



RESEARCH ARTICLE

State and Trait Anxiety Evaluation in Dental Patients

Hamid Razavian¹, Sara Mohammadi Sepah V^{2*}, Hadi Zare³ and Ali Mohammadi Sepahvandi⁴

¹Assistant Professor, Department of Endodontics, School of Dentistry, Isfahan University of Medical Sciences, Isfahan, Iran

²Assistant Professor, Department of Restorative Dentistry, Faculty of Dentistry, Lorestan University of Medical Sciences, Khorram Abad, Iran

³Assistant Professor, Department of Periodontics, Faculty of Dentistry, Lorestan University of Medical Sciences, Khorram Abad, Iran

⁴Medical Student, Medicine Faculty, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

*Corresponding author: Sara Mohammadi Sepah Vand, Assistant Professor, Department of Restorative Dentistry, Faculty of Dentistry, Lorestan University of Medical Sciences, Khorram Abad, Iran, Tel: 00989166637866



Abstract

Purpose: The purpose of this study was to evaluate the possible relation between dental patient's state anxiety, demographic factors and past experience of treatments with their trait anxiety in patients undergoing root canal treatments (RCT).

Materials and Methods: 60 patients participated in this study. A single molar was treated in every patient. At their first visit, patients were asked to fill out a questionnaire about their demographic and educational status as well as a Persian version of STAI-T (Spielberger Trait Anxiety Inventory). At the second visit they filled out a STAI-S (Spielberger State Anxiety Inventory) before going through the dental procedure.

Results: Our results showed a significant correlation between state and trait anxiety ($P = 0.001$). We also found no significant correlation between age and state anxiety ($P = 0.932$). However, no significant difference was found neither between education and state anxiety ($P = 0.78$) nor between past RCT experience and state anxiety ($P = 0.88$). In addition, our analysis indicates no correlation between state anxiety and total number of injections ($P = 0.68$). According to the patient's answers, the most stressful part of dental procedure was drilling (37%).

Conclusions: Our results suggest that there is a relation between trait anxiety and state anxiety. Also, dental procedures are not a source of anxiety in patients with higher trait anxiety per se.

Keywords

Anxiety, Endodontic therapy, Dentistry

Introduction

Dental procedures are usually stressful situations for most of the patients all over the world. Dental anxiety is ranked fourth among common fears and ninth among intense fears [1]. Researches show this fear is often multifactorial; negative experiences in the past, patient's tendency to think negatively about treatment and expected pain, patient's perception of a dental procedure, patient's general anxiety and personality and some clinical factors such as type of dental procedure and dentist's behavior are some of the probable reasons [2,3]. These anxiety's manifestations can potentially cause some difficulties for dentists to deal with patients. Patients suffering from dental anxiety tend to postpone their appointments and as a result their oral health are began compromising [2,4-6]. Also, they are more susceptible to show hyperventilation and syncope symptoms, which are two of the most common dental emergencies [7]. Thus, finding a way to recognize and manage this type of stress in these patients has been always under research.

Personality characteristics is known as an etiologic factor for anxiety [4] meaning that an underlying vulnerability to anxiety may increase the likelihood of developing dental anxiety [8]. To address the influence of personality characteristics in anxiety, two different types of anxiety have been defined: state and trait. State

anxiety mainly refers to how a person is feeling at the time of a perceived threat and therefore is considered temporary whereas trait anxiety is a personality trait which remains relatively stable over time. State anxiety is used to determine an individual's present level of anxiety, while trait anxiety is used to describe an individual's long-term anxiety level [9]. State-Trait Anxiety Inventory (STAI) is a self-report questionnaire which is commonly utilized in research to assess both trait and state anxiety separately [10-12]. It consists of 40 questions asking about these two different kinds of anxiety independently in two separate sections; STAI-S which assesses state anxiety and STAI-T which measures trait anxiety. This questionnaire is also validated in Persian and has been widely used before [13-17].

The aim of this study was to evaluate the possible relationship between state and trait anxiety. In this study, state anxiety is defined as the anxiety patients manifest in anticipation of undergoing a dental procedure. The relation between state and trait anxiety is measured by STAI questionnaire filled by patients undergoing one of the most stressful dental procedures. By employing the STAI questionnaire in patients undergoing one of the most stressful dental procedures. In order to identify the most stressful dental situation in our patients, a pilot study was run before the main experiment. Although RCT and oral surgery have been repeatedly reported as the two most stressful dental procedures in the literature [3,12,18,19], we decided to investigate this matter among our patients to eliminate any possibility of cultural effect.

