Insulin initiative attitudes of type 2 diabetes individuals Turkish validity and reliability study

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ABSTRACT

Purpose: A study was conducted to investigate the Turkish Validity and Reliability of the Insulin Initiation Attitudes Scale of individuals with Type 2 diabetes.

Materials and methods: This methodologically planned study was conducted with 128 Type 2 diabetes mellitus patients who met the sampling criteria. Data collected using a personal information form to identify individuals diagnosed with diabetes and CH-ASIQ, which assessed their attitudes towards diabetes, and the form Insulin Therapy Attitude Scale parallel as a parallel form. For the statistical analysis of the data, Construct Validity, Exploratory Factor Analysis, and Kaiser-Meyer-Olkin test, Confirmatory Factor Analysis, Structural Equation Modeling Results of the scale were found to be p=0.000. According to Cronbach Alpha result 0.756.

Results: It was statistically significant; it is seen that 14.1% of the participants were in the 41-50 age range, 37.5% were in the 51-60 age range, and 48.8% were 61 and over. According to Kaiser-Meyer-Olkin test, the result was found to be 0.626. According to the results of factor analysis, 4 factors have emerged which have Eigenvalues above 1 and explain 69.48% of the total variance. According to Confirmatory Factor Analysis, Structural Equation Modeling Results of the scale were found to be p=0.000. According to Cronbach Alpha result 0.756.

Conclusion: There was a relationship between attitudes to having information about the treatment of diabetics and attitude, and there was the relationship between them. Effects of fear, pain on these findings were observed. The importance of education for a positive attitude was determined. The importance of patients’ attitudes towards insulin therapy should be emphasized for adaptation to the disease.

Keywords: Validity, reliability, nursing care, type 2 diabetes, attitudes

DOI: 10.5604/01.3001.0014.9283

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Received: 16.01.2021
Accepted: 16.05.2021
Progress in Health Sciences
Vol. 11(1) 2021 pp 75-82
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INTRODUCTION

Type-2 diabetes is characterized by progressive insulin secretion defect based on insulin resistance according to the etiological classification [1,2]. In diabetes, which has a permanent structure, the compliance of the individual to the disease and treatment is of great importance [3,4]. The International Diabetes Federation (2019) estimates that there will be 700 million people with diabetes in the world by 2045, and this will be in the range of about 463 million (20-79 years). 10.4 million in the year 2045 that number will be in Turkey is estimated [5]. The patient plays a central role in the administration of insulin therapy. Patients’ attitudes towards the use of insulin therapy can change the control and course of the disease. Patient education is essential to achieve effective glycemic control [6,7].

The behaviors and attitudes of diabetes patients should be evaluated before diabetes and insulin administration training. False beliefs can be corrected before they become behaviours before new attitudes are introduced [6,8].

Education of patients with type-2 diabetes should be done with a multidisciplinary approach. This training should aim to inform patients about diabetes self-management, to encourage and gain glucose monitoring skills [1,9]. Dealing with disease-related fear and anxiety, increasing self-efficacy and eliminating the lack of information can contribute to proper management of the treatment process [2,3].

Nurses are in an essential position in applications related to the control and management of diabetes. Nurses can have the opportunity to monitor patients’ wrong attitudes closely and provide timely support. This study planned to perform the validity and reliability study of the Turkish version of the Ch-ASIQ scale used in the evaluation of attitudes of Type 2 diabetes patients who have just started insulin administration.

This study aimed to examine the transcultural adaptation and the reliability and validity of the Turkish version of The Chinese Attitudes To Starting Insulin Questionnaire (Ch-ASIQ).

MATERIALS AND METHODS

This study was conducted in two stages: (a) the transcultural adaptation process and (b) the construct validity and reliability assessment of the Turkish version of The Chinese Attitudes to Starting Insulin Questionnaire (Ch-ASIQ).

Study design
This was a methodological study.

