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Assessment of Preoperative and Postoperative Anxiety in Adults during Extraction of Impacted Third Permanent Molars

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SUMMARY

Background: *Dental fear and anxiety (DFA) is ubiquitous among the adult population. The anxiety component of DFA is more strongly expressed in adults, and includes a physiological and psychological component, and is more often analyzed in research. Oral-surgical interventions represent a significant source of stress for the appearance of anxiety in subjects. The research aim was to analyze the presence of anxiety with the use of the revised Corah Dental Anxiety Scale (DASR) and the Spielberger State-Trait Anxiety Inventory (STAI) in adult patients during the treatment of extraction of impacted third permanent molars by oral surgery.* ***Material and Methods****: The study included adult patients of both sexes, who were previously scheduled for oral-surgical removal of third permanent molars. Anxiety levels were assessed preoperatively and postoperatively as follows: 1st measurement (day of examination)-DASR, and STAI (X1 and X2); 2nd measurement (immediately before the intervention)–STAI (X1 and X2); 3rd measurement (day after the intervention)–STAI (X1 and X2).* ***Results:*** *Preoperatively, the presence of high levels of general anxiety, situational anxiety, and dental anxiety was determined. The levels were decreased before the planned surgery and were significantly reduced in the postoperative period. The STAI scale could be used to assess the presence of situational anxiety in the dental office on an equal footing with other known measuring instruments (e.g. DASR).* ***Conclusions****: Adequate therapy should be considered to prevent preoperative anxiety, which would increase the satisfaction of patients and therapists while reducing complications related to this type of intervention.*

Keywords: Anxiety, Extraction of Impacted Teeth, DASR, STAI, Prevention

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Introduction

Dental fear and anxiety (DFA) are ubiquitous among the adult population, ranging from 4.2% to over 50%, with a global estimated prevalence of 15.3% and a more frequent presence in females and younger adults[1]. DFA appears as the reaction of patients due to stressful situations in the dental office, in such a way that dental fear appears as a reaction to specific stimuli and dental anxiety (DA) mainly as thought about them. The anxiety component of DFA is more strongly expressed in adults and as a reaction to stressors includes a physiological and psychological component. The presence of DA in subjects is more often analyzed in the research. Dental stressors are related to the potential cause of pain and damage to the integrity of the organism[2]. It is an unquestionable fact that, for both reasons, oral-surgical intervention is considered a stressful intervention. The reaction to oral surgical intervention will also depend on the feeling that the patient acquires about the operator and his approach to the patient. It is not uncommon for syncope or collapse to occur before or during oral surgery in psychologically unprepared patients[3]. At the same time, the intensity of the psychological reaction depends on the intensity of the

patient's mental effort to face the challenging situation, which the oral surgical procedure inevitably entails[4].

There are several psychometric instruments used to assess DFA in adults[1,5]. Thus, the scales Kleinknecht's Dental Fear Survey (DFS) and Corah's Dental Anxiety Scale (CDAS) [6,7], as well as the Dental Anxiety Question (DAQ) are known[8]. Since they are concerned with measuring the presence of specific dental fears and anxiety caused by certain events in the dental office, these scales are extremely suitable for comparison with other scales that measure anxiety caused by the current event. Among them, the most famous and most frequently used is the revised form of the CDAS (DASR), with universal application in children and adults, composed of 4 particles[9]. The presence of DA before oral surgery, which is established during a dental examination, can have a significant impact on the level of general anxiety, that is, anxiety as a relatively stable personality trait[10]. In the assessment of anxiety and anxiety disorders in dental clinical practice, the following are used: clinical interview and examination, anamnestic and hetero-amnestic data. Spielberger and his collaborators are the creators of the State-Trait Anxiety Inventory (STAI)[11]. STAI is one of the most commonly used scales for assessing anxiety as a personality trait, i.e. general anxiety, as well as for assessing anxiety caused by a specific situation, i.e. current anxiety[12]. Anxiety as a personality trait is characterized by the continuity of anxious reactions to a large number of situations, whereby this phenomenon shows stability and persistence over time, and is an integral part of each of the individual forms of anxiety disorders and is their prerequisite[13]. Anxiety caused by a specific situation is characterized by an emotional reaction of heightened internal tension related to a specific situation as the cause of that reaction. When talking about anxiety as a condition or anxiety caused by a certain situation, it is mostly about a healthy and psychologically unremarkable person who is predisposed to developing anxiety in a stressful situation[14].

The research aimed to analyze the presence of anxiety with the use of DASR and STAI in adult patients during the treatment of extraction of impacted third permanent molars by oral surgery.

