Original Article

Validation of Arabic version of the Modified Dental Anxiety Scale (MDAS) and Kleinknecht's Dental Fear Survey Scale (DFS) and combined self-modified version of this two scales as Dental Fear Anxiety Scale (DFAS) among 12 to 15 year Saudi school students in Riyadh city

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ABSTRACT

Aims: The aim of this study was to test the reliability and validity of the Arabic version of Modified Dental Anxiety Scale (MDAS), Dental Anxiety Scale (DAS), and a combined self-modified version of these scales and Dental Fear and Anxiety Scale (DFAS). We also aimed to assess the impact of dental fear and anxiety among Arabic-speaking 12-15-year-old Saudi students on their quality of life by correlating MDAS, DAS, and DFAS scores with other demographic data. **Materials and Methods:** A cross-sectional study was conducted among 500 individuals (250 male and 250 female) in Riyadh city using a questionnaire. An unpaired t-test was used to check the mean difference between anxiety score among males and females, and one-way analysis of variance was used to check the mean difference between percentage anxiety score among different visit groups. Scheffe *post hoc* test was used to check the pairwise difference between the groups, and Cronbach's alpha was used to measure internal consistency of the questionnaire. **Results:** Overall mean percentage DAS score was $51.1640 + 6.87358$ and $55.2080 + 8.52805$ for male and females, respectively. The overall mean percentage MDAS score was $51.6640 + 10.9478$ and $58.3200 + 11.62990$ for males and females, respectively. The overall mean total score was found to be $64.4080 + 11.80776$ and $100.4680 + 12.34840$ for males and females, respectively. All the above results were statistically significant by 5% ($P < 0.001$). Cronbach's alpha score for MDAS and DAS was found to be 0.843 and it was 0.960 for DFAS. It was found that removal of any item would have decreased the overall consistency, which indicated a high level of internal consistency for our scales. **Conclusion:** Saudi Arabian version of Arabic version of MDAS, DAS and DFAS have shown high validity and reliability, and can be used to assess the dental patient's anxiety and fear.

KEYWORDS: *Arabic, Dental Anxiety Scale, Dental Fear and Anxiety Scale, Modified Dental Anxiety Scale*

INTRODUCTION

Dental anxiety affects approximately 4%–30% of adults across the world.[1-3] Dental anxiety is defined as patient's response to stress that is specific to the dental situation.[4,5] Anxious individuals avoid dental

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visits, do not cooperate while treatment procedures, require 20% more dental chair time, cancel or postpone dental appointments more often, and have a lower pain threshold. This results into a vicious cycle whereby dental fear, delayed/cancelled dental appointments, increased dental problems, and symptom-driven treatment form a linked chain feeding back into the fear experience.[5]

Various factors causing dental anxiety include fear of dental pain, discomfort, perceived lack of control over dental events, perceived negative attitude of dental staff, influence of other dentally anxious peers or family members, and past traumatic dental experiences.[1,6] Age, sex, educational qualification, and socioeconomic factors also play important role in developing dental anxiety.[6]

Managing dental anxieties is recognized as an important issue in dental practice. Patient's anxiety adversely affects the performance of a dentist hampering dental treatment.[7] Treating anxious patients consumes more time and they are often unsatisfied with their treatment resulting in increased occupational stress among the dentists.[8,9] Prior knowledge of the level of dental anxiety can forewarn the dentist about the patient's behavior, which can help him take measures to alleviate the anxiety during the operative procedure.[10]

A wide range of self-assessment questionnaires such as Corah's Dental Anxiety Scale (CDAS), Modified Dental Anxiety Scale (MDAS), State Trait Anxiety Scale, General Geer Fear Scale, Getz Dental Belief Survey, and Dental Fear Survey (DFS) are available to measure dental anxiety and fear. The most commonly used measures are CDAS, MDAS, and Kleinknecht's DFS. The former two questionnaires are more useful for screening and diagnosing patients with dental anxiety in a clinical setting.[5,6]

MDAS has been translated into different languages, namely Arabic, Chinese, Greek, Romanian, Spanish, Tamil, Turkish, and Italian.[3,4] Having assessment scales in local languages can help evaluate dental anxiety at more accurate level. Several studies have found good reliability and validity of Arabic version of MDAS.[3,11,12]

The aim of this study was to test the reliability and validity of the Arabic version of DFS, Dental Fear and Anxiety Scale (DFAS), and MDAS, so that it can be used as an effective tool to assess dental anxiety among the Arabic-speaking Saudi individuals of Riyadh city and also to correlate the scale with demographic data.

