Original Article

Validity and Reliability of the Turkish Version of Insulin Treatment Appraisal Scale for Type 2 Diabetes Patients

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Abstract

Background: The reason is that negative perceptions of insulin use cause patients to show resistance to starting insulin treatment. Evaluation of diabetes patients' perceptions is thought to allow planning effective attempts to develop self-management and behavioral changes in these patients.
Objective: The purpose is to evaluate the validity and reliability of the Turkish version of the Insulin Treatment Appraisal Scale.
Method: This study is a methodological study. The research sample included a total of 367 patients who received treatment for type 2 diabetes in one university hospital and one private hospital in Turkey between October 2015 and July 2016. The research data were collected with an Introductory Information Form and with the Insulin Treatment Appraisal Scale – Turkish Version *(*ITAS^{Tr}). For the analysis of the data, Kendall's coefficient of concordance, factor analysis, Cronbach alpha coefficient, Pearson correlation analysis and student t test were used.
Results: For the language validity of the scale, the translation-retranslation method was used. As for the content validity, the field experts reached consensus (KW = .114, p = .305). For ITAS^{Tr}, the item-total score correlation coefficients ranged between .40 and .82. For the whole scale, the Cronbach alpha coefficient was calculated as .80, and the coefficients for the sub-dimensions were calculated as .83 and .64.
Conclusion: Based on the results, ITAS^{Tr} was found to be a valid and reliable tool that can be used to measure insulin-using and non-insulin-using type 2 diabetes individuals' negative and positive perceptions of insulin treatment.

Key Words: Insulin resistance, Type 2 diabetes mellitus, validity, reliability.

Introduction

Prevalence of diabetes has gradually increased in Turkey. In Turkish Diabetes Epidemiology Study II (TURDEP II), the prevalence of diabetes in the Turkish adult population was found to increase from 7.7% to 13.7% in 10 years (Satman et al., 2013). In Turkey, approximately 163 people die because of diabetes-related causes each day. This is approximately equal to 59,786 adult deaths per year (Turkiye Diyabet Cemiyeti, 2013). As are the biggest problem experienced by those with type 2 diabetes, the disease exposes these patients to deterioration of glycemic control and other related complications. In order to reach the glycemic targets aimed for type 2 diabetes patients, the primarily suggested treatment options included physical activity, diet and oral hypoglycemic agents (American Diabetes Association [ADA], 2017). However, in the event of failure to achieve the glycemic goals, starting insulin treatment is suggested (ADA, 2017).

Almost half of type 2 diabetes patients who do not respond to oral hypoglycemic agents start insulin treatment after five years on average (Rubino, McQuay, Gough, Kvasz, Tennis, 2007).

It is pointed out that diabetes individuals who fail to respond to insulin treatment suffer from bad glycemic control as well as from increased the complications of diabetes (Delahanty, 2007).

It is also reported that among the diabetes patients throughout the world, 40% of type 2 diabetes patients need insulin treatment (Centers for Disease Control and Prevention [CDC], 2015). Accordingly, around half diabetes patients in the world are thought to receive insulin treatment. However, it is claimed that patients do not start insulin treatment as early as required and that they do not take sufficient amount of insulin considering the glycemic values determined for them (Brod, Kongso, Lessard, Christensen, 2009).

Starting insulin treatment is one of the most important and difficult choices that diabetes patients are supposed to make. The reason is that negative perceptions of insulin use cause patients to show resistance to starting insulin treatment (Brod, Kongso, Lessard, Christensen, 2009; Bahrmann et al., 2014; Peyrot, Rubin, Khunti, 2010; Polonsky, Fisher, Guzman, Villa-Cabalero, Edelman, 2005).

The factors leading to the development of insulin resistance in diabetes patients (PIR-psychological insulin resistance) include feeling loss of control, believing that the illness worsens, having the feeling of failure, experiencing injection anxiety, perceiving insulin treatment to be ineffective, worrying about gaining weight, being concerned about hypoglycemia (Petrak, Herpertz, Stridde, Pfutzner, 2013), failing to manage insulin treatment, lacking confidence, worrying about family and social pressure, and worrying about exposure to obstacles involving colleagues and friends (Brod, Kongso, Lessard, Christensen, 2009; Peyrot, Rubin, Khunti, 2010; Fu, Wong, Chin, Luk, 2016).

In literature, it is pointed out that it is necessary to evaluate type 2 diabetes individuals' negative and positive perceptions of insulin treatment before they start the treatment.[7] Evaluation of diabetes patients' perceptions is thought to allow planning effective attempts to develop self-management and behavioral changes in these patients (Brod, Kongso, Lessard, Christensen, 2009; Peyrot, Rubin, Khunti, 2010).

Moreover, it is seen in related literature that the Insulin Treatment Appraisal Scale (ITAS) is suggested as a tool to evaluate diabetes individuals' perceptions of insulin treatment (Peyrot, Rubin, Khunti, 2010). Many studies revealed that ITAS is a valid and reliable scale for the evaluation of 'insulin-using and non-insulin-using' type 2 diabetes individuals' perceptions of insulin treatment (Lee, 2016; Holmes-Truscott, Pouwer, Speight, 2014; Snoek, Skovlund, Pouwer, 2007).

The scale is used to investigate non-insulin-using individuals' expectations regarding insulin use. In addition, the scale is also used to examine insulin-using individuals' experiences regarding insulin use (Snoek, Skovlund, Pouwer, 2007). In our country, there is no such tool or scale that can be used to evaluate diabetes patients' perceptions of insulin treatment. In this study the ITAS scale will be assessed whether the tool is appropriate for Turkish culture. In addition, nurses can used this scale to evaluate diabetes patients' perceptions of insulin treatment.

The purpose of the present study was to adapt the Insulin Treatment Appraisal Scale (ITAS) into Turkish language and culture by conducting the validity and reliability studies of the adapted version.

