



## ORIGINAL ARTICLE

## Knowledge and Barriers to Insulin Therapy among Type 2 Diabetes Mellitus Patients from their Perspective

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### KEYWORDS

Type 2 diabetes mellitus;  
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**ABSTRACT:** Due to the progressive nature of type 2 diabetes mellitus (T2DM), insulin therapy will almost always be needed to maintain appropriate glycemic control in the majority of patients. Insulin therapy is unfortunately not implemented right away. Beginning insulin therapy is made more difficult by a number of patient misconceptions and erroneous ideas. To study the barriers and perceptions to insulin therapy in type 2 diabetes patients from their perspective. A descriptive cross-sectional study was conducted from March – September 2023 among 220 type 2 diabetes mellitus patients presenting in the endocrine outpatient department (OPD) at a tertiary healthcare center. A questionnaire inquiring about demographic characteristics, the status of insulin therapy, barriers to insulin therapy, and knowledge about insulin therapy for T2DM was administered during face-to-face interviews. *Results:* The study included 220 participants; the majority were from the age group 45–60 years (62.72%), females (50.90%), illiterate (20.90%), employed (58.18%), monthly income above 5000 (89.09%), duration of treatment with 2 or more drugs above 5 years (80.90%), and less than 10 years of insulin added to the treatment regimen (67.72%). The commonest barrier to insulin therapy is that it can cause blindness, cardiac arrest, and amputation, followed by a negative impact on working efficiency (70%). Seventy percent thought that insulin had a negative impact on social relationships and a fear of injection. Regarding the use of insulin, patients have a variety of worries and attitudes. Lack of knowledge about the benefits and adverse effects of using insulin, as well as misconceptions about these topics, appear to be important deterrents for diabetes patients from initiating this therapy.

### INTRODUCTION

Diabetes is one of the greatest global health concerns of this century. According to Wild et al., the prevalence of diabetes is predicted to double from 171 million in 2000 to 366 million in 2030 in India. An estimated 592 million people will die from diabetes by the year 2035. The International Diabetes Federation (IDF) estimates around 700 million by 2045. The number of people with diabetes

is expected to rise by 143% by 2045, and the prevalence in India is about 70% [1].

Diabetes is a chronic disorder that leads to severe complications associated with increased costs to the family, community, and healthcare system. To prevent problems, it necessitates continuous medical attention in addition to patient self-management education and

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assistance. It is recommended to follow standard care to reduce adverse effects such as hypoglycemia [2]. This approach's benefits have been shown by data from clinical and epidemiological studies, which showed that strict glycemic control significantly decreased the occurrence of micro- and macrovascular problems. These findings were confirmed by a meta-analysis of observational studies.

To reduce the incidence of complications, the National Institute for Health and Clinical Excellence (NICE) recommended a target HbA<sub>1c</sub> level between 6.5% and 7.5%. In patients with type 2 diabetes, insulin is typically given when HbA<sub>1c</sub> targets have not been achieved with maximum doses of multiple OAA (oral antidiabetic agents) and beta cell function is decreasing as the disease progresses [13].

Failure to achieve the target blood glucose level might result in a delay in starting and intensifying insulin therapy due to patient inertia. As a result, hyperglycemia may result in preventable complications that place a strain on the health system.

Despite its well-known advantages, insulin therapy is still not used to its full potential. Both the patient's and the doctor's inertia may play a role in the refusal to start insulin therapy. Patients could find insulin therapy complicated and expensive, and they might not accept or be able to afford home glucose monitoring [3,4]. When a patient refuse to comply with instructions or begs for a second chance after being put on insulin, insulin therapy is typically seen as a threat or punishment for the patient. It is stressed that because of the disease's natural history and progression, patients must be informed that insulin therapy is one of their treatment options as soon as they are diagnosed with diabetes. This will make it easier for the patient to accept and use their insulin treatment [7,8]. Patients and healthcare professionals (HCP) contend with therapeutic inertia in type 2 diabetes mellitus. When administering insulin, this inertia develops, particularly among patients who have never used insulin before. Delay in initiation of insulin, or initiation inertia, can cause a delay in the achievement of glycemic targets. A component of therapeutic inertia is intensification inertia [17].