Sample and setting
In this study, it was planned to reach 130 patients (10 times the number of the scale items), but the data of 128 participants who met the criteria and marked the forms correctly were included in the evaluation [10,11]. The study participants consisted of volunteers aged 18 and over who have type 2 diabetes, who have been using self-administration of insulin therapy for at least one month, have at least a literate educational level, and have no communication problems.

Data collection instruments
As data collection tools: 1. Individual Identification Form: includes a total of 14 questions related to the socio-demographic characteristics of patients with type 2 diabetes, including age, occupation, marital status, education level, employment status, income level, presence of chronic disease. 2. Chinese Attitudes to Starting Insulin Questionnaire (Ch-ASIQ): was developed by Fu, S. N., Chin, W. Y., Wong, C. K. H., Yeung, V. T. F., Yiu, M. P., Tsui, H. Y., & Chan, K. H. in 2013 with 27 items. As a result of the analyzes, it was arranged to have 13 items and four sub-dimensions. The scale was confirmed by Bartlett’s Sphericity test (p <0.001), and the Kaiser-Meyer-Olkin (KMO) value was calculated as 0.72. The Cronbach’s alpha values were for the first four factors were found to be ≥0.6. [12]. The “Self-image and stigmatization” sub-dimension consists of 3 items, the “Factor promoting self-efficacy” sub-dimension consists of 5 items, the “Fear of pain or needles” sub-dimension consists of 3 items, and the “Time & family support” sub-dimension consists of 2 items. The 4-point Likert scale evaluated the items in the scale. (1 = Totally disagree, 2 = disagree, 3 = agree, and 4 = totally agree). Higher scores from the “Factors promoting self-efficacy” and “Time & family support” sub-dimensions show higher rates of positive attitudes towards insulin use. Higher scores from “Self-image and stigmatization” and “Fear of pain or needles” sub-dimensions indicate high rates of negative attitudes towards insulin therapy [12]. 3. The Insulin Treatment Appraisal Scale (ITAS) was developed by Snoek FJ & Pouwer F. in 2007 [13]. It was adapted to the Turkish language by Sürrücü, Baksı, & Samancioglu in 2017 [14]. The scale, consisting of two sub-dimensions, contains 20 items. The 4-point Likert scale evaluated the items in the scale. Four items (3, 8, 17, and 19) of the scale evaluate positive attitudes, while the other 16 evaluate negative attitudes. The Cronbach’s alpha value was calculated as 0.80 for the entire scale [13].

Language translation
The scale was prepared by eight academian assistant professor nurses and two researchers. It was translated from English to Turkish by a total of 10 people. The researchers
have evaluated all translations, and a common form has been created. The back-translation of the scale was carried out by a translator specialized in both languages. After the expressive differences were reviewed, the final version of the scale was created.

Content validity assessment was evaluated by ten nursing professors who are experts in the field of nursing. A four-point Likert scale was designed and sent to experts via email to determine the content validity with numerical values: 1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, and 4 = highly relevant. The item content validity index (CVI) is computed as the number of experts giving a 3 or 4 divided by ten experts. The scale CVI of the Turkish version was calculated (CVI=0.97).

**Pilot Study**

Face validity refers to whether the instrument looks like it measures the target construct [15]. After language and content validity, the scale was applied to a pilot patient (21 people) group before the study, and it was asked to evaluate whether the statement was not understood. Patients who stated that there was no problem with understanding the questions at the end of the pilot application did not suggest changes.

**Data collection**

The data of the research were collected between March and June 2019. The collection of data from scales filled by patients took an average of 15 to 20 minutes.

**Ethical consideration**

Consent was obtained from Fu Sau Nga, who is the corresponding author of the original scale, by email, and then, the original scale was translated into Turkish. Before starting the study, approval was obtained from the Ethics Committee of Ege University Faculty of Medicine (Approval number: 18-11T / 28). Written permission has been obtained from the clinic where the application will be performed.