Furthermore, we evaluated the possible relation between demographic factors such as age, gender, education and patient's past RCT experience and patient's state anxiety.

Methods and Materials

Our experiment consists of two stages. In the first stage we conducted a pilot study to find out what dental procedure is considered as the most stressful one among our patients. In order to do so, two questionnaires were designed; one to ask the patients some questions about their demographic information and another to inquire what situation is rated as the most stressful dental situation among our patients. In the latter questionnaire, they were required to answer the following question: Which one do you think is the most stressful situation in dental procedures? 1) Tooth filling, 2) Root canal therapy, 3) Tooth extraction, or 4) Scaling and root planning.

This survey took place in two distinct dental clinics located in two different quarters of Esfahan known for their different socioeconomic situations. Patients were selected randomly to fill out the questionnaires. 30 patients participated in this study; 15 patients in each clinic. The result of this study reveals that, regardless

of the patient's socioeconomic status, all patients identified RCT and tooth extractions as the two most stressful dental situations. As a result, for the purpose of this study RCT was selected as the most stressful dental treatment.

In the next stage, 60 patients including 39 women and 21 men (their age ranged from 14 to 60 years, mean = 35.5 years old) were chosen randomly from patients with a molar tooth in need of RCT. For all patients, the procedure was done by a specialist in root canal therapy in his office. All the patients were required to sign an informed consent form. A single molar was treated in every patient. In order to measure their level of trait anxiety, they were asked to fill out a questionnaire about their demographic and educational status as well as a Persian version of STAI-T at their first visit. In this visit, their tooth was observed by the specialist and an appointment was set up for the patient to receive the treatment. At the second visit they filled out a STAI-S, also in Persian, to assess their level of state anxiety when they were in the waiting room waiting for their appointment to get the treatment. From all patients, whose tooth was observed in the first visit, only the ones with a molar tooth in need of RCT were included in this study. In addition any patient who missed their appointment or did not agree to participate in our study was excluded. We also recorded their number of anesthetic injections to investigate whether there is a relation between the amount of anesthesia they receive and the level of their state anxiety. The effect of age, education, gender and STAI-S on STAI-T were evaluated by using multiple linear regression (enter mode). Analysis of data was carried out with SPSS 20.0. P values less than 0.05 were considered significant.

Results

The findings of our study show that 37% of patients had moderate to very severe state anxiety. Also, 35% of patients reported having moderate to very severe trait anxiety. We found a significant correlation between state and trait anxiety ($p < 0.001$). There wasn't a significant correlation between age and state anxiety ($p = 0.932$) (Table 1). 47% of patients had master and higher degrees and no significant differences were found between education and state anxiety ($p = 0.78$). 65% of patients were women and 35% were men. We found that although women had more state anxiety than men, but this positive correlation wasn't significant ($p = 0.054$). 68% of participants had a past experience of RCT. There weren't a significant correlation between

Table 1: Correlation coefficients and P values between STAI-S, STAI-T, age and number of injections.

	Correlation coefficients	P value
State Anxiety/Trait Anxiety	0.634	< 0.001
Age/STAI-S	0.012	0.932
Number of injections/STAI-S	-0.055	0.680

past RCT experience and state anxiety ($p = 0.88$) as well as their number of injections ($p = 0.68$) (Table 1). Finally, base on the patient's answers, the most stressful part of dental procedure was drilling (37%) (Table 1).

Discussion

What are the most stressful dental procedures?

Extraction or RCT? Prosthesis or scaling? What is the more anxiety provoking treatment in dental procedure? Several studies have investigated this question among dental patients. The results indicate that anxiety level varies according to the type of dental treatment and hence assuming that all patients have the same level of anxiety for all various sorts of treatments may not be correct [3]. Many articles have found that oral surgery and RCT are rated as the top two fear-arousing treatments [3,5,12,18]. In our study, we first designed a pilot study to answer this question about Persian patients. Our results showed that Persian patients also identified these two dental procedures as the most stressful treatments which is inline with the published research on patients with different nationalities.

