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Reliability and validity of the Turkish version of the Abeer Children Dental Anxiety Scale (ACDAS)

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Highlights

- Dental anxiety is a common problem that can lead to adverse conditions in dentists and patients.
- Addressing childhood dental anxiety is a critical step in improving children's oral health and dental experience. It is important to identify the anxious child as early as possible.
- The Turkish version of the Abeer Children Dental Anxiety Scale (ACDAS) could be considered as a valid and reliable dental anxiety scale that helps us to identify and treat anxious children.

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Abstract

Aim: This study aimed to assess the validity and reliability of the Turkish version of the Abeer Children Dental Anxiety Scale (ACDAS) as a tool used for the identification and treatment of anxious children. **Methods:** The study sample included 122 children aged ≥7 years, and the intervention consisted of implementation of the ACDAS and the Children's Fear Survey Schedule-Dental Subscale (CFSS-DS) by the lead researcher during the first dental visit for each child. ACDAS application was also repeated by another pediatric dentist in a smaller sub-sample of 20 children during the same visit. The lead researcher repeated the process, (i.e. application of ACDAS) in the whole study sample after two weeks. **Results:** The mean age of the participants was 9.84 ± 1.696 years (range: 7–12 years), and anxiety (ACDAS ≥ 26) was detected in 36.1% of the children. The Turkish version of the ACDAS exhibited high correlation with the CFSS-DS ($r = 0.760$; $p < 0.001$), and the Cronbach Alpha value ($\alpha = 0.934$) showed good internal consistency. No statistically significant differences were observed in the dentist's responses to questions in the Dental and Cognitive sections when comparing the first and second applications of the scale ($p > 0.05$), although significant differences were observed in the Child Evaluation section ($p < 0.01$). The Area Under the Curve (AUC), obtained by Receiver Operative Characteristic Curve (ROC) Analysis was 0.849 indicating good diagnostic performance. **Conclusions:** Based on these findings, the Turkish version of the ACDAS can be considered as a valid and reliable dental anxiety scale for the identification of children concerned about dental procedures.

Keywords: Dental Anxiety; Dental Care; Pediatric Dentistry

INTRODUCTION

Although dental anxiety, a very common condition that may cause various problems for dentists and patients,[1,2] can appear at any age, it is typically observed in childhood or adolescence[2] as a result of social factors such as the individual's personality traits, socioeconomic status, family history of dental anxiety, parental expectations regarding their child's behavior in a dental settings, and various factors associated with the dental environment itself.[3] Childhood dental anxiety may also be carried into adulthood, resulting in the individual avoiding any form of dental treatment. Therefore, identification of an anxious child and management of their dental anxiety at an early stage[4] plays a critical role in the improvement of an individual's oral health and dental experience.[5] In order to achieve this, evaluation of dental anxiety must be child-oriented, reliable, valid, and practical,[6] and anxiety measurement techniques include scoring the child's behavior during dental visits, projective techniques, physiological measurements, and psychometric scales[7-11] such as the Children's Fear Survey Schedule-Dental Subscale (CFSS-DS) which assigns scores based on the level of fear exhibited by the child in response to dental-related conditions or treatments (e.g., "dentists," "injections," and "examining someone's mouth").[12,13] Although the CFSS-DS has been shown to have high reliability and validity in previous studies,[12,13] it does not evaluate the physical signs, thoughts, and behaviors of the child which may contribute to a better understanding of their dental anxiety.[2] The Abeer Children Dental Anxiety Scale (ACDAS) includes cognitive questions and is a valid scale for the measurement of dental anxiety in children over 6 years of age.[14] Therefore, the aim of this study was to investigate the validity and reliability of the Turkish adaptation of the ACDAS.

METHODS

Ethical approval

Ethical approval for this study was obtained from the Directorate of Scientific Research Ethics Committee of Karadeniz Technical University, Faculty of Medicine (No. 2019/18; 11/02/2019).

Sample size

The study was conducted at the Children's Dentistry Clinic of Karadeniz Technical University, Faculty of Medicine. The power calculation, based on a previous study done by Temel G and Erdogan S[15], yielded a sample size of 116. Based on this, this study aimed to include 140 children in order to allow up to 20% loss to follow-up. The inclusion criteria were as follows: age ≥ 7 years; absence of any systemic, mental and/or physical disorders; no history of medications for any psychiatric reasons; absence of any learning and understanding disabilities; and fluency in reading, speaking and understanding Turkish.

