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# IDENTIFICATION OF PERCEPTIONS AND THOUGHTS THAT CAN CREATE PSYCHOLOGICAL RESISTANCE TO INSULIN USE IN TYPE 2 DIABETES MELLITUS PATIENTS

## TİP 2 DİABETES MELLİTUSLU HASTALARDA İNSÜLİN KULLANIMINA PSİKOLOJİK DİRENÇ OLUŞTURABİLECEK ALGI VE DÜŞÜNCELERİN SAPTANMASI

Ebru Kırılı<sup>1</sup>, Tonguç Demir Berkol<sup>2</sup>, Hasan Mervan Aytaç<sup>2\*</sup>, Hüseyin Yumrukçalı<sup>2</sup>, Habib Erensoy<sup>3</sup>, Güliz Özden<sup>2</sup>

### Abstract

Diabetes Mellitus (DM) is chronic, metabolic disease characterized by hyperglycemia. It has been widely observed that large proportion of patients show psychological resistance to the initiation of insulin treatment, and as a result they are exposed to many complications of diabetes. It was aimed to identify the perceptions and beliefs that cause psychological insulin resistance among Type 2 DM diagnosed patients, to determine relationship between sociodemographic data and these perceptions & beliefs. In research, 120 patients diagnosed with type 2 DM were included followed by outpatient clinic of Bursa Şevket Yılmaz State Hospital Internal Medicine Unit. Patients were evaluated with socio-demographic information form, diabetes-related problem areas scale (PAID), insulin treatment assessment scale (ITAS), state and trait anxiety inventory (STAI), beck depression inventory (BDI). The average PAID score of patients is  $63.75 \pm 13.88$ , BDI scores:  $15.16 \pm 8.25$ , State Anxiety Inventory (SAI) subscale scores:  $41.96 \pm 3.74$ , Trait Anxiety Inventory (TAI) subscale scores:  $46.80 \pm 5.52$ . Correlation was found between age, duration of diabetes, sex, marital status, education level, employment status, type of treatment, the level of importance of blood sugar regulation, the difficulty level of blood glucose adjustment, complications, currently treatment for depression and certain items of ITAS. Similarly, relationship was found between certain items of ITAS and total PAID scores, SAI subscale scores, TAI subscalescores. As a result, it has been found that patients have psychological resistant to start insulin therapy and this is caused by large number of negative perceptions and thoughts. Cognitive interventions for perceptions and thoughts can reduce psychological resistance to insulin therapy.

**Keywords:** type 2 diabetes mellitus, insulin, psychogenic resistance.

### Özet

*Diyabetes Mellitus (DM), hiperglisemi ile karakterize, kronik, metabolik bir hastalıktır. Hastaların büyük bir bölümünün insülin tedavisine başlamaya psikolojik anlamda direnç gösterdiği yaygın olarak gözlemlenmekte, bu nedenle de diyabetin birçok komplikasyonuna maruz kaldıkları görülmektedir. Tip 2 DM tanısı almış hastalar arasındaki psikolojik insülin direncine neden olan algı ve inançları saptamak, bu düşünce ve algıların sosyodemografik verilerle ilişkisini belirlemek amaçlanmıştır. Araştırmaya, Bursa Şevket Yılmaz Devlet Hastanesi Dâhiliye Birimi Diyabet Polikliniğinden takip edilen Tip 2 DM tanılı 120 hasta dâhil edilmiştir. Hastalar; sosyodemografik bilgi formu, diyabetle ilgili sorunlu alanlar ölçeği (DİSA), insülin tedavisini değerlendirme ölçeği (İTAS) ile değerlendirilmiştir. Olguların %65'i (n=78) kadın, %35'i (n=42) erkektir. Olguların DİSA puanları ortalama  $63.75 \pm 13.88$ , BDO puanları  $15.16 \pm 8.25$ , DKÖ puanları  $41.96 \pm 3.74$ , SKÖ puanları ise  $46.80 \pm 5.52$ 'dir. İTAS'ın bazı maddeleri ile yaş, diyabet süresi, cinsiyet, medeni durum, eğitim düzeyi, çalışma durumu, tedavi çeşidi, kan şekeri ayarlamının önem düzeyi, kan şekeri ayarlamada güçlük çekme düzeyleri, komplikasyon gelişme durumu, şuan depresyon tedavisi alma durumu arasında ilişki olduğu saptanmıştır. Benzer şekilde bazı İTAS maddeleri ile DİSA toplam puanı, DKÖ puanı ve SKÖ puanı arasında ilişki olduğu gözlenmiştir. Sonuç olarak hastaların insülin tedavisine başlamaya psikolojik direnç gösterdikleri, bu direncin çok sayıda olumsuz algı ve tutumlardan kaynaklandığı bulunmuştur. Algı ve düşüncelere yönelik kognitif müdahaleler insülin tedavisine olan psikolojik direnci azaltabilir.*

**Anahtar Kelimeler:** tip 2 diyabetes mellitus, insulin, psikojenik direnç

<sup>1</sup> İstanbul S.B.Ü Kanuni Sultan Süleyman Eğitim ve Araştırma Hastanesi, İstanbul, Türkiye

<sup>2</sup> İstanbul S.B.Ü Bakırköy Prof. Dr. Mazhar Osman Ruh Sağlığı ve Sinir Hastalıkları Eğitim ve Araştırma Hastanesi, Psikiyatri, İstanbul, Türkiye

<sup>3</sup> Üsküdar Üniversitesi NP Etiler Polikliniği, M.D., İstanbul, Türkiye

\* Corresponding author: İstanbul S.B.Ü Bakırköy Prof. Dr. Mazhar Osman Ruh Sağlığı ve Sinir Hastalıkları Eğitim ve Araştırma Hastanesi, Psikiyatri E-mail: mervan176@hotmail.com

## 1. Introduction

Diabetes mellitus is the most common endocrine disorder affecting more than 1% of all individuals worldwide and represents a chronic metabolic disease characterized by hyperglycemia. It may be caused by reduced insulin secretion, absence of an insulin effect, or both. Furthermore, the type 2 diabetes mellitus spectrum may extend from relative insulin deficiency in conjunction with predominant insulin resistance to insulin resistance combined with predominantly secretory defect.

In 2013, there were approximately 382 million individuals with diabetes worldwide, and this figure is projected to increase by 55% to reach 592 million by the year 2035. Also, almost 5.1 million deaths due to diabetes and its complications have been reported to occur in the year 2013 (International Diabetes Federation, 2013). Results of a clinical study suggest that nearly 18 to 20% of individuals over 65 years of age have diabetes and 40% have impaired glucose tolerance, which represents the pre-diabetic stage (Harris et al., 1998).