Injection or drilling? Having X-ray or suturing? In most dental anxiety researches, the anesthetic injection and the drilling are ranked among the most unpleasant or anxiety-arousing stimuli [3,6,11,18,20]. However, there is a lack of agreement among studies about the most anxiety-provoking stimuli. Although, Wardle J [21] and J. Leclaire [20] ranked them as injection followed by drilling, but our participants mentioned drilling as the most anxiety-arousing stimuli (37%) and interestingly, injection after cleaning and shaping the root, was the third one.

How to detect anxious patients?

Objective measures: Physiological parameters changes due to patient's anxiety during dental procedures [10]. Heart rate and blood pressure can be used as reliable indicators of anxiety [10]. In addition, researchers have been trying to find a correlation between some other biologic markers such as saliva's cortisol, amylase [22,23] and plasma adrenaline in anxious patient's urine [24]. The results, however, are still controversial. Although all these physiological markers can be helpful to quantify anxiety, but they all are time-consuming in the dental clinic.

Subjective measures: They are self-reported questionnaires, filled out by patients, to measure their anxiety level. Some of the most popular questionnaires are Corah Dental Anxiety Scale (DAS) [10,25], State-Trait Anxiety Inventory (STAI) and Modified Dental Anxiety Scale [11,12]. For the purpose of our study, we chose STAI questionnaire; mainly because we were interested in finding the probable relation between state and trait anxiety. Since a dental procedure can be categorized as

a temporary incident which can potentially cause even high degree of anxiety in patients, STAI seems to be the best option.

What are the probable factors affecting patient's dental anxiety (STAI-S)? (which have searched in this study)

Age: We found that age had not have a significant relationship with dental anxiety which is in agreement with Wong and Reed Lytle [3], Rankin and Haris [26] and Arslan, et al. [27]. In contrast, several studies have shown that younger patients are more anxious than older ones [11,20,28,29]. More specifically, Hamissi, et al. [7] reported a significant relation between dental anxiety and age in Persian patients. Liddell, et al. [30] have argued that this finding might be due to the general decline in anxiety level with aging and greater exposure to other diseases and their treatments.

It is important to note that anxiety has its cultural roots and some of older patients tend to avoid reporting their anxiety as in some cultures expressing anxiety about certain events could be considered as a sign on weakness and an embarrassing behavior to show.

Education: We did not find any correlation between education and the level of STAI-S in our experiment. This finding is inline with studies done by Saatchi, et al. [31] and Arslan, et al. [27]. However, there are some studies indicate that patients with higher education demonstrated lower level of dental anxiety [18,32,33]. In their work, Peretz and Moshonov [18] argued that one possible explanation as to why education might have an effect on reducing anxiety is that higher education provides better tools to cope with fearful situations. One other possibility discussed in the paper is that higher education might put the patients in a status where they cannot afford presenting a fearful behavior. Yildirim, et al. [33] noticed that patients with higher level of education might have more knowledge about dental procedures and the importance of dental care.

Our results suggest that there is no significant relationship between education and the level of STAI-S in our experiment. Our argument is that the level of patients' anxiety might be more related to individual differences in how people react to stressful situations than to merely their level of education. It is worth mentioning that, as Al-Omari, et al. discussed in their research [34] it seems that lack of dental health education particularly, might result in patients' anxiety rather than education by itself.

Gender: The real effect of gender on anxiety is not clear yet. Many studies demonstrate that women tend to report dental anxiety more often than men [12,18,20,25,35,36]. In contrast, many others did not find such relation between gender and dental anxiety [2,3,11,37]. Yoshiaki Ihara, et al. [38] interestingly reported that male gender was a major factors related to

severe dental fear, despite that 76% of total participants in their study were women.

A greater readiness among females to acknowledge feelings of anxiety [2] and different threshold for pain between sexes [39] are among suggested reasons behind the gender differences observed in the literature. Saatchi, et al. [31], have mentioned that dental anxiety might be associated with emotions such as social phobia, panic, depression, stress, and fear, and these emotions tend to be more common among women than men. In another study, Al-Omari, et al. [34] justified these results by arguing that anxiety has been shown to be positively correlated with neuroticism and women are known to generally have a higher level of neuroticism. In contrast, Yoshiaki Ihara, et al. [38] reported that visiting a dentist is less common among men than women and as a result, men were classified as being severely difficult to treat in their study.

Appukuttan, et al. [11] interestingly pointed out cultural reasons might be one factor that attributes to the discrepancy among studies.