Translation of the scale into Turkish was carried out in three stages, and the language validity was tested using the translation/retranslation method. Two pediatric dentists who were proficient in English translated the scale into Turkish independently, following which the original scales and translations were evaluated by two different pediatric dentists to allow selection of the most appropriate one. At the final stage, a dentist who was blinded to the original scale translated the Turkish text into English, compared it with the original text, and translated the nonconforming items back into Turkish to obtain the final scale (Figure 1).

The ACDAS was applied to 20 participants by the lead researcher as well as another pediatric dentist in the same visit to allow measurement of interobserver reliability. ACDAS was further

administered by the lead researcher in all participants (excluding 20 children) after an interval of two weeks to measure other reliability parameters (internal consistency and test-retest). Additionally, the Children's Fear Schedule Scale-Dental Subscale (CFSS-DS) was also applied to the same children to assess the validity of ACDAS in the first visit.

Data collection tools

Abeer Children Dental Anxiety Scale

The ACDAS is a cognitive scale consisting of 19 questions and three sections, as follows: dental, cognitive, and child evaluation. In the dental section, consisting of 13 questions, the children were asked to show how they felt in response to the question by selecting the appropriate option out of three facial expressions provided. The responses were scored on a scale of 1–3, with the total scores ranging between 13 and 39 and a score of 26 and above indicating anxiety. The Cognitive and Child Evaluation sections of the scale were completed by the child's legal guardian and the dentist.[14]

Child Fear Survey Schedule-Dental Subscale (CFSS-DS)

The Turkish version[16] of the CFSS-DS consisted of 15 questions addressing the various stages of clinical dental treatments.

The children were asked to score their response to the question using a scale ranging from 1 to 5 (1: I am not scared at all; 2: I am scared very little; 3: I am a little scared; 4: I am very scared; 5: I am extremely scared). The total score ranged between 15 and 75, and a score of 36 and above was considered indicative of anxiety.

Statistical analysis

All statistical analyses were carried out using the SPSS 17.0 Statistical Package Program (Chicago: SPSS Inc.). Cohen's Kappa test was used to determine interobserver agreement, and Spearman's Correlation and ROC analyses were used to determine the validity of the ACDAS and CFSS-DS scales. The Cronbach Alpha test was used to assess internal consistency of the entire scale, and the Wilcoxon test was used to test the reliability of each section. The McNemar and McNemar–Bowker tests were used for detailed analysis of the survey questions, and an ACDAS-Turkish cut-off points ≥ 26[14] and CFSS-DS ≥ 36[17] were considered to be indicative of anxiety.

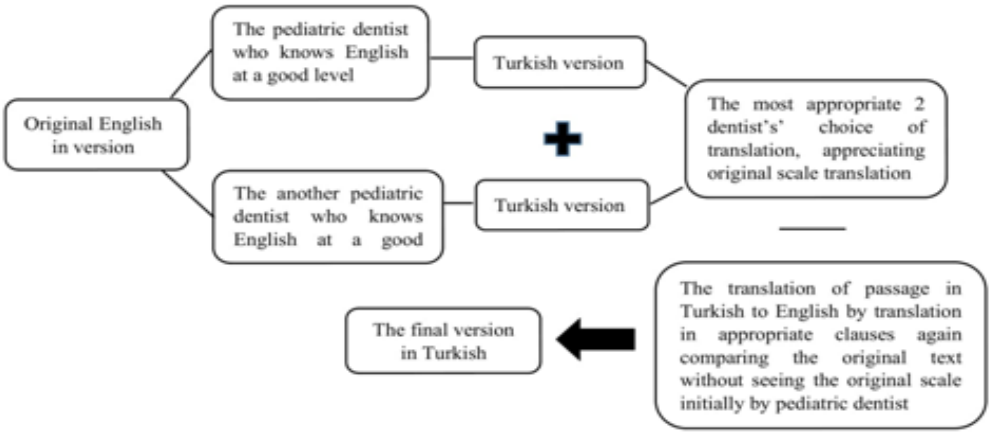

Figure 1. Flowchart of language validity

RESULTS

The study sample included 122 children, of which 65 were girls (53.3%) and 57 were boys (46.7%), and the mean age was 9.84 ± 1.696 years (range: 7–12 years).

Findings in relation to the cut-off score

The first application of the scale (ACDAS1) by the lead researcher found that 44 (36.1%) children were anxious, while 78 (63.9%) participants exhibited no anxiety based on their total scores being less than the cut-off values described previously. In contrast, 30 (24.6%) children were found to be anxious and 92 (75.4%) children exhibited no anxiety when using the CFSS-DS scale in the same visit (Table 1).