The refusal to receive insulin therapy can be attributed to a variety of patient-related factors. Injection phobia, fear

of hypoglycemia, hyperphagia, and weight gain are among them [22]. Self-injection, non-compliance with self-monitoring, and social stigma can also be obstacles. Additionally, it is a myth that insulin can result in blindness, death, and renal failure. Doctors, nurses, and pharmacists for diabetics need to thoughtfully address each of these difficulties.

### ***Objective of the study***

To study knowledge and barriers to insulin therapy in patients with type 2 diabetes mellitus. Despite the availability of several glucose-lowering medications, including insulin, and established management guidelines for type 2 diabetes mellitus, poor glycemic control in type 2 diabetes mellitus remains a global issue. Despite this, patients refuse to take insulin even after being instructed to do so by their physicians. In order to improve blood glucose management and avert consequences in the future, we would like to investigate the factors that lead to patients refusing or reluctance to take insulin and resolve their issues.

## **MATERIALS AND METHODS**

### ***Study design and setting***

A descriptive cross-sectional study was conducted among 220 type 2 diabetes mellitus patients presenting to the endocrine outpatient department (OPD) at a tertiary healthcare center. The study was approved by the ethics committee (EC/Feb/107/2023). Every procedure used in this investigation that involved human participants complied with the 1964 Helsinki Declaration. 18-year-old or older type 2 diabetes mellitus patients on insulin treatment attending an OPD run by an endocrinologist or diabetologist during March – September 2023 who were able to understand the questionnaire were included in the study. Patients with uncontrolled type 2 diabetes are not using insulin. And patients who are critically ill or in a diabetes emergency were excluded from the study.

### ***Data collection methods and tools***

To verify the accuracy of the data acquired from the well-structured, pre-tested questionnaire, an in-person interview was held. The questionnaire is divided into

three sections, including topics such as medical history, perceived obstacles to utilizing insulin, and understanding of insulin beginning and advantages perception. The questionnaire was then translated into Tamil and validated. In accordance with the learning objectives, the questions can be divided into three groups. Three questions focused on understanding how to take insulin, while seven questions assessed general knowledge of insulin. Responses to a three-point scale of strongly agree with "agree" and strongly disagree with "disagree" were combined to create consolidated Likert-type scales.

### *Statistical analysis*

Regarding insulin therapy, the frequency distributions of the answers were provided. The association between the acceptance of insulin therapy and independent variables was examined using the chi-square test in this study. Statistical significance was considered with a P-value of 0.05. The collected data were analysed using the Statistical Package for Social Sciences software version 26.

## **RESULTS**

A total of 220 adult patients with type 2 diabetes mellitus were enrolled and participated in the study. Among these participants, the majority were from the age group 45–60 years (62.72%), females (50.90%), illiterate (20.90%), employed (58.18%), monthly income above 5,000 rupees (89.09%), duration of treatment with 2 or more drugs above 5 years (80.90%), and less than 10 years of insulin added to the treatment regimen (67.72%). [Table 1]

Baseline fasting blood sugar, hemoglobin A1c, body mass index (BMI), and systolic and diastolic blood pressure are shown in Table 2. The mean BMI was significantly higher in female patients ( $P < 0.001$ ). Table

3 shows the distribution of different classes of anti-diabetic drugs the patients are administered; among these, basal bolus insulin (51.4%) and biguanides (50%) class of drugs were the most highly administered by the patients.

In Table 4, the various perceptions and barriers of patients with type 2 diabetes regarding insulin therapy are explored. The most common barrier to insulin is that it can cause blindness, cardiac arrest, and amputation (71.36%), followed by insulin having a negative impact on working efficiency (70.00%). More than half of them also agreed that self-injection of insulin is difficult.

Table 5 shows that the majority of patients (72.27%) dispute that insulin can improve blood sugar levels, followed by 70.45% agreeing that insulin can be destroyed if stored at high temperatures. Fortunately, 50.90% of you would accept insulin therapy if your physician recommended it. And 35.45% of patients eventually refused to use insulin.

A further investigation showed that patients with both monthly incomes perceived insulin about equally. Compared to males, female patients with type 2 diabetes mellitus scored higher. Again, the insulin perception score is higher in literate and employed patients. Insulin is accepted significantly better in patients with a BMI greater than 7. And the acceptance rate of insulin treatment in patients with 2 or more drug durations is greater in those who have been consuming medications for less than 5 years [Table 6].

Table 7 shows the distribution of the population studied according to acceptance of insulin therapy. There is a higher perception score on fear of injection (71%), and insulin has a significant negative influence on interpersonal relationships (70%).