Our results supports the findings of the latter group. Although there was a trend for gender difference, with women demonstrating higher level of anxiety, the correlation was not significant ($p = 0.0054$). We believe that further investigation is required to determine whether gender has any effect on the level of stress or not.

Previous experience of RCT: Our result showed that there was not a significant correlation between past experience of RCT and state anxiety. It means that patients who have had previous RCT experience, do not necessarily show less anxiety in next RCT. This finding is in agreement with Peretz and Moshonov [18] and in contrast with Wong and Lytle [3]. We believe that our result is more reliable since 68% of the patients in our study and 95% of the patients in Peretz and Moshonov's study had previous experience of RCT. This number, however, reduces to only 15% in Wong and Lytle's study.

It should be noticed that we did not divide our patients to those with previous unpleasant RCT experience or without it. As a result, we evaluated the possible relation between having past RCT experiences on patient's future dental anxiety. We believe that further investigations are required to determine whether previous experience of RCT or previous unpleasant experience of RCT have any effect on dental patient's stress level or not.

Patient's general anxiety and personality: STAI scale is considered as the most important scale in Psychology for measuring the state and trait anxiety [10,12]. Nevertheless, for practical reasons, DAS is the scale mainly used for measuring anxiety in density. We, however decided to utilize STAI-S for the purpose of our study instead as this scale is shown to have the highest correlation and reliability compared to all the other

available measures [11]. Although admittedly these two questionnaires do not measure the exact same anxiety trait, several studies have reported a significant correlation between dental anxiety measured by DAS and state anxiety assessed by STAI-S [1,12,40,41].

On the other hand, Studies investigating the relation between trait and dental anxiety have led to conflicting results. While some reported a significant relation between trait anxiety and dental anxiety [12,25,28,41,42], others failed to find such relationship [43,44]. Our result is in agreement with those of Hakeberg, et al. [41], Hägglin, et al. [28], Tarazona, et al. [12]. We found a significant correlation between the result of STAI-T and STAI-S. In other words, patients with higher values of state anxiety, reported higher values of trait anxiety. One possible explanation for these controversial findings is various anxiety measuring questionnaires are utilized in different studies. Although all of these questionnaires are valid and reliable, it is probable that using distinct methods of measuring anxiety could contribute to different results.

Finally, it is essential to mention that as Fuentes, et al. [45] have noticed in their study, based on their specific statistical analysis, it seems that patients with high dental anxiety tend to present high trait anxiety, but its opposite isn't true necessarily, it means that there is a positive correlation between state and trait anxiety in dental patients but having a high trait anxiety level seems not to be a predictor of having high level of dental anxiety. Further investigations are required to determine the relation between these two factors.

Does anxiety have effect on patient's total number of anesthetic injections?

As number of studies have shown that individuals with high dental anxiety tend to be hypersensitive to pain [20,46], we recorded the number of anesthetic injections in our patients. Our results, however, showed no significant correlation between patient's anxiety and their need for anesthetic injection, which is in agreement with Peretz, et al. [18] who have reported no differences in DAS scores regarding patient's request for local anesthesia. They argued that this might be because of the public's perception that endodontic treatment is a fearful and possibly painful procedure.

Conclusion

Our results indicates a significant correlation between state and trait anxiety in dental patients regardless of their age, gender and education. These findings suggest that dentists need to be aware of the possibility that patients with moderate to severe dental anxiety levels, could also have generalized trait anxiety. In other words, patients who show more dental anxiety most likely are those who are more anxious and nervous in their daily life.

Acknowledgements

Authors would like to thank Dr. Nazanin Mohammadi Sepahvand (PHD student of Electrical Engineering, Department of Electrical and Computer Engineering, McGill University) for her kind cooperation and encouragement. This study was supported by authors.

Author Contributions

Hamid Razavian: Idea, Hypothesis, RCT treatments;

Sara Mohammadi Sepah Vand: Idea, Experimental design, Performed the experiments;

Hadi Zare: Proofread the manuscript;

Ali Mohammadi Sepahvandi: Wrote the manuscript.

