

Dental Anxiety and Its Behavioral Consequences in a Sample of Saudi Adults

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Abstract

Background: Dental anxiety is a common problem that hinders patients from seeking timely dental treatment. The aims of this study were 1) To estimate the prevalence of dental phobia in a sample of Saudis in Riyadh, Saudi Arabia, and 2) To identify behavioral consequences of moderate or high dental anxiety in Saudi adults. **Materials and Methods:** Multistage cluster random sampling was employed to locate eleven public sampling sites, which included shopping malls, primary care centers, and mosques. A sample of 378 residents of Riyadh City was selected. We used Arabic Modified Dental Anxiety Scale (MDAS) to assess dental anxiety. **Results:** The mean age was 32.5 (\pm SD 10.1 years) and 44.2% were females. The prevalence of moderate to high dental anxiety (MDAS \geq 13) was reported in 24.5% of subjects, while high dental anxiety (i.e., dental phobia; MDAS \geq 19) was present in 5.4% of subjects. The prevalence of moderate or high dental anxiety tends to be higher in females (31.9% vs 18.8%, $P=0.003$), in participants with infrequent dental visits (41.7% vs. 19.7%, $P=0.001$), in participants who were treated in private clinics (27.7% vs 18%, $P=0.042$), and in participants with a history of delaying dental treatment (64.1% vs 11.5%, $P=0.001$). According to logistic regression, the odds of moderate or high dental anxiety were 17.9 times higher in participants with a history of delaying dental treatment. **Conclusion:** Our data showed 5.4% had dental phobia and 24.5% had moderate or high dental anxiety. Being female, having infrequent dental visits, using private clinics, having a history of delaying dental treatment, and having a history of canceling dental treatment were the most common behavioral consequences of dental anxiety.

Key Words: Dental anxiety, Dental phobia, Modified Dental Anxiety Scale, Female dental fear, Saudi Arabia

Abbreviations: AOR: Adjusted Odds Ratio; CI: Confidence Interval; DAS: Corah's Dental Anxiety Scale; KAIMRC: King Abdullah International Medical Research Center; MDAS: Modified Dental Anxiety Scale.

Introduction

Dental anxiety and fear and their relation to non-attendance at a clinic for an appointment are phenomena that have been debated and studied since the early eighties [1-3], yet studies in the Arab world, specifically Saudi Arabia, are lacking. Anxiety is defined as "an aversive emotional state related to an anticipated or expected encounter with a feared stimulus", with dental treatment being the primary stimulus in dental anxiety. Fear, on the other hand, is a rational reaction to an objectively identified external danger that may induce a person to flee or attack in self-defense [4,5]. Dental fear can be as mild as feeling uneasy or as extreme as experiencing panic. Phobias are defined by the American Psychiatric Association as "intense fear of clearly discernible, circumscribed objects or situations, which limits (as judged by a qualified person) the functioning of an individual in one or more domains [4,5]. Arm field argues that the terms anxiety, fear, and phobia overlap in literature and are interchangeably used [4].

Intensive research has found that causes of dental anxiety can be grouped into three broad categories [6,7]. First, perceived negative experience at previous dental appointments is a recurring theme expressed by anxious patients [8] and identified by researchers as a leading cause for dental anxiety, fear, and phobia [6]. Both the nature of the encounter (painful, frightening, or embarrassing) and the age at which such encounters occurred have been implicated in anxiety [9,10]. Second, both parents play a role in transmitting their dental fear to their offspring's [11,12]. A recent meta-analysis of 43 studies on the relation between parental and child dental anxiety/behavior found a significant positive association between the two factors [13]. Third, dental anxiety has been found to be associated with various personality traits such as interpersonal sensitivity, other anxiety disorders and specific

phobias, especially both injection phobia and blood-injury phobia [4,14,15]. Furthermore, one twin study demonstrated a degree of overlap between genetic effects that makes a person liable to dental anxiety and neuroticism in monozygotic but not in dizygotic twins [16].

In a study that surveyed 1,959 Dutch adults, dental anxiety ranked fifth among commonly feared situations [7] and dental phobia was the highest in prevalence (3.7%) relative to ten other specific phobias (e.g., claustrophobia, snakes, blood, and injections) [17]. Prevalence of dental anxiety ranged from 5% to 22% [18,19]. A study in Netherlands found more than 40% of participants to have higher-than-average dental anxiety [20]. Another study cited that 6-15% of patients with high dental anxiety do in fact avoid dental treatment [7].

Few studies have explored dental fear, anxiety, or phobia among the Saudi population. These studies were either limited to single-sex or the young population [21-24], which affected generalizability, or were based on self-developed questionnaires [25,26] or interviews [27], which limited their comparability with similar studies done elsewhere.