Method

Research Type

This study was methodological.

Setting and Sample

Figure 1 presents the research type and its place and time. The study was conducted in the Diabetes Training Center and Endocrine-Metabolism Center of a University Hospital and in Diabetes Training and Follow-up Center of a private hospital in Turkey between October 2015 and July 2016. The individuals with diabetes who applied to the Diabetes Training Centers were those newly diagnosed as diabetes, those who started to receive insulin treatment and those whose monitoring was in progress. The diabetes individuals visiting these centers were registered patients who were expected to have their medical examinations done once in every three months. In these centers, individuals with diabetes are provided with individual and group trainings as well as with counseling services. Also, diabetes nurses with a certificate in diabetes nursing work in these centers. The Endocrine and Metabolism Center is a 25-bed center where hospitalized patients with diabetes (Type 1, type 2 and

gestational diabetes) and those with other endocrine diseases receive related treatment.

Research Sample

The research sample included 367 patients receiving treatment for type 2 diabetes. Among these patients, 172 of them used insulin, and 195 of them received the treatments of physical activity, diet and/or oral hypoglycemic agents. Figure 1 presents the criteria for including the patients in the research sample (Lee, 2016; Holmes-Truscott, Pouwer, Speight, 2014; Snoek, Skovlund, Pouwer, 2007; Hermanns, Mahr, Kulzer, Skovlund, Haak, 2010).

In literature, there are different criteria and approaches regarding the sample size necessary to conduct multivariate analyses such as factor analysis for the reliability and validity of a scale. Researchers provide a ratio for sample size considering the number of items in a scale. Based on these approaches, while some point out that the sample size should be five-fold of the number of items (Akgul, 2005; Eser E, Baydur, 2007; Sencan, 2005). There are some others claiming that the sample size should be at least eight-fold of the total number of items (Sumer, 2000). For this reason, the study group was determined with the convenience sampling approach among the research universe, and eventually, 367 volunteering patients were included in the study. In line with this information in related literature, the sample size could be said to be appropriate since each group in the sample size was higher than eight-fold of the number of items in the scale (172 insulin-using patients and 195 non-insulin-using patients).

Data Collection Tools

In the study, two data collection tools were used.

Introductory Information Form: The introductory information form was developed by the researchers in line with the related literature. The form included questions regarding socio-demographic information (gender, age, marital status and so on) and diabetes (year of diabetes, type of treatment received for diabetes and so on) (Lee, 2016; Holmes-Truscott,Pouwer, Speight, 2014; Snoek, Skovlund, Pouwer, 2007; Hermanns, Mahr, Kulzer, Skovlund, Haak, 2010). By filling out this form, the patients provided information about such socio-demographic backgrounds as gender, age, marital status, employment, financial income, educational background and living alone or with family. The information about the patients' diabetes was obtained via their medical records in relation to year of diabetes, type of treatment received for diabetes, existence of other chronic diseases, diabetes-related complications (renal, ophthalmic, cardiovascular, neurological and peripheral vascular system), body mass index and A1C .The A1C values of the patients were measured in the last three months and obtained from the medical records of the patients.

Insulin Treatment Appraisal Scale: The scale was developed by Snoek, Skovlund and Pouwer in 2007 to evaluate insulin treatments of individuals with type 2 diabetes (Snoek, Skovlund, Pouwer, 2007). In addition, the scale is also used to investigate the obstacles perceived in relation to insulin treatment and to monitor the changes perceived over time. The scale includes such headings as *"feeling oneself ill, being over-dependent, a high risk of hypoglycemia, painful injection, limited daily life, protection from complications and feeling oneself energetic"* (Snoek, Skovlund, Pouwer, 2007). The scale was made up of 20 items under two sub-dimensions. The scale included Likert-type five-point items receiving the lowest point for "I Completely Disagree" and the highest point for "I Completely Agree". Of all the items in the scale, four of them *(Item Numbers: 3, 8, 17 and 19)* measured positive attitudes, while 16 of them *(Item Numbers: 1, 2, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 18 and 20)* measured negative attitudes. The sum of the four items with positive statements (ranging between 4 and 20) constituted the positive appraisal sub-dimension, while the sum of the 16 items with negative statements (ranging between 16 and 80) constituted the negative appraisal sub-dimension. As for the sum of all the items (20 items), it gives the total score (ranging between 20 and 100). A high positive appraisal score refers to a high positive appraisal of insulin, while a high total score and a high negative appraisal score mean a negative perception of insulin use (Snoek, Skovlund, Pouwer, 2007). The total score of the scale is calculated via the sum of the four positive statement items reversed and the other 16 negative statement items. In the reliability and validity study of the scale, the total internal consistency reliability coefficients (Cronbach alpha) were calculated as .89 for the whole scale, as .68 for the positive appraisal sub-dimension and as .90 for the negative appraisal sub-dimension. In the scale, the total item score

correlation coefficients ranged between .34 and .53 for the positive appraisal sub-dimension and between .46 and .74 for the negative appraisal sub-dimension (Snoek, Skovlund, Pouwer, 2007). Although initial examination of ITAS revealed a two-factor structure (positive and negative sub-dimensions) and a low level of single-factor item associations, the developers of the scale suggested using the total score (Holmes-Truscott,Pouwer, Speight, 2014). The cut-off score of the scale was not provided (Snoek, Skovlund, Pouwer, 2007). For the adaptation of the scale to the Turkish society, the consents of the developers of the scale were taken.

Data Collection

The research data were collected by other nurses who did not take part in the study. First, these nurses were informed about the research purpose, sampling criteria, research process and contents of the data collection tools. Following this, a pilot application was conducted with five patients under the guidance of the nurses. In the study, it took the participants four minutes to respond to the Introductory Information Form and the scale.

