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Insulin Treatment Perception and Factors affecting the Acceptance in Type 2 Diabetes Mellitus Patients attending a Specialist Clinic in Ilorin, Nigeria

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Abstract

Type 2 Diabetes Mellitus (T2DM) is a significant global health challenge, with increasing prevalence and diverse management approaches. Insulin therapy, a cornerstone in the management of advanced T2DM, is often met with reluctance and negative perceptions. A better understanding of the multifaceted factors influencing insulin acceptance is crucial for tailored interventions. This study explored the perception regarding insulin treatment using the validated Insulin Treatment Appraisal Scale (ITAS). This study aimed to explore socio-demographic and clinical factors influencing insulin therapy perception and acceptance among T2DM patients in Ilorin, Nigeria. It was a cross-sectional study among T2DM patients. Data on socio-demographic characteristics, diabetes related features and ITAS were collected and analyzed. Statistical methods, including t-tests and chi square were employed to assess the impact of various variables on insulin treatment perception. There was a statistically significant difference (p=0.029) between the age of insulin naïve and experienced patients. Some insulin-experienced patients had positive perceptions of insulin, like their belief in insulin's health benefits (p = 0.001) and ability to control blood glucose (p = 0.048). Insulin-naive individuals exhibited more negative attitudes toward insulin, emphasizing the need for targeted interventions and patients' health education. This study provides valuable insights into the intricate interplay of socio-demographic characteristics, diabetes related features, and individual perceptions influencing insulin therapy acceptance among participants with T2DM. The findings underscore the importance of personalized interventions to address negative perceptions, ultimately enhancing diabetes management and treatment outcome.

Keywords: Insulin treatment, Type 2 diabetes mellitus, Perception, Acceptance, Nigeria

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1 Introduction

Type 2 Diabetes Mellitus (T2DM) is a chronic metabolic disorder characterized by insulin resistance and impaired insulin secretion, resulting in elevated blood glucose levels. The global prevalence of T2DM has reached alarming proportions, with an estimated 463 million adults affected worldwide [1]. Nigeria, like many other countries, is grappling with a rising prevalence of T2DM, contributing to the increasing burden of non-communicable diseases [2]. The management of T2DM often involves a combination of lifestyle modifications, oral medications, and in advanced stages, insulin therapy [3]. Despite the effectiveness of insulin in controlling blood glucose, there is a persistent reluctance and negative perception associated with its initiation and use among individuals with T2DM [4].

The decision to initiate insulin therapy in T2DM is a critical juncture in diabetes management, influenced by various factors, including socio-demographic characteristics, disease-related features, and individual perceptions [5]. Understanding the factors that shape perceptions toward insulin treatment is crucial for healthcare providers to tailor interventions and improve acceptance, adherence, and overall diabetes treatment outcome [6]. The Insulin Treatment Appraisal Scale (ITAS) is a validated instrument designed to assess individual attitudes and perceptions toward insulin therapy, offering valuable insights into the psychosocial aspects of diabetes management [7].

Socio-demographic factors, such as age, education, and economic status, have been identified as key determinants influencing individuals' perceptions of insulin therapy [8]. Additionally, diabetes-related features, including the duration of diabetes and the presence of comorbidities, play a pivotal role in shaping attitudes toward insulin initiation [9]. While some studies have explored these factors independently, there is a need for comprehensive research that integrates socio-demographic characteristics, disease-related features, and individual perceptions to provide a holistic understanding of the complex dynamics surrounding insulin therapy in T2DM.

This study seeks to address this research gap by examining the socio-demographic characteristics, diabetes-related features, and perceptions toward insulin therapy among

individuals with T2DM. By employing the ITAS questionnaire, the research aims to elucidate the spectrum of attitudes and beliefs individuals hold regarding insulin treatment and explore the factors that contribute to these perceptions. The findings of this study are expected to inform healthcare providers and policymakers about the nuanced factors influencing insulin acceptance, guiding the development of targeted interventions to enhance diabetes management strategies in Ilorin and other healthcare settings globally.

