

Evaluation of Pain and Anxiety Levels of Tooth Extraction**

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Article info

Research article

Received :02.09.2020
 Received in revised form :21.11.2020
 Accepted :02.11.2020
 Available online :05.01.2021

Keywords

Tooth extraction
 Pain
 Anxiety

Abstract; The anxiety observed in patients before and during dental treatments is defined as a complex behavior pattern related to physiological activation against internal or external stimuli. Anxiety formation is common before dental treatments, especially before tooth extraction. In this study, we were aimed to evaluate the anxiety, preoperative / postoperative pain levels and the relationship of various variables (age, smoking, etc.) with tooth extraction, which is one of the most basic procedures of oral and maxillofacial surgery. During the study process, 982 patients applied, 312 patients were identified according to the inclusion criteria, and the study was conducted with 210 patients who volunteered to participate in the study. There were significant differences between the groups in terms of marital status, educational status, history of previous tooth extraction and tooth brushing frequency ($p < 0.05$). The level of anxiety increases towards posterior teeth (mean: 37.38 ± 7.40 for anterior teeth, mean: 44.40 ± 10.43 for molar teeth with complications). When the VAS scores were examined, the pain increased significantly from the anterior teeth to the posterior teeth ($r: 0.568, p < 0.05$). There were statistically significant differences in terms of Penn State Worry Questionnaire (PSWQ) total scores when the groups that had tooth extraction were compared. Although smoking causes an increase in the incidence of alveolar osteitis, it has been observed that it causes less pain (low VAS score) in patients who undergo tooth extraction.

INTRODUCTION

The anxiety observed in patients before and during dental treatments is defined as a complex behavior pattern related to physiological activation against internal or external stimuli ¹. A high level of fear of dental treatment is widely observed all over the world, studies conducted in different countries indicate that the anxiety rates in dental treatments are between 4.2% and 20.9% ^{2,3}.

Dental anxiety prevents the realization of planned treatments and increases the incidence of diseases in surrounding tissues ⁴. Although various levels of anxiety are felt in patients before treatment in dental treatments, oral surgical procedures are associated with the highest levels of anxiety ⁵. In the study conducted by Muğlalı and Kömerik, 30% of the patients undergoing minor oral surgical procedures had mild, moderate anxiety levels in 40%, high levels in 14% and very high levels of anxiety in 11% and the level of patients who did not feel any anxiety remained around 5% ⁶.

If the anxiety and worry related to dental treatment observed in patients are not managed properly, it is likely that a

vicious circle will occur due to this fear and anxiety ⁷. Patients avoid dental treatments for these reasons and this causes dental problems to become more complex. This situation may lead to more intense and potentially more traumatic treatment requirements in the future ⁸.

Postoperative pain reaches its peak between the first 6th and 8th hours with the disappearance of the local anesthetic effect. Pain occurs when inflammatory mediators and algogenic substances secreted by surgical injury stimulate the non-myelinated C fibers of the trigeminal nerve. These stimulating substances are bradykinin and prostaglandin secreted from damaged cells, and leukocytes, lymphocytes, mast cells, eosinophils and leukotrienes that reach the injured area in the inflammatory process. The stimulated peripheral nerves release substance P and send nociceptive pain signals to the central nervous system and simultaneously cause vasodilation, local proinflammatory symptoms such as edema in the area by exiting the plasma from the vein. Peripheral fibers that carry pain enter the brainstem directly from the pons and stimulate the neurons in the spinal trigeminal nucleus.

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**This study has been prepared as a Master of Science thesis

After this stage, the impulse travels to the thalamus and reaches the regions that process the nociceptive senses, such as the somatosensory cerebral cortex and the limbic forebrain, creating the sensation of pain⁹.

In this study, it was aimed to evaluate the anxiety, preoperative / postoperative pain levels and the relationship of various variables (age, smoking, etc.) with tooth extraction, which is one of the most basic procedures of oral and maxillofacial surgery.

MATERIAL and METHOD

Ethical approval

This study was approved by the Tokat Gaziosmanpaşa University Non-Interventional Clinical Research Ethics Committee on 22.11.2019, with the meeting number 2019/17, project number 19-KAEK-241 and the decision number 83116987-859.

Study design

Between 2019 and 2020, it was held in Tokat Gaziosmanpaşa University Faculty of Medicine, Department of Emergency Medicine and Tokat Gaziosmanpaşa University Faculty of Dentistry, Department of Oral and Maxillofacial Surgery. During the study process, 982 patients applied, 312 patients were identified according to the inclusion criteria, and the study was conducted with 210 patients who volunteered to participate in the study.

Inclusion criteria applied:

- 18-65 years old
- ASA (American Society of Anesthesiologists) -I systemic status
- Not having a previous psychiatric disorders
- Not being diagnosed with a current psychiatric disorder and not receiving any treatment
- Not having a history of any trauma to the maxillofacial area.