Type 2 diabetes mellitus is a multifactorial polygenic disorder, in which numerous genes as well as their mutations and polymorphisms have been associated with the condition (Baier et al., 2015). The primary defect involves insulin resistance and/or insulin deficiency (Foster et al., 1998).

Many diabetic patients are diagnosed on the basis of symptoms such as polyuria, polydipsia, and weight loss. While a diagnosis may be established with identification of elevated blood glucose levels during a routine health check, in most instances it is the diabetes-related health problems that allow a diagnosis. Fasting blood glucose is an important diagnostic marker, with a level exceeding 126 mg/dl being considered diagnostic of diabetes. Also, a random blood glucose of greater than 200 mg/dl may allow a diagnosis of diabetes.

However, a second confirmatory test is generally considered necessary before a diagnosis is made.

Doubtlessly, insulin therapy has transformed diabetes from a deadly disease to a chronic and manageable condition. During the course of diabetes, insulin therapy, either as a replacement or addition to the existing treatment, may become necessary. Although it has been clearly established by numerous scientific reports that a good glycemic control may prevent or delay the onset of complications of type 2 diabetes, a significant proportions of patients exhibit psychological reactance to starting insulin treatment, with a consequent increase in the frequency of many diabetic complications. However, patients with type 2 diabetes have been found to have complex system of beliefs regarding the initiation of insulin therapy.

Negative perceptions toward insulin use may prevent or delay the initiation of insulin therapy recommended by physicians. On the other hand, insulin therapy plays a significant role in achieving good glycemic control, prevention of complications, and improving the life quality of patients (Brunton et al., 2006). Despite this fact, frequent postponement and even rejection of insulin therapy by the patients is a well known phenomenon (Riddle, 2012), leading to therapeutic challenges as well as increased economical burden.

Numerous reports have pointed out to the high frequency of psychogenic resistance to insulin use among type 2 diabetics. For instance, in a study from the UK found that nearly 27% of the type 2 diabetics showed resistance to initiation of insulin therapy (United Kingdom Prospective Diabetes Study, 1998). In another study, the corresponding figure was approximately 28% (Davis & Renda, 2006). In other words, almost one third of all type 2 diabetics may exhibit resistance to initiation of insulin.

Despite large number of studies showing high prevalence of psychogenic insulin resistance, those examining the causes of this resistance are relatively scarce. On the other hand, it is evident that patients are likely to fail in their attempts to overcome this resistance without support from healthcare professionals. The underlying beliefs and knowledge of patients feeling discomfort regarding insulin therapy may be investigated and brief and customized interventions may be developed addressing the conceptualization of patients regarding insulin therapy. Also, cognitive interventions targeting factors that contribute to psychogenic resistance may alleviate negative perceptions, allowing patients to receive their ideal treatment. Among many studies addressing psychogenic insulin resistance, DAWN (Diabetes Attitudes, Wishes and Needs) was the largest investigation that was conducted in 2001 with the participation of 3000 diabetes specialists and 5000 diabetic patients across 13 countries (Diabetes Attitudes, Wishes and Needs Study, 2002). The results of the study showed that more than half of the patients (53%) experienced intense concerns at the initiation of insulin therapy.

## 2. Methods

This study was aimed to identify perceptions and beliefs associated with psychogenic insulin resistance, to assess their relationship with sociodemographic characteristics, and to provide data for interventions addressing improved awareness regarding the importance of insulin therapy among patients diagnosed with type 2 diabetes mellitus. The study population consisted of 120 type 2 diabetes patients followed up at the Outpatient Unit, Department of Internal Medicine, Bursa ŞevketYılmaz State hospital.

Patients were assessed using the sociodemographic data form, Problem Areas in Diabetes (PAID) scale as well as the Insulin Therapy Appraisal Scale (ITAS).

### 2.1. Sociodemographic Data Form

This comprehensive form was developed by the investigator based on an examination of previous studies on the same subject. The questionnaire includes initial questions gathering data on general sociodemographic parameters, proceeding with diabetes related questions, and closing with questions assessing depressive symptomatology.

### 2.2. The Beck Depression Inventory

This is a 21-item self-administered scale measuring various symptoms of depression. It comprises 21 groups of statements describing the somatic and cognitive-emotional symptoms of depression. Each item consists of four alternative responses graded from 0 to 3 according to the severity of the symptom. The patients choose the response closest to their state during the past week. A sum score is counted, a higher score indicating more severe depression. (Beck et al., 1961)

### 2.3. PAID (Problem Areas in Diabetes) Scale

This tool originally introduced by Polons et al. in 1997 (Polonsky et al., 1995) is a likert-type self-report scale with 20 items and a score range between 0 and 4. It is a well validated self-reported scale widely used for assessing the current level of diabetes-related stress both in type 1 and 2 diabetics. The scores are summed up and higher scales indicate worse emotional stress. The tool was translated into Turkish by Huis, Makine et al. in 2011 (Huis et al., 2011).

### 2.4. ITAS (Insulin Treatment Appraisal Scale)

This likert-like, 20 item tool asking the patients whether they agree with the statements in a 4-point scale was developed by Snoek et al. in 2007 (Snoek et al., 2007). After consultation with a large group of specialists and practitioners, a consensus regarding the use of 4 positive and 16 negative statements in the tool was reached. ITAS has been conceptualized as a 2-axis tool that allows the calculation of a total score and 2-subscale scores, with an underlying single structure for "assumptions regarding insulin therapy". Although ITAS was originally conceived as a diagnostic tool, over time it has also been used to monitor the perceptions regarding insulin therapy. This tool was translated into Turkish in 2009 by Makine et al. (Makine et al., 2009).

### 2.5. State and Trait Anxiety Inventory

Spielberg et al. developed this tool in 1970 (Spielberger et al., 1970), and translation into Turkish language was performed in 1985 by Öner and Le Compte (Öner, 1994). It is a Likert-type self-assessment tool with 20 items

consisting of short statements that are scored on a 1 to 4 point scale.

## 3. Statistical Analyses

Number Cruncher Statistical System (NCSS, LLC Kaysville, Utah, USA) 2007 was used for statistical analyses. In addition to descriptive statistical methods (mean, standard deviation, minimum, maximum, frequency, median), Kruskal Wallis test was used for inter-group comparisons for parameters without normal distribution, and Mann Whitney U test was used identifying the group responsible for the difference and between-group (comparisons. For the correlation analyses for parameters without normal distribution Spearman's rho correlation coefficient was used. Statistical significance was assessed at a p level of less than 0.05.