Research Ethics

Permission was received from the Ethics Committee of the Faculty of Medicine, Dicle University, Turkey (Date 06 12 2015, number: 292). In order to conduct the study, the institutions where the study was conducted, the developers of the measurement tool and the patients were asked for their consents (Figure 1).

Data Analysis

The research data was analyzed using statistical analysis package softwares: SPSS-21 (Chicago, USA). The patients' socio-demographic and clinical backgrounds were examined using mean scores, numbers and percentages. For language validity, the translation-retranslation method was used, and for content validity, expert views were examined with Kendall's coefficient of concordance. As for the construct validity of the scale, exploratory factor analyse was conducted, and for the known-group validity, numbers, percentages, mean scores, student t test in independent groups and effect sizes were used. Effect sizes are reported using Cohen's d. Statistical tests are two-sided with differences accepted at the significant level of $p < 0.05$. For the reliability, descriptive statistics, Cronbach alpha internal consistency reliability coefficient and Pearson product-moment correlation coefficient (point-bi-serial) were used (Figure 1).

Results

Language Validity

For language validity, the scale was translated from English to Turkish by two experts from the Department of Foreign Languages who were native speakers of Turkish and who knew both languages and cultures well. After the most appropriate statements were selected as a result of the translation, the scale was re-translated into English by two experts from the Department of Foreign Languages who had not seen the original English version of the scale and who knew the two languages and cultures well as native speakers of Turkish. Following this, the statements in the re-translated version were compared with those in the original version of the scale, and the necessary corrections were done in line with the experts' views.

Content Validity

Each item in the Turkish version of the scale which was found to have language validity was rated by four faculty members expert in the field of nursing, by three diabetes nurses and by three doctors by assigning scores ranging between 1 and 4 *(1 = inappropriate, 2 = the item needs to be made appropriate, 3 = appropriate but needs little changes, and 4 = very appropriate)*. When the expert views were examined with Kendall's coefficient of concordance, it was found that 10 expert views were statistically consistent with one another and that the experts reached consensus ($W = .114$, $p = .305$). Following the language validity and content validity, a pilot application was conducted with 16 patients with backgrounds similar to the research sample, and the scale was finalized. The pilot application data were not used in the study.

Backgrounds of the research sample

Descriptive Statistics Regarding ITAS^{Tr}

When the standard errors (SE) among the descriptive statistics were examined, it was seen that the inventory sub-dimension standard error means ranged between .10 and .48 and that the standard errors were lower than half of the means. When the standard deviations and the sub-dimension means were examined, it was found that the standard deviations were lower than the means (Table 2).

