

Original Article

Self-reported anxiety of dental procedures among dental students and its relation to gender and level of education



Saqib Ali, MSc^{a,f}, Imran Farooq, MSc^{b,*}, Soban Q. Khan, MSc^c,
Imran A. Moheet, MSc^d, Badr A. Al-Jandan, FRCD(c)^b and
Khalifa S. Al-Khalifa, DrPH^e

^a Department of Oral Biology, Sardar Begum Dental College, Peshawar, Pakistan

^b Department of Biomedical Dental Sciences, College of Dentistry, University of Dammam, Dammam, KSA

^c Department of Clinical Affairs, College of Dentistry, University of Dammam, KSA

^d Department of Substitutive Dental Sciences, College of Dentistry, University of Dammam, KSA

^e Department of Preventive Dental Sciences, College of Dentistry, University of Dammam, KSA

Received 11 April 2015; revised 2 June 2015; accepted 5 June 2015; Available online 17 July 2015

المخلص

أهداف البحث: تهدف الدراسة إلى تحديد الإجراءات المستخدمة في طب الأسنان التي ينشأ عنها أكبر درجة من القلق، وعلاقة هذا القلق بجنس الطالب واختلاف درجة الشعور به خلال سنوات الدراسة.

طريقة البحث: أجريت هذه الدراسة المقطعية في كلية "ساردار بيغم" لطب الأسنان بمقاطعة بيشاور في باكستان خلال شهر يونيو ٢٠١٤م. تم توزيع مقياس "كورة" لقلق الأسنان على جميع الطلبة. يحتوي هذا المقياس على ٢٦ عنصراً لقياس درجة القلق المستشعرة من جراء التعرض لإجراءات مختلفة متعلقة بطب الأسنان. تتدرج الخيارات في هذا المقياس من ١-٤ لكل عنصر، بحيث يمثل ١ أقل درجة و٤ أعلى درجة من القلق.

النتائج: كان معدل الاستجابة للنموذج ٦٧,٣٪ (ن = ١٠١؛ ٦٤ طالبة و ٣٧ طالباً). تبين أن الطالبات كن أكثر قلقاً من الطلبة الذكور في الخمس الإجراءات الأكثر إثارة للقلق (الخوف من الحقن/ الإبر، ومعالجة العصب، والخلع، وتعرض السن للهواء البارد). كما تبين أن الخوف كان أشد عند طلبة المراحل قبل السريرية (السنين الأولى والثانية) منه عند طلبة المراحل السريرية (السنين الثالثة والرابعة). وجدت فوارق ذات قيمة اعتبارية في ثلاثة إجراءات؛ تركيب السد المطاطي، وعدم القدرة على إيقاف طبيب الأسنان، وأخذ طبعة الأسنان. كما

سجل طلبة المراحل السريرية قلقاً مرتفعاً تجاه الأخير وطلبة المراحل قبل السريرية قلقاً مرتفعاً تجاه الإجراء الأول والثاني.

الاستنتاجات: سجلت أعلى درجات القلق لدى الطالبات وطلبة المراحل قبل السريرية مقارنة بغيرهم. قد تخفف الدروس التثقيفية والتعرض التدريجي للعلاج في المراحل المبكرة من القلق المصاحب للإجراءات المتعلقة بطب الأسنان.

الكلمات المفتاحية: القلق من الإجراءات الطبية للأسنان؛ الخوف؛ الرهاب؛ طلبة الأسنان؛ الإجراءات الطبية للأسنان

Abstract

Objectives: The study aimed to identify the dental procedures that elicit the highest level of anxiety by various dental procedures and to determine the correlation of anxiety with students' gender and varying perceptions of anxiety across years of dental education.

Methods: This cross-sectional study was conducted at Sardar Begum Dental College, Peshawar, Pakistan during June 2014. The Corah's Dental Anxiety Scale (DAS) was distributed to all students. This instrument had 26 items examining the anxiety levels experienced for different dental procedures. Options ranging from 1 to 4 were provided for every item, where 1 represented low anxiety and 4 represented the highest anxiety.

Results: The overall response rate was 67.3% (n = 101; 64 females and 37 males). Among the top five dental procedures eliciting the highest anxiety levels, females were found to be more anxious than males for all

* Corresponding address: College of Dentistry, University of Dammam, Dammam, KSA.

E-mail: drimranfarooq@gmail.com (I. Farooq)

Peer review under responsibility of Taibah University.



Production and hosting by Elsevier

^f Current address: Department of Oral Biology, Khyber College of Dentistry, Peshawar, Pakistan

1658-3612 © 2015 The Authors.

