or more drug			
<6yr	56%	67.70%	0.113
6_11yr	37.20%	17.80%	
12_17yr	5.80%	14.50%	
When insulin added			
<8yr	53.40%	69.60%	0.194
8_14yr	29.30%	30.40%	
15_21yr	10.40%	0.00%	
>22yr	6.90%	0.00%	
Time to initiate insulin from starting OAs			
<7yr	48.00%	67.80%	0.1
7_11yr	28.90%	22.00%	
12_16yr	2.20%	5.80%	
>17yr	20.90%	4.40%	
Time since diagnosis			
<10yr	48.00%	67.80%	0.101
10_17yr	29.40%	22.00%	
18_25yr	10.80%	7.80%	
>26yr	11.80%	2.40%	

Table 4: The Cross-tabulation shows the distribution of the population studied according to acceptance insulin therapy if the physician decides to start it and patients barriers.

Perception	Insulin acceptance (%)	Insulin rejection (%)	P-value
Insulin injection is a painful process	55.2	32	0
The self injection of insulin is difficult	55.7	35.2	0
Injection phobia	59.9	32.9	0
I don't have any relative to inject insulin If someone does the injections I would use it	29	41	0
I am concerned about the pain of needle of glucometer testing	60.9	26.4	0
I am concerned about hypoglycemia	72	7.2	0
Insulin leads to gain weight	60.3	28.7	0.001
Insulin has a negative impact on work	54.1	18.6	0
Insulin has a negative impact on social relationships	52.8	19.5	0.003
Insulin can cause harm like blindness	58.2	18	0.003
Once on insulin it cannot be stopped	64.5	15	0

Table 5: Shows the distribution of the population studied according to the overall knowledge regarding insulin therapy.

Knowledge	Accept	Not accept	P-value
Overall knowledge	26.40%	73.60%	0

In the current study significant statistical difference were evident between patient with insulin inertia and their education level, occupation and income, while in Mirghani et al. [27], similar study in Omdurman, he observed significant difference between patient inertia and their age sex occupation and level of education, and they similarly in the relation to the factor the time since diagnosis [29].

Moreover, the present study shows that T2DM patients were concerned regarding the adverse effects of insulin such as weight gain, blindness amputation and heart disease. And they also lack of confidence to self-inject insulin to them self. These findings are consistent with some previous studies [26].

Finally, the possibility of negative perception in the majority of T2DM patients which is 66.8% in this study could be due to their low health literacy and lack of effective communication between physicians and patient. This statement has been studied by recent study done by Rehan Sarwar et al. [30], which reported that the average consultation time was 1.2 min only rather than the standard of 10 min time. So that suggests the correlation between consultation time and the negative perception of patients regarding the insulin therapy.

The present study has several limitations. Firstly, it was 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 excluded.

Consider a well-constructed patient-centered approach with better communication between doctors, patients and diabetic educators. Patient group education and diabetic nurse home visiting and communication with the patient are examples. Emphasize work in a multidisciplinary team including a doctor, nurse and diabetic nurse or educator. The need for further physician workshops to stress the practice of early initiation of insulin. Further large-scale studies are needed to further address these issues and find effective solutions.

Conclusion

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

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