## 4. Results

This study was undertaken at Diabetes Outpatient Unit, Department of Internal Medicine, Bursa ŞevketYılmaz State Hospital in 2009 with the participation of 120 Type 2 diabetic patients who met the inclusion criteria and provided written informed consent.

The mean age was  $55.80 \pm 11.02$  years with a range between 38 and 80 years. Mean BMI was  $29.55 \pm 4.82$  kg/m<sup>2</sup>. Overall there were 78 (65%) and 42 (35%) male and female patients, respectively. Eighty percent (n=96) were married, 72.5% (n=87) were primary school graduates, while 27.5% (n=33) had an education level of high school or higher. The number of employees 20% (n=24) (Table 1). Proportion of patients with a diabetes duration of less than 1 year, between 1-2 years, 3-4 years, 5-10 years, and more than 10 years were 10% (n=12), 11.7% (n=14), 20.8% (n=25), 23.3% (n=28), and 34.2% (n=41), respectively. Of the participants 69.2% (n=83) were receiving oral therapy only, while 5.8% (n=7) were receiving insulin only, and 25% (n=30) were treated with diet + oral anti-diabetics + insulin. A treatment has been recommended by a physician in 38.3% of the cases (n=46). The proportion of patients complying with insulin therapy recommended by a physician was 87% (n=40), and 40.5% (n=30) of the cases reported that they would use the insulin therapy recommended by their doctor (Table 1). While 12.5% (n=15) of the patients regarded blood glucose regulation as minimally important, 45% (n=54) considered it important, and 42.5% (n=51) considered it very important. Some difficulty in blood glucose regulation was reported by 57.5% (n=69), moderate difficulty was reported by 32.5% (n=39), and significant difficulty was reported by 10% (n=12). Diabetes-related complications were present in 41.7% of the patients (n=50), while 75% (n=90) reported diabetes-related sexual dysfunction (Table 1).

The total PAID scores ranged between 21 and 91, with a mean value of  $63.75 \pm 13.88$ . The Beck Depression Inventory (BDI) total score was between 2 and 43, and the mean score was  $15.16 \pm 8.25$ . Total score for STAI scores ranged between 35 and 52, and the mean score was  $41.96 \pm 3.74$ . Based state anxiety measurements 4 patients (3.3%) had no anxiety, while 76 (63.3%) had

**Table 1:** Distinction of descriptive properties

<b>Age; Ave±SD (Min-Max)</b>		55,80±11,02 (34-80)
<b>BMI; Ave±SD (Min-Max)</b>		29,55±4,82 (19,03-43,82)
<b>Gender; Woman/ Man n(%)</b>		78 /42
<b>Maritalstatus; Married/ Widower; n(%)</b>		96/24
<b>Educationalstatus; n(%)</b>	Primaryeducation	87 (72,5)
	High Schoolandthen	33 (27,5)
<b>Employmentstatus; n(%)</b>	Employee	24 (20)
	NonEmployed	96 (80)
<b>Duration of Diabetes</b>	<1 year	12 (10,0)
	1-2 years	14 (11,7)
	3-4 years	25 (20,8)
	5-10 years	28 (23,3)
	>10 years	41 (34,2)
<b>Treatment; n(%)</b>	Tablet	83 (69,2)
	İnsülin	7 (5,8)
	Diet+Tablet+İnsülin	30 (25)
<b>Is the doctor advised on the treatment of insülin?</b>		46 (38,3)
<b>Use of doctor-recommended insulin therapy (n=46)</b>		40 (87,0)
<b>The Importance of Blood Sugar Adjustment; n(%)</b>	Less Important	15 (12,5)
	Important	54 (45)
	Very Important	51 (42,5)
<b>Difficulty in Blood Sugar Setting; n(%)</b>	Less	69 (57,5)
	Fairly	39 (32,5)
	To Much	12 (10)
<b>Complications Related Sugar; n(%)</b>		50 (41,7)
<b>Sexual Issues Related Sugar; n(%)</b>		90 (75)
<b>Depression Due to Diabetes (n=39); n(%)</b>		18 (46,2)
<b>Treatment of Depression in the Past; n(%)</b>		38 (31,7)
<b>Getting Depression Treatment now; n(%)</b>		34 (28,3)
<b>Thinking about the Role of Diabetes in the Emergence of Depression (n=34); n(%)</b>		18 (52,9)
<b>PAID Total; Ave±SD (Min-Max)</b>		63,75±13,88 (21-91)
<b>BDI Total; Ave±SD (Min-Max)</b>		15,16±8,25 (2-43)
<b>Acute Anxiety (SAI); Ave±SD (Min-Max)</b>		41,96±3,74 (35-52)
<b>Chronic Anxiety (TAI); Ave±SD (Min-Max)</b>		46,80±5,52 (35-58)
<b>Acute Anxiety n(%)</b>	<b>No Anxiety</b>	4 (3,3)
	<b>Slightly Anxiety</b>	76 (63,3)
	<b>High Anxiety</b>	40 (33,3)
<b>Chronic Anxiety</b>	<b>Slightly Anxiety</b>	2 (1,7)
	<b>High Anxiety</b>	118 (98,3)

mild anxiety, while 40 patients (33.3%) had significant anxiety. Trait anxiety total scores ranged between 35 and 58, with a mean score of  $46.80 \pm 5.52$ , and showed the presence of mild anxiety in 2 patients (1.7%) and high level of anxiety in 118 (98.3%) (Table 1).

A statistically significant positive correlation of 21% was found between age and the following statement: "Adjustment of insulin injection doses requires significant time and energy" ( $r:0.210$ ;  $p < 0.05$ ) (Table 2).

Significantly higher proportion of female patients responded positively to the statement "I am afraid to give self injections with a needle" than male patients ( $p < 0.01$ ). Also, significantly more women agreed with the statement "Adjustment of insulin injection doses requires significant time and energy" than men ( $p < 0.05$ ). The statement "Self injections of insulin are embarrassing"

was agreed significantly more frequently by male patients than female patients ( $p < 0.05$ ). (Table 2).

The following statements "Insulin injections are painful" and "Insulin therapy helps achieve better control of blood glucose" were significantly more frequently agreed by married patients than unmarried patients ( $p < 0.05$ ). Also, patients with high school or higher educational level agreed significantly more frequently than primary school graduates with the following statements: "Insulin treatment places restrictions on daily life", "Insulin therapy helps achieve a better health status", and "Self-injections of insulin are embarrassing" ( $p < 0.01$ ). Also, significantly higher proportion of patients with high school or higher educational level agreed with the statement "Insulin injections help better control of blood glucose" as compared to primary school graduates ( $p < 0.05$ ) (Table 3).