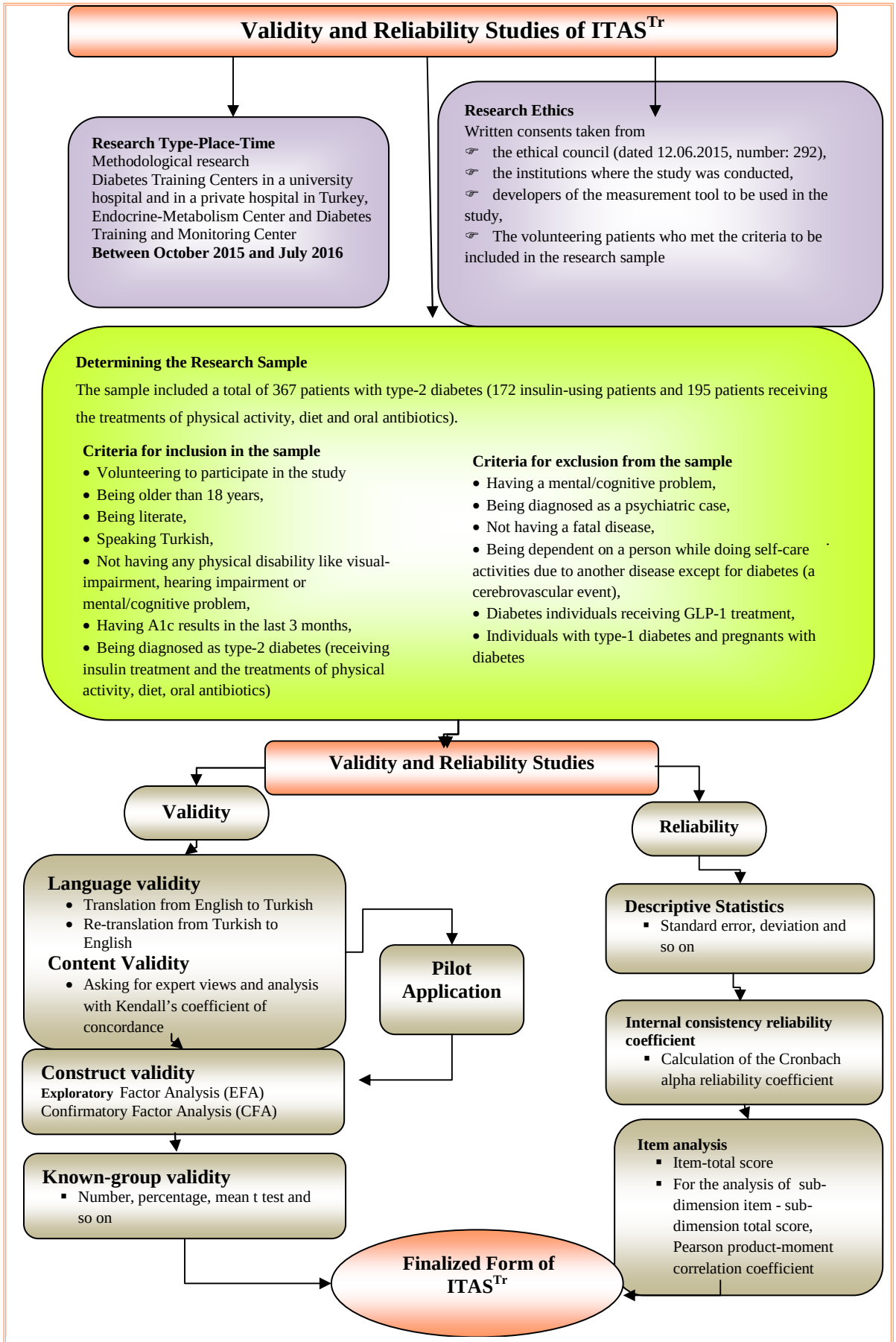

Figure 1. Research Method and Reliability and Validity Analyses of ITAS^{Tr}

[a]*ITAS; Insulin treatment appraisal scale,*[b]*GLP-1;* Glucagon-Like Peptide-,

Table 1. Socio-demographic and clinical backgrounds of type 2 diabetes individuals

	Total	Non-insulin users	Insulin users
N (%)	367 (100%)	195 (53.1%)	172 (46.9%)
Sex (Female)	189 (51.5%)	100 (51.3%)	89 (51.7%)
Age – years	52.97 ± 17.06	50.74 ± 17.42	55.51 ± 16.31
Married	298 (%81.2)	153 (78.5%)	145 (84.3%)
Employment status (working)	97 (26.4%)	61 (31.3%)	36 (20.9%)
Education			
Low	231 (%62.9)	108 (54.4%)	123 (71.5%)
Medium	103 (%28.1)	60 (30.8%)	43 (25.0%)
High	33 (%9)	27 (13.8%)	6 (3.5%)
Living alone	24 (6.5%)	12(6.2%)	12 (7.0%)
Diabetes duration – years	7.69 ± 6.00	5.52 ± 4.30	10.14 ± 6.68
Having diabetes complication	118 (32.2%)	44 (22.6%)	74 (43.0%)
Having another chronical disease	149 (40.6%)	64 (32.8%)	85 (49.4%)
BKI*	26.73 ± 4.83	26.47 ± 4.65	27.02 ± 5.02
HbA1c	8.94 ± 2.62	7.85 ± 1.88	10.19 ± 2.79

* Body Mass Index

Table 2. Examining the descriptive features of ITAS^{Tr} and its sub-dimensions

Sub-Dimensions of ITAS^{Tr}	Descriptive Statistics					
	Number of Items	Mean	Standard Deviation (SD)	Standard Error (SE)	Median	Minimum-Maximum
Positive	**4**	**9.18**	**2.08**	**0.10**	**8.0**	**5-19**
3		2.22	0.69	0.03	2.0	1-5
8		2.33	0.76	0.03	2.0	1-5
17		2.13	0.75	0.03	2.0	1-5
19		2.49	0.75	0.03	3.0	1-5
Negative	**16**	**47.49**	**8.48**	**0.44**	**44.0**	**25-73**
1		3.53	0.95	0.04	4.0	1-5
2		3.22	0.87	0.04	3.0	1-5
4		2.90	0.97	0.05	3.0	1-5
5		3.37	1.02	0.05	4.0	1-5
6		2.88	1.36	0.07	3.0	1-5
7		3.05	0.61	0.03	3.0	1-5
9		3.15	1.00	0.05	3.0	1-5
10		2.73	1.06	0.05	2.0	1-5
11		2.94	1.10	0.05	3.0	1-5
12		2.78	1.11	0.05	2.0	1-5
13		1.80	0.95	0.04	2.0	1-5
14		2.52	1.33	0.06	2.0	1-5
15		2.70	1.21	0.06	2.0	1-5
16		2.94	1.21	0.06	3.0	1-5
18		3.37	0.96	0.03	0.05	1-5
20		3.53	0.87	0.04	4.0	1-5
Total ITAS^{Tr}	**20**	**56.68**	**9.28**	**0.48**	**53.0**	**36-85**

Table 3. Item analyses for ITAS^{Tr}, Internal Consistency Reliability Coefficient, Factor Loadings (n: 367)

ITAS^{Tr}	**All patients**		**ITAS^{Tr}**	**Insulin users**		**Total**	**Non-insulin users**		**Toplam**	
Item Number	**Positive sub-dimension**	**Item Number**		**Positive sub-dimension Factor loading**	**Negative sub-dimension Factor loading**		**Positive sub-dimension Factor loading**	**Negative sub-dimension Factor loading**		r
3	0.479		0.206	0.681		0.096	0.425		0.338	0.40
8	0.526		0.227	0.712		0.171	0.445		0.296	0.53
17	0.396		0.159	0.697		0.256	0.272		0.338	0.62
19	0.478		0.407	0.685		0.446	0.399		0.457	0.58
1		0.796	0.010		0.803	0.018		0.080	0.003	0.73
2		0.678	0.245		0.704	0.226		0.302	0.259	0.72
4		0.653	0.636		0.694	0.698		0.577	0.563	0.63
5		0.499	0.477		0.523	0.563		0.422	0.387	0.51
6		0.662	0.367		0.680	0.417		0.279	0.308	0.55
7		0.747	0.177		0.640	0.267		0.088	0.073	0.60
9		0.680	0.147		0.668	0.115		0.220	0.193	0.58
10		0.685	0.629		0.712	0.703		0.503	0.552	0.76
11		0.508	0.508		0.555	0.584		0.468	0.446	0.54
12		0.605	0.284		0.661	0.235		0.344	0.327	0.67
13		0.447	0.451		0.510	0.500		0.376	0.392	0.55
14		0.725	0.564		0.703	0.551		0.495	0.572	0.76
15		0.746	0.656		0.735	0.665		0.590	0.642	0.82
16		0.602	0.607		0.579	0.633		0.554	0.577	0.71
18		0.601	0.379		0.699	0.326		0.420	0.435	0.40
20		0.504	0.106		0.476	0.67		0.214	0.168	0.67
Explained variance		40.11 %			% 41.77				40.15 %	
Total Cronbach Alpha:		0.80			0.81				0.80	
Subscale Cronbach's alphas:										
		0.64	0.83		0.64	0.85		0.60	0.81	