MATERIALS AND METHODS

This was a cross-sectional study carried out from December 2017- December 2018 among government school children. The study protocol was approved by the Research Center of Riyadh Elm University and its institutional review board (REU/30032018.), and all participants provided informed consent. Permission was obtained from the government school authorities to conduct the study.

The MDAS, DFS, and DFAS questionnaires were translated from English to Arabic by two bilingual professionals from King Saud University, fluent in English and having Arabic as their native language following the recommendations of Sartorius and Kuyken.[13] A sample of 30 patients of age 12–15 years attending dental clinics of college of dentistry, Riyadh Elm University was selected to fill out the questionnaire; the selected patients were from different socioeconomic background and education level. The patients were interviewed about the questionnaire in order to check whether they understood the questions and the answer formats. They were asked to report if they found any question confusing or difficult to comprehend. Final corrections were made to the translated Arabic version and used for testing the psychometric properties.

A total of 500 subjects were selected randomly from intermediate governmental schools from five areas in Riyadh city (middle, south, north, east, and west regions), 50 subjects per male school and 50 per female school per region (a total of 10 schools) for MDAS and DFS. Another 500 subjects were selected to test DFAS with similar criteria. The study participants were aged between 12 and 15 years. Only subjects who were willing to participate were included in the study. Subjects who refused to give informed consent and those who were undergoing psychiatric therapy or were having generalized anxiety disorders were excluded from the study. The assessment tools included a history form and Arabic version of DFS, DFAS, and MDAS.

The minimum required sample size was estimated to be 30 in each group, assuming 50% of the response rate and a power of 80% with 5% level of significance.

Hence, we will be selecting 50 patients in each male and female group with 500 being the total participants.

The methodology was tested in a pilot study on a sample of 30 patients in College of dentistry, Riyadh Elm University dental hospital for the same age group (12–15 years), we found that this age group comprise a 60% of the whole population in Riyadh city.

STATISTICAL ANALYSIS

The Statistical Package for the Social Sciences (SPSS for Windows, version 20.0 Chicago, Illinois, USA) was used for statistical analysis. Unpaired *t*-test was used to check the mean difference of anxiety score between males and females, and one-way analysis of variance (ANOVA) was used to check the mean difference of percentage anxiety score between different visit groups. Scheffe *post hoc* test was used to check the pairwise difference between the groups, and the Cronbach's alpha was used to measure of internal consistency of the questionnaire. For all statistical analyses, the level of significance was set at $P < 0.05$.

RESULTS

Our study consisted of 500 participants, 100 from each zone such that 50 were male and 50 female, summing up to 250 males and females. Each age group (12, 13, 14, and 15 years) consisted of 125 (25%) participants. The mean age of study subjects was found to be 13.5 ± 1.119 years [Table 1].

According to MDAS score, 56 (11.2%) participants were slightly anxious, 313 (62.6%) were moderately anxious, and 131 (26.2%) were extremely anxious [Table 2].

In this study, unpaired *t*-test was used to check the mean difference between anxiety score between males and females. Both mean percentage DAS and MDAS score showed statistically significant difference at 5% significant level [Table 3].

One-way ANOVA was used to check the mean difference between anxiety score of different age groups and percentage anxiety score between different visit groups which showed significant difference [Table 4].

Cronbach's alpha for MDAS was 0.843, which indicates a high level of internal consistency for our scale with this specific sample.

As per Table 5, a positive correlation was found between avoidance score and arousal score ($P = 0.729$), avoidance score and stimulus score ($P = 0.775$), and also between arousal and stimulus score ($P = 0.829$).

Table 6 shows that removal of question Q1 would have increased Cronbach's alpha value to 0.792, removal of question Q2, Q3, Q4, and Q5 would have reduced

Cronbach's alpha value to 0.746, 0.744, 0.715, and 0.733, respectively; hence we would not want to remove these questions.

