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Self-assessment of Dental Anxiety and Fear among Dental Students in a Saudi Arabian College

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Authors' contributions

This work was carried out in collaboration between all authors. Author Hakeem designed the study, wrote the protocol and wrote the first draft of the manuscript. Authors Bhayat and AAS managed the literature searches, analyses of the study and discussion. Author AQ collected data and assisted in analysis. All authors read and approved the final manuscript.

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ABSTRACT

Introduction: The objective was to determine the levels of anxiety and fear of dental students in relation to dental treatment.
Materials and Methods: This was a cross-sectional study and included all dental students registered at a Saudi dental college in 2013/2014. Dental fear and anxiety were evaluated using the Modified Dental Anxiety Scale (MDAS) and Dental Fear survey (DFS). All data was anonymous and confidential.
Results: A total 143 students completed the questionnaire (response rate of 88%) of which 67% were female. Females were significantly more anxious compared to males ($p<0.01$) and there was a positive correlation between dental anxiety and dental fear, patients with dental anxiety were more likely to have dental fear as well. Pre-clinical students reported significantly higher levels of dental fear ($p=0.014$) and anxiety scores ($p=0.008$) compared to clinical students. In addition, between 10% and 20% of students reported high levels of dental anxiety and fear respectively and females' demonstrated higher dental anxiety and fear scores than males. The administration of an anaesthetic injection was the highest cause for both dental fear and anxiety.

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Conclusion: Female demonstrated higher dental anxiety and dental fear scores than males. In addition pre-clinical students demonstrated higher dental anxiety and dental fear scores than clinical students. The most anxious and fearful item was the anaesthetic injection.

Keywords: Self-reported dental anxiety; dental fear.

1. INTRODUCTION

Anxiety is used to indicate responses to situations in which the source of the threat to the individual is not well defined, is unclear or not immediately present [1,2]. It is a sign of reactions to non-immediate situations [1]. On the other hand, fear is an individual's emotional response to a threat or danger [1-3]. Fear prepares and mobilizes the body to face the threat (fight) or to escape from it (flight) while dental anxiety denotes a state of apprehension that something horrible is going to happen in relation to dental treatment [2,3]. Nevertheless, dental fear is considered as a normal emotional reaction to specific threatening stimuli in a dental situation [1-3].

Dental anxiety and fear are serious concerns for many patients. It has been associated with avoidance behaviour and could result in making the dental treatment more difficult to be accomplished successfully [4,5].

Dental anxiety is not only a problem for the patient but also to the dentist; since treating an anxious patient was considered among the most stressful situations for the dentist [6]. Anxious patients usually tend to cancel their appointments, and require longer time to receive treatment and have a lower pain threshold compared to non-anxious patients [7-9]. Dental anxiety might also affect the patient-dentist relationship and obscure proper diagnosis of the actual dental problem [7].

The Corah's Dental Anxiety scale, which consists of twenty six items, has been used in the past to measure the levels and causes of dental anxiety [5]. Due to its length, the Modified Dental Anxiety Scale (MDAS) was developed and this proved to be both reliable and valid [10]. The MDAS is considered to be a practical screening instrument for predicting general dental anxiety levels and as a result, was utilised in the current study [10].

The Dental Fear Survey (DFS) has routinely been used to measure and predict dental fear amongst dental patients [11]. However, no Saudi study has used both of these tools; the modified dental anxiety scale (MDAS) and dental fear survey (DFS) to determine dental anxiety and fear.

A limited number of studies related to dental anxiety and fear have been conducted in Saudi Arabia. A study on females in Riyadh reported a high anxiety and fear prevalence of 29% and 25% respectively [12]. Another Saudi study showed that 12% of the general population perceived dental treatment as stressful and 5% avoided the dentist due to the possibility of having painful dental treatment [13]. No study has been conducted in Madinah to identify the levels of anxiety and fear related to dental procedures. Therefore, this will provide baseline data on the prevalence of dental anxiety and fear among dental students attending Taibah University College of Dentistry (TUCoD).