2 Methods

2.1 Study design and Sample collection

This was a cross sectional descriptive study that was conducted at the Diabetes Clinic of the Medical Outpatient Department in University of Ilorin Teaching Hospital (UITH). The study population were patients with diagnosed T2DM attending the clinic who satisfied the inclusion criteria (Patient above 18 years of age with the diagnosis of T2DM willing to participate in the study). Patients with Type 1 DM, Type 2 DM who had diabetic emergencies (like diabetic ketoacidosis, hyperosmolar hyperglycaemic state, lactic acidosis and hypoglycaemia), sepsis, mental retardation or speech impairment were excluded from the study.

The study utilized a sampling of convenience to recruit all eligible T2DM patients attending the diabetic clinic between 1st August and 31st October 2022. All consenting eligible patients were interviewed with a pre-tested structured questionnaire administered and monitored by the researchers and three research assistants who had been trained on the objectives of the study and how to fill the questionnaire.

2.2 Research Instrument: Insulin Treatment Appraisal Scale

The perception of T2DM patients on insulin therapy was measured using the Insulin Treatment Appraisal Scale (ITAS). The Insulin Treatment Appraisal Scale is a 20-item questionnaire, including 16 statements referring to barriers to insulin use and four referring to its benefits [10]. This tool was developed and validated for use on people with T2DM regardless of current treatment type, with the advantage of enabling assessment both before and after insulin initiation [11]. For non-insulin using respondents, the ITAS assessed expectations about future insulin use, while for those already using insulin; the instrument was used to evaluate their experience with insulin use. The clinical relevance of the ITAS has been demonstrated from previous studies [12], [13], [14].

The ITAS asked respondents to indicate their level of agreement ('strongly disagree' = 1 to 'strongly agree' = 5) with 20 statements. Sixteen of the ITAS statements are negatively worded while 4 statements are positive. Scores for the 16 negatively-worded items are summed to provide a 'negative appraisal' score (16–80); scores for four positively-worded items are summed to provide a 'positive appraisal' score (4–20); all twenty items would be summed (with positively-worded items reversed) to form a 'total' score (20–100). Higher 'negative appraisal' scores indicate more negative attitudes, while higher 'positive appraisal' scores indicate more positive attitudes towards insulin.

2.3 Statistical analysis and presentation of data

Descriptive statistics was used to describe the socio-demographic characteristics of the T2DM patients. Frequencies, percentages, mean, and standard deviation was calculated for the normally distributed continuous variables. A Mann-Whitney U test and the Kruskal-Wallis test were used to find the association between insulin perception and patients' characteristics.

All the collected data were analysed using the Statistical Package for the Social Sciences (SPSS) version 27.0 software (SPSS Inc., Chicago, IL, USA). The level of statistical significance was set at a $p < 0.05$.

3 Results and Discussion

The socio-demographic characteristics of the study respondents comprised of 139 individuals with T2DM, distinct patterns emerged among insulin-naive (n=52) and insulin-experienced (n=87) groups. The majority of participants were females (67.6%), with a mean age of 55.32±13.95 years. There was a significant difference between the mean ages of the insulin- naïve and insulin-experienced groups (p=0.029), suggesting potential age-related variations in insulin treatment practices. Majority of respondents attained at least secondary education (71.2%) and identified as Yoruba tribe (85.6%). About two-third of the participant engaged in trading, and one-half funded their treatment out of pocket (Table 1).