Akeel and Abduljabbar studied 164 patients attending the screening clinic at the College of Dentistry, King Saud University, Riyadh and found the prevalence of high dental anxiety to be 8.5% [28]. Quteish, in surveying levels of dental fear in 368 Saudi undergraduate students, found that 33.4% of participants were slightly-to-moderately fearful or anxious regarding dental treatment and 5.5% had high dental phobia [29]. The two previous studies had used established dental fear or anxiety measures, but they depended on non-probability sampling (e.g., convenience sampling). In addition, a university sample may not be well suited to represent the general population, and the young age of participants might have overestimated the prevalence of dental anxiety and fear.

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In this study, we included a more representative population-based sample. The aim of the current study is to determine the prevalence and behavioral consequences of dental anxiety in a sample of the Saudi population.

Method

A cross-sectional study was conducted in Riyadh City, Saudi Arabia to assess dental anxiety levels in a sample of Saudi adults. Ethical approval was obtained from the College of Public Health and Health Informatics' Research Committee. The study was approved and partially funded by the King Abdullah International Medical Research Center (KAIMRC), Research Protocol #RR12/176. We included Saudis who were 18 years of age or above and who agreed to provide informed consent. Multistage cluster random sampling was used. We divided Riyadh City into five clusters based on geographical orientation. A list of district numbers and names in each cluster was obtained. The clusters in the North, South, East, and West of the city were included in the study whilst the fifth cluster (Central Riyadh) was excluded, as the list showed that the area was dominated by governmental establishments and ministries rather than being residential in nature.

Names of districts, location of malls, mosques, and primary care centers were available by electronic maps provided by the Higher Commission of Arriyadh Development. Names and phone numbers of each primary care location were available from the Ministry of Health and, in the case that a location of interest was not present in any specific district, the closest location on the map was chosen instead. Each of the point of interest (district, mosque, and mall) was given a distinct number. Random sampling was generated by using the

number of districts within each cluster as the range and was entered to the random sequence generator available at www.randomizer.org to create a group of six non-sorted numbers. The first two numbers were used to locate a shopping mall, the second two numbers to locate a mosque, and the last two numbers to locate a primary health care center operated by the Ministry of Health. The same was done for all four clusters.

Data was collected by a self-administered questionnaire in Arabic that consisted of two parts. Part 1 gathered demographic information and Part 2 was the Arabic version of the MDAS questionnaire. The Arabic translation of the original English MDAS questionnaire was made available by St. Andrews University. The Arabic version was found reliable and valid with a Cronbach's alpha=0.90 [30]. The questionnaire asks a participant to rate his/her anxiety level in regard to five hypothetical dental situations; answers had a consistent five choices of anxiety levels that formed a Likert scale. Anxiety levels were from "not anxious" (a score of one) to "extremely anxious" (a score of five). The MDAS total score ranged from five to 25. A value of 19 and above indicated high dental anxiety (or dental phobia) and a value of 13 to 18 indicated moderate levels of dental anxiety. Thus, a value of 13 and above indicated moderate or high dental anxiety. A written informed consent was obtained from each participant. A total of 450 questionnaires were distributed, 378 were completed and returned, with a response rate of 84%.

Statistical Analyses

SPSS version 22 was used for data compilation and analysis. Descriptive analysis was used to describe categorical and numerical data (Table 1). Dental anxiety was evaluated by percentage and 95% confidence intervals. Chi-square test was

Table 1. Dental anxiety and its relation to socio-demographic characteristics.

Characteristics	Levels	Overall		Moderate or high dental anxiety				P=
		N=378		No		Yes		
		n	%	75.50%		24.50%		
Gender	Male	211	55.8	169	81.2	39	18.8	0.003*
	Female	167	44.2	111	68.1	52	31.9	
Education Level	High school or less	188	50	136	74.3	47	25.7	0.547
	University	188	50	144	77	43	23	
Employment	Housewife	59	15.7	40	70.2	17	29.8	0.381
	Student	72	19.1	53	73.6	19	26.4	
	Employed	231	61.4	174	76.3	54	23.7	
	Retired/Others	14	3.8	12	92.3	1	7.7	
Source of majority of dental treatment	Private Clinic	251	66.8	180	72.3	69	27.7	0.042*
	Governmental Clinic	125	33.2	100	82	22	18	
Area of residence	Northern Riyadh	55	15.2	44	81.5	10	18.5	0.08
	Southern Riyadh	55	15.2	41	74.5	14	25.5	
	Eastern Riyadh	134	36.9	94	71.8	37	28.2	
	Western Riyadh	66	18.1	55	83.3	11	16.7	
	Outside Riyadh	53	14.6	32	62.7	19	37.3	
Monthly income	<15000 SR	320	86.3	241	76.5	74	23.5	0.195
	≥1500 SR	51	13.7	34	68	16	32	
Frequent dental visit	Yes	299	80.4	237	80.3	58	19.7	0.001*
	No	73	19.6	42	58.3	30	41.7	
History of delaying dental treatment	Yes	95	25.3	33	35.9	59	64.1	0.001*
	No	281	74.7	247	88.5	32	11.5	
History of cancelling/ missing dental treatment	Yes	53	14.1	17	33.3	34	66.7	0.001*
	No	322	85.9	262	82.1	57	17.9	
Age/years (18-74)	Mean±SD	32.5±10.1		32.7±10		31.2±9.9		0.197