Employed patients significantly more frequently agreed with the statements "Insulin therapy helps prevent other complications", "Insulin therapy places restrictions on daily life", and "Insulin therapy helps achieve a better health status" ( $p < 0.01$ ). Also, these patients were significantly more likely to agree with the statements "Self-injections of insulin are embarrassing" and "Insulin therapy helps achieve better control of blood glucose" ( $p < 0.05$ ) (Table 3).

Also, the duration of diabetes was associated with significant differences in responses to the statement "Insulin therapy places restrictions on daily life" ( $p < 0.05$ ). Pairwise comparisons revealed that patients with a diabetes duration of 1-2 years were significantly more likely to agree with this statement as compared to those with a diabetes duration of 3-4, 5-10, or  $> 10$  years ( $p=0.032$ ,  $p=0.018$ ,  $p=0.016$ , and  $p < 0.05$ , respectively). Also, the responses to the statement "I am afraid to give self-injections with a needle" showed significant differences according to the duration of diabetes. Again, pairwise comparisons showed a significantly higher positive response to this statement in those with a diabetes duration of less than 1 year as compared to other groups ( $p=0.016$ ,  $p=0.028$ ,  $p=0.010$ ,  $p=0.005$ , and  $p < 0.05$ , respectively). There were no significant associations between other ITAS items and duration of diabetes.

The route of treatment was also associated with highly significant differences in responses to the statement "Insulin therapy shows a worsening of my diabetes" ( $p < 0.01$ ). Pairwise comparisons showed that patients receiving oral treatments were highly significantly more likely to respond positively to this statement as compared to those receiving treatment with diet + oral anti-diabetics + insulin ( $p=0.001$ ;  $p < 0.01$ , respectively). Other routes of treatment did not exhibit statistically significant differences ( $p > 0.05$ ).

Responses to the statement "Adjustment of insulin injection doses requires a lot of time and energy" differed significantly according to the type of treatment ( $p < 0.05$ ). Pairwise comparisons showed that those receiving oral treatments significantly more frequently responded positively to this statement as compared to insulin users ( $p=0.046$ ,  $p < 0.05$ , respectively). In this regard, no

**Table 2:** ITAS Questionnaire distribution and evaluation results according to age, BMI and gender

ITAS	Ave±SD	Gender		BMI		Man	Woman	ap
		r	p	r	p	Ave±SD (Median)	Ave±SD (Median)	
ITAS 1	4,10±0,97	0,040	<b>0,662</b>	0,138	<b>0,134</b>	4,21±0,89 (4)	4,03±1,0 (4)	<b>0,382</b>
ITAS 2	4,11±1,11	0,005	<b>0,956</b>	0,026	<b>0,778</b>	4,02±1,13 (4)	4,15±1,10 (5)	<b>0,441</b>
ITAS 3	3,87±0,80	-0,217	<b>0,018*</b>	-0,177	<b>0,054</b>	4,0±0,76 (4)	3,80±0,81 (4)	<b>0,217</b>
ITAS 4	4,08±1,06	-0,107	<b>0,247</b>	-0,066	<b>0,477</b>	4,19±0,89 (4)	4,02±1,14 (4)	<b>0,740</b>
ITAS 5	3,50±1,16	-0,014	<b>0,876</b>	0,05	<b>0,589</b>	3,5±1,17 (4)	3,49±1,15 (4)	<b>0,940</b>
ITAS 6	3,53±1,54	0,130	<b>0,160</b>	0,305	<b>0,001**</b>	2,97±1,48 (3)	3,38±1,49 (5)	<b>0,003**</b>
ITAS 7	3,26±0,95	-0,204	<b>0,026*</b>	-0,064	<b>0,492</b>	3,30±0,99 (3)	3,23±0,93 (3)	<b>0,699</b>
ITAS 8	3,74±0,86	-0,222	<b>0,015*</b>	-0,124	<b>0,18</b>	3,92±0,71 (4)	3,63±0,91 (4)	<b>0,140</b>
ITAS 9	2,97±1,12	-0,087	<b>0,344</b>	0,001	<b>0,995</b>	2,88±1,19 (3)	3,02±1,08 (3)	<b>0,367</b>
ITAS 10	3,15±1,22	0,210	<b>0,022*</b>	0,063	<b>0,493</b>	2,83±0,98 (3)	3,32±1,30 (4)	<b>0,028*</b>
ITAS 11	2,99±1,14	0,136	<b>0,139</b>	-0,1	<b>0,28</b>	3,07±0,99 (3)	2,94±1,21 (3)	<b>0,702</b>
ITAS 12	3,48±1,23	0,051	<b>0,584</b>	0,015	<b>0,872</b>	3,64±1,16 (4)	3,38±1,25 (3)	<b>0,321</b>
ITAS 13	2,53±1,40	0,018	<b>0,845</b>	-0,113	<b>0,222</b>	2,83±1,39 (2)	2,36±1,38 (2)	<b>0,044*</b>
ITAS 14	2,71±1,34	0,177	<b>0,055</b>	0,053	<b>0,566</b>	2,5±1,21 (2)	2,81±1,40 (3)	<b>0,257</b>
ITAS 15	3,66±1,26	0,012	<b>0,896</b>	-0,003	<b>0,973</b>	3,47±1,21 (4)	3,75±1,27 (4)	<b>0,165</b>
ITAS 16	3,08±1,35	0,152	<b>0,098</b>	0,022	<b>0,809</b>	3,12±1,23 (3)	3,05±1,41 (3)	<b>0,836</b>
ITAS 17	4,00±0,86	-0,185	<b>0,044*</b>	-0,225	<b>0,014*</b>	4,28±0,86(4,5)	3,84±0,82 (4)	<b>0,003**</b>
ITAS 18	4,03±1,14	-0,151	<b>0,100</b>	-0,106	<b>0,251</b>	4,09±0,95 (4)	3,98±1,23 (4)	<b>0,887</b>
ITAS 19	2,94±0,75	0,097	<b>0,294</b>	0,12	<b>0,195</b>	2,67±0,78 (3)	3,09±0,69 (3)	<b>0,005**</b>
ITAS 20	3,74±1,06	-0,039	<b>0,677</b>	-0,038	<b>0,683</b>	3,64±1,24 (4)	3,79±0,95 (4)	<b>0,865</b>