**Data analysis**

The required statistical analyses of the validity and reliability of the Turkish version of CH-ASIQ were performed using SPSS version 21.0. Descriptive analyzes were performed to evaluate the characteristics of the participants. Content validity was assessed with CVI, with an acceptable value of 0.80 or higher. Factor analysis is a method used to define sets of related variables, which are the dimensions underlying a large structure [15]. In this study, EFA and CFA were used with 128 patients for construct validity. Before EFA test, the suitability of the respondent data was assessed for factor analysis using the Kaiser-Meyer-Ollkin test (KMO, range 0.5-1.0) and Bartlett's test of sphericity (p< .05) [16].

Reliability analysis included the test-retest method, item-total correlation analysis, split-half analysis, and internal consistency (Cronbach Alpha) analysis. The internal consistency was examined with Cronbach's Alpha, with an acceptance of the value of .70 or higher [17,18].

**RESULTS**

**Sample characteristics**

The age range was 37.5% (51 to 60), and 48.4% of the participants were over 61 years of age. Insulin treatment duration is between two and six months in 68% of patients. Diabetes diagnosis times are less than two years of 33.6%, between 3 and 8 years of 50%, and more than nine years of 15.4%.

**Validity analysis**

After the transcultural adaptation of the scale was completed, the content validity assessment was evaluated by ten nursing professors who are experts in nursing. The content validity index (CVI=0.97) was found high [19]. The scale analyzed for content was evaluated in a pilot study with twenty-one patients. The Turkish version showed strong face validity and was based on the evaluation of expert and pilot study patients.

**Construct validity**

The scale's Kaiser-Meyer-Olkin (KMO) value (0.626), Bartlett's Sphericity test value ($\chi_2$ (78) = 823.273; p <0.01) were calculated. Values were in the appropriate range for factor analysis. Exploratory factor analysis (EFA) and confirmatory factor analyzes were performed to evaluate the construct validity of the Turkish version of the scale. EFA analysis identified four factors with eigenvalues above one and meeting 69.484% of the total variance. The factor loading of the items was found to be high (>0.30). Only the factor load of the 8th item was found below 0.30, and it was decided to remain on the scale due to the high variance explained [17,20].

The first factor, "self-image and stigmatization," meets 20.23% of the total variance, followed by the second factor "factor promoting self-efficacy" with 16.51%, the third factor "fear of pain or needles" with 17.66% and the fourth factor "time & family support" with 15.08%. Due to the overlapping factor load, one item is placed in a different sub-dimension. The 7th item in the scale is located in the 4th sub-dimension (Table 1).

Confirmatory factor analysis (CFA) of the scale was performed. Also, structural equation modelling analysis gave significant results with $p = 0.000$. A correlation was found between the 13 items and the four sub-dimensions and scale structures (Figure 1).
Table 1. Turkish version of Chinese Attitudes to Starting Insulin Questionnaire (Ch-ASIQ): The EFA results

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 1</td>
<td>0.887</td>
<td></td>
<td></td>
<td></td>
<td>0.844</td>
</tr>
<tr>
<td>Item 2</td>
<td>0.922</td>
<td></td>
<td></td>
<td></td>
<td>0.891</td>
</tr>
<tr>
<td>Item 3</td>
<td>0.754</td>
<td></td>
<td></td>
<td></td>
<td>0.746</td>
</tr>
<tr>
<td>Item 4</td>
<td>0.559</td>
<td></td>
<td></td>
<td></td>
<td>0.379</td>
</tr>
<tr>
<td>Item 5</td>
<td>0.721</td>
<td></td>
<td></td>
<td></td>
<td>0.555</td>
</tr>
<tr>
<td>Item 6</td>
<td>0.594</td>
<td></td>
<td></td>
<td></td>
<td>0.480</td>
</tr>
<tr>
<td>Item 7</td>
<td>0.263</td>
<td></td>
<td>0.830</td>
<td></td>
<td>0.752</td>
</tr>
<tr>
<td>Item 8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item 9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item 10</td>
<td>0.622</td>
<td></td>
<td>0.835</td>
<td></td>
<td>0.750</td>
</tr>
<tr>
<td>Item 11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item 12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item 13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explained Variance (%)</td>
<td>20.230</td>
<td>16.514</td>
<td>17.660</td>
<td>15.081</td>
<td>69.484</td>
</tr>
<tr>
<td>Eigenvalue (Λ)</td>
<td>3.548</td>
<td>2.466</td>
<td>1.772</td>
<td>1.246</td>
<td></td>
</tr>
</tbody>
</table>