Reliability analysis

The internal consistency Cronbach Alpha coefficient ($\alpha = 0.934$) and the Cohen's Kappa test ($\varkappa = 1$, $p < 0.001$) showed high reliability of the ACDAS scale and good interobserver agreement between the two researchers, respectively (Table 2).

No statistically significant differences were observed in the dentist's responses to the questions in the Dental and Cognitive sections of the ACDAS scale when comparing the first application by the lead researcher to the second application two weeks later (ACDAS2) ($p > 0.05$). The frequency and distribution of the total scores for the questions in the Cognitive and Child Evaluation sections have been shown in Table 3. Sstatistically significant differences in the legal guardian's responses to the questions in the Child Evaluation section ($p = 0.004$; $p < 0.01$) (Table 3) were observed. Approximately 29.5% of the respondents reported feeling ashamed when they went to the dentist; 40.1% said that they were ashamed of the appearance of their teeth; and 36.9% said that they were worried about losing control when visiting the dentist.

Table 1. Distrubution of groups to anxious and non anxious

	N	%
ACDAS1		
< 26	78	63.9
≥ 26	44	36.1
ACDAS2		
< 26	77	63.1
≥ 26	45	36.9
CFSS-DS		
< 36	92	75.4
≥ 36	30	24.6
Total	122	100.0

Table 2. Interobserver agreement

		ACDAS1		Total	$\varkappa$ (Cohen's Kappa)	p
		<26	≥26			
ACDAS (Researcher 2)	<26	10	0	10	1.000	p<0.001
	≥26	0	10	10		
	N	10	10	20		

**Values of p<0.05 were considered statistically significant* (N=20, κ=1, p<0.001)

Table 3. Cognitive part and information related to child assesment

	ACDAS 1		ACDAS 2		p
The Cognitive Part	N	%	N	%	
3	12	9.8	8	6.6	
4	28	23.0	30	24.6	p=0.398
5	37	30.3	37	30.3	
6	45	36.9	47	38.5	
TCA-For Legal Guardian					
2	55	45.1	69	56.6	
3	54	44.3	45	36.9	*p=0.004
4	8	6.6	8	6.6	
5	5	4.1	-	-	
TCA-For Operator					
1	50	41.0	64	52.5	
2	61	50.0	43	35.2	p=0.150
3	11	9.0	15	12.3	
Total	122	100	122	100	

**Values of p<0.05 were considered statistically significant*

Statistically significant differences in the legal guardian's responses to the question "has your child had dental treatment before? (Yes/No)" in the Child Evaluation section was observed ($p < 0.001$) (Table 4). No statistically significant differences were observed in the answers to the question "how do you expect your child's behavior to be like today? (Happy/Well/Afraid)" between the first and second applications of the scale ($p > 0.05$) (Table 4).

Table 4. Child assessment- Time-related changes in legal guardian responses

		ACDAS1		ACDAS2		p
		N	%	N	%	
Has your child had previous dental treatment?	Yes	109	89.3	122	100	*p<0.001
	No	13	10.7	-	-	
How do you expect your child's behaviour today?	Happy	58	47.5	69	56.6	p<0.199
	Ok	55	45.1	45	36.9	
	Scared	9	7.4	8	6.6	
	Total	122	100	122	100	

**Values of p<0.05 were considered statistically significant*

Validity analysis

The criterion validity of the scale was evaluated using CFSS-DS, and a highly statistically significant correlation was observed between the ACDAS and CFSS-DS (Spearman's Correlation Analysis $r = 0.760$; $p < 0.001$).

The AUC obtained from the ROC analysis was 0.849 (Figure 2) indicating good diagnostic performance.

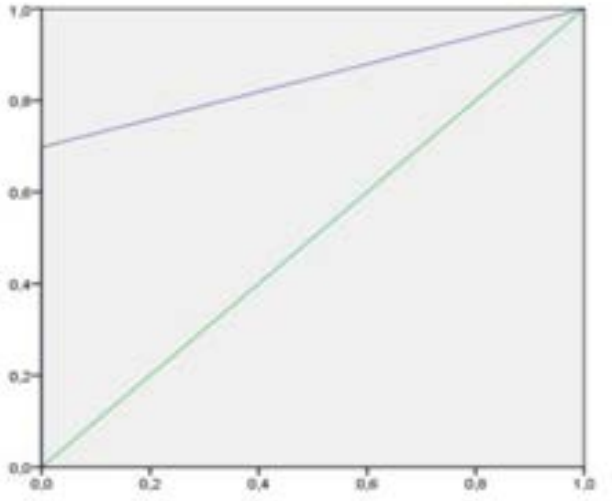

Figure 2. Roc curve

DISCUSSION

The main aim of this study was to evaluate the psychometric characteristics of ACDAS after translation to Turkish by analyzing its validity and reliability. The ACDAS may have advantages over the Turkish measures, such as the inclusion of a separate cognitive section with only 3 faces in response. In addition, the scale can uniquely measure dental anxiety by asking questions to the child, mother/legal guardian, and dentist simultaneously. This feature can provide 360^0 ratings of children's dental anxiety. Therefore, this scale can be considered as a much more beneficial and valid Turkish anxiety scale compared to the previously reported scales.[14,16,18]