Material and Methods

The research was of a prospective cross-sectional type, conducted following the Helsinki Declaration[15], and with the approval of the Ethics Committee of the Faculty of Medicine of the University of Zenica.

The study included adult patients of both sexes, in whom oral-surgical removal of an impacted maxillary or mandibular third permanent molar was previously indicated. The molars were in a mesioangular position and had completely completed root growth and development.

Patients were also free of pain and other inflammatory symptoms including swelling, hyperemia, and reduced mouth opening at the time of the planned treatment. Patient exclusion criteria were: kidney or liver disease, blood dyscrasias, previous and current gastric ulceration, heart disease, proven hypersensitivity, allergic reactions to some investigational drug, pregnancy, and lactation.

After the indication was established in the standard way (anamnesis, examination, X-ray findings-orthopantomogram), and before the planned operation, the content of the research was explained to the subjects, and their informed consent to participate in the study was requested.

In the Zenica Health Center, the same operative approach of removing impacted teeth was applied to all subjects with standard surgical instruments, with the application of local anesthesia (in a dose of 4 ccs of 2% lidocaine with 1:80,000 adrenaline), with the prescription of adequate oral-surgical preoperative and postoperative therapy, which included analgesic, antibiotic and antiphlogistic medication.

At the same time, patients were assessed for preoperative and postoperative anxiety in such a way that the respondents filled out measuring scales. The assessment of preoperative anxiety was performed on the day of the examination (1st measurement), with the use of the DASR scale and the STAI scale, and on the day of the treatment, immediately before the intervention itself, with the use of the STAI scale (2nd measurement).

Assessment of postoperative anxiety was performed the day after the surgical intervention (3rd measurement), using the STAI scale. The DASR scale had 4 items and was related to the assessment of the presence of DFA when going to the dentist and staying in the office. Answers to the questions were ranked on a 5-point Likert scale, with a total score of 20. The STAI scale consisted of 40 items, 20 for the assessment of general anxiety (X1 form) and 20 for the assessment of current anxiety (X2 form). Answers to the questions were ranked on a 4-point Likert scale, with a total score of 80 each.

The results obtained in the research were presented in a descriptive tabular form. Statistical analyzes of differences were determined using the $\chi 2$ test in contingency tables, using the paired t-test between dependent samples, and correlations were determined using the Pearson correlation coefficient. All statistical analyses were performed with IBM SPSS statistical software v. 23 for the Windows operating system, at a significance level of $p \leq 0.05$.

Results

A total of 500 patients, aged 18-45, were included in the research, of which 41.8% were male and 58.2%

were female. Among the respondents, lower wisdom teeth (55%) were slightly higher surgically removed than the upper ones (45%). The descriptive values of the scores achieved during the measurement of preoperative and postoperative anxiety on the DASR and STAI scales were presented in Table 1.

Statistically significant differences were found between the values of higher average scores on the STAI scale X1 and X2 in preoperative compared to lower scores of postoperative anxiety (t-test for paired samples, $p<0.001$ for all analyses) as well as between the lower scores of general anxiety (scores on the STAI X1 form) and higher situational anxiety scores (scores on the STAI X2 form) in all three measurements (t-test for paired samples, $p<0.001$ for all analyses) (Table 2). It was noticeable that anxiety scores gradually decreased from the day of examination to the day of treatment, and then more strongly in the postoperative period.

Table 1. Descriptive values of preoperative and postoperative anxiety scores

	preoperative anxiety					postoperative anxiety	
	1st measurement			2nd measurement		3rd measurement	
	DASR	X1	X2	X1	X2	X1	X2
N (number of respondents)	500	500	500	500	500	500	500
mean value	14.33	47.05	51.00	46.16	50.12	39.02	41.92
standard deviation	4.071	9.836	10.030	9.551	9.873	9.793	10.411
minimum value	8	26	28	25	28	23	24
maximum value	20	62	66	62	67	59	63

Table 2. Differences between the scores achieved on the STAI scale

pair	t	p	pair	t	p	pair	t	p
X1_1 vs X1_2	6.228	<0.001	X2_1 vs X2_2	6.092	<0.001	X1_1 vs X2_1	-103.528	<0.001
X1_1 vs X1_3	26.906	<0.001	X2_2 vs X2_3	36.598	<0.001	X1_2 vs X2_2	-92.665	<0.001
X1_2 vs X1_3	33.372	<0.001	X2_1 vs X2_3	29.487	<0.001	X1_3 vs X2_3	-52.806	<0.001