Kaiser –Meyer- Olkin (KMO) =0.626; $\chi^2(78)$ =823.273; Bartlett Sphericity Test Value (p) = 0.000

EFA: Exploratory Factor Analysis

Figure 1. First Level Multifactor Confirmatory Factor Analysis Model of The Ch-ASIQ
F1: Self-Image And Stigmatization, F2: Factors Promoting Self-Efficacy
F3: Fear Of Pain Or Needles, F4: Time & Family Support
With the improvement in the model, variables that decrease the compliance were determined, and new covariance was created for those with high covariance among the values. Then, the renewed fit index (goodness of fit values) calculations of the values accepted for the fit index are shown in Table 2. According to the results of the first level multi-factor analysis, when we look at the goodness of the fit index of the attitude to start insulin; RMSEA 0.10; GFI 0.87; CFI 0.89; It can be said that $\chi^2$ is at an acceptable level with 2.355 ($p = 0.000$) values [21] (Table 2).

### Table 2. Turkish version of Chinese Attitudes to Starting Insulin Questionnaire (Ch-ASIQ): Fit indices of the model in CFA (n = 128)

<table>
<thead>
<tr>
<th>Fit indices</th>
<th>Model results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Root Mean Square Error of Approximation (RMSEA)</td>
<td>0.10</td>
</tr>
<tr>
<td>Normed Fit Index (NFI)</td>
<td>0.841</td>
</tr>
<tr>
<td>Comparative Fit Index (CFI)</td>
<td>0.899</td>
</tr>
<tr>
<td>Incremental Fit Index (IFI)</td>
<td>0.902</td>
</tr>
<tr>
<td>Goodness-Of-Fit Index (GFI)</td>
<td>0.871</td>
</tr>
<tr>
<td>Trucker-Lewis Index (TLI)</td>
<td>0.865</td>
</tr>
<tr>
<td>CMIN/df ($\chi^2 / df$)</td>
<td>2.355</td>
</tr>
</tbody>
</table>

### Reliability analysis

**Stability**

Test-retest analysis, one of the reliability analyzes of the scale, was applied. The scale was reapplied to thirty patients at four-week intervals. According to test-retest results, there was a difference between the two applications of the "fear of pain or needles" and "time & family support" sub-dimensions ($p<0.05$) (Table 3).

### Table 3. Turkish version of Chinese Attitudes to Starting Insulin Questionnaire (Ch-ASIQ): The results of the Test retest

<table>
<thead>
<tr>
<th>Scale</th>
<th>Test</th>
<th>Retest</th>
<th>R</th>
<th>P</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch-ASIQ</td>
<td>16.56±3.32</td>
<td>22.90±3.73</td>
<td>0.346</td>
<td>0.061</td>
<td>-8.556</td>
<td>0.000</td>
</tr>
<tr>
<td>Self-Image And Stigmatization</td>
<td>3.13±0.57</td>
<td>4.16±1.48</td>
<td>0.338</td>
<td>0.068</td>
<td>-4.038</td>
<td>0.000</td>
</tr>
<tr>
<td>Factors Promoting Self-Efficacy</td>
<td>5.23±1.54</td>
<td>7.96±1.99</td>
<td>-0.151</td>
<td>0.426</td>
<td>-7.623</td>
<td>0.000</td>
</tr>
<tr>
<td>Fear Of Pain Or Needles</td>
<td>4.40±2.17</td>
<td>5.40±1.45</td>
<td>0.395</td>
<td>0.031*</td>
<td>-2.628</td>
<td>0.014*</td>
</tr>
<tr>
<td>Time &amp; Family Support</td>
<td>3.80±1.54</td>
<td>5.36±1.54</td>
<td>0.671</td>
<td>0.000*</td>
<td>-6.861</td>
<td>0.000*</td>
</tr>
</tbody>
</table>