r: Spearsman's rho correlation coefficient, used Mann-Whitney U test

\*p&lt;0.05

\*\*p&lt;0.01

**Table 3:** ITAS evaluations according to marital status, education and working status

ITAS;	Married			Primaryeducation			Employee		
Ave±SD (Median)	Married	Widower	p	Primaryeducation	High School andthen	p	Employee	Notemployeeed	p
ITAS 1	4,15±0,99 (4)	3,87±0,85 (4)	<b>0,068</b>	4,12±0,99 (4)	4,03±0,92 (4)	<b>0,427</b>	4,16±0,76 (4)	4,08±1,01 (4)	<b>0,952</b>
ITAS 2	4,14±1,12 (5)	3,95±1,08 (4)	<b>0,303</b>	4,10±1,18 (5)	4,12±0,89 (4)	<b>0,469</b>	4,16±1,12(4,5)	4,09±1,11 (4)	<b>0,737</b>
ITAS 3	3,83±0,83 (4)	4,04±0,62 (4)	<b>0,282</b>	3,97±0,84 (4)	4,09±0,63 (4)	<b>0,076</b>	4,33±0,56 (4)	3,75±0,81 (4)	<b>0,001**</b>
ITAS 4	4,20±0,96 (4)	3,62±1,31 (4)	<b>0,045*</b>	4,04±1,13 (4)	4,18±0,84 (4)	<b>0,977</b>	4,25±0,98(4,5)	4,04±1,01 (4)	<b>0,353</b>
ITAS 5	3,56±1,17 (4)	3,20±1,06 (3)	<b>0,116</b>	3,27±1,16 (3)	4,06±0,93 (4)	<b>0,001**</b>	4,04±1,04 (4)	3,35±1,14 (4)	<b>0,006**</b>
ITAS 6	3,55±1,54 (4)	3,41±1,55 (3,5)	<b>0,773</b>	3,61±1,55 (4)	3,30±1,51 (4)	<b>0,289</b>	3,37±1,43 (4)	3,56±1,57 (4)	<b>0,416</b>
ITAS 7	3,26±0,98 (3)	3,25±0,85 (3)	<b>0,957</b>	3,30±0,99 (3)	3,15±0,83 (3)	<b>0,387</b>	3,54±0,83 (3)	3,18±0,97 (3)	<b>0,128</b>
ITAS 8	3,78±0,85 (4)	3,54±0,88 (4)	<b>0,333</b>	3,63±0,90 (4)	4,0±0,66 (4)	<b>0,005*</b>	4,16±0,70 (4)	3,63±0,86 (4)	<b>0,006**</b>
ITAS 9	2,89±1,13 (3)	3,29±1,04 (3)	<b>0,114</b>	2,88±1,15 (3)	3,21±1,02 (3)	<b>0,174</b>	3,29±1,19 (3)	2,89±1,09 (3)	<b>0,130</b>
ITAS 10	3,09±1,19 (3)	3,37±1,31 (3,5)	<b>0,319</b>	3,10±1,27 (3)	3,27±1,06 (4)	<b>0,424</b>	3,41±1,17 (4)	3,08±1,22 (3)	<b>0,208</b>
ITAS 11	3,02±1,14 (3)	2,87±1,11 (3)	<b>0,423</b>	2,91±1,20 (3)	3,18±0,95 (3)	<b>0,345</b>	3,08±1,17 (3)	2,96±1,13 (3)	<b>0,707</b>
ITAS 12	3,61±1,20 (4)	2,95±1,18 (3)	<b>0,019*</b>	3,43±1,27 (3)	3,60±1,08 (4)	<b>0,571</b>	3,5±1,10 (3,5)	3,47±1,26 (3)	<b>0,959</b>
ITAS 13	2,54±1,45 (2)	2,45±1,17 (2)	<b>0,959</b>	2,30±1,32 (2)	3,12±1,43 (3)	<b>0,005**</b>	3,16±1,55 (4)	2,36±1,32 (2)	<b>0,028*</b>
ITAS 14	2,57±1,32 (2)	3,21±1,31(3)	<b>0,040*</b>	2,68±1,37 (2,5)	2,75±1,27 (3)	<b>0,736</b>	2,66±1,27 (3)	2,71±1,36 (2)	<b>0,924</b>
ITAS 15	3,70±1,24 (4)	3,45±1,321 (4)	<b>0,389</b>	3,69±1,32 (4)	3,54±1,06 (4)	<b>0,299</b>	3,95±1,04 (4)	3,57±1,30 (4)	<b>0,266</b>
ITAS 16	3,07±1,34 (3)	3,08±1,38 (3)	<b>0,965</b>	3,03±1,42 (3)	3,18±1,13 (3)	<b>0,638</b>	3,20±1,38 (3)	3,04±1,34 (3)	<b>0,595</b>
ITAS 17	4,08±0,84 (4)	3,67±0,86 (4)	<b>0,038*</b>	3,90±0,84 (4)	4,24±0,86 (4)	<b>0,033*</b>	4,37±0,71(4,5)	3,90±0,87 (4)	<b>0,017*</b>
ITAS 18	4,16±1,07 (5)	3,45±1,21 (3,5)	<b>0,005**</b>	3,96±1,21 (4)	4,18±0,91 (4)	<b>0,662</b>	4,37±0,87 (5)	3,93±1,18 (4)	<b>0,126</b>
ITAS 19	2,92±0,77 (3)	3,0±0,65 (3)	<b>0,990</b>	2,93±0,76 (3)	2,96±0,72 (3)	<b>0,755</b>	2,79±0,88 (3)	2,97±0,71 (3)	<b>0,184</b>
ITAS 20	3,77±1,07 (4)	3,58±1,01 (4)	<b>0,295</b>	3,72±1,12 (4)	3,78±0,96 (4)	<b>0,834</b>	3,87±1,03 (4)	3,75±1,07 (4)	<b>0,486</b>

Used Mann-Whitney U test.

\*p&lt;0.05

\*\*p&lt;0.01

significant differences between other treatment types were observed. Also significant differences between different routes of treatment were observed in terms of the responses to the statement "My family members and friends take better care of me because of insulin therapy" ( $p < 0.01$ ). Pairwise comparisons revealed significantly higher positive response rates to this statement in those receiving diet + oral anti-diabetics + insulin ( $p=0.002$ ,  $p<0.01$ ) as compared to other routes of treatment. The difference between other routes of treatment was not statistically significant.