As per Table 7, a positive correlation was found between Q1 and Q2 ($P = 0.028$), avoidance score and stimulus score ($P = 0.775$), and also between arousal and stimulus score ($P = 0.829$). Pearson's correlation [Table 8] was used for testing reliability between two scales, and a strong positive statistically significant correlation (0.815) was found between total percentage DAS and percentage MDAS scores.

Another 500 samples were selected for DFAS and a similar study was conducted. High level of internal consistency was found for DFAS (Cronbach's alpha, 0.960). It was also noted that removal of question would not have changed the Cronbach's alpha value significantly.

Unpaired *t*-test was used to check the mean difference between anxiety score between males and females. Statistically significant difference was found between the mean score at 5% significant level ($P < 0.001$). The overall mean percentage score was also statistically significant at 5% significant level ($P \leq 0.001$).

DISCUSSION

This study was carried out in children due to their susceptibility to fear of unknown and peer influences. It has been observed that children with previous dental experiences can have higher levels of dental fear and anxiety.[14]

In our study, all items of MDAS and DAS score contributed to the final Cronbach's alpha score, and removal of any item would have decreased the overall consistency except arousal component in DAS and Q1

Table 2: Categorization of subjects based on Modified Dental Anxiety Scale score

Category of subject based on MDAS score			
MDAS scale		Frequency	Percent
Valid	Slight anxious	56	11.2
	Moderately anxious	313	62.6
	Extreme anxious	131	26.2
	Total	500	100.0

Table 1: Descriptive statistic for Modified Dental Anxiety Scale (MDAS) and Dental Anxiety Scale (DAS)

Descriptive statistics	Descriptive statistic for MDAS and DAS											
	Age	Q1	Q2	Q3	Q4	Q5	Total MDAS	Total MDAS (%)	Avoidance	Arousal	Stimulus	Total DAS	Total DAS (%)
Mean	13.5000	1.998	2.248	2.924	3.292	3.286	13.748	54.992	21.684	10.264	21.254	53.186	53.186
SD	1.11915	0.77408	0.7666	0.8785	0.90353	0.8158	2.94105	11.7642	4.55518	1.59354	2.52552	7.99771	7.99771

DAS = dental anxiety scale, MDAS = modified dental anxiety scale, SD = standard deviation

Table 3: Unpaired *t*-test						
Unpaired *t*-test						
Scales	Sex	Mean	Std. deviation	*t*	df	*P*
Percent DAS	Male	51.1640	6.87358	−5.838	498	<0.001
	Female	55.2080	8.52805			
Percent MDAS	Male	51.6640	10.94781	−6.589	498	<0.001
	Female	58.3200	11.62990			

DAS = dental anxiety scale, MDAS = modified dental anxiety scale

Table 4: Analysis of variance (ANOVA) test					
One-way ANOVA					
Scale	Age		Mean	Std. deviation	*F*	*P*
Percent MDAS	12 Years		67.84	7.36863	298.62	<0.001
	13 Years		58.336	7.75735		
	14 Years		51.808	4.78859		
	15 Years		41.984	7.81436		
	Response	*N*	Mean	Std. deviation	*F*	*P*
Percent DAS	Never visited	82	54.878	9.03818	3.837	0.022
	Only when needed	230	52.2217	7.38513		
	Visits frequently	188	53.6277	8.11875		
		N	Mean	Std. deviation	*F*	*P*
Percent MDAS	Never visited	82	57.2195	11.14996	3.236	0.04
	Only when needed	230	53.6696	11.28257		
	Visits frequently	188	55.6383	12.44268		

DAS = dental anxiety scale, MDAS = modified dental anxiety scale

Table 5: Inter item correlation matrix For dental anxiety scale				
Scale	Avoidance	Arousal	Stimulus	DAS
Avoidance	1.000	0.729	0.775	0.962
Arousal	0.729	1.000	0.669	0.829
Stimulus	0.775	0.669	1.000	0.894
DAS	0.962	0.829	0.894	1.000

DAS = dental anxiety scale

Table 6: Item total statistics for modified dental anxiety scale				
Questionnaire items	Scale mean if item deleted	Scale variance if item deleted	Corrected item-total correlation	Cronbach's alpha if item deleted
Q1	25.4980	31.385	0.302	0.792
Q2	25.2480	28.548	0.667	0.746
Q3	24.5720	27.961	0.631	0.744
Q4	24.2040	26.335	0.803	0.715
Q5	24.2100	27.609	0.738	0.733
MDAS	13.7480	8.650	1.000	0.753

MDAS = modified dental anxiety scale

component in MDAS, which indicated a high level of internal consistency for our scales.