2. MATERIALS AND METHODS

A cross-sectional study was carried out on all registered dental students at TUCoD. All of the 162 dental students, who were registered in 2013/2014, were invited to participate in the study. Permission to distribute the questionnaires to all the students was obtained from the dean and from the different lecturers. The questionnaires were then delivered by the researchers to the students after the morning lectures on a specific day. The researchers waited in the lecture room for the students to complete them and once completed, the students handed them in. All students were informed of the aims and rationale of the study and those who did not want to participate were told that they could leave the questionnaire blank. Also, students were informed that all information was strictly confidential and anonymous and if they felt they wanted to stop answering the questions at any time, they were not compelled to complete it.

The Modified Dental Anxiety Scale (MDAS) and the Dental Fear Survey (DFS) were used to collect the necessary data. Participation was voluntary and informed consent was obtained from each student. All information was anonymous and data was strictly confidential.

The MDAS was used to elicit information regarding dental anxiety. The scale consists of five items and students were asked to rate each item using a Likert scale; from 'not anxious' to 'extremely anxious' and the responses were coded from 1 to 5 respectively. The total score was a sum of all five items which ranged between 5 and 25. The total score was also classified into three categories; "mild", "moderate" and "severe" anxiety as described by previous authors [10]. The Arabic version of the MDAS, which had been used in other studies, was used [14].

The DFS consisted of twenty items focussed on avoidance behaviour, overall fear, physiological arousal and specific dental fear. The answers ranged from "not at all fearful" to "very much afraid". The scores were classified into three categories; "low" (below 33), "moderate" (between 34 and 58) and "high" fear (above 59) as described by other authors [12].

As there is no Arabic version of the DFS, it was translated from English into Arabic and then back translated by an independent person to English. Grammatical and translation errors were rectified and the Arabic version was piloted on ten medical students to test for reliability and validity. It was repeated on the same students 1 week later and the results were acceptable.

The MDAS, DFS and a section on demographics were combined and together with a cover letter distributed to the students. The current study is unique since both the modified dental anxiety scale (MDAS) and dental fear survey (DFS) were utilised to determine the prevalence and aetiology of dental anxiety and fear respectively.

The data was analysed using the SPSS software package. Descriptive and inferential statistics such as Chi-Square and the Spearman's correlation were used to determine significant associations between the variables.

The study was approved by the Taibah Research Ethics Committee at Taibah University according to the Helsinki Principles.

3. RESULTS

A total of 143 questionnaires were satisfactorily completed (88% response rate). There were 47 (33%) males and 96 (67%) females. Table 1 shows the relationship between the levels of dental anxiety and fear and the gender and clinical status of respondents. Half of the respondents reported low anxiety (52%) and fear (45%); however, females (*P*=.013 and *P*<.001) and pre-clinical students (*P*=.017 and *P*=.010) reported significantly higher levels of dental anxiety and fear compared to males and clinical students respectively.

There were significant differences in the mean total dental anxiety and fear scores between the pre-clinical and clinical students. The clinical students reported significantly lower scores in many of the items compared to the pre-clinical students (Table 2).

The administration of the local anaesthetic solution evoked the highest mean scores and was the cause of the most dental anxiety and fear. This drilling of the tooth and the waiting in anticipation for dental treatment also scored high among respondents (Table 3). However, in all of these items, females were significantly more anxious and fearful compared to males.