A highly significant inverse correlation of 30.9% between the significance of adjusting blood glucose and responses to the statement "Insulin therapy places restrictions on daily life" was found ( $r:-0.309$ ;  $p < 0.01$ ); also, a statistically significant and negative correlation of 21.2% was found for the responses to the statement "Doing timely insulin injections every day is a difficult task" ( $r:-0.212$ ;  $p < 0.05$ ). On the other hand, a significant positive correlation of 22.1% was found between the significance of adjusting blood glucose and responses to the statement "Insulin therapy makes me more dependent on my doctor" ( $r=0.221$ ;  $p < 0.05$ ).

A negative highly significant correlation of 24.4% between the level of difficulty experienced in blood glucose regulation and responses to the statement "Insulin therapy helps prevent other complications of diabetes" was found ( $r:-0.244$ ;  $p < 0.01$ ), while a negative correlation of 18.8% was found with the responses to the statement "Adjustment of insulin injections requires a lot of time and energy" ( $r:-0.188$ ;  $p < 0.05$ ). Again, a negative correlation of 22.5% was found with the response to the statement "Insulin therapy increases my energy level" ( $r:-0.225$ ;  $p < 0.05$ ).

Significantly higher positive responses were given to the statements "Insulin therapy places restrictions on daily life" and "Insulin therapy helps achieve a better health status" among those without complications as compared to those with complications ( $p=0.044$  and  $p=0.004$ , respectively). There was a significant positive correlation of 17.6% between the total PAID total score and the statement "Insulin therapy places restrictions on daily life" ( $r:0.76$ ;  $p < 0.05$ ), while a positive significant correlation of 18.7% was found with the responses to the statement "Insulin therapy increases the risk of experiencing hypoglycemia" ( $r:0.187$ ;  $p < 0.05$ ). Again, a positive and highly significant correlation of 37.8% was found with the responses to the statement "Self injections of insulin are embarrassing" ( $r:0.378$ ;  $p < 0.01$ ) (Table 5).

The state anxiety scale scores showed a significant positive correlation of 20.2% to the statement "Self injections of insulin are embarrassing" ( $r:0.202$ ;  $p < 0.05$ ). Again, there was a significant positive correlation of 18.6% between the trait anxiety scale scores and the statement "Self injections of insulin are embarrassing" ( $r:0.186$ ;  $p < 0.01$ ) (Table 5).

## 5. Discussion

Previous studies have suggested a high rate of avoidance or rejection of insulin therapy among diabetic patients.

For instance, 27% of the patients in the UKPDS (United Kingdom Prospective Diabetes Study) were reported to reject insulin therapy initially (UKPDS, 1999), while in the study by Polonsky et al. 28% of the patients reported that they would not use prescribed insulin (Polonsky et al., 2005), and in the DAWN study more than half of the diabetic patients (nearly 53%) currently receiving no insulin reported a high level of anxiety when asked about initiating insulin therapy (UKPDS, 1999).

In our study, insulin therapy was prescribed by a physician to 38.3% of the patients, while no such prescriptions were given in 61.7%. Also, 87% of the patients in whom insulin was prescribed received the prescribed treatment. On the other hand, more than half of the patients (approximately 60%) currently not receiving insulin reported that they would not use insulin if prescribed. The contrast between the proportion of patients using the prescribed insulin and the proportion of patients who stated that they would reject the therapy is striking. Although this observation is an indication for the high level of negative attitudes and anxiety associated with insulin use, it also suggests that patients may have more positive attitudes to insulin therapy when adequate information and explanation are provided by their physicians. Our results are highly in agreement with the published data. However, the previously reported association between the level of expertise of the physician and their ability to convince their patients for insulin use (Skovlund et al., 2007). In our study, a high acceptance rate of 87% for the prescribed therapy suggests that a great majority of the patients were satisfied with their physicians.

In a study by Polonosky et al., patients regarded initiation of insulin therapy as a personal failure. Nearly 48% of the patients without previous insulin use reported that initiation of insulin was their own failure, and they perceived insulin treatment as a penalty for inadequate exercise and diet (Polonosky et al., 2005). The corresponding figure reported by Larkin et al. (20) was 49%, and it was 50% in the DAWN study, while it was much higher, i.e. 89%, in our study. On the other hand, based on BMI measurements 42% of our patients were obese, and another 42% were overweight. Although diet was recommended by physicians to almost all patients, these BMI values suggests that patients largely failed to follow a diet, which might have resulted in feelings of guilt in a significant proportion of participants. Another very important reported factor in terms of the patients' perception of insulin as a punishment was the use of insulin as a threat by the physicians. However, since physicians' attitudes toward patients was not investigated in the current study, we are unable to clearly elucidate the causes of this high, i.e. 87%, rate.

Literature data suggested that patients were less scared of insulin injections than expected, with low rates of injection phobia, while concerns regarding the administration of the injections were more prominent. According to Larkin et al.'s study, 37% of the patients expected that the injection would cause pain, and 40% reported that they were afraid that they could not administer the injections (Larkin et al., 2008). In the study by Polonosky et al. 34% of the patients reported