Table 1: Sociodemographic characteristics of the study participants

Variable	All T2DM N=139 n(%)	T2DM Insulin naive n=52 n(%)	T2DM Insulin experienced n=87 n(%)	p value
Sex				
Male	45(32.4)	11(21.2)	34(39.1)	0.029
Female	94(67.6)	41(78.8)	53(60.9)	
Age group (yr)				
<30	8(5.8)	2(3.8)	6(6.9)	0.611
30-49	35(25.2)	11(21.2)	24(27.6)	
50-64	60(43.2)	26(50)	34(39.1)	
≥65	36(25.9)	13(25)	23(26.4)	
Mean Age (yr)	55.32±13.95[a]	57.23±14.54[a]	54.18±13.55[a]	0.214
Education				
None	17(12.2)	7(13.5)	10(11.5)	0.226
Primary	22(15.8)	7(13.5)	15(17.2)	
Secondary	30(21.6)	7(13.5)	23(26.4)	
Tertiary	70(50.4)	31(59.6)	39(44.8)	
Tribe				
Yoruba	119(85.6)	43(82.7)	76(87.4)	0.448
Others	20(14.4)	9(17.3)	11(12.6)	
Religion				
Christianity	70(50.4)	30(57.7)	40(46)	0.181
Islam	69(49.6)	22(42.3)	47(54)	
Occupation				
Unemployed	28(20.1)	15(28.8)	13(14.9)	0.224
Civil servant	33(23.7)	8(25.4)	25(28.7)	
Trading	60(43.2)	22(42.3)	38(43.7)	
Artisan	10(7.2)	4(7.7)	6(6.9)	
Others	8(5.8)	3(5.8)	5(5.7)	
Economic status				
Low	47(33.8)	17(32.7)	30(34.5)	0.325
Middle	82(59)	29(55.8)	53(60.9)	
High	10(7.2)	6(11.5)	4(4.6)	
Source of funds				
Self	71(51.1)	22(42.3)	49(56.3)	0.083
Family/friends	65(46.8)	30(57.7)	35(40.2)	
Insurance	3(2.2)	0(0)	3(3.4)	
Substance use				
Alcohol	7(5)	3(5.8)	4(4.6)	0.257
Cigarette	2(1.4)	0(0)	2(2.3)	
Support group				
Tribal	26(18.7)	9(17.3)	17(19.5)	0.754
Social	29(20.9)	13(25)	16(18.4)	
Religious	74(53.2)	29(55.8)	45(51.7)	

a represents mean±standard deviation(SD)

Table 2: Diabetes related features among the study participants

Variable	All T2DM N=139 n (%)	T2DM Insulin naive n=52 n (%)	T2DM Insulin experienced n=87 n (%)	p value
Median DM duration(IQR)	7(9)[b]	6(11)[b]	8(11)[b]	0.439
DM duration (yr)				
0-5				
6-10	50(36)	18(34.6)	32(36.8)	0.643
11-15	51(36.7)	22(42.3)	29(33.3)	
>15	16(11.5)	6(11.5)	10(11.5)	
DM education	22(15.8)	6(11.5)	16(18.4)	
No				
Yes	23(16.5)	9(17.3)	14(16.1)	0.852
Therapy	116(83.5)	43(82.7)	73(83.9)	
Diet only				
Oral medication only	6(4.3)	6(11.5)	0(0)	
Oral medication + Insulin	46(33.1)	46(88.5)	0(0)	
Insulin only	73(52.5)	0(0)	73(83.9)	
Comorbidity	14(10.1)	0(0)	14(16.1)	
Hypertension				
Dyslipidemia	76(54.7)	31(59.6)	45(51.7)	0.878
Stroke	25(18)	8(15.4)	17(19.5)	
Retinopathy	5(3.6)	1(1.9)	4(4.6)	
Nephropathy	23(16.5)	7(13.5)	16(18.4)	
Myocardial infarction	16(11.5)	5(9.6)	11(12.6)	
	4(2.9)	1(1.9)	3(3.4)	

b represents median (interquartile range [IQR])

The diabetes-related features further elucidated distinctions, as insulin-experienced patients exhibited a longer median diabetes duration in all the age group and diversified therapeutic options, encompassing oral medications and insulin. Comorbidities, such as hypertension (54.7%) and dyslipidemia (18.0%), were prevalent across both groups, emphasizing the multifaceted nature of T2DM management (Table 2).

Regarding DM education, a majority of the participants (83.5%) had received some form of diabetes education, indicating a reasonably high level of awareness and knowledge about their medical condition. Comorbidities such as hypertension and dyslipidemia were prevalent across both groups, underscoring the common occurrence of additional health challenges among individuals with T2DM (Table 2).

