

Cross-Cultural Adaptation of Kannada Version of Modified Dental Anxiety Scale Among an Adult Indian Population

GAURAV GUPTA¹, NAMITA SHANBHAG², MANJUNATH P PURANIK³

ABSTRACT

Background: Dental anxiety is one of the most common barriers in seeking dental care. In order to overcome this barrier dentist need to screen patients to successfully help in treatment. A scale is thus needed to measure dental anxiety which is socially & culturally acceptable.

Aim: This study aimed to assess the Cross cultural adaptation and validity of the Kannada translation of the Modified Dental Anxiety Scale (MDAS-K).

Materials and Methods: A test-retest was conducted on 30 patients visiting a dental institution to assess the reliability of MDAS- K. A cross-sectional survey of 301 patients was conducted in different departments at a dental institution to test the psychometric properties of MDAS-K. The assessment tool consisted of a proforma containing socio-demographic, non socio- demographic variables, MDAS-K and Visual analogue scale (VAS).

Statistical analysis: Reliability was assessed using Cronbach's alpha, inter-item Spearman's correlation. Independent t-test, ANOVA and post hoc Bonferroni were used to analyse dental anxiety in the psychometric constructs.

Results: The internal consistency of MDAS-K was good with Cronbach's alpha of 0.83. The test-retest reliability for MDAS K had a good correlation of 0.901. The psychometric variables established the construct validity of MDAS-K. MDAS-K also showed good convergent validity with VAS score. The anxiety levels differed in patients visiting different dental departments.

Conclusion: The high reliability and validity of the MDAS-K supports its cross cultural adaptation and indicates that it can be a valuable tool for dental practioners in quantifying anxiety among patients and provide quality dental care.

Keywords: Assessment, Reliability, Validity, Visual analogue scale

INTRODUCTION

Increased awareness among public of the consequences of poor oral health has contributed towards increase in the demand for dental services over the years but anxiety and fear of pain associated with dental treatment, keeps patient away from seeking dental care.

Dental anxiety is defined by Corah NL as a patient's response to the stress that is specific to the dental situation [1]. The theories related to anxiety have been classified into psychoanalytical, physiological, behavioural/learning, phenomenological, cognitive and those concerned with uncertainty [2]. Dental anxiety can also have physiological, cognitive or behavioural impacts on daily living. Assessment of dental anxiety is thus important for two reasons: first, to assist the dentist in the management of anxious patients and secondly to provide evidence-based research into this psychological construct which has been shown to predict dental avoidance [3]. A dentally anxious patient may enter a vicious cycle where anxiety leads to avoidance, neglected dental care and feeling of shame which may have an effect on both prognosis and treatment.

Various dental anxiety measures have been developed [4]. Among them was Modified dental anxiety scale that was advocated for its brief nature and ease of interpretation that has lent itself to its widespread use in general dental practice. Anxiety assessment by such measures provides information to the dentist and also confers a psychological benefit on patients [4].

The modulating effect of culture in synergy with other variables contributes to the variations as seen in reports of dental anxiety between different regions of the world [5]. To maintain the essence and the content validity of the instrument across cultures, the items must be well translated linguistically and adapted culturally [5]. The term "cross-cultural adaptation" is used to encompass a process that looks at both language (translation) and cultural adaptation issues in the process of preparing a questionnaire for use in another setting [6].

The MDAS has been translated and validated to measure dental anxiety in many countries namely Greece, Spain and Turkey as a measure of dental anxiety [7-9]. With regard to Indian context there is paucity of studies on cross cultural adaptation of MDAS into different Indian languages. The Visual analogue scale has also been used to measure dental anxiety and establish the convergent validity of MDAS [10,11].

The aim of this study was to assess the cross cultural adaptability of the Kannada translation of the MDAS alongside the dental anxiety among adult patients.

MATERIALS AND METHODS

This cross-sectional study was carried out among the dental patients who reported at Government Dental College and Research Institute in Bangalore city, India, during the months of May- June 2013. Ethical clearance was obtained from the Institutional ethical committee and necessary permission was sought.

Subjects

The patients who fulfilled the inclusion and exclusion criteria were recruited from the waiting areas of the respective departments.

Inclusion criteria

All those patients proficient in Kannada language, who reported to the institute and provided informed consent were included.