Table 4. Differences in ITAS^{Tr} scores depending on insulin use

		Insulin users		Non-Insulin users		
		M ± SD	*A/SA%*	*M ± SD*	*A/SA%*	*D*
1	Taking insulin means I have failed to manage my diabetes with diet and tablets	3.51 ± 1.03	66%	3.54 ± 0.88	53%	-0.03
2	Taking insulin means my diabetes has become much worse	3.27 ± 0.91	58%	3.18 ± 0.82	48%	0.10
3	Taking insulin helps to prevent complications of diabetes^	2.16 ± 0.71	*67%*	2.27 ± 0.67	*65%*	-0.15
4	Taking insulin means other people see me as a sicker person	3.04 ± 1.05	*24%*	2.78 ± 0.88*	*15%*	0.26
5	Taking insulin makes life less flexible	3.43 ± 1.06	*43%*	3.31 ± 1.00	*46%*	0.11
6	I'm afraid of injecting myself with a needle	3.02 ± 1.40	*36%*	2.75 ± 1.32	*30%*	0.19
7	Taking insulin increases the risk of low blood glucose levels (hypoglycaemia)	3.07 ± 0.66	*70%*	3.03 ± 0.57	*52%*	0.06
8	Taking insulin helps to improve my health^	2.32 ± 0.82	*68%*	2.33 ± 0.70	*73%*	-0.013
9	Insulin causes weight gain	3.08 ± 1.03	*48%*	3.21 ± 0.97	*61%*	-0.12
10	Managing insulin injections takes a lot of time and energy	2.80 ± 1.07	*30%*	2.68 ± 1.04	*21%*	0.11
11	Taking insulin means I have to give up activities I enjoy	2.91 ± 1.08	*34%*	2.96 ± 1.12	*35%*	-0.04
12	Taking insulin means my health will deteriorate	2.84± 1.07	*36%*	2.73 ± 1.15	*28%*	0.09
13	Taking insulin is embarrassing	1.85 ± 1.04	*12%*	1.76 ± 0.88	*8%*	0.09
14	Injecting insulin is painful	2.70 ± 1.34	*25%*	2.36 ± 1.30*	*17%*	0.25
15	It is difficult to inject the right amount of insulin correctly at the right time every day	2.80 ± 1.25	*26%*	2.61 ± 1.16	*17%*	0.15
16	Taking insulin makes it more difficult to fulfil my responsibilities (at work, at home)	3.02 ± 1.23	*34%*	2.87 ± 1.18	*31%*	0.12
17	Taking insulin helps to maintain good control of my blood glucose^	2.15 ±0.81	*8%*	2.11± 0.69	*5%*	0.05
18	Being on insulin causes family and friends to be more concerned about me	3.39 ± 1.00	*40%*	3.36 ± 0.92	*37%*	0.03
19	Taking insulin helps to improve my energy levels^	2.55 ± 0.89	*12%*	2.44 ± 0.78	*64%*	0.13
20	Taking insulin makes me more dependent on my doctor	3.43 ± 0.89	*45%*	3.62 ± 0.84*	*64%*	-0.12
Mean Total Negative items ITAS		31.84 ± 8.14		30.23 ± 7.15		0.210
Mean Total Pozitive items ITAS		9.20 ± 2.26		9.17 ± 1.93		0.014
Mean Total ITAS		41.05 ± 9.16		39.41 ± 8.26		0.188

M: mean; SD: standard deviation; A/SA: Agree/Strongly Agree; ^ positive ITAS items, *p < .05, Scoring: 1 = Strongly Disagree, 5 = Strongly Agree. Cohen's d: Effect size

Item Analyses – Internal Consistency Reliability Coefficient

The analysis revealed that the item-total score correlation coefficients ranged between 0.40 and 0.82, and for the whole scale, the Cronbach alpha value was calculated as 0.80, and the variance explained was measured as 40.11%. The coefficients calculated for the negative and positive sub-dimensions ranged between 0.83 and 0.64 ($\lambda_2 = 0.84$, $\lambda_2 = 0.64$, respectively). Regarding the insulin-using patients, the Cronbach alpha values were 0.81, $\lambda_2 = 0.84$ for the whole scale; $\alpha = 0.64$, $\lambda_2 = 0.64$ for the positive sub-dimension; and $\alpha = 0.64$, $\lambda_2 = 0.64$ for the negative sub-dimension. As for the non-insulin-using patients, the Cronbach alpha and Guttman values were calculated for the whole scale and for the positive and negative sub-dimensions ($\alpha = 0.80$; 0.60; 0.81 and $\lambda_2 = 0.83$; 0.61; 0.83, respectively) (Table 3).

Exploratory Factor Analysis

In relation to the construct validity of the scale, Varimax Rotation and Principle Components Analysis were applied to the scale items to see whether the scale preserved its original factor structure or not. For this purpose, KMO index of ITAS^{Tr} was calculated as .78; p as .000 and effect value as 190. It was found that the factor loadings of the scale ranged between 0.01 and 0.65 (Table 3).

Known-group validity

Table 4 presents the effect size, t-test significance results and the means and standard deviations for the whole scale and its positive and negative sub-dimensions with respect to insulin use.