**Table 4:** ITAS assessment according to depression treatment status

ITAS; Ave±SD (Median)	Treatment of Depression in the			Getting Depression Treatment		
	Past		p	Now		p
	Yes	No		Yes	No	
ITAS 1	4,13±0,93 (4)	4,08±10,98(4)	<b>0,854</b>	4,23±0,85 (4)	4,04±1,01 (4)	<b>0,142</b>
ITAS 2	4,07±1,07 (4)	4,12±1,13 (5)	<b>0,620</b>	3,97±1,08 (4)	4,16±1,12 (5)	<b>0,751</b>
ITAS 3	3,89±0,72 (4)	3,86±0,83 (4)	<b>0,916</b>	3,94±0,60 (4)	3,84±0,86 (4)	<b>0,663</b>
ITAS 4	4,10±1,03 (4)	4,07±1,08 (4)	<b>0,917</b>	3,85±1,07 (4)	4,17±1,04 (4)	<b>0,508</b>
ITAS 5	3,55±1,20 (4)	3,46±1,14 (4)	<b>0,648</b>	3,23±10,15(3)	3,60±1,14 (4)	<b>0,650</b>
ITAS 6	3,47±1,58 (4)	3,55±1,53 (4)	<b>0,806</b>	3,47±1,44 (4)	3,55±1,59 (4)	<b>0,246</b>
ITAS 7	3,15±0,91 (3)	3,30±0,97 (3)	<b>0,428</b>	3,11±1,06 (3)	3,31±0,90 (3)	<b>0,836</b>
ITAS 8	3,89±0,83 (4)	3,67±0,86 (4)	<b>0,195</b>	3,82±0,71 (4)	3,70±0,91 (4)	<b>0,519</b>
ITAS 9	3,0±1,13 (3)	2,96±1,12 (3)	<b>0,920</b>	3,02±1,08 (3)	2,95±1,14 (3)	<b>0,046*</b>
ITAS 10	3,13±1,31 (3)	3,16±1,17 (3)	<b>0,902</b>	3,17±1,29 (3)	3,14±1,19 (3)	<b>0,213</b>
ITAS 11	3,13±1,18(3,5)	2,92±1,11 (3)	<b>0,331</b>	3,08±0,90 (3)	2,95±1,22 (3)	<b>0,806</b>
ITAS 12	3,44±1,26 (3)	3,49±1,21 (3)	<b>0,869</b>	3,5±1,16 (3)	3,47±1,25 (3)	<b>0,492</b>
ITAS 13	2,60±1,49 (2)	2,49±1,36 (2)	<b>0,854</b>	2,61±1,30 (2)	2,49±1,44 (2)	<b>0,154</b>
ITAS 14	2,57±1,36 (2)	2,76±1,33 (3)	<b>0,460</b>	2,91±1,40 (3)	2,62±1,32 (2)	<b>0,258</b>
ITAS 15	3,73±1,24 (4)	3,61±1,27 (4)	<b>0,632</b>	3,70±1,26 (4)	3,63±1,26 (4)	<b>0,850</b>
ITAS 16	3,21±1,39 (3)	3,01±1,32 (3)	<b>0,454</b>	3,17±1,42 (4)	3,03±1,39 (3)	<b>0,457</b>
ITAS 17	4,02±0,97 (4)	3,98±0,81 (4)	<b>0,521</b>	3,94±0,95 (4)	4,02±0,83 (4)	<b>0,857</b>
ITAS 18	4,07±1,23 (5)	4,0±1,09 (4)	<b>0,453</b>	3,88±1,22 (4)	4,08±1,10 (4)	<b>0,746</b>
ITAS 19	3,10±0,83 (3)	2,86±0,70 (3)	<b>0,083</b>	3,08±0,79 (3)	2,88±10,73 (3)	<b>0,573</b>
ITAS 20	3,86±0,96 (4)	3,67±1,10 (4)	<b>0,449</b>	3,94±0,85 (4)	3,65±1,12 (4)	<b>0,391</b>

Used Mann-Whitney U test.

\*p&lt;0.05

\*\*p&lt;0.01

**Table 5:** Relationship PAID, SAI subscale scores, TAI subscale scores to ITAS

ITAS	DISA		DKO		SKO	
	r	p	r	p	r	p
ITAS 1	-0,075	<b>0,707</b>	-0,087	<b>0,346</b>	0,018	<b>0,843</b>
ITAS 2	0,087	<b>0,343</b>	-0,005	<b>0,955</b>	-0,033	<b>0,718</b>
ITAS 3	-0,045	<b>0,627</b>	0,067	<b>0,466</b>	0,084	<b>0,359</b>
ITAS 4	0,001	<b>0,321</b>	0,007	<b>0,941</b>	-0,131	<b>0,154</b>
ITAS 5	0,176	<b>0,050*</b>	-0,170	<b>0,857</b>	-0,136	<b>0,137</b>
ITAS 6	0,014	<b>0,879</b>	0,012	<b>0,898</b>	0,067	<b>0,468</b>
ITAS 7	0,187	<b>0,041*</b>	-0,007	<b>0,936</b>	0,051	<b>0,579</b>
ITAS 8	-0,001	<b>0,994</b>	0,147	<b>0,108</b>	0,264	<b>0,004**</b>
ITAS 9	0,144	<b>0,117</b>	0,183	<b>0,045*</b>	0,097	<b>0,292</b>
ITAS 10	-0,051	<b>0,581</b>	0,165	<b>0,071</b>	0,040	<b>0,666</b>
ITAS 11	0,039	<b>0,668</b>	0,077	<b>0,402</b>	-0,001	<b>0,989</b>
ITAS 12	0,119	<b>0,196</b>	0,009	<b>0,927</b>	0,007	<b>0,943</b>
ITAS 13	0,378	<b>0,001**</b>	0,202	<b>0,027*</b>	0,186	<b>0,041*</b>
ITAS 14	0,078	<b>0,398</b>	0,056	<b>0,541</b>	0,163	<b>0,075</b>
ITAS 15	-0,119	<b>0,195</b>	-0,085	<b>0,356</b>	-0,147	<b>0,108</b>
ITAS 16	0,110	<b>0,232</b>	0,020	<b>0,830</b>	0,078	<b>0,399</b>
ITAS 17	-0,210	<b>0,819</b>	0,233	<b>0,011*</b>	0,266	<b>0,003**</b>
ITAS 18	0,015	<b>0,875</b>	-0,144	<b>0,116</b>	-0,125	<b>0,174</b>
ITAS 19	0,132	<b>0,150</b>	-0,056	<b>0,541</b>	-0,103	<b>0,263</b>
ITAS 20	0,127	<b>0,165</b>	0,042	<b>0,650</b>	0,075	<b>0,414</b>

r: Spearman's rho

correlation coefficient

used Mann-Whitney U test.

\*p&lt;0.05

\*\*p&lt;0.01

that the injections were painful, and another 44% were afraid that they would not be able to adjust insulin doses, hold insulin needles and vials, and administer insulin at specified time points (Polonsky & Jackson, 2004).

In our study, almost 60% of the patients reported that they were afraid of self-injections of insulin, although only 31% reported that insulin injections are painful, 18% reported that they were undecided, and 51% did not regard injections as painful. Additionally, nearly 50% stated that doing timely injections with accurate doses of insulin is a challenging task. These results suggest that in line with previous reports, a high proportion of patients showed avoidance behavior toward insulin injections, while this was mainly related to concerns regarding the administration and self-confidence issues.

Also, a higher rate of injection fear was reported among women than men (Bogatean & Hancu, 2004), which was echoed in our sociodemographic findings showing that female patients were more scared of self-injections and were more likely to consider injection dose adjustments as a challenging task.

Furthermore, increasing age was associated with increasing concerns regarding the use of insulin injections in our study. Also, unmarried patients (single or widowed) experienced a higher level of anxiety from injections than married patients. These two latter findings suggest that elderly and unmarried individuals may suffer from lower levels of self-adequacy.

Studies have suggested that on average 40% of the diabetic patients considered insulin therapy as a form of treatment used for more severe disease. It has also been found that patients may not be aware of the fact that diabetes may not always be managed with exercise, diet, or oral-antidiabetics (Davis & Renda, 2006; Larkin et al., 2008). In this regard, the figures observed in our study were much higher than those previously reported. Eighty percent of our patients thought that receiving insulin therapy was a sign of worsening diabetes. Additionally, nearly 45% believed that insulin use was a sign of worsening health condition in the future, while 34% were undecided, and only 20% did not agree with this statement.