Moreover, the overall knowledge regarding insulin therapy was higher than the acceptance rate (68.37%) Figure 1.

**Table 1.** Socio-demographic variables.

Socio-demographic variables	No. of population	Percentage (%)
<b>Gender</b>		
Male	108	49.09
Female	112	50.90
<b>Age</b>		
Less than 45	56	25.45
45 - 60	138	62.72
> 60	26	11.81
<b>Level of education</b>		
Illiterate	46	20.90
Primary	23	10.45
Secondary and Higher Secondary	13	5.90
University Education	18	8.18
Higher Education	1	0.45
<b>Occupation</b>		
Employed	128	58.18
Unemployed	92	41.81
<b>Monthly Income</b>		
>5000 Rupees	196	89.09
<5000 Rupees	24	10.90
<b>Duration of treatment with 2 or more drugs</b>		
<5yr	42	19.09
>5yr	178	80.90
<b>When insulin added</b>		
<10yr	149	67.72
>10yr	71	32.27

**Table 2.** Baseline Characteristics.

Baseline Characteristics	Minimum	Maximum	Mean	Standard Deviation
FBS (mg dl <sup>-1</sup> )	55	587	187.53	72.67
HbA1c (%)	7.50	15.72	9.35	2.01
<b>BMI (kg m<sup>-2</sup>)</b>				
Male	12.45	52.74	24.07	3.67
Female	16.01	55.06	30.56	6.09
SBP (mmHg)	90	200	131.90	20.54
DBP(mmHg)	50	120	62.32	10.72

**Table 3.** Distribution of different classes of anti-diabetic drugs among patient's.

Drugs	Pooled prevalence (%) of patients HbA1c goal of < 7%	95% CI
Basal Insulin	37.8	33.6-44.7
Biphasic Insulin	32.4	28.1-35.6
Prandial Insulin	35.9	25.3-57.8
Basal bolus insulin	51.4	45.2-59.2
Glucagon like peptide-1 receptor agonist (GLP-1RA)	49.9	35.7-51.0
Exenatide LAR (GLP-1RA)	27.3	16.7-30.9
Alpha-glycosidase inhibitors	23.6	14.2-30.4
Dipeptidyl peptidase-4 inhibitors	41.8	36.0-49.2
Metformin (Biguanides)	50.0	48.9-60.5
Sulfonylureas	48.5	42.7-53.7
Glinides	39.0	32.7-47.6
Thiazolidinediones	30.1	26.9-38.1

**Table 4.** Distribution of the population studied according to the patient's barriers to insulin therapy.

Barrier	Agree		Neutral		Disagree	
	n	%	n	%	n	%
The injection of insulin is a painful procedure	120	54.54	38	17.27	62	28.18
Insulin self-injection is difficult	112	50.90	31	14.09	77	35.00
Fear of injection	110	50.00	26	11.81	84	38.18
I have no family members who can inject insulin. I would use it if someone else did the injections	56	25.45	70	31.81	94	42.72
I'm worried about the pain of glucometer testing needles	134	60.90	30	13.63	56	25.45
I'm worried about hypoglycemia	138	62.72	62	28.18	20	9.09
Insulin causes weight gain	136	61.81	43	19.54	41	18.63
Insulin has a negative impact on working efficiency	154	70.00	39	17.72	27	12.27
Insulin has a negative influence on interpersonal relationships	107	48.63	58	26.36	55	25.00
Insulin can cause blindness, cardiac arrest, and amputation	157	71.36	52	23.63	11	5.00
It is impossible to stop taking insulin once you start	89	40.45	66	30.00	65	29.54