Regarding the questions constituting the positive dimension (Item numbers: 3, 8, 17 and 19), comparison of insulin-using patients and non-insulin-using patients revealed that the insulin-using patients had a higher score except for the 3rd and 8th items. As for the questions constituting the negative dimension (Item numbers: 1, 2, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 18. and 20.), comparison of insulin-using patients and non-insulin-using patients demonstrated that the insulin-using group had a higher score except for the 1, 9, 11, 20th item. Considering the insulin-using patients and non-insulin-using patients, a statistically significant difference was found between the mean scores of "Agree" for the 4th item, the 14th item and the 20th item ($p<0.05$). For the insulin-using and non-insulin-using groups, there was no statistically significant difference regarding the negative dimension scores (t = -0,133, p = 0.89, d = 0.021) and the total scores (t = -1.804, p = 0.07, d = 0.188). In addition, there was a significant difference with respect to the positive sub-dimension scores (t = -2.020, p = 0.04, d = 0.014) (Table 4).

Analysis of the ITAS^{Tr} Items with Respect to Patients' Insulin Use

The total scale score for the insulin-using patients was 41.05 ± 9.16. The positive sub-dimension score was calculated as 9.20 ± 2.26, and the negative sub-dimension score was calculated as 31.84 ± 8.14. For non-insulin-using patients, the total scale score was 39.41 ± 8.26. The positive sub-dimension score was found to be 9.17±1.93, and the negative sub-dimension score was found to be 30.23 ± 7.15 (Table 4).

Discussion

Language Validity

In the phase of translation done within the scope of language validity, translation of a scale into another language changes the nature of that scale (Aksayan and Gozum, 2002). This inevitable change depends on the change in feelings, thoughts and behaviors in different societies (Akbas and Korkmaz, 2007). Examining the scale items attentively to minimize the differences, making the necessary changes to increase comprehensibility of the items in the target language and doing standardization in accordance with the target language speaker's norms constitute the basis of the adaptation (Aksayan and Gozum, 2002). In this study, in line with these issues, ITAS^{Tr} similar to the original version was prepared to meet the criterion of language validity, which constitutes the basis of scale adaptation studies.

Content Validity

Content validity examines whether the items or the questions in the measurement tool are appropriate to the purpose of measurement and whether they represent the area intended to be measured (Yurdugul and Paralel, 2006; Eser and Baydur, 2007). For this purpose, field experts were asked for their views since evaluation to be done by a person who has adapted the measurement tool could be misleading (Yurdugul and Paralel, 2006).

For the content validity of the scale, it was found that the experts reported consistent views and

reached consensus (W = .114; p > .05). This result demonstrated that the scale items were applicable, comprehensible, appropriate to the measurement purpose and representative of the area to be measured.

Consequently, by doing the necessary corrections and changes in line with the expert views and with the results of the pilot application and by meeting the criterion of language validity and content validity, ITAS^{Tr} was finalized, and psychometric properties analysis was conducted.

Descriptive Statistics for ITAS^{Tr}

When the results of standard error (SE), one of descriptive statistics, were examined, it was seen that the scale sub-dimension/total error ratios were .10 for the positive sub-dimension and .48 for the negative sub-dimension and that these ratios were lower than half of the standard error means (Table 2). In this study, the fact that the standard error values of the sub-dimensions were low indicates the reliability of the measurement tool (Yurdugul and Paralel, 2006).

Standard deviation shows the distribution of the data regarding the mean scores with respect to the frequency distribution (Ozgur, 2009). Standard deviations should not be higher than the mean. When the scale sub-dimension/total means and the standard deviations were examined, it was seen that the standard deviations were lower than the mean (Table 2).

Item Analyses

Another method that shows internal consistency of a scale is the item analysis method. This method of analysis allows revealing the relationship between the items, the scale and the sub-dimensions (Sumer, 2000). A higher level of item-total score correlation shows that the items have a single dimension; in other words, it reveals that the items measure the same thing (Ercan and Kan, 2004).

The item-total score correlation coefficients of the scale ranged between .40 and .82. When the related literature is examined, it is seen in scale validity and reliability studies that the item-total score correlation coefficient of items is expected to be higher than the reliability level of 0.20 (Akbas and Korkmaz, 2007; Buyukozturk, 2010; Cokluk, Sekercioglu, Buyukozturk, 2010). In the study, it was seen that the item-total score correlation coefficients were higher than 0.20 (Table 3).

Internal consistency reliability coefficient

A reliability criterion frequently used in scale development and adaptation studies is the *internal consistency reliability coefficient.* Internal consistency reliability coefficient should range between 0 and 1. According to the evaluation criterion, a scale has no reliability if $.00 \leq \alpha < .40$; it has a low level of reliability if $.40 \leq \alpha < .60$; it has a moderate level of reliability if $.60 \leq \alpha < .80$; and it has a high level of reliability if $0.80 \leq \alpha < 1.00$ (Eser & Baydur, 2007). The Cronbach alpha internal consistency reliability coefficient for the whole ITAS^{Tr} was .80. This coefficient was found similar to the internal consistency reliability coefficient of the original version of the scale (Snoek FJ, Skovlund SE, Pouwer, 2007), and the scale can thus be said to have a high level of reliability. It was seen that the "positive" sub-dimension of the scale was moderately reliable (.64) and that the "negative" sub-dimension had a high level of reliability (.83). The internal consistency reliability coefficients of ITAS^{Tr} were .81, .64 and .85 for the insulin-using group and .80, .60 and .81 for the non-insulin-using group (Table 3). Depending on the principle idea that the internal consistency reliability coefficient is based on, it could be stated that the scale included independent units to serve a specific purpose and that these units had equal and known weightings for the whole scale. In general, the scale could be said to measure the same thing consistently.

Construct Validity

In order to determine the construct validity of the scale, exploratory factor analyses were conducted. For factor analysis, the research sample size and the data set should be appropriate to analysis (Akgul, 2005; Eser and Baydur, 2007). For this purpose, Kaiser Mayer Olkin (KMO) and Barlett test were applied. The value of Kaiser-Meyer-Olkin (KMO) should be higher than 0.60, and the result of Barlett test should be significant (Buyukozturk, 2010). The KMO index of ITAS^{Tr} was calculated as .78. These results demonstrate that the scale was appropriate to factor analysis.