Even a very significant proportion of the patients including those on oral antidiabetics, i.e. 75%, reported that initiation of insulin therapy would make family members unhappy and would increase the extent of attention given to the patient. Thus, these results demonstrate that majority of diabetic patients in our study did not know or denied that diabetes is a progressive disease that can necessitate the use of insulin in the future. Also, this result is consistent with the belief that the disease progression is mostly their fault.

Also, patients receiving treatment with oral antidiabetics only were more likely to associated insulin use with advanced diabetes than those who were receiving insulin, again corroborating the above findings.

In previous studies, diabetics were found to have beliefs that insulin may undermine the self-control over life. For instance, 44.8% and 61% of the patients were reported to hold these type of beliefs in the studies by Polonsky et

al. (Polonsky & Jackson, 2004) and Larkin et al. (Larkin et al., 2008), respectively. Again the figure observed in the current study, i.e. 58.4%, is consistent with the published data. Of note, only 20% of the patients reported that insulin would not place any restrictions on their daily life, while another 20% were undecided about such an effect. More specifically, 42.5% of our participants believed that insulin use would lead to cessation of leisure activities, 41.5% believed that insulin therapy would hamper daily activities at home and work. Furthermore, 70% of the patients believed that initiation of insulin therapy would lead to higher dependence to their doctors, which may be associated with the belief that insulin would place restrictions on daily life.

Also, patients with higher education levels were found to hold firmer beliefs that insulin therapy would place restrictions on their life as compared to those with lower education. It may be assumed that these individuals with higher education may have deeper concerns regarding the use of insulin in workplace or other public environments.

On the other hand, patients with a diabetes history of less than 2 years were more likely to regard insulin therapy as a restrictive factor than those with a longer diabetes history, suggesting a relative lack of knowledge on insulin therapy.

Again, patients with no diabetes-related complications were more likely to believe that insulin therapy would restrict their life as compare to those with complications. It is likely that concerns regarding daily life restrictions may have been overshadowed by the necessity of more intense insulin use in this group of individuals.

Also, another reported finding in previous studies was the fact that patients did not believe in effectiveness of insulin therapy (Polonsky & Jackson, 2004). In the DAWN study, only a small portion of the patients (approx. 20%) thought that insulin represented a good therapeutic agent (Diabetes Attitudes, Wishes and Needs Study, 2002), while in others more dramatic figures such as < 10% were reported (Skovlund 2004). In contrast, of our participants almost 65% reported that insulin could help them achieve a better health status, 70% believed that insulin may help prevent other complications of diabetes, and approximately 70% thought that it would be easier to regulate blood glucose when insulin is used. Particularly, patients with diabetes-related complications were more likely to think that insulin could help them achieve a better health status. Also, patients who were employed or who had higher education levels were more likely to consider insulin as a positive factor in terms of health condition than those with a lower education level or those who were unemployed.

On the other hand, 24% and 27% of the patients were undecided regarding the ability of insulin to regulate blood glucose or to achieve a better health status. These two figures, apparently inconsistent with the literature data, may be explained on the basis of two factors: firstly, a very high rate of physician satisfaction and confidence (almost 100%) was reported among our participants, and secondly, the belief hold by majority of the patients that insulin would be required as a last resort only when the

disease is far advanced.

Previous reports have suggested that social stigmatization represents an important cause of psychogenic resistance toward initiation of insulin therapy, and patients were reluctant to perform insulin injections when accompanied by others. For instance, in a study involving diabetic patients 25% of the individuals reported that they were embarrassed from insulin injections, and 45% believed that others would consider them as "sick" if they performed injections (Larkin et al., 2008). In our study, 80% of the subjects believed that others would label them as "sick", and 30% reported embarrassment with insulin injections. Also, patients with higher scores in state and trait anxiety scales were more likely to be embarrassed by insulin injections. Therefore, it can be concluded that the majority of our participants were embarrassed from administering insulin injections in the presence of others and that injections would label them as "severely ill". Also, males were more likely to feel embarrassment than females, which may be related with masculine values attributed to men. On the other hand, embarrassment were more prevalent among those with higher education level and those who were employed. The latter observation is not surprising, when one considers the more active roles played by these individuals in social life.

Patients in other studies were also reported to think that insulin use could lead to other problems, a major one of which is hypoglycemia (Diabetes Attitudes, Wishes and Needs, 2002; Korytkowski, 2002; Larkin et al., 2008).

In our study, nearly 30% of the individuals thought that insulin could lead to severe hypoglycemia, while 55% responded as "I don't know" to this question, suggesting a lack of knowledge on this issue. Again, when patients were asked on the association between weight and insulin, more than 50% responded as "I don't know", again indicative of low level of knowledge.

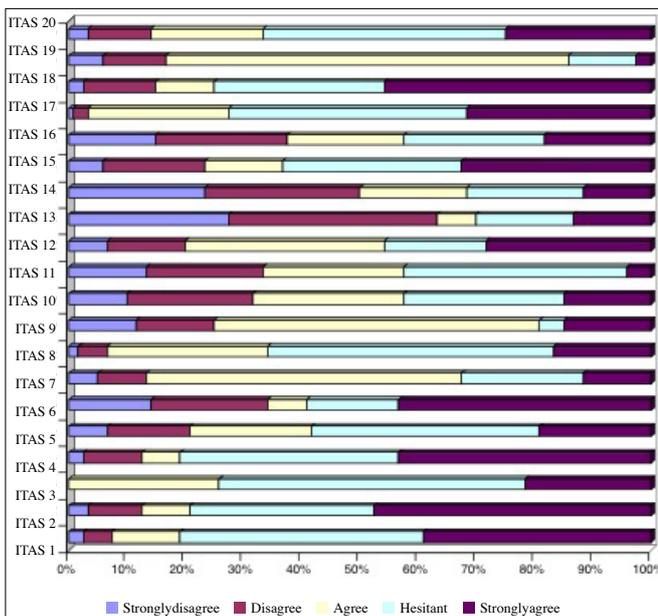


Figure 1: ITAS scale scores distribution

In conclusion, it has been found that patients exhibit psychogenic resistance toward initiation of insulin therapy as a result of a variety of negative perceptions and attitudes and that the cognitive interventions targeting the identified perceptions and attitudes may decrease the level of psychogenic resistance, ultimately leading to better glycemic control.

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