

Full Length Research Paper

Evaluation of anxiety level changes during the first three months of orthodontic treatment in Pakistani population

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There are two types of anxiety disorders: state and trait anxiety. Anxiety among dental patients is common and potentially problematic, both for the patient and for the dental team in managing such patients. The aim of this study was to evaluate changes in dental anxiety among patients and parents, their state and trait anxiety were assessed by using anxiety scales. Anxiety levels of 120 patients and parent of each patient were assessed using questionnaire based scales for state-trait and dental anxiety. Questionnaires were filled by patients and parents at two different intervals, that is, T1 (start of orthodontic treatment) and T2 (3 months after orthodontic treatment). T1 and T2 scores were compared using paired sample t-test and the correlation between dental anxiety scale (DAS) and State-trait anxiety inventory (STAI) was performed using Pearson's correlation test. The results of this study show that anxiety levels of patients greatly reduced with time, however their parent's anxiety level remains unchanged. Level of anxiety of both state and dental patients decreases as these patients become more familiar with the dental environment and orthodontist.

Key words: Orthodontic treatment, state anxiety STAT-S, trait anxiety STAT-T, dental anxiety scale DAS.

INTRODUCTION

Anxiety disorders are of two main types: state and trait anxiety. State anxiety (STAI-S) is a fluctuating emotional condition that changes overtime and shows how one feels right now at the moment, whereas trait anxiety (STAI-T) is a personality trait which remains relatively stable overtime (Caumo et al., 2000). State anxiety is used to assess present level of anxiety, while trait anxiety is used to determine long-term anxiety level.

Dental anxiety and fear are common, and can cause problems, both for the patient and for the dental team in managing such patients. Dental anxiety does not only

make the patients to avoid dental care, but it also results in sleep disturbance, ponders on negative feelings and thoughts and develops low self-esteem (Cohen et al., 2000). Those patients who have painful past dental experience are found to be more apprehensive as compared to those who have pain free experience.

Dental anxiety is a strong negative feeling that is related to dental procedures. According to Sanikop et al. (2011), dental anxiety is defined as a "state of apprehension that something dreadful is going to happen in relation to dental treatment or certain aspects of dental

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treatment. It is a multidimensional complex phenomenon which is influenced by personality characteristics, fear of pain, past traumatic dental experience in childhood and dentally anxious family members or peers. From an orthodontics standpoint, the initial placement of orthodontic appliances can cause discomfort. It was reported in literature that pain associated with the use of orthodontic appliances appeared to be the primary complaint of patients, more in adults than in adolescents, and that this discomfort was a major determining factor for cessation of orthodontic treatment. Anxiety was considered to be at its peak the day following orthodontic appliance placement and slowly reduces from that point onwards (Keith et al., 2013).

However, despite the advent of contemporary dental equipment's and technologies, that are designed to lower pain related to dental procedures, research shows that they are not effective in reducing the fear of pain (Vassend, 1993). According to the study done in the Maxillofacial Department of Khyber College of Dentistry, Peshawar, the frequency of anxiety from local anesthesia injection is high among patients (Mehboob et al., 2011). The results regarding gender differences in studies are conflicting. Hakeberg et al. (1992) reported higher levels of dental anxiety among females, but Sari et al. (2005) did not find any such difference between genders.

State-trait anxiety inventory (STAI) is an n assessment scale based on a 4-point scale. The STAI records two types of anxiety: anxiety-state and trait. Higher scores show greater levels of anxiety.

The Corah's dental anxiety scale (DAS) contains 4 multiple choice options that deals with the patient's subjective reactions to the dental situations. Subjects with higher scores show greater level of anxiety.

In this study, three psychological outcome measures (state anxiety, trait anxiety, and dental anxiety) experienced by patients and one of their parents before and after three months of orthodontic treatment were investigated. The aim of this study was to assess whether patient and parent level of anxiety decrease after patients and their parents became familiar with their orthodontist, and became used to orthodontic treatment procedures.

MATERIALS AND METHODS

This questionnaire-based longitudinal study consisted of 60 patients with class I, II and III malocclusion and 60 parents of each patient. The parents could be male or female. They were all students by profession. All of the patients were treated by the same clinician using fixed orthodontic treatment approach (extraction and non-extraction). Informed consent forms were signed by all the participants and it was ensured that their responses will be kept confidential.

Inclusion criteria

The inclusion criteria includes patients between the age range of 15

and 25 years, patients with skeletal and dental class I, II and III malocclusions, patients undergoing fixed orthodontic treatment extraction and non-extraction.

Exclusion criteria

The exclusion criteria includes patients with previous orthodontic treatment, patients with craniofacial syndromes, patients with mandibular asymmetries and extensive prosthetic appliances, and patients who are mentally disabled

Data collection

Data was collected from patients coming to Orthodontics Department at Dr. Ishrat-ul-Ebad Khan Institute of Oral Health Sciences, DUHS for orthodontic treatment. Patient and parent anxiety levels were assessed using questionnaires that were filled by the patients and one of their parents. The first set of questionnaires was given at the start of the initial appointment (T1). The second set of questionnaires was given at the end of the third month of orthodontic treatment (T2). The two sets of questionnaires were similar and comprised two different tests of the STAI and Corah's DAS (Corah, 1969).