*p<0.05

Scale’s internal consistency reliability and Cronbach alpha reliability coefficient

### Table 4. Turkish version of Chinese Attitudes to Starting Insulin Questionnaire (Ch-ASIQ): Item to Total Correlations

<table>
<thead>
<tr>
<th>Items</th>
<th>Item Total Correlations</th>
<th>T Alt %27-Ust %27</th>
<th>Chronbach’s Alfa α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 1</td>
<td>0.844</td>
<td>-23.685***</td>
<td>0.905</td>
</tr>
<tr>
<td>Item 2</td>
<td>0.891</td>
<td>-21.718***</td>
<td></td>
</tr>
<tr>
<td>Item 3</td>
<td>0.746</td>
<td>-20.422***</td>
<td></td>
</tr>
<tr>
<td>Item 4</td>
<td>0.379</td>
<td>-5.719***</td>
<td>0.605</td>
</tr>
<tr>
<td>Item 5</td>
<td>0.555</td>
<td>-5.019***</td>
<td></td>
</tr>
<tr>
<td>Item 6</td>
<td>0.480</td>
<td>-7.092***</td>
<td></td>
</tr>
<tr>
<td>Item 7</td>
<td>0.253</td>
<td>-8.550***</td>
<td></td>
</tr>
<tr>
<td>Item 8</td>
<td>0.752</td>
<td>-17.885***</td>
<td>0.883</td>
</tr>
<tr>
<td>Item 9</td>
<td>0.750</td>
<td>-18.278***</td>
<td>0.708</td>
</tr>
<tr>
<td>Item 10</td>
<td>0.589</td>
<td>-9.648***</td>
<td></td>
</tr>
<tr>
<td>Item 11</td>
<td>0.510</td>
<td>-8.718***</td>
<td></td>
</tr>
<tr>
<td>Item 12</td>
<td>0.418</td>
<td>-12.204***</td>
<td></td>
</tr>
<tr>
<td>Item 13</td>
<td>0.698</td>
<td>-11.316***</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>0.756</td>
</tr>
</tbody>
</table>

*** p < 0.05
Correlation analysis coefficients of the scale items were calculated to vary between 0.253 and 0.891.

A significant difference was found between the items in the sub-dimensions and the mean scores of 27% of the upper and 27% of the lower groups (p <0.05).

Cronbach Alpha 0.756 was calculated for the scale total reliability analysis. It was calculated as 0.905 for the first sub-dimension, 0.605 for the second dimension, 0.883 for the third sub-dimension, and 0.708 for the last sub-dimension (Table 4).

Other tests to measure the internal consistency of Ch-ASIQ are half-tests. The Guttman Split-half coefficient was found to be 0.593. The equal-length Spearman-Brown Coefficient was 0.603, while the unequal-length Spearman-Brown coefficient was 0.604.

**DISCUSSION**

In the study, the validity and reliability study of the Turkish version of the Ch-ASIQ scale was performed. According to the results of the Turkish society cultural adaptation studies, the insulin intervention attitudes of Type 2 Diabetes patients, its validity and reliability were found to be sufficient. In the results of the study, it was found that the Turkish version of the Ch-ASIQ scale showed good content validity index, adequate EFA and CFA values. This study has some limitations. Data of the study were collected by using convenience sampling. In the study, it was planned to reach 130 people with ten times the number of scale items, but due to the data loss of the two participants, the study was completed with 128 patients. This scale will be used to determine the attitudes of patients who are just starting to use insulin. There is a need for more clinical trials. Invalidity and reliability studies, it is recommended to make the sample size 5-10 times the number of items on the scale. In this study, 130 participants with ten times the number of items (13 items) were targeted, and since only two participants were excluded from the study, it was completed with 128 participants.

As a result of the EFA and CFA analysis, one item (7th item) placed from the second sub-dimension to the fourth sub-dimension according to the factor load. An explained variance between 40% and 60% is considered sufficient in multiple factor patterns [22,23]. Telef (2013) reported a total explained variance of 42% as a result of factor analysis [22]. Another study reported a total explained variance of 50.45% for four sub-dimensions [24].