Table 1. Association between gender, clinical status and levels of dental anxiety and fear (N=143)

Dental anxiety	Combined N (%)	Male N (%)	Female N (%)	*P*-value*	Pre-clinical N (%)	Clinical N (%)	*P*-value*
Low	75 (52)	31 (67)	44 (46)		56 (48)	20 (74)	
Moderate	54 (39)	15 (30)	40 (42)	0.013	47 (41)	6 (23)	0.017
High	13 (9)	1 (3)	12 (12)		13 (11)	1 (3)	
Dental fear							
Low fear	65 (45)	29 (62)	36 (37)		56 (48)	20 (74)	
Moderate fear	48 (34)	12 (26)	36 (37)	<0.001	38 (33)	6 (23)	0.010
High fear	29 (21)	5 (12)	24 (26)		22 (19)	1 (3)	
Total	143	47	96		116	27	

P-value calculated using the Chi-Square test

Table 2. Association between dental anxiety and fear amongst clinical and preclinical students (N=143)

Items		Mean (±STD Dev)	*P*-value*
Total anxiety score	Preclinical (N=116)	11.91 (±4.94)	0.008
	Clinical (N=27)	10.13 (±4.33)	
Total fear score	Preclinical (N=116)	41.90 (±17.60)	0.014
	Clinical (N=27)	35.60 (±17.75)	
About to have a tooth drilled	Preclinical (N=116)	2.68 (±1.77)	0.03
	Clinical (N=27)	2.15 (±1.51)	
Sitting in the waiting room	Preclinical (N=116)	1.87 (±1.77)	0.03
	Clinical (N=27)	1.46 (±1.14)	
Hearing the drill	Preclinical (N=116)	2.84 (±1.56)	0.03
	Clinical (N=27)	2.19 (±1.40)	
Seeing the needle	Preclinical (N=116)	2.81 (±1.45)	0.04
	Clinical (N=27)	2.37 (±1.46)	
Seeing the drill	Preclinical (N=116)	2.77 (±1.57)	0.002
	Clinical (N=27)	2.12 (±1.33)	
Feeling the drill	Preclinical (N=116)	2.74 (±1.59)	0.01
	Clinical (N=27)	2.19 (±1.37)	

Table 3. Association between highest anxiety and fear producing factors and gender (N=143)

Dental anxiety	Mean score (±SD)	Gender	Mild anxiety N (%)	Moderate anxiety N (%)	Severe anxiety N (%)	*P*-value
Having a local anaesthetic injection	2.7 (±1.38)	Male	28 (60)	10 (21)	9 (19)	
		Female	37 (39)	20 (21)	39 (40)	<0.001
Having a tooth drilled	2.6 (±1.26)	Male	27 (59)	14 (29)	6 (13)	
		Female	44 (46)	21 (22)	31 (32)	<0.001
Sitting in the waiting room	2.0 (±1.11)	Male	37 (79)	7 (14)	3 (7)	
		Female	67 (69)	16 (17)	13 (14)	0.005
Dental fear			**Mild fear N (%)**	**Moderate fear N (%)**	**Severe fear N (%)**	
Feeling the needle injected	2.7 (±1.5)	Male	31 (66)	6 (12)	10 (22)	
		Female	37 (39)	18 (19)	40 (42)	<0.001
Seeing the anaesthetic needle	2.6 (±1.5)	Male	33 (71)	5 (11)	8 (18)	
		Female	40 (42)	17 (18)	39 (40)	<0.001
Hearing the drill	2.6 (±1.5)	Male	31 (66)	6 (12)	10 (22)	
		Female	43 (45)	15 (16)	37 (39)	<0.001

**P-value calculated using Chi-Square test*

Among the physiological responses "muscle become tense" had the highest mean score followed by "breathing rate increases" and "heart beats faster" as shown in Table 4. Similar to dental anxiety and fear, females had significantly higher mean scores compared to males.

The Spearman's correlation was used to determine the relation between levels of dental anxiety and fear. There was a highly significant correlation (*P*<.001) between the dental anxiety and fear levels (r=.64), the majority of those who reported to have high dental anxiety also reported high dental fear scores.