No major surgery in the maxillofacial region

Exclusion Criteria Applied:

- Having a history of psychiatric disorders
- Having a psychiatric treatment history
- Having a systemic condition other than ASA – I

- Patients who did not agree to be included in the study
- Patients with incomplete demographic data
- Patients with incomplete postoperative follow-up

Bisphosphonate use history

The patients were divided into 7 groups according to the tooth to be extracted: Anterior, Canine, Premolar, Molar, Complicated Molar, 3rd Molar Tooth with Mucosa Retention and 3rd Molar Tooth with Bone Retention. All tooth extractions were done by the same Oral and Maxillofacial surgeon(YB). Non-Steroid Anti-Inflammatory Drugs (NSAIDs) at a dose of 2x1 for 3 days were prescribed to all groups.

Surveys applied

Patients; Demographic Data Form (with information on age, gender, smoking status, etc.), Penn State Worry Questionnaire (PSWQ), Pain Catastrophizing Scale (PCS-T) and Visual Analogue Scale (VAS) were applied.

Demographic Data Form: The patient demographic data questionnaire aims to obtain information by including questions about the current systemic status, educational status, social character and medical history of the patients participating in the study. The content of this questionnaire, which is not based on literature data, was determined by the researchers who participated in the study. It does not contain any scoring system. It is mainly for obtaining information about the patients participating in the study.

Penn State Worry Questionnaire (PSWQ): PSWQ has been used in different medical branches for many years to measure the anxiety level of the patient. The presence of worry factor consists of 11 items expressed positively, while the absence of worry factor consists of the remaining 5 items written in a negative way¹⁰. While 11 existing items are scored positively, the remaining 5 items (items 1, 3, 8, 10 and 11) require reverse scoring. Scoring with a minimum of one and a maximum of 5 points is required for each item in the total 16-item survey scoring. According to the scoring results of all items, patients have a scoring score between 16 and 80. Increasing the scoring score means that the patient's anxiety level increases. The scale is filled by the patients in the preoperative period. PSWQ reported adequate internal consistency, with consistencies ranging from 0.86 to 0.95 in both clinical and non-clinical samples¹¹. In addition, test-retest reliability of PSWQ in different time intervals varies between

0.74 and 0.93 in three independent university samples ¹².

Pain Catastrophizing Scale (PCS-T): PCS-T is used to assess the patient's feelings, thoughts, and senses about pain and disaster. It is a self-administered questionnaire with 13 items and 3 subscales: helplessness, magnification, and rumination. A 5 point scale is used for each item, higher values mean greater disaster. Of the 13-item questions, PCS-T scored between 0 and 52 in total. Higher scores mean patients are more catastrophic. The scale is filled by the patient in the preoperative period. It was reported that the inter-item and item-total correlations of the Turkish version of the scale were between 0.488 and 0.848, and the intraclass correlation coefficient was 0.830 ¹³.

Statistical analysis

In this study, statistical analyzes were carried out using SPSS 22.0 (IBM Company, United States) statistical package software. While analyzing the data, one-way analysis of variance (ANOVA) was used in addition to descriptive statistics (mean, standard deviation) for intergroup comparisons

of variables showing normal distribution, and t-test was used for paired comparisons. Kruskal Wallis test was used for comparison between variables that did not show normal distribution, Mann-Whitney U test for paired comparisons, Chi-Squared test for comparisons, and Pearson correlation test was used to determine the relationships between variables. Tukey and Games-Howell tests were used in post hoc analysis. P <0.05 was considered statistically significant.

RESULTS

A total of 118 women (mean age 35.71 ± 14.76), 92 men (mean age 40.58 ± 14.63) were included in the study. The demographic information obtained from the patients is summarized in table 1. There were significant differences between the groups in terms of marital status, educational status, history of previous tooth extraction and toothbrushing frequency (p <0.05, Table 1). In the post hoc analysis, it was seen that 3rd molar teeth with Bone / Mucosa Retention differed from other groups.