The STAI comprises separate self-report scales measuring two distinct anxiety concepts. These scales measure state anxiety (how one feels at a particular moment e.g. dental visit) and trait anxiety (how one usually or generally feels) (Corah, 1969).

The state anxiety score is based on 20 items for which respondents rate anxiety on a scale from one (not at all) to four (very much so). The trait anxiety score (STAI-T) is based on 20 questions designed to measure anxiety on a scale from one (almost never) to four (almost always). The total score is in the range of 20 to 80. The case with the highest total shows increased level of anxiety.

Corah's (DAS, 1969) is a brief questionnaire consisting of four questions asking how respondents would feel "if they had to go to the dentist tomorrow," "waiting at the dentist office," "waiting while he gets the drill ready," and "in the dentist's chair to have teeth cleaned". Respondents rate each item on a five-point scale that ranges from not anxious to extremely anxious, in ascending order. Each question carries a possible maximum score of five, and the total scores range between 4 and 20. Anxiety rating: 4 - 8 = low anxiety, 9 - 12 = moderate anxiety, 13 - 14 = high anxiety, and 15 - 20 = severe anxiety (or phobia).

Statistical analyses were done using the Statistical Package for the Social Sciences (SPSS for windows version 15). A sample size of 120 (patients and parents combined) was selected to provide more than 90% power. A P-value less than 0.05 was considered statistically significant. The mean anxiety levels and standard deviations were calculated for T1 and T2 after that paired sample t test was applied to compare scores of T1 and T2. In order to find out the relationship between DAS and STAI scores among patients and their parents, Pearson's correlation coefficient (bivariate two tailed) was calculated for T1 and T2.

RESULTS

In Table 1, mean patient and parent anxiety values and standard deviation (SD) are given for T1 and T2. DAS scores decreased significantly among patients from 6.87 (± 1.95) at T1 to 5.77 (± 1.57) at T2 ($p < 0.001$). Similarly, state and trait anxiety values of patients also decreased

Table 1. Descriptive statistics of dental anxiety and state anxiety scores with paired sample t test.

Index (possible range)	Patient (N= 120)			Parent (N=120)		
	T1	T2	P value	T1	T2	P value
	Mean (SD)	Mean (SD)		Mean (SD)	Mean (SD)	
Dental anxiety (4-20)	6.87 (±1.95)	5.77 (±1.57)	0.000	6.87 (±1.95)	6.73 (±1.82)	0.113
State anxiety (20-80)	41.40 (±5.90)	40.46 (±6.07)	0.000	40.46 (±6.07)	39.98 (±5.82)	0.20
Trait anxiety (20-80)	38.53 (±4.975)	38.48 (±4.98)	0.083	38.48 (±4.98)	38.49 (±4.94)	0.657

Table 2. Correlation matrix showing Pearson's correlation coefficient between DAS and STAI prior to the start of orthodontic treatment (T1).

Correlation	Patient DAS	Patient STAI-S	Patient STAI-T	Parent DAS	Parent STAI-S	Parent STAI-T
Patient DAS	1					
Patient STAI-S	0.141	1				
Patient STAI-T	-0.73	0.092	1			
Parent DAS	1.00 [†]	0.141	-0.075	1		
Parent STAI-S	0.124	0.983 [†]	0.983 [†]	0.124	1	
Parent STAI-T	-0.075	0.088	0.088	-0.075	0.097	1

[†]Correlation is significant $p < 0.05$. STAI-S: Stat anxiety; STAI-T: trait anxiety; DAS: Corah's dental anxiety scale.

Table 3. Correlation matrix showing Pearson's correlation coefficient between DAS and STAI 3 months after the start of orthodontic treatment (T2).

Correlation	Patient DAS	Patient STAI-S	Patient STAI-T	Parent DAS	Parent STAI-S	Parent STAI-T
Patient DAS	1	-	-	-	-	-
Patient STAI-S	0.093	1	-	-	-	-
Patient STAI-T	-0.048	0.097	1	-	-	-
Parent DAS	0.776 [†]	0.125	0.007	1	-	-
Parent STAI_S	0.116	0.956 [†]	0.074	0.107	1	-
Parent STAI-T	-0.050	0.093	0.999 [†]	0.008	0.072	1

[†]Correlation is significant $p < 0.05$. STAI-S: Stat anxiety; STAI-T: trait anxiety; DAS: Corah's dental anxiety scale.

from T1 to T2, STAI-S 41 (± 5.90) at T1 to 40.46 (± 6.07) at T2 ($p < 0.001$) and STAI-T values at T1 38.53 (± 4.975) and at T2 38.48 (± 4.98) does not show significant reduction as P value is (> 0.005). Among parents, the mean DAS and STAI-S values (± SD) decreased from 6.87 (± 1.95) at T1 to 6.73 (± 1.82) at T2 and from 40.46 (± 6.07) at T1 to 39.98 (± 5.82) at T2, respectively. The mean STAI-T value, increased from 38.48 (± 4.98) at T1 to 38.49 (± 4.94) at T2. However, none of these differences were statistically significant ($p > 0.05$). Parent's anxiety values did not show significant reduction in their scores.