Exclusion criteria

Patients below 18 years, illiterate and who were undergoing psychiatric therapy or who reported of generalized anxiety disorders were excluded from the study.

CROSS-CULTURAL ADAPTATION

The translation of MDAS was done by means of a forward- and back- translation procedure [6]. Two bilingual experts and one dentist translated the original MDAS from English to Kannada

language. The translated Kannada versions were submitted to panel of experts who agreed on the Kannada version of MDAS. The Kannada version was then back translated to English by other set of independent bilingual experts and a dentist to check for the validation of word modification. The back translated versions were submitted to panel of experts who reached at an agreement with minor modifications. The final back-translated version was pretested and was then referred as MDAS-K

Reliability (test –retest)

Reliability of MDAS-K was established among 30 patients who were willing to revisit the dental institute to complete the same questionnaire after a week.

For Psychometric testing (Validity)

Construct Validity of MDAS-K was established among 301 patients who visited the outpatient clinics of different dental departments (Orthodontia, Prosthodontia, Oral Surgery, Periodontia and Conservative & Endodontia). The psychometric questionnaire consisted of structured proforma in Kannada on socio-demographic details (age, gender, education occupation and income) and non socio demographic variables (duration of previous dental visits, past dental experiences, self perceived oral health status, avoidance of dental care due to dental anxiety).

Convergent Validity

Convergent validity was assessed using VAS. VAS from 0 (non anxious) to 100mm (extremely anxious) was used in both test – retest and in the psychometric study.

STATISTICAL ANALYSIS

The data was analysed using SPSS-14 software (Chicago, Ill. USA). The internal reliability (consistency) was evaluated using Cronbach's alpha and inter item correlation. The external reliability or test-retest reliability (stability) was evaluated using inter- item correlation matrix. Paired t-test was used to measure any difference in the mean dental anxiety scores of MDAS-K. MDAS-K dental anxiety scores during the two consecutive visits were correlated using Pearson's correlation. The independent t-test and one-way Analyses of Variance (ANOVA) were used to study the difference in the groups based on the mean dental anxiety scores. Post-hoc Bonferroni test was done for pair wise comparison of the results which were significant. Convergent validity between MDAS and VAS was measured by using Spearman's Correlation test. The statistical significance was set at $p < 0.05$

RESULTS

Reliability Measures

The Cronbach's alpha for MDAS-K was 0.83. The Spearman's inter item correlation in MDAS- K showed items were homogeneous and each of them measured the same as the rest of items in the scale thus confirming the internal consistency of MDAS- K [Table/ Fig-1]. The inter-item correlation matrix between the five items of MDAS -K in the two visits q1(0.84), q2(0.85), q3(0.89), q4(0.81), and q5(0.86) was significant at $p < 0.01$. Pearson's correlation coefficient between anxiety scores in the two visits of MDAS –K was 0.901 which also confirmed the stability of MDAS-K. No statistically significant difference was observed between the mean dental anxiety scores of the MDAS-K in the two visits and also between VAS test and retest [Table/Fig-2].

Validity

The construct validity was established by analyzing the socio-demographic and other non socio-demographic variables.

Patients less than 30 years of age had the highest (11.54) mean anxiety scores among the considered age groups. Statistically

ITEMS	q1	q2	q3	q4	q5
q1	1.000	.651*	.522*	.348*	.536*
q2		1.000	.567*	.544*	.553*
q3			1.000	.570*	.831*
q4				1.000	.684*
q5					1.000

[Table/Fig-1]: Inter item Spearman's Rho correlation between MDAS- K questions

* $p < 0.01$

Anxiety scales	N	Mean anxiety score (S.D)	Test	Correlation
MDAS(K) test	30	11.76(4.763)	t=.837*	0.90 [†]
MDAS(K) retest	30	11.00(4.291)		
VAS test	30	2.04(0.978)	Wilcoxon signed rank test=-1.4*	0.96 [†]
VAS retest	30	2.12(1.013)		

[Table/Fig-2]: Test retest statistics for Mean Dental Anxiety Score

* $p > 0.05$, [†] $p < 0.001$

significant differences were observed between the groups ($p < 0.001$). Post-hoc test showed significant difference in anxiety between age group up to 30 years and those above 30 years of age [Table/Fig-3]. Pearson's rho correlation showed inverse correlation between age and mean anxiety score and was statistically significant ($r = -0.2$, $p < 0.01$).