The study assessed the spectrum of responses among the respondents to each item of the ITAS questionnaire, aiming to elucidate perceptions related to insulin treatment. The data, presented in Table 3, illustrates the diverse sentiments expressed by individuals with T2DM regarding insulin therapy. Notably, a substantial portion of respondents perceived taking insulin is a measure of failure in managing diabetes with diet and tablets (30.2% agreed, 19.4% strongly agreed), reinforcing the existing stigma surrounding insulin use. Additionally, concerns were raised about the perceived impact on flexibility, fear of injections, and the association of insulin with weight gain.

Interestingly, a considerable number of participants recognized the potential benefits of insulin therapy, with some acknowledging insulin role in preventing complications of diabetes (38.1% agreed and 40.3% strongly agreed). Furthermore, some participants expressed a positive belief that insulin helps to improve health (41.7% agreed and 46.8% strongly agreed) and maintain good control of blood glucose (36.0% agreed, 49.6% strongly agreed).

Concerns about the inconveniences associated with insulin therapy were also evident, with notable proportions expressing

apprehensions about the time and energy required for insulin injections, potential interference with daily activities, and perceived difficulties in injecting the right amount at the right time (Table 3).

The significance of the relationship between the different ITAS item among insulin-naïve and insulin-experienced participants was assessed. This showed the multifaceted impact of various factors on the perception of insulin therapy.

The insulin perception question on "Taking insulin makes life less flexible" was found to be statistically significant ($p < 0.001$), indicating that insulin-naive participants perceive a greater reduction in life flexibility compared to their insulin-experienced counterparts.

Table 3: Spectrum of the responses of the study participants to each item of ITAS questionnaire

	Insulin Perception Questions	Response N(%)				
		SD	D	DK	A	SA
1	Taking insulin means I have failed to manage my diabetes with diet and tablets	30(21.6)	25(18)	15(10.8)	42(30.2)	27(19.4)
2	Taking insulin means my diabetes has become much worse	33(23.7)	35(25.2)	13(9.4)	37(26.6)	21(15.1)
3	Taking insulin helps to prevent complications of diabetes	3(2.2)	10(7.2)	17(12.2)	53(38.1)	56(40.3)
4	Taking insulin means other people see me as a sicker person	35(25.2)	51(36.7)	13(9.4)	25(18)	15(10.8)
5	Taking insulin makes life less flexible	29(20.9)	37(26.6)	20(14.4)	37(26.6)	16(11.5)
6	I'm afraid of injecting myself with a needle	41(29.5)	34(24.5)	5(3.6)	28(20.1)	31(22.3)
7	Taking insulin increases the risk of low blood glucose levels (Hypoglycemia)	14(10.1)	30(21.6)	16(11.5)	45(32.4)	34(24.5)
8	Taking insulin helps to improve my health	0(0)	8(5.8)	8(5.8)	58(41.7)	65(46.8)
9	Insulin causes weight gain	24(17.3)	23(16.5)	51(36.7)	25(18)	16(11.5)
10	Managing insulin injections takes a lot of time and energy	40(28.8)	38(27.3)	18(12.9)	36(25.9)	7(5)
11	Taking insulin means I have to give up activities I enjoy	43(30.9)	36(25.9)	21(15.1)	30(21.6)	9(6.5)
12	Taking insulin means my health will deteriorate	65(46.8)	41(29.5)	14(10.1)	17(12.2)	2(1.4)
13	Injecting insulin is embarrassing	66(47.5)	37(26.6)	12(8.6)	13(9.4)	11(7.9)
14	Injecting insulin is painful	46(33.1)	31(22.3)	10(7.2)	30(21.6)	22(15.8)
15	It is difficult to inject the rightamount of insulin correctly at the right time every day	44(31.7)	41(29.5)	21(15.1)	22(15.8)	11(7.9)
16	Taking insulin makes it more difficult to fulfill my responsibilities (at work, at home)	55(39.6)	43(30.9)	11(7.9)	24(17.3)	6(4.3)
17	Taking insulin helps to maintain good control of blood glucose	1(0.7)	9(6.5)	10(7.2)	50(36)	69(49.6)
18	Being on insulin causes family and friends to be more concerned about me	23(16.5)	36(25.9)	18(12.9)	30(21.6)	32(23)
19	Taking insulin helps to improve my energy level	5(3.6)	13(9.4)	33(23.7)	51(36.7)	37(26.6)
20	Taking insulin makes me more dependent on my doctor	20(14.4)	29(20.9)	25(18)	33(23.7)	32(23)