Production and hosting by Elsevier Ltd on behalf of Taibah University. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>). <http://dx.doi.org/10.1016/j.jtumed.2015.06.002>

procedures (fear of injection/needle, root canal treatment, extraction, and application of cold air) except the need for further treatment. Pre-clinical students (1st and 2nd year) were found to be more anxious than clinical students (3rd and 4th year). Significant differences ($p < 0.05$) were found for three procedures: rubber dam placement, inability to stop dentist, and impression taking. Clinical students reported high anxiety for the latter, and pre-clinical students reported higher anxiety for the former two procedures.

Conclusions: Higher anxiety levels were reported by females and pre-clinical students than their respective counterparts. Educational sessions and graded exposure therapy at an initial stage of dental educational training may decrease the anxiety associated with dental procedures.

Keywords: Anxiety by dental procedures; Dental procedures; Dental students; Fear; Phobia

© 2015 The Authors.

Production and hosting by Elsevier Ltd on behalf of Taibah University. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Anxiety is defined as the “*fear of unknown*”.¹ A specific phobia is regarded as one of the most commonly occurring anxiety disorders.² Dental anxiety is a type of specific phobia that is related to the commonly-feared conditions that are encountered in a dental office, and its prevalence has been reported up to 20% among different study groups.³ Due to its high prevalence, patients often delay dental treatments (unless there is an emergency), which results in complex dental treatments and leads to poor dental health.⁴ Avoidance of dental treatment due to dental anxiety not only situates the oral health of a patient at risk but also poses a severe threat to his general health, as the patient can suffer from a number of serious medical conditions such as septicaemia, sepsis, sinusitis, and osteomyelitis of the face.⁵

The perception of patients concerning anxiety is different for different dental procedures.⁶ Therefore, it is logical to anticipate that anxiety levels also vary between different social groups, as well as between the individuals of a same social group. Anxiety related to dental procedures is not only problematic for patients, but it is also a major source of stress for dental practitioners to treat anxious patients. There is now substantial evidence suggesting that the physiological stress responses (increased blood pressure, elevated heart rate, etc.) of dentists are equal to the responses of the patients when procedures are being performed.⁷

One important group of people is dental students, who are future frontline health care providers. It is necessary for a dental student to learn about the techniques that can help them to overcome their own dental anxiety.⁸ A decrease in

their anxiety levels would make them confident practitioners, who could in turn treat their patients well.

A number of tools have been developed to measure dental anxiety levels. One such scale is Corah’s Dental Anxiety Scale (DAS),⁹ which evaluates levels of anxiety in respondents, and identifies the most anxiety-inducing procedure.

There is little data present in the literature regarding the most frightening dental procedure reported by dental students from Pakistan. Therefore, this cross-sectional study was carried out to identify the dental procedures that elicit the highest level of dental anxiety. In addition, the relation of anxiety with students’ gender and level of dental education was evaluated.

Materials and Methods

Design of the study

This cross-sectional study was conducted at Sardar Begum Dental College, Peshawar, Pakistan in June 2014. Ethical approval was acquired from the Ethics Committee of the college; participation in this study was on a voluntary basis, and an informed consent was obtained from all participants. The questionnaires were distributed to all 1st – 4th year students present on the day of study (150 students) at the end of their respective lectures and clinical sessions. The respondents completed the questionnaires anonymously, and no data except gender and year of study were collected.

Determining dental anxiety related to various procedures

The DAS was used for this study. It contains twenty-six items (each representing different dental procedures/situations), probing the level of anxiety experienced for each item. Four options ranging from 1 to 4 were provided for every item, where 1 represented low anxiety, 2 represented moderate anxiety, 3 represented high anxiety, and 4 represented no anxiety.

Statistical analysis

SPSS software (version 19.0; SPSS Inc., Chicago, IL, USA) was utilized for statistical analysis. A one-way ANOVA test was used to evaluate the differences between the anxiety levels reported by male and female students, as well as between pre-clinical (1st – 2nd year) and clinical (3rd – 4th year) dental students. P-values < 0.05 were considered statistically significant.

Results

This study was conducted with 1st – 4th year dental students. Of the 150 questionnaires circulated, 103 were returned, of which two were excluded, as they were incomplete. The overall response rate was 67.3% (101 of 150) which included 36.6% males (37 of 101) and 63.4% females (64 of 101). The year-wise response rates from all of the dental students/year are summarized in [Table 1](#).

The five procedures that elicited the highest dental anxiety levels collectively in both male and female students are

Table 1: Showing year-wise response rates of male and female dental students.