Statistically significant differences were observed between the genders with respect to their mean anxiety scores ($p < 0.001$) with mean anxiety scores of males being lower than that of females. The correlation ($r = 0.2$, $p < 0.0005$) between the mean dental anxiety scores and the gender was statistically significant [Table/Fig-3].

The mean dental anxiety score (11.52) was found to be higher among the unemployed patients than those who were employed. One-way ANOVA showed statistically significant difference between the groups ($p < 0.003$). The post-hoc test showed significant difference between unemployed and semi skilled workers and also between unemployed and clerical/shop owners/farmer [Table/Fig-3].

The mean dental anxiety score of the patients who had visited the dentist previously was lower (9.95) than who had not [Table/

Variable	Number of patients(%)	Mean total score \pm SD	p-value
Age group			$p < 0.001$
≤ 30	145 (48.17)	11.54 \pm 4.26 [†]	
31-50	101 (33.55)	9.39 \pm 4.28 [*]	
≥ 51	55 (18.27)	8.24 \pm 3.71 [†]	
Gender			$p < 0.001$
Male	151 (51)	9.36 \pm 3.969	
Female	150 (49)	11.07 \pm 4.60	
Education			$p > 0.05$
Professional / Post graduate/ Graduate	130 (43.18)	9.53 \pm 4.0	
Intermediate / diploma	49 (16.27)	10.55 \pm 4.4	
Middle and High school	52 (23.25)	9.76 \pm 4.1	
Primary school	70 (23.25)	10.71 \pm 4.7	
Occupation			$p < 0.05$
Professional	21 (6.97)	8.95 \pm 3.52	
Semi-professional	21 (6.97)	9.81 \pm 3.29	
Clerical/ shop owner/ farmer	35 (11.29)	8.91 \pm 3.50 [*]	
Skilled	22 (7.30)	9.23 \pm 3.89	
Semiskilled	37 (12.29)	9.05 \pm 3.93 [†]	
Unemployment	46 (15.28)	11.52 \pm 4.85 ^{*,†}	
Income			$p < 0.05$
≤ 10000	124 (41.19)	9.85 \pm 4.3	
10001-20000	108 (35.88)	10.90 \pm 4.5	
≥ 20001	69 (23)	9.80 \pm 4.0	

[Table/Fig-3]: Socio demographic variables and Mean Dental Anxiety Scores

Bonferroni post hoc test^{*}, [†] Same symbol show statistical difference between the groups at $p < 0.05$

Variable	Number of patients(%)	Mean total score \pm SD	p-value
Previous dental visit			
More than 1 yr	83 (27.54)	10.47 \pm 4.51	p> 0.05
6-12 months	62 (20.59)	9.77 \pm 4.19	
less than 6months	83 (27.54)	9.54 \pm 3.77	
Not visited	73 (24.25)	11.03 \pm 4.94	
Dental visit experience			
Pleasant	157(68.85)	9.56 \pm 3.991	p>0.05
Can't Say	58(25.43)	10.91 \pm 4.736	
Unpleasant	13(5.70)	10.38 \pm 2.844	
Avoided dental visit (Anxiety)			
Yes	100 (33.22)	9.40 \pm 4.269	p<0.05
No	201 (66.77)	11.85 \pm 4.133	
Self perceived oral hygiene			
Good	126 (41.8)	9.61 \pm 4.16	p>0.05
Average	121 (40.19)	10.63 \pm 4.58	
Bad	32 (10.63)	10.44 \pm 4.29	
Can't say	22 (7.30)	11.05 \pm 4.27	
Different departments visited			
orthodontia	34 (11.3)	11.65 \pm 4.28*	p<0.05
oral surgery	74 (24.6)	10.76 \pm 4.30	
conservative	76 (25.2)	10.18 \pm 4.83	
periodontics	47 (15.6)	10.26 \pm 4.50	
prosthodontic	33 (11.0)	8.30 \pm 3.60*	

[Table/Fig-4]: Non demographic characteristics and Mean Dental Anxiety Scores Bonferroni post hoc test; * - Same symbol show statistical difference between the groups at p<0.05

Fig-4]. The mean dental anxiety score was the highest (10.91) in patients who were not able to express their dental visit experience. However, the difference was not statistically significant [Table/Fig-4]. The mean dental anxiety score was highest (11.85) in patients who had avoided dental visits when compared to those who did not. The Independent t-test showed statistically significant difference between the groups [Table/Fig-4].