There is no consensus among experts on the standardization of a wide variety of fit indices, which leads to the emergence of ranges of different values [22,25]. Since chi-square statistics are easily affected by the sample size, \( \chi^2 / df \) is a measure that can be used instead [26]. Yalçın et al. (2019) (Quote from Schumacker: 1996) considered a CMIN / df (\( \chi^2 / df \)) value in the range of 0 to 3 as a measure of a perfect fit. The RMSEA value is the square of the mean of approximate errors, which means that the model has a good fit for values below 0.1 [27]. This may be related to our sample size, which is far below 200. A study suggests that the fit index value should be below two based on the EFA analysis and indicates that a value of 5 and less is within the acceptable range [25,26].

As a result of reliability test-retest analysis, Cronbach Alpha values, and halfway tests, it was found to be reliable enough. In this study, the scales were applied to 30 patients after 30 days. Scale test-retest correlation coefficient (r = 0.346) was calculated in this study. The correlation value for test-retest is expected to be above (+ 0.3). One study reported test-retest reliability values in the range of 0.79 for the total scale and 0.79 to 0.91 for six sub-dimensions [19]. In another study, the test-retest values of the sub-dimensions of the scale were calculated between 0.56 and 0.69 [28]. In our study, Cronbach’s alpha coefficients (\( \alpha \)) were found between 0.605 and 0.905 for the sub-dimensions and 0.756 for the total scale (Table 4). This value is in the range that shows the reliability of the scale. Gürsoy and Özpolat (2017) found an \( \alpha \) value of 0.61 for the total scale and between 0.63 and 0.77 for the sub-dimensions [24].

In this study, item-total correlations of the scale ranged from 0.253 to 0.891. The significant differences between all items in the sub-dimensions in terms of the mean scores of the 27% lower and 27% upper groups (p <0.05) provide evidence for the discrimination of the sub-dimensions of the scale. Akin et al. in their study, the adjusted item-total correlation values of the scale were between 0.48 and 0.71, and the item scores and t-values (SD: 320) of 27% lower and upper groups were between 16.11 and 29.57 (p <0.001) [28]. Another study found total item correlation values ranging from 0.41 to 0.63. Significant t values for all 27% lower and upper groups provide evidence of high-reliability rates (Telef, 2013). In another study, t-values were found between 21.80 and 53.74 (p <.001) [29].

The two-half reliability analysis of the internal consistency of the Ch-ASIQ showed a reliability coefficient of 0.694 for the first half and 0.690 for the second half of the scale. The Guttman Split-half coefficient was found to be 0.593. In a study (2019), the Guttman Split-half coefficients and the Spearman-Brown Coefficients ranged from 0.735 to 0.882 for the sub-dimensions of the scale. The expected value range is from 0.70 to over [30]. In this study, although the results of the split-half test were below 0.70, obtaining the desired values in
other reliability analyzes was proof for the reliability of the scale.

CONCLUSIONS

Individuals with chronic diseases need to adapt to the disease, treatment, and related problems. Achieving this adaptation expected from patients as soon as possible makes patients and health professionals successful in combating the disease. In order to develop desired attitudes, it is necessary to understand the patient's problems correctly and in a timely manner so that healthcare professionals can provide patients with the support they need.

According to the results of the study, the Turkish version-Ch-ASIQ scale can be accepted as valid and reliable for Turkish society. It is thought that this scale will help determine the attitude problems of the patients who have problems in starting insulin and, as a result, will contribute to providing early and correct support. This tool will help identify the compliance-related problems experienced by the patients who have just started insulin treatment. Ch-ASIQ - Turkish version of the scale will allow nurses to recognize early attitudes about the attitudes that patients may experience during insulin initiation and enable patients to reach their education and support needs more efficiently. As a result of the feedback given by the patients, patients with compliance problems can be identified early, and they can be supported to strengthen their management by providing continuous training.

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Acknowledgements

The author would like to thank the who participated in our study.

Conflicts of interest

The authors have declared no conflict of interest.

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