References

- Kvale G, Berg E, Raadal M (1998) The ability of corah's dental anxiety scale and spielberger's state anxiety inventory to distinguish between fearful and regular Norwegian dental patients. *Acta Odontol Scand* 56: 105-109.
- Abrahamsson KH, Berggren U, Hallberg L, Carlsson SG (2002) Dental phobic patients' view of dental anxiety and experiences in dental care: A qualitative study. *Scand J Caring Sci* 16: 188-196.
- Wong M, Lytle WR (1991) A comparison of anxiety levels associated with root canal therapy and oral surgery treatment. *J Endod* 17: 461-465.
- Gordon D, Heimberg RG, Tellez M, Ismail AI (2013) A critical review of approaches to the treatment of dental anxiety in adults. *J Anxiety Disord* 27: 365-378.
- Carter A, Carter G, George R (2015) Pathways of fear and anxiety in endodontic patients. *Int Endod J* 48: 528-532.
- Armfield JM, Heaton LJ (2013) Management of fear and anxiety in the dental clinic: A review. *Aust Dent J* 58: 390-407.
- Hamissi J, Hamissi H, Ghoudosi A, Ghholami S (2012) Factors affecting dental anxiety and beliefs in an Iranian population. *International Journal of Collaborative Research on Internal Medicine & Public Health* 4: 585-593.
- Weiner AA, Sheehan DV (1990) Etiology of dental anxiety: Psychological trauma or CNS chemical imbalance? *Gen Dent* 38: 39-43.
- Caumo W, Broenstrup J, Fialho L, Petry S, Brathwait O, et al. (2000) Risk factors for postoperative anxiety in children. *Acta Anaesthesiol Scand* 44: 782-789.
- Jimeno FG, Bielsa SY, Fernández CC, Rodríguez AL, Bellido M (2011) Objective and subjective measures for assessing anxiety in paediatric dental patients. *Eur J Paediatr Dent* 12: 239-244.
- Appukkuttan DP, Tadepalli A, Cholan PK, Subramanian S, Vinayagavel M (2013) Prevalence of dental anxiety among patients attending a dental educational institution in Chennai, India—a questionnaire based study. *Oral Health Dent Manag* 12: 289-294.
- Tarazona B, Tarazona-Álvarez P, Peñarrocha-Oltra D, Rojo-Moreno J, Peñarrocha-Diago M (2015) Anxiety before extraction of impacted lower third molars. *Med Oral Patol Oral Cir Bucal* 20: e246-e250.
- Shabanloei R, Golchin M, Esfahani A, Dolatkhan R, Rasoulian M (2010) Effects of music therapy on pain and anxiety in patients undergoing bone marrow biopsy and aspiration. *AORN J* 91: 746-751.
- Dehdari T, Heidarnia A, Ramezankhani A, Sadeghian S, Ghofranipour F (2009) Effects of progressive muscular relaxation training on quality of life in anxious patients after coronary artery bypass graft surgery. *Indian J Med Res* 129: 603-608.
- Golpour M, Hosseini SH, Khademloo M, Ghasemi M, Ebadi A, et al. (2012) Depression and anxiety disorders among patients with psoriasis: A hospital-based case-control study. *Dermatology Research and Practice* 2012.
- Fayazi S, Babashahi M, Rezaei M (2011) The effect of inhalation aromatherapy on anxiety level of the patients in preoperative period. *Iran J Nurs Midwifery Res* 16: 278-283.
- Hosseini SH, Yousefnejad K, Tabiban S, Nesarhoseyni V, Bagheri B, et al. (2011) Effects of depression and anxiety symptoms on cardiac mortality following myocardial infarction: A 2-year follow-up. *Int J Psychiatry Clin Pract* 15: 91-96.
- Peretz B, Moshonov J (1998) Dental anxiety among patients undergoing endodontic treatment. *J Endod* 24: 435-437.
- Sirin Y, Humphris G, Sencan S, Firat D (2012) What is the most fearful intervention in ambulatory oral surgery? Analysis of an outpatient clinic. *Int J Oral Maxillofac Surg* 41: 1284-1290.
- LeClaire AJ, Skidmore AE, Griffin JA, Balaban FS (1988) Endodontic fear survey. *J Endod* 14: 560-564.
- Wardle J (1982) Fear of dentistry. *Br J Med Psychol* 55: 119-126.
- Kanegane K, Penha SS, Munhoz CD, Rocha RG (2009) Dental anxiety and salivary cortisol levels before urgent dental care. *J Oral Sci* 51: 515-520.
- Takai N, Yamaguchi M, Aragaki T, Eto K, Uchihashi K, et al. (2004) Effect of psychological stress on the salivary cortisol and amylase levels in healthy young adults. *Arch Oral Biol* 49: 963-968.
- Edmondson H, Roscoe B, Vickers MD (1972) Biochemical evidence of anxiety in dental patients. *Br Med J* 4: 7-9.
- Akarlsan Z, Erten H, Uzun O, Iseri E, Topuz O (2010) Relationship between trait anxiety, dental anxiety and DMFT indexes of Turkish patients attending a dental school clinic. *East Mediterr Health J* 16: 558-562.
- Rankin JA, Harris MB (1984) Dental anxiety: The patient's point of view. *J Am Dent Assoc* 109: 43-47.
- Arslan S, Ertaş ET, Ülker M (2011) The relationship between dental fear and sociodemographic variables. *Erciyes Týp Dergisi* 33: 295-300.
- Hägglin C, Hakeberg M, Hällström T, Berggren U, Larsson L, et al. (2001) Dental anxiety in relation to mental health and personality factors. A longitudinal study of middle-aged and elderly women. *Eur J Oral Sci* 109: 27-33.
- Saeed NA, Hussein HM, Mahmood A (2017) Prevalence of dental anxiety in relation to sociodemographic factors using two psychometric scales in Baghdad. *IRAQI* 14: 38-50.
- Liddell A, Locker D (1997) Gender and age differences in attitudes to dental pain and dental control. *Community Dent Oral Epidemiol* 25: 314-318.
- Saatchi M, Abtahi M, Mohammadi G, Mirdamadi M, Binandeh ES (2015) The prevalence of dental anxiety and fear in patients referred to Isfahan Dental School, Iran. *Dent Res J (Isfahan)* 12: 248-253.