Table 1. Distribution of demographic characteristics by groups

		Groups							p
		Anterior (n=30)	Canine (n=30)	Premolar (n=30)	Molar (n=30)	C.Molar (n=30)	MR 3rd (n=30)	BR 3rd (n=30)	
Gender	Male	14	17	11	14	13	12	11	0,733
	Female	16	13	19	16	17	18	19	
Marital status	Married	25	27	27	19	18	12	12	<0,01*
	Single	5	3	3	11	12	18	18	
Education status	Primary Education	16	14	21	11	10	6	3	<0,01*
	High school	9	11	2	11	6	11	12	
	Undergraduate	5	5	7	7	13	12	11	
	Post Graduate	0	0	0	1	1	1	4	
Previous Tooth Extraction Experience	Yes	29	29	27	23	21	22	20	0,03*
	No	1	1	3	7	9	8	10	
Tooth Brushing Frequency	No	5	3	2	3	1	2	0	0,023*
	Once a week	7	9	8	5	3	3	4	
	Once a day	10	11	13	11	18	8	13	
	Twice a day	8	7	7	11	8	17	13	
Smoking	Yes	10	14	9	10	10	7	6	0,411
	No	20	16	21	20	20	23	24	

Data are shown as n (%). Test: One Way ANOVA * p value is significant at the 0.05 level., C.Molar: Complicated Molar , MR 3rd: 3rd molar tooth with Mucosal Retention , BR 3rd: 3rd molar tooth with Bone Retention

Quantitative changes are shown in table 2. There were significant differences between the groups in terms of age, PCS-T and PSWQ (p <0.05). The level of anxiety increases towards posterior teeth (mean: 37.38 ± 7.40 for anterior teeth, mean: 44.40 ± 10.43 for molar teeth with complications). When the

VAS scores were examined, the pain increased significantly from the anterior teeth to the posterior teeth (r: 0.568, p <0.05).

There was no significant relationship between tooth brushing frequency and PCS-T and PSWQ scores (p > 0.05).

Table 2. Distribution of quantitative values by groups

	Groups							p
	Anterior (n=30)	Canine (n=30)	Premolar (n=30)	Molar (n=30)	C.Molar (n=30)	MR 3rd (n=30)	BR 3rd (n=30)	
Age	49,46±13,39	52,53±10,20	43,33±13,22	34,33±12,69	33,40±11,38	25,10±7,45	27±8,40	<0,01*
Penn State Worry Questionnaire	37,83±7,40	39,06±8,43	40,33±12,15	41,56±10,09	44,40±10,43	44,96±10,41	43,26±8,88	<0,01*
PCST Pain Scale Score	12,26±6,07	15,56±8,76	19,03±9,80	20,70±10,41	22,13±12,26	18,33±10,94	14,76±6,25	<0,036*

Data are shown as Mean ± SD. Test: One Way ANOVA * p value is significant at the 0.05 level., C.Molar: Complicated Molar , MR 3rd: 3rd molar tooth with Mucosal Retention , BR 3rd: 3rd molar tooth with Bone Retention

While there was no significant relationship between smoking and PCS-T and PSWQ scores, there was a significant relationship between VAS scores (Tables 3 and 4). The average VAS scores of smokers were lower than non-smokers (4.06 ± 1.71 versus 6.12 ± 1.52). However, the incidence of alveolar osteitis in smokers was 1.3 times higher than in non-smokers.

Table 3. Relationship between smoking and Penn State Worry Questionnaire and PCST Pain Scale Score

	Smoking		t	p
	Yes (n=66)	No (n=144)		
Penn State Worry Questionnaire	36,66±8,63	42,39±10,53	-1,217	0,224
PCST Pain Scale Score	16,31±8,87	18,10±10,29	-1,840	0,067

Data are shown as Mean ± SD. Test: Independent Sample T Test * p value is significant at the 0.05 level

Table 4. Distribution of VAS scores by smoking use

	Smoking		t	p
	Yes (n=66)	No (n=144)		
VAS Score 6 Hours After Tooth Extraction	4,06±1,71 ^(a)	6,12±1,52 ^(a)	8,115	0,003*
VAS Score 24 Hours After Tooth Extraction	1,14±1,51 ^(b)	2,95±1,62 ^(b)	7,697	0,003*
VAS Score 72 Hours After Tooth Extraction	0,17±0,55 ^(c)	0,63±1,01 ^(c)	3,340	0,003*

Time: F= 102,160; p<0,001*
TimexGroups: F=7,535; p=0,003*

DISCUSSION

The concept of dental anxiety, which is widely observed, includes a complex behavioral model associated with physiological activation that occurs in response to cognitive and somatic internal stimuli or environmental external stimuli that patients may experience before or during dental treatment¹. Fear and anxiety observed in dentistry often cause psychosocial problems such as poor oral hygiene, poor quality of life, low self-esteem and mental collapse, which occur as a result of inadequate oral health¹⁴. McGrath and Bedi reported that low oral and dental health was observed in patients with high dental treatment anxiety¹⁵. In the present study, PCS-T scores were observed to be lower in patients with high oral hygiene who had regular tooth brushing habits, and conversely, PCS-T scores were observed to be lower in patients with poor oral hygiene, although it was not statistically significant.