Convergent Validity

A highly significant correlation between MDAS-K and VAS in the test- retest (0.76-0.79) and Psychometric study (0.71, $p < 0.001$) supported the convergent validity of MDAS-K.

Anxiety levels in patients visiting different departments

The highest mean dental anxiety scores were experienced by patients visiting the department of Orthodontia (11.65). The difference in the mean anxiety scores of the patients with respect to different departments was statistically significant. Bonferroni post-hoc analysis showed significant difference in mean dental anxiety scores between patients visiting departments of Orthodontia and Prosthodontia, only [Table/Fig-4].

DISCUSSION

Effect of culture on the complex network of aetiology factors is possible because the response to felt/trait anxiety depends to a large extent on processes of cognitive appraisal and coping mechanisms developed by the individual.

The reliability was established by measuring the internal consistency and the stability of MDAS-K. Cronbach's alpha for internal consistency of MDAS-K (0.83) was similar to the Tamil version (0.83) of MDAS but higher than another Indian study by Acharya et al., [11,12]. The Cronbach's alpha value of Greek (0.90) and Turkish (0.91) version showed a higher consistency [7,9]. The test – retest correlation of 0.9 between MDAS-K pre and post was similar to that of the Greek version (0.94) [7]. Further the test–retest inter item correlation matrix for q1(0.84), q2(0.85), q3(0.89), q4(0.81) and q5(0.86) confirmed the stability of the questionnaire and was similar to that of the Tamil version q1(0.9), q2(0.83), q3(0.89), q4(0.89) and q5(0.92) [11].

Age

Age related cerebral changes and other factors such as acceptance of the inevitable, extinction or habituation may attenuate the fears

and phobias as age advances [13]. Lindell and Locker explained that lower levels of dental anxiety in the elderly may be because problems of chronic illness and disability looms larger than oral health issues and that older patient have more time for good experiences to neutralize aversive ones [14]. In this study, age was inversely correlated to dental anxiety. The patients with less than 30 years of age had the highest mean dental anxiety scores and the difference between the groups was statistically significant. The results of the study were similar to studies of Acharya and Humphris GM [12,15] while study by Tunc suggested higher dental anxiety levels in older individuals [9]. However, no significant difference was found between age and MDAS scores by Malvani and by Gisler [16,17].

Gender

In the present study, females were more dentally anxious than males. The results of this study are in agreement with studies by Acharya and Malvania on Indian population and by Gremigni, Stabholzon European population [12,16,18,19]. This may be explained by the fact that females desire greater control but their lower perception of actual control is likely to create psychological tension [14]. Secondly, there is a general willingness among females to acknowledge feeling of dental anxiety [12].

Education

The mean dental anxiety score was highest among less educated patients. The reason may be that education equips a person to handle stress in a better way [19]. The results are in agreement with studies conducted by Acharya and Malvania who found decreased anxiety levels with higher education levels [12,16]. However, studies by Akeel, found that people with higher level of education to be more anxious [20].

Occupation

Unemployed patients were more anxious than those who were employed, the difference was statistically significant and similar to the results of the Indian studies by Appukkuttan and Malvania [11,16]. This could have been due to low level of rationalization of the situation by unemployed patients [16].

Income

There was no statistically significant difference in the mean dental anxiety scores and patients monthly family income. The results of this study are similar to the study by Hakerberg and Kanegane [21,22]. However, the results are in contrast to those of Moore wherein those having extreme anxiety were of higher income [23].

Previous Dental Visits

The lowest dental anxiety scores were in patients who had visited the dentist previously. However, the results were not statistically significant. Similar results have been reported in studies on Indian and Dunedin adults [16,24].