**Table 5.** Distribution of the population studied according to their knowledge of insulin therapy.

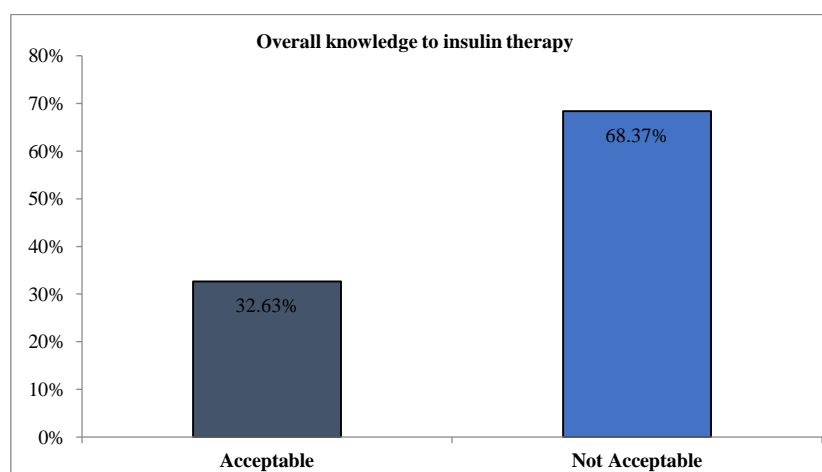
Question	Agree		Neutral		Disagree	
	n	%	n	%	n	%
Insulin can improve blood sugar control	159	72.27	54	24.54	7	3.18
Diabetes problems can be managed or controlled using insulin	95	43.18	45	20.45	80	36.36
When metabolic regulation is disrupted by medical illness or procedures, insulin may be used from the time of diagnosis in certain instances	63	28.63	27	12.27	130	59.09
The insulin dose must be modified based on blood glucose monitoring	99	45	102	46.36	19	8.63
Taking insulin without food may result in hypoglycemia	115	52.27	90	40.90	15	6.81
Withdrawal of insulin may result in severe implications	85	38.63	70	31.81	65	29.54
If you start using insulin, you may be able to discontinue your oral medications	40	18.18	78	35.45	102	46.36
Insulin should be started when HbA1c is equal to or more than 9	61	27.72	100	45.45	59	26.81
Insulin can be destroyed if stored at high temperatures	155	70.45	15	6.81	50	22.72
Would you accept insulin therapy if your physician recommended it	112	50.90	30	13.63	78	35.45

**Table 6.** Distribution of the study population according to their willingness to begin insulin therapy, related demographic information, and treatment data

Factors	Accept Insulin (%)	Not Accept Insulin (%)	P value
<b>Gender</b>			
Male	35.30	20.90	0.002
Female	64.70	30.50	
<b>Education</b>			
Literate	79.50	15.10	0.001
Illiterate	21.50	50.60	
<b>Occupation</b>			
Employed	55.10	40.50	0.09
Unemployed	45.20	50.10	
<b>Monthly Income</b>			
>5000 Rupees	47.20	29.10	0.001
<5000 Rupees	45.30	12.40	
<b>BMI</b>			
<7	55.40	30.45	0
>7	70.56	20.10	
<b>Duration of treatment with 2 or more drugs</b>			
<5yr	60	20.05	0.034
>5yr	40.10	45.15	
<b>When insulin added</b>			
<10yr	70.12	20.30	0
>10yr	50.20	10.15	

**Table 7.** Distribution of the population studied according to acceptance insulin therapy if the physician decides to start it and patient's barriers.

Perception	Insulin acceptance (%)	Insulin rejection (%)	P value
The injection of insulin is a painful procedure	58.20	20	0
Insulin self-injection is difficult	52	30	0
Fear of injection	71	25	0
I have no family members who can inject insulin. I would use it if someone else did the injections	25	45	0.01
I'm worried about the pain of glucometer testing needles	62.20	26.50	0.05
I'm worried about hypoglycemia	52	18.60	0.001
Insulin causes weight gain	58.12	12	0.04
Insulin has a negative impact on working efficiency	52.40	29.60	0.078
Insulin has a negative influence on interpersonal relationships	70.00	5.50	0.01
Insulin can cause blindness, cardiac arrest, and amputation	54.30	19.50	0
It is impossible to stop taking insulin once you start	68.20	15	0.02

**Figure 1.** Distribution of the population studied according to the overall knowledge to insulin therapy.

## DISCUSSION

In India, diabetes mellitus is a major health problem that, if neglected, can result in macrovascular consequences including peripheral vascular disease, stroke, and heart disease, as well as microvascular complications like retinopathy, nephropathy, and neuropathy. Oral hypoglycemic agents and injectable insulin, along with lifestyle adjustments such as diet or exercise, are used for the treatment of diabetes mellitus. Insulin is the mainstay of therapy when oral hypoglycemic drugs fail or when diabetic micro- and macrovascular complications occur [31]. Failure to achieve therapeutic objectives, such as patient's failure to adhere to treatment regimens, can be

explained by a variety of reasons. Despite the therapeutic benefits and effects of insulin, many patients have claimed to be unwilling to begin such medication due to discomfort, inconvenience, and the social judgment of using needles in public. Insulin therapy must be understood and coordinated by both the patient with diabetes mellitus and healthcare professionals in charge of diabetic care. The insulin dosage that works best for each individual and changes in the dose of insulin depending on blood glucose levels or type of insulin are not known. As a result, insulin therapy must be adjusted to the patient's lifestyle and underlying diabetic

problems.