used to assess the association between categorical data and dental anxiety status (moderate or high dental anxiety-Yes/No) (Table 1). Independent two sample t-tests were used to test the difference between dental anxiety status in relation to age (Table 1). MDAS subscales were summarized by counts and percentages (Table 2). Multiple binary logistic regression model was used to identify behavioral consequences of moderate or high dental anxiety (MDAS ≥ 13). Adjusted odds ratios (aOR) and 95% CIs were calculated to assess the strength of the association between the behavioral consequences and moderate or high dental anxiety (Table 3).

Results

More than one-half (55.8%) of the population sampled

(n=378) were males, and participants under the age of 35 years comprised two-thirds of the sample (67.8%). Monthly income was 15,000 Saudi Riyals (SR) or less for 86.3% of the sample. While 19.6% of the population sampled had not seen the dentist in more than a year, the remainder had a dental visit sometime during the last year. One-quarter (25.3%) of participants had delayed seeking dental treatment due to anxiety and 14% had cancelled or missed an appointment at least once for the same reason. A full breakdown of socio-demographic characteristics is presented in Table 1. The prevalence of low (MDAS score of 5-12), moderate (MDAS score of 13-18), and high dental anxiety (dental phobia) (MDAS score of >19) were 75.5% (95% CI: 70.8%-79.8%),

Table 2. Anxiety Predisposing Situations in the Study Participants based on MDAS

MDAS Items	Anxiety levels	n	%
Having an appointment tomorrow	Not Anxious	254	68.1
	Slightly Anxious	70	18.8
	Anxious	23	6.2
	Very Anxious	21	5.6
	Extremely Anxious	5	1.3
When in waiting room	Not Anxious	227	60.9
	Slightly Anxious	72	19.3
	Anxious	43	11.5
	Very Anxious	20	5.4
	Extremely Anxious	11	2.9
When about to have a tooth drilled	Not Anxious	137	36.8
	Slightly Anxious	110	29.6
	Anxious	65	17.5
	Very Anxious	44	11.8
	Extremely Anxious	16	4.3
When about to have teeth cleaned & polished	Not Anxious	104	27.9
	Slightly Anxious	181	48.5
	Anxious	66	17.7
	Very Anxious	17	4.6
	Extremely Anxious	5	1.3
When about to have oral anesthetic injection	Not Anxious	50	13.4
	Slightly Anxious	179	48.1
	Anxious	68	18.3
	Very Anxious	53	14.2
	Extremely Anxious	22	5.9

Table 3. Behavioral consequences of moderate or high dental anxiety (MDAS ≥ 13). *Wald Chi-square is significant at $\alpha=0.05$.

Characteristics	Reference	B	SE	P	OR	95% C.I. for OR	
Female	Male	0.65	0.42	0.124	1.9	Lower	Upper
High school or less	University	0.31	0.36	0.386	1.4	0.837	4.345
Housewife	Retired/Others	2.01	1.32	0.128	7.5	0.678	2.732
Student	Retired/Others	2.26	1.42	0.112	9.6	0.56	100.118
Employed	Retired/Others	2.15	1.25	0.086	8.6	0.593	154.464
Private Clinic	Governmental Clinic	0.18	0.38	0.637	1.2	0.738	100.778
Northern Riyadh	Outside Riyadh	-0.05	0.64	0.933	0.9	0.571	2.502
Southern Riyadh	Outside Riyadh	1.36	0.65	0.037	3.9	0.271	3.32
Eastern Riyadh	Outside Riyadh	0.09	0.51	0.866	1.1	1.083	14.106
Western Riyadh	Outside Riyadh	0.98	0.63	0.122	2.7	0.405	2.931
Income < 15000 SR	≥ 1500 SR	-0.44	0.47	0.351	0.6	0.769	9.203
Infrequent dental visit	Frequent dental visit	0.7	0.38	0.066	2	0.253	1.629
History of delaying dental treatment	None	2.88	0.43	.001*	17.9	0.954	4.252
History of cancelling/ missing dental treatment	None	0.66	0.5	0.189	1.9	7.668	41.593
						0.723	5.171
Age		-0.01	0.02	0.794	1		
Constant		-4.92	1.84	0.007	0	0.952	1.038

19.1% (95% CI: 15.3%-23.5%), and 5.4% (95% CI: 3.3%-8.2%), respectively.