NOTE: SD- Strongly Disagree, D- Disagree, DK- Neither Agree nor Disagree, A- Agree, SA- Strongly Agree

A significant difference was observed in the belief that "Taking insulin helps to improve my health" ($p = 0.002$), indicating that insulin-experienced participants have a stronger belief in the health improving effects of insulin. For the perception that "It is difficult to inject the right amount of insulin correctly at the right time every day" and "Managing insulin injections takes a lot of time and energy" a significant difference was found ($p < 0.001$), indicating that insulin-naive individuals perceive greater challenges in correct insulin dosage and timing. Some other questions on insulin treatment evaluated showed a significant relationship to participant's perception as shown in table 4.

In the assessment of ITAS domains, a significant difference emerged ($p < 0.001$) with negative scores, illustrating that insulin-naive participants harbor more negative perceptions toward insulin treatment compared to the insulin experienced participants (Table 5).

Table 4: Assessment of perception of insulin therapy among T2DM patient in Ilorin

	Insulin Perception Questions	T2DM Insulin naive n=52 [median(IQR)]	T2DM Insulin exposed n=87 [median(IQR)]	p value
1	Taking insulin means I have failed to manage my diabetes with diet and tablets	4(2-4)	3(2-4)	0.582
2	Taking insulin means my diabetes has become much worse	4(2-4)	2(1-4)	0.009**
3	Taking insulin helps to prevent complications of diabetes	4(3-5)	4(4-5)	0.019**
4	Taking insulin means other people see me as a sicker person	2(2-4)	2(1-3)	0.084
5	Taking insulin makes life less flexible	4(2-4)	2(-4)	0.001**
6	I'm afraid of injecting myself with a needle	4(2-5)	2(1-4)	<0.001**
7	Taking insulin increases the risk of low blood glucose levels (Hypoglycemia)	4(2-5)	4(2-4)	0.618
8	Taking insulin helps to improve my health	4(3-5)	5(4-5)	0.002**
9	Insulin causes weight gain	3(3-4)	3(2-4)	0.071
10	Managing insulin injections takes a lot of time and energy	3(2-4)	2(1-3)	<0.001**
11	Taking insulin means I have to give up activities I enjoy	3(2-4)	2(1-3)	0.025**
12	Taking insulin means my health will deteriorate	2(1-3)	1(1-2)	0.061
13	Injecting insulin is embarrassing	2(1-4)	1(1-2)	<0.001**
14	Injecting insulin is painful	4(2-4)	2(1-4)	0.001**
15	It is difficult to inject the right amount of insulin correctly at the right time every day	3(2-4)	2(1-3)	<0.001**
16	Taking insulin makes it more difficult to fulfill my responsibilities (at work, at home)	2(2-4)	2(1-2)	0.001**
17	Taking insulin helps to maintain good control of blood glucose	2(1-2)	1(1-2)	0.068
18	Being on insulin causes family and friends to be more concerned about me	2(1-4)	4(2-4)	0.006**
19	Taking insulin helps to improve my energy level	2(2-3)	2(1-3)	0.080
20	Taking insulin makes me more dependent on my doctor	3(2-4)	3(2-4)	0.445

Table 5: Insulin treatment perception score among study participants

Variable	All T2DM N=139 [median(IQR)]	T2DM Insulin naive n=52 [median(IQR)]	T2DM Insulin exposed n=87 [median(IQR)]	p value
ITAS domains				
Negative score	44(37-52)	50(42-58)	42(35-48)	<0.001**
Positive score	10(8-12)	10(8-12)	10(8-12)	0.532
Total score	54(48-62)	58(53-67)	51(45-58)	<0.001**