Moreover, a high level of internal consistency was found for DFAS so that removal of any question should not change the Cronbach's alpha value significantly, thereby creating modified version of DFAS a stronger scale to assess dental fear and anxiety in children.

Study conducted by Al-Nasser *et al.*[3] to validate the Arabic version of MDAS and to assess cutoff points for a high dental anxiety in a Saudi population also showed high internal consistency with Cronbach's alpha of 0.90 with the 95% confidence interval of 0.85–0.93.

Abu-Ghazaleh *et al.*[12] found internal consistency for their sample using the Arabic MDAS to be 0.87. The Arabic version of MDAS used by Bahammam and Hassan[11] in their study also had high internal consistency and reliability with alpha coefficient greater than 0.9. These findings were consistent with our study.

Rajwar and Goswami[15] conducted a study where the reliability and validity of the Hindi versions of DFS was assessed, and alpha value was found to be greater than or equal to 0.70, which was considered satisfactory. In our study, the DFS and DFAS displayed a stronger inter-rater reliability for each question, Cronbach's alpha value being 0.9992.

Giri *et al.*[4] in their study found the Cronbach's alpha of Nepali version of MDAS as 0.775, which was considered to be highly consistent. Furthermore, deletion of any item among the five items did not show any variation in Cronbach's alpha value.[4]

A study by Gunjal *et al.*[7] showed high internal consistency with Cronbach's alpha as 0.86. Bonafé and

Table 7: Inter item correlation matrix for modified dental anxiety scale

Questions	Q1	Q2	Q3	Q4	Q5	MDAS
Q1	1.000	0.028	0.115	0.201	0.188	0.419
Q2	0.028	1.000	0.457	0.610	0.521	0.736
Q3	0.115	0.457	1.000	0.493	0.425	0.717
Q4	0.201	0.610	0.493	1.000	0.678	0.854
Q5	0.188	0.521	0.425	0.678	1.000	0.798
MDAS	0.419	0.736	0.717	0.854	0.798	1.000

MDAS = modified dental anxiety scale

Table 8: Pearson correlations for DAS and MDAS

Scales	Correlation coefficient	Percent DAS	Percent MDAS
Percent DAS	Pearson correlation	1	**0.815****
	sig. (two-tailed)		**<0.001**
Percent MDAS	Pearson correlation	0.815**	1
	sig. (two-tailed)	.000	

DAS = dental anxiety scale, MDAS = modified dental anxiety scale

Campos[2] evaluated the properties of the percentage DAS score among 14 years was 50, where the reliability of the scale was measured using Cronbach's alpha, which indicated high level of consistency with alpha value greater than 0.70. The overall mean percentage DAS score among 12 years was found to be 61%, 55% among 13 years, 50 among 14 years and 46% among 15 years. These results were similar to the study conducted by Rajwar and Goswami[15] where the age group of children between 12 and 14 years showed maximum response of 54.5%. This may be attributed to the fact that when the cognitive ability develops the fear levels tend to reduce with age so the older younger age group children showed more fear compared to that of adults.

This study showed that the fear levels were more in females as compared to males, which is similar to the studies conducted by Rajwar and Goswami,[15] Bahammam and Hassan,[11] and Suhani *et al.*[8] This may be attributed to the fact that females are more susceptible to anxiety disorders and have a lower pain threshold.[11] A cross-sectional study conducted by Talo Yildirim *et al.*[9] also concluded that women had significantly higher anxiety scores than men ($P < 0.05$).

In our study, the overall mean percentage DAS score among those who never visited dentist was more compared to the subjects who visited dentists when needed and frequent visitors. This was similar to a study conducted by Suhani *et al.*[8] where people who experienced previous traumatic dental episodes showed higher levels of dental anxiety. However, Bahammam and Hassan[11] found that subjects who visited the dentist regularly had the lowest anxiety level compared to irregular visitors and those who visited the dentist only when needed.