Table 1 also illustrates the prevalence of moderate or high dental anxiety (MDAS ≥ 13) and its relation to socio-demographic data. The female gender reported significantly more moderate or high dental anxiety compared with the male gender (31.9% vs. 18.8%, $P=0.003$). Participants from private clinics reported more moderate or high dental anxiety compared with governmental clinics (27.7% vs. 18, $P=0.042$). Participants who had infrequent visits to the dentist experienced more moderate or high dental anxiety than participants who had frequent visits to the dentist (41.7% vs. 19.7%, $P=0.001$). Delaying dental treatment (64.1% vs. 11.5%, $P=0.001$) and cancelling dental treatment (66.7% vs. 17.9%, $P=0.001$) were significantly associated with moderate or high dental anxiety.

Table 2 highlights proportion of study participants against the anxiety predisposing situations based on MDAS. Behavioral consequences of moderate or high dental anxiety were reported in *Table 3*. Behavioral consequences associated with moderate or high dental anxiety were a history of delaying dental treatment (aOR=17.9; 95% CI, 7.668-41.593), and living in southern Riyadh (aOR=3.9; 95% CI, 1.083-14.106).

Discussion

We studied the prevalence of dental anxiety levels in a sample of Saudi adults. A valid and reliable Arabic version of the Modified Dental Anxiety Scale (MDAS) [30] was used to assess the dental anxiety levels. The prevalence of high dental anxiety (dental phobia) among our study sample was 5.4% (MDAS score ≥ 19). Our results were similar to a number of studies that assessed the prevalence of high dental anxiety in various cultures and populations. The prevalence of high dental anxiety was 5.4% in Sweden's population [31], 3.5% in the Malaysian population [32], and 3% in India [33]. However, even higher rates of dental anxiety have been noted in several other studies.

The prevalence of high dental anxiety was reported to be 8.8% among Turkish patients [34], 9.3% among patients attending dental clinics in four cities (Belfast, Northern Ireland; Helsinki, Finland; Jyväskylä, Finland and Dubai, UAE) [35], and 11.6% in the UK population [36]. This discrepancy may be explained by variations in the target populations in these studies where they recruited their participants from admission clinics and patients attending dental clinics. In our study sampling, dental clinic settings were eliminated to avoid selection bias. However, selection of cut-off point to classify dental anxiety levels may cause discrepancy in reporting the prevalence of dental anxiety. In our study, the prevalence of moderate or high dental anxiety was found to be high in our sample (24.5%).

The literature documents that the female gender tends to report higher dental anxiety compared to the male gender [31,37-40]. Our study has yielded consistent results in this regard, confirming that the female gender tends to report more moderate or high dental anxiety compared with the male gender (31.9% vs. 18.8%, $P=0.003$). Those who had a history of delaying dental treatment were 17.9 times high to report moderate or high dental anxiety than those who had no history

of delaying dental treatment. Areas of residence within Riyadh were significant on the multivariate logistic regression. This may be explained by the dynamics of socioeconomics rather than by the location of sampling only.

Two-thirds of the population sampled received a majority of their dental treatment in private clinics, which raises a question about actual availability and accessibility of governmental dental clinics, as any Saudi citizen should be entitled to free dental care subsidized by the Ministry of Health. In addition, participants treated in private dental clinics showed higher anxiety scores than others. They also had the majority of delayed and not attended appointments, although this proportion was not statistically significant. The tendency to have higher anxiety levels of participants who were treated in private clinics might be due to personal experiences. Private clinics in Riyadh are numerous and vary greatly in terms of expertise of the dental staff, quality of care, and costs of treatment.

We recognized a number of limitations in our study. The reported data was based on self-report, and their responses may be subject to bias. The comparison with the rates reported from other cultures or countries must be considered with caution, as the discrepancy may be explained by variations in selecting a cut point to classify dental anxiety levels (e.g., cut-off point ≥ 15 or ≥ 19). Our study used cut-off MDAS score ≥ 19 , which indicates high dental anxiety, while in the inferential analysis we used cut-off MDAS score ≥ 13 . Our study suggests screening for dental anxiety symptoms among female patients and possibly including appropriate counseling interventions as part of the dental care and treatment. The results of this study may be useful not only to dentists who provide dental care and screening in their dental clinic practices, but to patients as well.

Conclusions

Our data showed 5.4% had dental phobia and 24.5% had moderate or high dental anxiety. Being female, having infrequent dental visits, using a private clinic, having a history of delaying dental treatment, and having a history of canceling dental treatment were the most common behavioral consequences of dental anxiety. Screening females for dental anxiety may improve dental anxiety treatment strategies in the Saudi population.

Ethics Approval

All participants gave informed consent.

Competing Interests

The authors declare that they have no competing interests.

Authors' Contributions

All authors collaborated in the design, data analysis plan, and drafting the manuscript.

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