The results of the exploratory factor analysis conducted to obtain information about the factor structure of the scale (Eser and Baydur, 2007) revealed that the factor loadings of ITAS ranged between 0.01 and 0.65. In literature, factor loadings are expected to be higher than the cut-off value of 0.30 (Akgul, 2005). However, in the

present study, the items with low factor loadings were not excluded for the following reasons (Table 3): the item correlation coefficients were found to be higher than 0.20; exclusion of five items would be likely to demolish the factor validity of the scale; the total scale

Cronbach Alpha value for ITAS would increase only by 2 after item exclusion; the current Cronbach Alpha of the current scale was 0.80; and most importantly, the items were among those considered to be very important in related literature in terms of the evaluation of insulin fear (Brod, Kongso, Lessard and Christensen, 2009; Peyrot, Rubin and Khunti, 2010; Fu, Wong, Chin and Luk, 2016).

In addition, these factors with an eigenvalue of >1 were found to explain 40.11% of the total variance (Table 2). The higher the ratio of variance obtained is, the stronger the factor structure of scale is. In studies conducted in the field of Social Sciences, variance ratios ranging between 40-60% are considered to be sufficient (Sencan, 2005). Accordingly, it was seen that the total variance explained was sufficient, which demonstrates that ITAS scale had an appropriate construct validity.

Known-Group Validity

When the insulin-using patients and non-insulin-using patients were compared, it was seen that the insulin-using group had a statistically significantly higher ITAS score for the 4th scale item (Taking insulin means other people see me as a sick person ($p < 0.05$, $d = 0.27$)) and for the 14th scale item (Injecting insulin is painful ($p < 0.05$, $d = 0.25$)) (Table 4).

However, this finding is not supported by other studies reported in related literature which revealed that non-insulin-using diabetes patients had statistically significantly higher ITAS scores for the 4th and 14th items when compared to insulin-using patients (Bahrmann et al, 2014; Holmes-Truscott, Pouwer, Speight, 2014; Snoek, Skovlund, Pouwer, 2007). In a study conducted with a large sample (12.000) in USA, it was found that patients using insulin are mostly afraid of being stigmatized by the society (Liu et al., 2017). In one other study, Bahrmann and colleagues (2014) conducted personal interviews with diabetes individuals and reported that they did not want to be confused with drug-addicted individuals in the society (Bahrmann et al, 2014). In the present study, the Item-4 was thought to produce a higher score because the insulin-using patients constituting the research sample were afraid of being stigmatized by the society.

Many studies report that diabetes individuals' perception of diabetes, diabetes complications and diabetes treatment are among major factors influential on diabetes individuals' self-care, emotional well-being and glycemic control (Skinner, 2004; Peyrot et al, 2005). The insulin-using diabetes individuals included in the research sample of the present study had more diabetes-related complications and suffered from other chronical diseases more when compared to non-insulin-using diabetes individuals. For this reason, the insulin-using patients participating in this study are thought to find insulin injection more painful as in the 14th item of the scale.

When the insulin-using group and the non-insulin-using group were compared, the mean score for the item of "Taking insulin makes me more dependent on my doctor" (Item-20) was found to be statistically higher for non-insulin users. Insulin-using patients more frequently visit their doctors for routine follow-ups (ADA, 2017). and they are more frequently exposed to hypoglycemia (Yavuz, Ozcan and Deyneli, 2015). Therefore, these patients are more frequently supposed to see their doctors for insulin treatment methods. For all these reasons, the higher score for Item-20 was an expected result for non-insulin-using patients.

Limitations to the Study

Initially, in order to reach an enough size of research sample and to get reliable data, the study started in a single center. When the process of collecting the research data started in the study, a second institution was simultaneously involved in the study for data collection to obtain the intended sample size because the number of patients who were illiterate or did not speak Turkish was high, because there was a limited number of patients appropriate to the criteria for participant selection for the research sample and because the time for the research process was limited.

Conclusion and Suggestions

In the study, the Turkish version of ITAS was found to be a valid and reliable tool for the evaluation of insulin treatment of type 2 diabetes individuals. ITAS^{Tr} can be used in clinical practices to evaluate not only non-insulin-using diabetes individuals' expectations

regarding insulin use but also non-insulin-using diabetes individuals' experiences regarding insulin use. The scale provides several advantages such as being practical, allowing comprehensive evaluation of the related treatment and providing diabetes individuals with the opportunity to use it themselves. Depending on these advantages, the scale could be said to develop diabetes individuals' treatment and nursing care as well as to improve the life quality if used effectively and prevalently.

References

American Diabetes Association. Standards of Medical Care in Diabetes (2017). Diabetes Care 2017; 40(Suppl. 1):S1–S2

Akbas G, Korkmaz L. (2007). Scale adaptation. *Turkish Psychology Bulletin*, 13, 40, 15-16 (in Turkish).

Akgul A. (2005). Statistical analysis techniques in medical research SPSS applications. (3rd Edition, pp. 440-455). Ankara: Emek Ofset Ltd. Sti. (in Turkish).

Aksayan S, Gozum S. (2002). Intercultural scale adaptation guide I: Scale adaptation steps and language adaptation. *Journal of Research and Development in Nursing*, 4, 9–14. (in Turkish).

Buyukozturk S. (2010). Data analysis handbook for social sciences. (11th Edition), Ankara: Pegem Academy Publications. (in Turkish).

Brod M, Kongso JH, Lessard S, Christensen TL. (2009). Psychological insulin resistance: patient beliefs and implications for diabetes management. *Quality of Life Research Journal* 18:23–32.