In order to overcome the obstacles of insulin therapy, diabetic patients receiving insulin should be well aware of their disease and are also developing positive attitudes towards self-administration of insulin. Awareness and fewer mistakes in insulin delivery will be generated from teaching techniques that focus on the self-administration of insulin. Information and training have led to a significant improvement in knowledge, attitudes, and skills that contribute to better management of diabetes, which is widely accepted as an integral part of overall care. Standardizing and enhancing the insulin self-administration method is of greater importance [35].

We have examined the obstacles and attitudes to treatment with insulin in this descriptive cross-sectional study, which has shown that diabetic delay in starting insulin is one of the key factors contributing to uncontrolled glucose status and subsequent development of problems. Since most patients don't have access to reliable information on the benefits and drawbacks of insulin, they tend to think that it lowers blood sugar levels too much and leads to hypoglycemia. Insulin resistance was made worse by incomplete and incorrect information. In this study, 68.37% of patients had insulin inertia, which is consistent with other studies that have been conducted in the past. Comparatively to Khan et al., who were over half at 57%, and Ahsan Saleem et al., who were at 65%, insulin inertia was 70% in the Singaporean study. And it is higher in comparison to the earlier Omdurman study, which found inertia in nearly half the patients (47.1%).

Based on the available data, it was shown that insulin can lead to blindness, cardiac arrest, and amputation (71.36%), and that insulin negatively affects work efficiency (70%). These results are similar to those of earlier studies conducted in Saudi Arabia, Sudan, Germany, Sweden, the Netherlands, and the United Kingdom [5,8,18,19]. Due to their negative concerns over insulin injection, a significant majority of individuals were unwilling to use insulin. This study reported that 50% of patients with injection phobia and 60.9% of patients with concerns about the pain of glucometer needles and insulin injections, respectively, and a study that reported 71% of insulin-naïve diabetics were also affected by this anxiety related to insulin

injection in the form of injection pain or needle fear.

In contrast, the present investigation demonstrated a significant statistical difference between patients with insulin inertia and their income, occupation, and level of education. This was observed in Mirghani et al.'s similar study in Omdurman, where he also noted a significant relationship between patient inertia and age, sex, occupation, and education level [23].

Furthermore, this current study demonstrates that patients with type 2 diabetes mellitus were worried about the adverse consequences of insulin, including weight gain, blind amputation, and heart disease. Additionally, they lack the courage to administer insulin to themselves. These results are in line with certain earlier investigations. Finally, it's probable that the 68.5% of type 2 diabetes mellitus patients in this study who had negative perceptions were a result of their inadequate health literacy and ineffective communication between physicians and patients.

#### ***Limitation of the study***

There are several limitations to the current study. First, a single-centered cross-sectional design was used that provided only limited information. Second, because only one locality was included in the study, it is not possible to generalize these results to the entire county. Finally, additional forms of diabetes were not included.

Therefore, a patient-centered strategy with improved interaction between medical professionals, patients, and pharmacists must be implemented. Examples include diabetes nurse home visits, patient communication, and patient group education.

Put an emphasis on working in a multidisciplinary team, including a doctor, nurse, and pharmacist. The requirement for additional physician workshops to emphasize the practice of early insulin initiation to further examine these difficulties and identify practical answers, additional large-scale investigations are required.

#### **CONCLUSIONS**

Diabetes mellitus imposes a lifelong threat on individuals and their families. The study showed that there was insufficient information on insulin treatment, and



patients did not have knowledge about the use of their own insulin. Regarding the use of insulin, patients have a variety of worries and attitudes. The main reason that diabetic patients refuse to start this medication appears to be a lack of proper information and misconceptions about the use of insulin, including its advantages and disadvantages. The conclusion can therefore be drawn that people with diabetes, through innovation methods that are adapted according to their needs and provided by trained healthcare providers and diabetic educators, should receive continuous quality education in accordance with the requirements of health care.

### CONFLICTS OF INTEREST

There are no conflicts of interest

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