Dental visit experience

There was no statistical difference in the mean dental anxiety scores of patients with regard to their previous dental visit experience. Acharya and Malvania have reported similar results [12,16]. In a longitudinal study by Thomson and Locker, putative conditioning experience did not appear to be the main aetiological agent in the adult onset of dental anxiety [24,25]. Methodological problems remain relating to the temporal sequence of events necessary to assign a causal role. It is also possible that dentally anxious subjects may be more likely than non anxious to classify their previous experiences as negative even if they did not play an aetiological role [25].

Avoidance of dental visit due to anxiety

Implications of avoidance and fear of dentistry can be a vicious cycle where fear contributes to an avoidance behaviour which in turn,

leads to a deteriorating oral health that aggravates the fear [21]. In this study, patients who had avoided dental visits due to anxiety had higher mean dental anxiety scores than patients who had not ($p < 0.05$). Appukuttan found similar results in Tamil speaking adults [11].

Self perceived oral health status

In this study, patients who perceived their oral health to be good had the lowest mean anxiety scores. Appukuttan found that Tamil speaking patients with high dental anxiety score expressed their oral health status as poor [11]. In a study on Israeli military personnel, those with higher dental anxiety score expressed more dental treatment needs [26]. The study by Carrillo-Díaz, established a strong correlation between self assessed oral health status and dental anxiety [27].

Anxiety levels in patients visiting different departments

The highest observed dental anxiety was in patients attending the Department of Orthodontia followed by Department of Oral Surgery, Conservative dentistry, Periodontics and Prosthodontics respectively.

In a study by Weinstein patients visiting department of Oral Surgery and Orthodontia had similar mean dental scores [28]. However, the study done by Yildirim found that patients seeking restorative and prophylactic dental care had higher dental anxiety levels than those seeking Orthodontic treatment [29]. Most of the patients visiting department of Orthodontia were less than 30 years of age and had never visited a dental surgeon before. These variables could have confounded the results of this study.

Patients visiting the Department of Oral Surgery were more anxious in this study than those visiting the Department of Conservative and Periodontics while in the study by Koleoso patients felt more anxious having their tooth drilled than those who would have a local anaesthetic in their gums [30].

In this study, the patients visiting Departments of Periodontics had higher mean dental anxiety scores than those visiting the Department of Conservative and Endodontics. This was in agreement with the study by Stabholz which ranked scaling as the second most common procedure provoking dental anxiety after dental extractions [19].

Prosthodontic care evoked least anxiety in the patients and was similar to the study by Weinstein [28]. It can be assumed that dental treatment of edentulous patients is painless or without any discomfort and therefore not invoking fear. However, psychological and somatic lack of 'well-being and also with hostility and neuroticism's may explain the mean dental anxiety score of 8.30 in patients visiting Department of Prosthodontia [31].

Convergent Validity

The correlation between the MDAS-K and VAS established the convergent validity as observed in the study by Bahammam, Appukuttan and Facco [10,11,32].

LIMITATION

However, this study had certain limitations since it was a self reported questionnaire based study thus recall bias could have affected the outcomes. Secondly, since it was conducted in patients visiting dental teaching institute which may not have reflected the dental anxiety levels of general population. In this study no attempt was made to distinguish between patients who visited the Department of Conservative and Endodontic surgery on the basis of restoration or endodontic procedures as most of the patients were not aware of the difference between the two.

CONCLUSION

The high reliability and validity of MDAS-K demonstrated in this study supports its cross cultural validation and indicates that it may be a

valuable tool in quantifying dental anxiety among Kannada speaking adult population. The broader acceptance and adaptation of this tool in various settings by dentists can improve the quality of oral care provided to the patients, by employing cognitive behavioural or pharmacological therapy, thereby effectively dealing with their dental anxiety.

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PARTICULARS OF CONTRIBUTORS:

1. Post Graduate Student, Department of Public Health Dentistry, Government Dental College & Research Institute, Bangalore, India.
2. Associate Professor, Department of Public Health Dentistry, Government Dental College & Research Institute, Bangalore, India.
3. Professor and Head of the Department, Department of Public Health Dentistry, Government Dental College & Research Institute, Bangalore, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Gaurav Gupta,
Post Graduate Student, Department of Public Health Dentistry, Government Dental College & Research Institute,
Bangalore- 560002, Karnataka, India.
E-mail: gauravbenu@gmail.com

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