Year	Males	Females
1st year	9 (37.5%)	15 (62.5%)
2nd year	10 (33.3%)	20 (66.7%)
3rd year	7 (35%)	13 (65%)
4th year	11 (40.8%)	16 (59.2%)
Total	37 (36.6%)	64 (63.4%)

summarized in Figure 1. This particular result was achieved by including only the high-anxiety responses reported by males and females from 1st to 4th year (Table 2). All of the high-anxiety responses were analysed to achieve an ascending list of the most anxiety-inducing dental procedures in Figure 1. It can be observed from Figure 1 that, among these procedures, females were more anxious than males for all of the procedures (Fear of injection/needle, root canal treatment, extraction, and application of cold air) except the need for further treatment. Although clear differences were present between males and females, none of the differences among top five procedures were statistically significant.

A summary of the anxiety levels of pre-clinical and clinical dental students is presented in Table 3, and it can be observed that, for the majority of the procedures, pre-clinical students were found to be more anxious than clinical students, although there were some procedures for which clinical students expressed more anxiety. Although clear differences were present between the responses of clinical and pre-clinical students, only seven out of twenty-six differences were statistically significant ($p < 0.05$). Among them, clinical students expressed more anxiety for only one procedure (inadequate anaesthesia) whereas for the remaining six procedures (disliking of the numb feeling, injection/needle, periodontal probing, rubber dam, prolonged mouth opening, incapability to stop the dentist) having significant differences, pre-clinical students reported more anxiety.

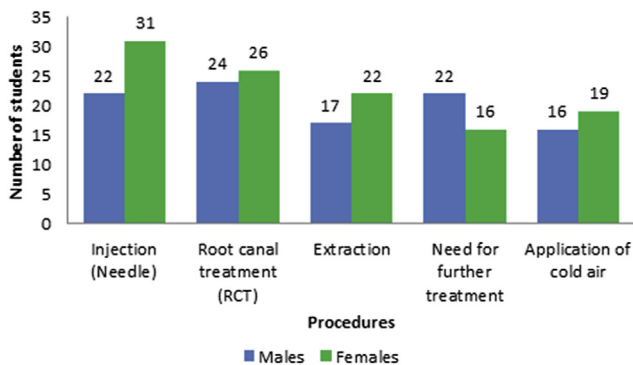


Figure 1: Top five procedures eliciting the highest dental anxiety levels among male and female dental students (achieved by analysing all high-anxiety responses from male and female dental students belonging to all years).

Discussion

The results of this study revealed that even dental students can suffer from phobia related to different dental procedures. A similar finding has been reported recently from Brazil, where 27.5% of the dental students confirmed their fear for various procedures after becoming dental patients.¹⁰ A long-term consequence of these findings could be that, because dental students are fearful themselves, they could pass on their anxieties to their patients,^{10,11} which will contribute towards an overall increase in the prevalence of dental anxiety.

Another outcome was that females generally had a greater phobia of dental procedures than their male colleagues. One reason for this trend could be that males tend to hide their fears due to their orthodox gender role.¹² In addition, it has been reported that, in general, females are more reactive to a specific stimulus (like a needle prick) than males, which could account for the higher anxiety levels reported by females in various studies.^{13,14} However, the most relevant reason for this inclination could be credited to 'neuroticism', which is defined as having traits of being anxious and jealous; these traits have been found to be more common in females,¹⁵ although assessing neuroticism was not part of this study.

The results of the current study show that, overall, the most feared dental procedure reported was fear of an injection/needle (52.4%) followed by root canal treatment (RCT) (47.5%) and dental extraction (43.5%). Similar results have been demonstrated previously where the fear of an injection/needle has been reported to be the scariest procedure, as perceived by Indian dental students.¹⁶ In general practice, the fear of injection is one of the most common obstacles in seeking good medical care. There is strong evidence that, due to this fear, people tend to avoid imperative medical treatment and, in some cases, refuse medical assistance completely.¹⁷ The possible reason for reporting these procedures as most fear-inducing among all of the others could be that these procedures have the ability to invoke severe pain, and it has been reported earlier that past traumatic experiences of patients helps in the build-up of severe anxiety related to dental procedures.¹⁸ Pakistan is a developing country and health care infrastructure is not very well developed. Patients do not visit medical and dental care facilities for routine check-ups, implicating that most of the treatment patients receive would be operative in nature. This is also evident from the results of our study where patients have chosen operative procedures (which have pain-generating capacity) as procedures that provoke high levels of anxiety, compared to non-operative procedures.