Diabetes mellitus is a major non-communicable disease of public health significance, which can cause both microvascular complications (retinopathy, nephropathy, neuropathy), and macrovascular complications (stroke, heart disease, and peripheral vascular disease) when left untreated or poorly treated. It has been noted in previous studies that diabetic patients at some point in the course of their treatment may require insulin therapy [15], [16]. Insufficient knowledge of insulin use can result in preventable complications, adverse patient outcome, poor adherence to therapy and invariably poor glycemic control [17]. In this study we identified some socio-demographic related variations in insulin treatment practices; majority of the patients were female and insulin experienced. This finding is similar to the report by Saleem et al. [18] and Jasper et al. [19] but different from what was reported by Priscilla et al. [20]. The finding of majority of the participants being insulin-experienced was expected as participants were recruited from diabetes specialist clinic where most of the patients would have been educated on the importance of insulin in the management of DM. It was however noted that some participants had other chronic medical conditions that may interfere with their treatment. Hypertension and dyslipidemia were the commonest co-morbid medical condition in this study. Olamoyegun et al. [21] reported a similar finding in their study while Poe et al. [22] report was at variance. These

findings have direct implications for designing the treatment interventions for the different T2DM population. Interventions targeting the treatment of other co-morbid medical conditions can be designed with insulin therapy to enhance insulin acceptance and adherence.

Majority of the study participants that were insulin naïve had a negative perception regarding insulin therapy. This constitutes a great setback in diabetes management and it is also assuming a global dimension as demonstrated in some previous studies [18], [23], [24]. It was found that T2DM patients were more concerned about the perceived potential adverse effects of insulin treatment (like difficulty of injecting and pain associated with the insulin injection, life flexibility and the worries of the family members on the deteriorating nature of their disease because of insulin use). Tan et al. [25] and Nur Azmiah et al. [26] reported that their patients had concerns about the adverse reactions associated with insulin therapy though the reported adverse effects were at variance with our findings. This also emphasized the fact that diabetic patients generally have worries about adverse effects associated with insulin therapy. These concerns or worries related to insulin therapy may be attributed to lack of knowledge and experience about insulin therapy, and past experiences about insulin particularly among the insulin experienced participants. There is another possibility that the negative perception in the majority of T2DM patients could be due to the lack of effective communication between the attending physicians and the patients [27], [28]. This showed that the concerns of participants should be thoroughly addressed for insulin treatment to be acceptable to T2DM. It is noteworthy to state that some participants reported beneficial effect of starting insulin therapy particularly in maintaining good glycemic control. Consistent with our findings, insulin therapy was perceived as beneficial to achieve better glycemic control, prevent complications, and improve health outcomes by T2DM diabetes patients in some previous studies [28], [29], [30].

4 Conclusions

Conclusion

In this study we concluded that participants had different reactions and complex perspectives (which composed of negative and positive perspectives) regarding insulin treatment. Participants who were insulin naïve generally have a negative perception about insulin use. For insulin therapy, healthcare professionals particularly physicians in charge of diabetes treatment should pay more attention to how the patients feel when they are about to start insulin therapy. Individualized training programs and health education (like site of injection, dose of injection, and possible side effects) are needed to reduce negative perceptions of insulin therapy. This will also motivate the patients to adopt insulin therapy with ease. A future research can be designed to look into the expectations of T2DM patients from the physician at the beginning of insulin therapy to better manage all the aspects of the treatment process.

5 Declarations

5.1 Acknowledgements

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5.2 Authors Contributions

The names of all authors listed in this work contributed equally to the conceptualization, design, execution of the study, manuscript writing and proof-reading.

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5.4 Ethic

The study was approved by the Ethics and Research Committee of the University of Ilorin Teaching Hospital with approval number: ERC PAN/2022/07/0311

5.5 Conflicts of interest

The authors declare no conflict of interest.

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