The Pearson's correlation coefficient between DAS, STAI-S and STAI-T among patients and parents are shown in Table 2 for T1 and Table 3 for T2. Patient DAS

score at T1 shows correlation with parent DAS which is 1.00, $p < 0.05$ score and there was also significant correlation found between patient STAI-T and STAI-S with parent STAI-S which is 0.983, $p < 0.05$.

At T2, patient DAS score shows correlation with parent DAS which is 0.776, $p < 0.05$. Patient STAI-S shows correlation with parents STAI-S (0.956, $p < 0.05$) and patient STAI-T shows correlation with parents STAI-T (0.999, $p < 0.05$).

DISCUSSION

The purpose of this research was to assess changes in the level of dental anxiety in orthodontic patients using a

questionnaire. The age of patients was between 15 and 25 years in which 40 were girls and 20 were boys. Our assumption was that the patients who were anxious at the start of orthodontic treatment became less apprehensive with passage of time. Reduction in anxiety levels were attributed to the familiarity with the orthodontist and orthodontic procedures (Dailey et al., 2001).

The assessment scales used in this study were state anxiety score, trait anxiety score and dental anxiety score. Not only the patients but one of their parents was also included in this study because according to studies high anxiety levels in parents of children awaiting orthodontic treatment which could affect the outcome of their child's treatment (Krishnan, 2007).

The results show that anxiety levels of patients greatly reduced with time; however, their parent's anxiety level remains somewhat unchanged. It seems reasonable to expect that the more time that passed since patients start treatment, the more familiar and comfortable they become, and therefore, lower their level of dental anxiety about orthodontic treatment. Patients receive information at every appointment and they become familiar with the procedures more than their parents. This explains why patient's anxiety levels lowers with time. This is in agreement to the findings of Sergl et al. (1998) who reported that well informed patients tend to show less anxiety.

On the other hand, parents' anxiety levels remain unchanged due to facts that in most of the appointments parents normally stay out of the dental office and they receive less information about the procedures being done in patients' mouth.

The results showed a significant correlation between dental anxiety and state-trait anxiety among patients and parents. Patients' state and trait anxiety before treatment was correlated with parents' state and dental anxiety. Additionally, parent's dental anxiety was also correlated with patient dental anxiety at the start of the treatment. The correlation between patients' DAS and parents' DAS remained significant even after three months of orthodontic treatment. Also, correlation among patients' state and trait anxiety and parents' state and trait anxiety also remained significant after three months of orthodontic treatment. This finding is according to Hakeberg et al. (1992) definition of anxiety as a contagious emotion. According to Gordis et al. (2001), anxiety levels of children are greatly influenced by the attitude and behavior of family members.

The limitations of this study are the use of wide range of patients. For instance, patients of ages 25 will show anxiety which cannot be compared with the stress level of 14 years old patient. Secondly, treatment method was not evaluated, for example, effects of extraction versus non extraction method on reducing level of dental anxiety.

Last but not the least, patients included in this study

were not selected on the basis of their class of malocclusion.

The type of treatment also affects the level of stress among patients. Restorative procedures are less likely to cause anxiety than periodontal or endodontic treatment (Stabholz and Peretz, 1999). Studies show that anxiety levels among patients who are undergoing periodontal and endodontic procedures are high as compared to restorative and prophylactic procedures (Dailey et al., 2001). Recent literature stated that some orthodontic related procedures like separator placement, placement and activation of arch wires, delivery of orthopedic forces and deboning produce pain in patients (Hakeberg et al., 1992). It has also been suggested that patients treated with fixed appliances had more painful experience than removable or functional appliances (Hakeberg et al., 1992).

Approximately 70 to 95% of orthodontic patients are reported to experience pain during orthodontic treatment. Patients with past painful experiences during orthodontic treatment were found to be less cooperative and less motivated throughout their treatment. Although for most patients, pain is not a major problem (e.g. they tolerate it and continue their treatment). However, up to 8% of orthodontic patients discontinued their orthodontic treatment because of initial painful experiences (Yıldırım and Karacay, 2012).

By identifying the cause of fear among patients, orthodontist will be able to understand patients in a better way and therefore can improve the quality of patient care. Since pain is considered to be the main contributing factor for anxiety, efforts employed to reduce pain will be beneficial both for the clinician and patient. Dentist should also have good communication with the patients and create a friendly environment which will result in reduced anxiety among patients (Sergl et al., 1998).

Conclusion

Level of anxiety both state and dental decreases as the patients become more familiar with the dental environment and orthodontist. The anxiety levels of patients are greatly influenced by the parents' anxiety levels.

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