In general, clinical students reported having less anxiety in response to the majority of the dental procedures than the pre-clinical students. This could be because of fact that the students become more aware, more professionally developed, and acquire more clinical experience when they move from pre-clinical to clinical years, and this development is aligned with the results of several other studies.^{17,19} Other credible reasons for the decrease in anxiety levels of clinical students compared to pre-clinical students could be that progressing education and clinical experience pacifies the

Table 2: Procedures eliciting highest dental anxiety levels among all male and female dental students.

Dental procedures	Male	Female	P-value
	High anxiety Number (%)	High anxiety Number (%)	
Sound or vibration of the drill	11 (29.7)	19 (29.7)	0.69
Inadequate anaesthesia	9 (24.3)	21 (32.8)	0.64
Disliking of the numb feeling	10 (27)	15 (23.4)	0.38
Injection (Needle)	22 (59.5)	31 (48.4)	0.22
Periodontal probing	10 (27)	14 (21.9)	0.12
Noise/sound of scaler	7 (18.9)	16 (25)	0.27
Impression taking	10 (27)	19 (29.7)	0.51
X-rays	6 (16.2)	7 (10.9)	0.18
Rubber dam	8 (21.6)	18 (28.1)	0.88
Prolonged mouth opening	14 (37.8)	15 (23.4)	0.47
Cold air	16 (43.2)	19 (29.7)	0.08
Lacking procedure information	15 (40.5)	19 (29.6)	0.49
Root canal treatment (RCT)	24 (64.9)	26 (40.6)	0.61
Extraction	17 (45.9)	22 (34.4)	0.99
Fear of sustaining injury	11 (29.7)	23 (35.9)	0.57
Panic attacks	10 (27)	18 (28.1)	0.88
Incapability to stop the dentist*	11 (29.7)	17 (26.6)	0.02
Unable to ask questions*	15 (40.5)	12 (18.8)	0.03
Not being listened to	15 (40.5)	19 (29.7)	0.41
Being criticized	17 (45.9)	16 (25)	0.43
Smells in the dental clinics	10 (27)	22 (34.4)	0.41
The need for further treatment	22 (59.5)	16 (25)	0.22
Financial costs of the treatment	16 (43.2)	14 (21.9)	0.43
No. of appointments and time required for further treatment	13 (35.1)	15 (23.4)	0.7
Feeling ashamed about the condition of the mouth	11 (29.7)	8 (12.5)	0.21
Feeling restricted or loss of control	9 (24.3)	7 (10.9)	0.29

*ANOVA, significant at $P < 0.05$ (Low, moderate anxiety, and no anxiety responses not included).

Table 3: Procedures eliciting highest dental anxiety levels among pre-clinical and clinical students.

Dental procedures	Pre-clinical	Clinical	P-value
	High anxiety Number (%)	High anxiety Number (%)	
Sound or vibration of the drill	12 (22.2)	18 (38.3)	0.84
Inadequate anesthesia*	12 (22.2)	18(38.3)	0.04
Disliking of the numb feeling*	13 (24.1)	12 (25.5)	0.01
Injection (Needle)*	29 (53.7)	24 (51.1)	0.007
Periodontal probing*	13 (24.1)	11 (23.4)	0.01
Noise/sound of scaler	11 (20.4)	12 (25.5)	0.48
Impression taking	12 (22.2)	17 (36.2)	0.066
X-rays	8 (14.8)	5 (10.6)	0.05
Rubber dam *	16 (29.6)	10 (21.3)	0.00
Prolonged mouth opening*	19 (35.2)	10 (21.3)	0.049
Cold air	18 (33.3)	17 (36.2)	0.32
Lacking procedure information	18 (33.3)	17 (36.2)	0.26
Root canal treatment (RCT)	25 (46.3)	25 (53.2)	0.21
Extraction	20 (37.0)	19 (40.4)	0.29
Fear of sustaining injury	20 (37.0)	14 (29.8)	0.29
Panic attacks	16 (29.6)	12 (25.5)	0.30
Incapability to stop the dentist *	19 (35.2)	9 (19.1)	0.048
Unable to ask questions	14 (25.9)	13 (27.7)	0.77
Not being listened to	15 (27.8)	19 (40.4)	0.61
Being criticized	16 (29.6)	17 (36.2)	0.64
Smells in the dental clinics	17 (31.5)	15 (31.9)	0.65
The need for further treatment	17 (31.5)	21 (44.7)	0.088
Financial costs of the treatment	14 (25.9)	16 (34.0)	0.77
No. of appointments and time required for further treatment	15 (27.8)	13 (27.7)	0.48
Feeling ashamed about the condition of the mouth	9 (16.7)	10 (21.3)	0.72
Feeling restricted or loss of control	6 (11.1)	10 (21.3)	0.43

*ANOVA, significant at $P < 0.05$ (Low, moderate anxiety, and no anxiety responses not included).

unpleasant childhood memories of students, consequently building their confidence when they are executing or undergoing any dental procedure.²⁰ It is therefore recommended that graded exposure therapy (exposure of clinical procedures) should be introduced at an early stage of dental training, which will not only eliminate bad memories of past dental experiences but will also reduce students' dental anxiety levels.