Bahrmann A, Abel A, Zeyfang A, Petrak F, Kubiak T, Hummel J, Oster P, Bahrmann P. (2014). Psychological insulin resistance in geriatric patients with diabetes mellitus. *Patient Education and Counseling.* 94(3), 417–422.

Centers for Disease Control and Prevention [CDC]. Basics about diabetes, 2015. Access Date: February 17, 2017, http://www.cdc.gov/diabetes/basics/diabetes.html.

Cokluk O, Sekercioglu G, Buyukozturk S. (2010). Multivariate statistical SPSS and LISrel applications for social sciences. Ankara: Pegem Academy publications. (Original work published in Turkish).

Delahanty LM, Grant RW, Wittenberg E, Bosch JL,Wexler DJ, Cagliero E, et al. (2007). Association of diabetes-related emotional distress with diabetes treatment in primary care patients with Type 2 diabetes. *Diabetic Medicine*, 24(1), 48–54.

Ercan I, Kan II. (2004). Reliability and validity in scales. *Uludag University Journal of Medical Faculty*. 30, 211–216. (in Turkish).

Eser E, Baydur H. (2007). Cultural Adaptation of Health Related Quality Scales of Life. 2. Life Quality Congress in the Healthy, Pre-congress Course Book. Izmir. (in Turkish).

Fu SN, Wong CKH, Chin WY, Luk W. (2016). Association of more negative attitude towards commencing insulin with lower glycosylated hemoglobin (HbA1c) level: a survey on insulin-naïve type 2 diabetes mellitus Chinese patients. *Journal of Diabetes & Metabolic Disorders*, 15, 3.

Hermanns N,Mahr M, Kulzer B, Skovlund SE, Haak T. (2010). Barriers to wards insulin therapy in type 2 diabetic patients: results of an observational longitudinal study. *Health and Quality of Life Outcomes* 8,113.

Holmes-Truscott AE, Pouwer F, Speight J. (2014). Further investigation of the psychometric properties of the insulin treatment appraisal scale among insulin-using and non-insulin-using adults with type 2 diabetes: results from diabetes MILES. *Health and Quality of Life Outcomes*, 12:87.

Lee KP. (2016) Validity and reliability of the Chinese version of the Insulin Treatment Appraisal Scale among primary care patients in Hong Kong**.** Hong Kong Med J 22, 306–13

Liu NF, Brown AS, Younge MF, Guzman SJ, Close KL, Wood R. (2017). Stigma in People With Type 1 or Type 2 Diabetes. *Clinical Diabetes*, 35(1), 27-34

Ozgur S. (2009). Research Methods in the Field of Health (3rd Edition, pp. 31-39). Ankara: Gunes Medical Bookstores. (in Turkish).

Ozguven İE. (2000). Psychological tests, reliability and validity (pp. 83-109). Ankara: System Ofset Publications. (in Turkish).

Peyrot M, Rubin RR, Lauritzen T, Snoek FJ, Matthews DR, Skovlund SE. (2005). Psychosocial problems and barriers to improved diabetes management:results of the Cross-National Diabetes Attitudes, Wishes and Needs (DAWN) study. *Diabet Medicine*, 22,1379–85.

Peyrot M, Rubin RR, Khunti K. (2010). Addressing barriers to initiation of insulin in patients with type 2 diabetes. *Primary Care Diabetes*, 4(suppl. 1), S11–S18.

Polonsky WH, Fisher L, Guzman S, Villa-Cabalero L, Edelman SV. (2005). Psychological insulin resistance in patients with Type 2 diabetes: thescope of the problem. *Diabetes Care*, 28, 2543–2545.

Petrak F., Herpertz S, Stridde E, Pfutzner A. (2013). Psychological insulin resistance in Type 2 diabetes patients regarding oral antidiabetes treatment, subcutaneous insulin injections, orinhaled insulin. *DiabetesTechnology&Therapeutics*, 15 (8), 702-710.

Rubino A, McQuay LJ, Gough SC, Kvasz M, Tennis P. (2007). Delayed initiation of subcutaneous insulin therapy after failure of oral glucose-lowering agents in patients with Type 2 diabetes: a

population-based analysis in the UK. *Diabet Medicine*, 24, 1412–1418.

Satman I, Omer B, Tutuncu Y, Kalaca S, Gedik S, Dinccag N, et al. (2013). Twelve- year trends in the prevalence and risk factors of diabetes and prediabetes in Turkish adults. *European Journal of Epidemiology*, 28(2):169-80.

Snoek FJ, Skovlund SE, Pouwer F. (2007). Development and validation of the insulin treatmentappraisalscale (ITAS) in patients with type 2 diabetes. *Health Qual Life Outcomes* 5, 69.

Skinner TC. (2004). Psychological barriers. *European Journal* of *Endocrinology*, 151, T13–7.

Sencan H. (2005). Reliability and validity in social and behavioral measures. Ankara: Seckin Publishing. (in Turkish).

Sumer N. (2000). Structural equation models: Basic concepts and sample applications. *Turkish Psychology Articles*, 3(6), 49–74. (in Turkish).

Turkiye Diyabet Cemiyeti (2013). Turkiye'de ve olge Ulkelerinde Diyabet Sorunu. Erisim tarihi: 26.07.2017. http://www.diabetcemiyeti.org/c/turkiye-de-ve-bolge-ulkelerinde-diyabet-sorunu

Yurdugul H. (2006). Comparison of reliability coefficients for parallel, equivalent and congener measurements. Ankara University Journal of Educational Sciences, 39 (1), 15–37. (in Turkish).

Yavuz DG, Ozcan S, Deyneli O. (2015). Adherence to insulin treatment in insulin-naïve type 2 diabetic patients initiated on different insulin regimens. *Patient Preference and Adherence*, 9, 1225–1231.