Pain is a difficult symptom to live with and often needs treatment. It is also defined as unpleasant sensory and emotional experiences associated with actual or potential tissue damage. After tooth extraction, the pain reaches its maximum level as the effect of local anesthetic disappears. Pain perception is associated with many mechanisms, including environmental stimuli, cognitive and emotional processes, and

social-cultural conditions. The minimum amount of the stimulus that triggers the pain is different for each patient. Pain disaster is considered a marker of pain. It is defined as exaggerated negative reactions to a painful stimulus. The severity of the pain experienced by the individual plays an important role in the formation of the thought of catastrophizing the event. In a study involving 92 patients, Altan et al.¹⁶ investigated the effect of preoperative PCS-T score on postoperative analgesic use using the pain disaster scale. Although it was not statistically significant according to the results of the study, it was observed that the use of analgesics was statistically higher in patients with higher PCS-T scores. They concluded that the preoperative anxiety level was significantly higher in female patients compared to male patients¹⁶. The results of the present study showed that postoperative analgesic use may be higher in patients with high PCS-T scores. The data in the present study are in agreement with the data in Altan et al.¹⁶ study. When the groups were examined, it was observed that PCS-T values were significantly higher in those who drank more than one painkiller per day.

Patients with medical disaster fear that a medical emergency such as cardiac arrest might develop during treatment¹⁷. Usually, such patients report that they are allergic or react to local anesthetics, especially those containing epinephrine or similar vasoconstrictors. In addition, placing instruments in the mouth during treatment triggers concerns about suffocation. In the event of a reaction due to local anesthesia, the patient may show symptoms such as heart palpitations or shortness of breath due to increased epinephrine levels. Patients tend to interpret these symptoms as anesthetic allergy. The expectation of the patient to have a similar reaction at the next appointment where the anesthetic is used may lead to an increase in anxiety level. When anxiety-induced autonomic arousal or any condition associated with epinephrine is experienced, the patient may believe that this condition will worsen over time. It is important to distinguish these and similar situations in terms of effective anesthesia depth. Otherwise, insufficient anesthesia depth will manifest itself in the form of an increased risk of pain and an increased level of anxiety. When dealing with this type of fear, it is important to provide a detailed medical history. The actual prevalence of allergies to local anesthetics is extremely low. It has been determined that most negative responses are associated with

anxiety. Even in cases where a patient's true allergy to local anesthetics does not seem likely, consulting the patient with an immunology-allergist can completely eliminate patient anxiety, in order to eliminate this concern completely. Patients with this fear do not respond well to assurances that such allergy stories are rare. In cases where the dentist takes the patient's anxiety seriously, it is observed that the patients respond well. After excluding an allergy history, briefing about the nature and effects of epinephrine can enable the patient to relate their symptoms¹⁷⁻²⁰.

In the present study, alveolar osteitis was observed 1.3 times more in smokers compared to non-smokers. This situation supports previous studies, but the mechanism of smoking on alveolar osteitis has not been clearly explained. The most accepted theory suggests that mechanical clot dislodgement occurs with the suction movement while smoking, but the effect of nicotine contained in cigarette smoke on the formation of granulation tissue or the reduced local immune and inflammatory response due to smoking may also lead to alveolar osteitis²¹⁻²³.

Dental anxiety and dental phobia in oral surgical procedures pose a major problem in terms of both dentist and patient comfort. Various pharmacological and non-drug procedures are widely used to reduce dental anxiety and phobia. Non-drug procedures such as music therapy, aromatherapy, and hypnosis support the theory that patients feel less negative emotions when they move away from an unpleasant stimulus²⁴. Due to the physical conditions, non-drug procedures could not be applied in the clinics where our study was conducted.

In the presented study; Patients have deficiencies such as not determining the pain threshold levels and not recording the operation times. To overcome this situation, the patient's pain threshold levels can be determined and standardized by measuring the levels of biomarkers such as opiorphin in saliva²⁵. The addition of these two variables in similar studies to be planned will help to explain more clearly the pain levels that will occur after extraction in different groups of teeth.

CONCLUSION

This study, in which we intended to evaluate the pain and anxiety of patients before and after tooth extraction, was completed with the analysis of data obtained from 210 patients. While the ages of the patients were lower in the posterior tooth

extraction groups (Molar and 3rd molar teeth), the average age of the patients increased towards the anterior.

There were statistically significant differences in terms of PSWQ total scores when the groups that had tooth extraction were compared. Higher PSWQ scores were observed in the 3rd molar tooth extraction group and compared to the molar tooth group. It was observed that the anxiety level was higher in patients with posterior tooth extraction compared to the anterior region. When the two groups were compared in terms of PCS-T scores, statistically insignificant higher scores were observed in patients with complicated molar teeth and those requiring extraction of 3rd molar teeth.

Although smoking causes an increase in the incidence of alveolar osteitis, it has been observed that it causes less pain (low VAS score) in patients who undergo tooth extraction.

Conflict of interest

The authors declare that they have no conflict of interest

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