The limitations of the present study include a small sample size and data representation from only one dental college. Another limitation was a prominent difference between the female and male respondents, which could have affected the statistical analysis. Future studies aimed at exploring the same field from other regions could prove useful in establishing a nationwide picture of prevailing dental anxiety levels.

Conclusions

Females and pre-clinical students reported more anxiety related to specific dental procedures than their respective counterparts. Educational sessions and graded exposure therapy (exposure of clinical procedures) at an initial phase of dental training could help decrease these anxiety levels.

Conflict of interest

The authors have no conflict of interest to declare.

Acknowledgements

The authors would like to express their gratitude to all of the students of Sardar Begum Dental College, Peshawar, Pakistan who participated in this study.

References

- Canacki CF, Canacki V. Pain experienced by patients undergoing different periodontal therapies. *J Am Dent Assoc* 2007; 138: 1563–1573.
- Kevin H, Ricarda E, Nina IM, Hans-Ulrich W, Ulrike L. Fear processing in dental phobia during crossmodal symptom provocation: an fMRI study. *Biomed Res Int* 2014; 2014: 196353. 11.
- Wide Boman U, Carlsson V, Westin M, Hakeberg M. Psychological treatment of dental anxiety among adults: a systematic review. *Eur J Oral Sci* 2013; 121(3 Pt 2): 225–234.
- Armfield JM, Slade GD, Spencer AJ. Dental fear and adult oral health in Australia. *Community Dent Oral Epidemiol* 2009; 37: 220–230.
- Sanikop S, Agrawal P, Patil S. Relationship between dental anxiety and pain perception during scaling. *J Oral Sci* 2011; 53(3): 341–348.
- Nicolas E, Collado V, Faulks D, Bullier B, Hennequin M. A national cross-sectional survey of dental anxiety in the French adult population. *BMC Oral Health* 2007; 7: 12.
- Randy L. *Stress in dentistry – it could kill you!*. Oral Health Group. Available; <http://www.oralhealthgroup.com/news/stress-in-dentistry-it-could-kill-you/1000214585/>; 2007 [Accessed 13.02.15].
- Al-Omari WM, Al-Omiri MK. Dental anxiety among university students and its correlation with their field of study. *J Appl Oral Sci* 2009; 17: 199–203.
- Corah NL. Development of a dental anxiety scale. *J Dent Res* 1969; 48: 596.
- Serra-Negra J, Paiva SM, Oliveira M, Ferreira E, Freire-Maia F, Pordeus I. Self-reported dental fear among dental students and their patients. *Int J Environ Res Public Health* 2012; 9(1): 44–54.
- Hakim H, Razak AI. Dental fear among medical and dental graduates. *Sci World J* 2014; 2014: 747508.
- Farooq I, Ali S. A cross sectional study of gender differences in dental anxiety prevailing in the students of a Pakistani dental college. *Saudi J Dent Res* 2015; 6(1): 21–25.
- Newton T, Asimakopoulou K, Daly B, Scambler S, Scott S. The management of dental anxiety: time for a sense of proportion? *Br Dent J* 2012; 213: 271–274.
- Armfield MJ. How do we measure dental fear and what are we measuring anyway. *Oral Health Prev Dent* 2010; 8: 107–115.
- Lippa AR. Gender differences in personality and interests: when, where, and why? *Soc Personal Psychol Compass* 2010; 4(11): 1098–1110.
- Acharya S, Sangam DK. Dental anxiety and its relationship with self-perceived health locus of control among Indian dental students. *Oral Health Prev Dent* 2010; 8(1): 9–14.
- Ab Latif Wani, Ara A, Bhat SA. Blood injury and injection phobia: the neglected one. *Behav Neurol* 2014; 2014(471340): 2014.
- Oosterink FM, de Jongh A, Aartman IH. Negative events and their potential risk of precipitating pathological forms of dental anxiety. *J Anxiety Disord* 2009; 23(4): 451–457.
- Kirova GD. Dental anxiety among dental students. *J IMAB* 2011; 17(2): 137–139.
- Telang LA, Nerali JT, Telang A, Kalyan Chakravarthy PV. Perceived sources of stress among Malaysian dental students. *Eur J Gen Dent* 2013; 2(3): 300–307.