This study design had several limitations. Firstly, recruitment of participants was restricted to a single clinic and, for this reason, the results may not be generalizable to all children of this age in Turkey. Secondly, this study only evaluated the validity and reliability of the scale, and the dental anxiety observed in the sample and the factors associated with it were not explored.

Cohen's Kappa test ($\kappa = 1$, $p < 0.001$) showed excellent interobserver agreement in this study, and this was similar to a previous study conducted by Al-Namankany et al.[18] who observed slightly lower inter observer agreement ($\kappa = 0.89$; 95% CI: 0.82–0.96) and an internal consistency Cronbach Alpha coefficient ($\alpha = 0.90$) similar to findings of this study ($\alpha = 0.934$), indicating homogeneity in all items of the scale. Moreover, the internal consistency of the ACDAS was found to be comparable to that of the CFSS-DS (α = 0.8–0.9).[2] Based on these findings, the Turkish version of the ACDAS was found to be a reliable dental anxiety scale suitable for use in children and adolescents. Mafla et al.[19] previously evaluated the validity and reliability of the Spanish version of ACDAS and reported a high internal consistency coefficient ($\alpha = 0.88$). The Cronbach Alpha reliability coefficient observed in this study was similar to that reported by a systematic review examining anxiety scales.[2]

Although no statistically significant differences were detected in the repeatability of the dentist's answers in dental, cognitive and child evaluation section in the evaluation of the repeatability of ACDAS ($p>0.05$), a statistically significant difference was observed in the legal guardian's response to the question "has your child had dental treatment before? (Yes/No)" between the first and second applications of the scale ($p < 0.001$). A total of 109 participants answered "Yes" and 13 participants responded "No" in the first application of the scale and, as dental treatment of the participants was carried out in the same visit,

all participants were able to respond "Yes" to this question in the second appointment. This significant difference between the two applications of the ACDAS over a two week interval could be attributed to the fact that patients who had never had dental treatment before at the time of the first appointment went on to receive treatment and, therefore, this status changed at the time of the second appointment.

The high correlation ($r = 0.760$; $p < 0.001$) between the ACDAS and the CFSS-DS supports the validity of ACDAS in the field of dentistry, indicating that it was capable of accurately measuring the characteristic of interest without confusing it with any other characteristics. Although the ACDAS evaluates the child's experience of dentistry, similar to the CFSS-DS, it also evaluates other important factors such as the perception of losing control, feeling shame, and loss of self-confidence in the child, all of which are related to the cognitive nature of the child and may play a role in anxiety. The correlation values obtained in this study were similar to those observed in a previous study comparing the validity of MCDAS with CFSS-DS ($r = 0.82$; $p < 0.001$)[20], and higher than that observed in another study also comparing the validity of ACDAS with CFSS-DS but in a different population ($r = 0.46$, $p = 0.007$; $p < 0.001$)[21].

The area under the ROC curve, used to assess the ability of the ACDAS scale to identify an anxious individual accurately, was high (EAA = 0.849) in this study, and these findings were similar to that reported by Al-Namankany et al.[14] (EAA = 0.80).

This study showed that acceptable results were obtained in terms of both numerical and categorical data. The study sample included children in the age range of 7–12 years, similar to previous studies[19,21], as younger children would not have the cognitive complexity necessary to accurately report their reactions to dental treatments.[22] Moreover, as the questions on the scale were answered by the participants themselves, only those who had the ability to read Turkish (7 years and older) would be eligible.

Evidence suggests that the prevalence of dental anxiety varies globally, with estimates ranging between 3% and 43%,[23-25] and Folayan et al.[26] argued that these differences could be attributed to the method of study as well as environmental factors themselves. This study found that 36.1% of children aged 7–12 years exhibited anxiety (≥26 points) and, although higher than the estimates provided by previous studies[5,27,28] evaluating anxiety in a similar age group, this proportion was within the global range.

CONCLUSIONS

Based on these findings, the Turkish version of the ACDAS may be considered as a valid and reliable scale for the identification of children with dental anxiety, thus enabling recognition of the causes of their concerns and facilitating treatment and prevention of further anxiety.

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