32. Yildirim TT, Dundar S, Bozoglan A, Karaman T, Dildes N, et al. (2017) Is there a relation between dental anxiety, fear and general psychological status? *PeerJ* 5: e2978.
33. Yildirim TT (2016) Evaluating the relationship of dental fear with dental health status and awareness. *J Clin Diagn Res* 10: 105-109.
34. Al-Omari WM, Al-Omiri MK (2009) Dental anxiety among university students and its correlation with their field of study. *J Appl Oral Sci* 17: 199-203.
35. Agras S, Sylvester D, Oliveau D (1969) The epidemiology of common fears and phobia. *Compr Psychiatry* 10: 151-156.
36. Fiset L, Milgram P, Weinstein P, Melnick S (1989) Common fears and their relationship to dental fear and utilization of the dentist. *Anesth Prog* 36: 258-264.
37. Thomson WM, Locker D, Poulton R (2000) Incidence of dental anxiety in young adults in relation to dental treatment experience. *Community Dent Oral Epidemiol* 28: 289-294.
38. Ihara Y, Fukuda K-i, Saita N, Ichinohe T (2018) Male gender and high trait anxiety are 2 major factors associated with severe dental fear and avoidance. *Anesth Prog* 65: 177-180.
39. Ilgüy D, Ilgüy M, Dinçer S, Bayirli G (2005) Reliability and validity of the modified dental anxiety scale in turkish patients. *J Int Med Res* 33: 252-259.
40. Lago-Méndez L, Diniz-Freitas M, Senra-Rivera C, Seoane-Pesqueira G, Gándara-Rey JM, et al. (2006) Dental anxiety before removal of a third molar and association with general trait anxiety. *J Oral Maxillofac Surg* 64: 1404-1408.
41. Hakeberg M, Hägglin C, Berggren U, Carlsson SG (2001) Structural relationships of dental anxiety, mood, and general anxiety. *Acta Odontol Scand* 59: 99-103.
42. Locker D, Liddell A, Shapiro D (1999) Diagnostic categories of dental anxiety: A population-based study. *Behav Res Ther* 37: 25-37.
43. Benjamins C, Schuurs AH, And TK, Hoogstraten JA (1996) Self-reported and physiologically measured dental anxiety, coping styles and personality traits. *Anxiety, Stress, & Coping* 9: 151-162.
44. Schuurs AH, Duivenvoorden HJ, Thoden van Velzen SK, Verhage F, Makkes PC, et al. (1986) Psychologic correlates of dental anxiety. *Community Dent Oral Epidemiol* 14: 69-72.
45. Fuentes D, Gorenstein C, Hu LW (2009) Dental anxiety and trait anxiety: An investigation of their relationship. *Br Dent J* 206: E17.
46. Shoben Jr EJ, Borland L (1954) An empirical study of the etiology of dental fears. *J Clin Psychol* 10: 171-174.