Arabic version of MDAS, DAS, and DFAS used in our study shows high internal consistency and reliability, hence it can be used to assess dental anxiety among Arabic-speaking population with greater precision.

Limitations

1. Present study didn't clarify the methods for understanding and improving the fears and behavior of children and adolescents when they visit dentists.

Future scope

1. Longitudinal study can be conducted to assess test–retest reliability.
2. Trials or case-control studies could be preferred to understand single mode of intervention or combinations of interventions to manage children with different level of anxiety in clinical practice.
3. Studies to understand the effect of age, gender, education and general psychological status in children and young adults, which contribute for dental anxiety are needed.

CONCLUSION

As one's understanding is better when communicated in mother tongue, Arabic version of dental anxiety scales can be of great help in assessing Arabic-speaking population with precision. The Arabic version of MDAS, DAS, and DFAS used in our study showed great reliability and can be used on dental patients.

CONFLICTS OF INTEREST

There are no conflicts of interest.

REFERENCES

1. Oyekunle OM, Fulton J, Hayes C. What is the most effect treatment for the management of dental anxiety among adults? A systematic review of interventions. J Community Public Heal Nurs 2016;02. doi:10.4172/2471–9846.1000146
2. Bonafé FSS, Campos JADB. Validation and invariance of the Dental Anxiety Scale in a Brazilian sample. Braz Oral Res 2016;30:1-8.
3. Al-Nasser L, Yunus F, Ahmed A. Validation of Arabic version of the Modified Dental Anxiety Scale and assessment of cut-off

points for high dental anxiety in a Saudi population. J Int Oral Heal 2016;8:21-6.

4. Giri J, Pokharel PR, Gyawali R, Bhattarai B. Translation and validation of Modified Dental Anxiety Scale: The Nepali version. Int Sch Res Notices 2017;2017:1-5.

5. Appukuttan D, Datchnamurthy M, Deborah SP, Hirudayaraj GJ, Tadepalli A, Victor DJ. Reliability and validity of the Tamil version of Modified Dental Anxiety Scale. J Oral Sci 2012;54:313-20.

6. Fayad MI, Elbieh A, Baig MN, Alruwaili SA. Prevalence of dental anxiety among dental patients in Saudi Arabia. J Int Soc Prevent Communit Dent 2017;7:100-4.

7. Gunjal S, Pateel DGS, Parkar S. Dental anxiety among medical and paramedical undergraduate students of Malaysia. Int J Dent 2017;2017:1-5.

8. Suhani RD, Suhani MF, Badea ME. Dental anxiety and fear among a young population with hearing impairment. Med Pharm Reports 2015;89:143-9.

9. Talo Yildirim T, Dundar S, Bozoglan A, Karaman T, Dildes N, Acun Kaya F, *et al.* Is there a relation between dental anxiety, fear and general psychological status? Peer J 2017;5:e2978.

10. Amir A, Kamate S, Gupta P, Gupta A, Singh J, Singh S. Assessment of dental anxiety using MDAS (Modified Dental Anxiety Scale) among students in Bareilly city—A cross sectional study section. Int J Contemp Med Res 2018;5:5-7.

11. Bahammam MA, Hassan MH. Validity and reliability of an Arabic version of the Modified Dental Anxiety Scale in Saudi adults. Saudi Med J 2014;35:1384-9.

12. Abu-Ghazaleh SB, Rajab LD, Sonbol HN, Aljafari AK, Elkarmi RF, Humphris G. The Arabic version of the Modified Dental Anxiety Scale. Psychometrics and normative data for 15-16 year olds. Saudi Med J 2011;32:725-9.

13. Sartorius N, Kuyken W. Translation of health status instruments. In: Orley J, Kuyken Weds. Quality of Life Assessment: International Perspectives. Heidelberg: Springer Verlag; 1994:3-18.

14. Abanto J, Vidigal EA, Carvalho TS, Sá SNC de, Bönecker M. Factors for determining dental anxiety in preschool children with severe dental caries. Braz Oral Res 2017;31:1-7.

15. Rajwar AS, Goswami M. Prevalence of dental fear and its causes using three measurement scales among children in New Delhi. J Indian Soc Pedod Prev Dent 2017;35:128-33.