Table 4. Association between the most severe physiological responses and gender (N=143)

		Mean (±SD)	Rarely N (%)	Sometimes N (%)	Often N (%)	*P*-value
Muscles become tense	Male	2.1 (±1.16)	36 (76)	7 (15)	4 (9)	
	Female		57 (59)	21 (22)	18 (19)	0.00
Heart beats faster	Male	1.9 (±1.20)	40 (86)	3 (6)	4 (9)	
	Female		64 (67)	13 (14)	18 (19)	0.00
Breathing rate increases	Male	1.9 (±1.10)	38 (81)	6 (13)	3 (6)	
	Female		65 (67)	19 (20)	12 (13)	0.00

4. DISCUSSION

The response rate was similar (88%) to other studies and could be attributed to absenteeism on the day the data was collected and incomplete questionnaires [15,16]. There were more females than males; this was indicative of the student population.

Compared to other studies, the current cohort reported a relatively low prevalence of high levels of dental anxiety and fear [12]. However, the current cohort comprised of dental students while the other study was conducted on the general population [12]. The dental students, through their training, could have been more aware of dental procedures and have a higher dental IQ compared to the general population. As a result they naturally had lower dental anxiety and fear scores. This was confirmed by a study done on Bulgarian dental students in which only 7% reported to have high levels of anxiety [17].

High levels of anxiety and fear were more frequently reported among females than males and this was supported by previous studies [15,16]. This could be due to response bias, as males tend to hide their fears and project a stronger and more fearless attitude [15,16]. In addition, the nature of females and social culture may also be partly responsible for these differences. Clinical students showed significantly lower levels of dental anxiety and fear compared to pre-clinical students. This was confirmed in other studies and could be due to the fact that as dental students' progress in their training programme, they become aware of the dental procedures and this could decrease their levels of anxiety and fear [15]. Another possibility is that their continued exposure to clinical practice may reduce their childhood fears and as a result, reduce their dental anxiety and fear [17].

There was a strong relationship between dental anxiety and fear; those having higher levels of anxiety were more likely have higher levels of fear. This confirmed the validity of these questionnaires and stressed the importance of addressing the dental anxiety and fear levels simultaneously.

The anaesthetic needle injection scored the highest in terms of causes for both dental anxiety and fear and this was similar to other studies [15,18]. This could be attributed to previous unfavourable dental experiences such as injecting the anaesthetic too fast or by not applying a topical anaesthesia prior to injecting [19]. These factors could have resulted in an increased level of discomfort which could be responsible for the dental anxiety and fear.

Among the physiological responses, "muscle become tense" had the highest mean score; this was similar to other studies [18]. This physiological response was more common in females and was possibly due to their high anxiety and fear scores. The high prevalence of these physiological responses could be responsible for the fact that the majority of the sample reported only going to the dentist when necessary. This has been confirmed in previous studies [16,20].

Causes of dental anxiety and fear might be linked to lack of adequate dental education, past unfavourable dental experiences or the late introduction of dental care as reported by other studies [21]. It has been recommended that children and young adults be exposed to the dental team, its environment and minor conservative treatment at a younger age. This could help them to interpret the dental visit as a normal health care event and has been shown to reduce dental anxiety when they get older [21,22].

Good dental health education, regular dental visits, good patient-dentist relationship and suitable communication with patients could help in reducing dental anxiety and fear. This combined with a sympathetic, quiet and gentle approach could help to ensure that patients remain calm and cooperative [23,24].

5. RECOMMENDATIONS

- Further investigations are required to assess other factors that may play a role in the incidence of dental anxiety and fear
- Introduce young children, especially females, to the dentist at an early age to familiarize them to the dental environment
- Implement stress reduction protocol for all potentially anxious and frightened patients

6. LIMITATIONS

The data was collected using a self-administered questionnaire and respondents could have answered untruthfully which could have led to bias.

7. CONCLUSION

The prevalence of "high" dental anxiety and fear was relatively low. Females and pre-clinical

students demonstrated higher dental anxiety and fear scores compared to males and clinical students respectively. The administration of the local anaesthetic injection obtained the highest scores for both dental anxiety and fear.

CONSENT

All authors declare that 'written informed consent was obtained from the patient (or other approved parties) for publication of this case report and accompanying images.

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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