X1_1 – STAI X1 at the first measurement; X2_1 – STAI X2 at the first measurement; X1_2 – STAI X1 at the second measurement; X2_2 – STAI X2 at the second measurement; X1_3 – STAI X1 at the 3rd measurement; X2_3 – STAI X2 at the 3rd measurement

Table 3. Correlations between the scores achieved on the DASR and STAI scales

Pearson correlation coefficient r		1st measurement			2nd measurement		3rd measurement	
		DASR	X1	X2	X1	X2	X1	X2
1st measurement	DASR	1.000	0.962**	0.961**	0.913**	0.916**	0.753**	0.755**
	X1	0.962**	1.000	0.997**	0.946**	0.945**	0.769**	0.773**
	X2	0.961**	0.997**	1.000	0.944**	0.948**	0.769**	0.774**
2nd measurement	X1	0.913**	0.946**	0.944**	1.000	0.996**	0.878**	0.880**
	X2	0.916**	0.945**	0.948**	0.996**	1.000	0.875**	0.879**
3rd measurement	X1	0.753**	0.769**	0.769**	0.878**	0.875**	1.000	0.995**
	X2	0.755**	0.773**	0.774**	0.880**	0.879**	0.995**	1.000

The analysis of the results presented in Table 3. showed that the correlation between the results for the first day of measurement for the mentioned parameters DA (DASR), general anxiety (STAI X1), and situational anxiety (STAI X2) was high and statistically significant (ranging from 0.961 to 0.962, p= 0.01). Also, very high and statistically significant correlation coefficients of preoperative anxiety were determined for the achieved scores on the DASR and STAI scale between the first two measurements (examination and before surgery) (ranging from 0.913 to 0.997, p=0.01), while it was slightly lower compared to postoperative anxiety at the third measurement (ranging from 0.753 to 0.774, p= 0.01). According to the protocol of Nakazat *et al.*[16], subgroups of patients were determined based on the gradation of achieved anxiety scores on the DASR and STAI X1 and X2 scales, with presented absolute (frequencies, f) and relative (percentages, %) values of the observed parameters (Tables 4-6).

Table 4. Subgroups of respondents according to score levels on the DASR scale

Preoperative DA levels	f	%
mild anxiety	27	5.4
moderate anxiety	161	32.2
high anxiety	47	9.4
very high anxiety	265	53.0
Total	500	100.0

Table 5. Subgroups of respondents according to score levels on the STAI X1 scale

general anxiety – form STAI X1	preoperative 1st measurement		preoperative 2nd measurement		postoperative 3rd measurement	
	f	%	f	%	f	%
mild	22	4.4	22	4.4	65	13.0
moderate	166	33.2	180	36.0	200	40.0
high	149	29.8	164	32.8	137	27.4
very high	163	32.6	134	26.8	98	19.6
Total	500	100.0	500	100.0	500	100.0

Table 6. Subgroups of respondents according to score levels on the STAI X2 scale

situational anxiety – form STAI X2	preoperative 1st measurement		preoperative 2nd measurement		postoperative 3rd measurement	
	f	%	f	%	f	%
mild	22	4.4	22	4.4	65	13.0
moderate	165	33.0	177	35.4	200	40.0
high	150	30.0	161	32.2	137	27.4
very high	163	32.6	140	28.0	98	19.6
Total	500	100.0	500	100.0	500	100.0

The majority of subjects had statistically significantly higher levels (high and very high categories) of DASR DA scores ($\chi2=292.672$, $p<0.001$), STAI X1 general scores ($\chi2=228.664$, $p<0.001$), and STAI X2 situational anxiety scores ($\chi2 =232.486$, $p<0.001$) preoperatively. STAI scores of general and situational anxiety decreased statistically significantly preoperatively and gradually on the day of surgery (X1 $\chi2=449.226$, $p<0.001$; X2 $\chi2=423.225$, $p<0.001$), as well as postoperatively (X1 $\chi2=268.121$, $p<0.001$; X2 $\chi2=301.511$, $p<0.001$).

Discussion

In the subjects from our research, at the first preoperative measurement, mostly high levels of general and specific DA, as well as situational anxiety were determined through the scores achieved on the DASR and STAI scale. The study dealt with patients who were scheduled for oral-surgical intervention to remove impacted teeth. Indeed, precisely these types of interventions, due to their nature, could influence elevated levels of anxiety in patients[17,18].

Research has thus shown that the level of DA was the highest in patients who were indicated for oral surgery, compared to patients who needed conservative or endodontic treatment on their teeth[19]. Causing anxiety through interventions in the oral cavity is a universal phenomenon, which could be intensified by smell, sound, and light, as well as previous experience[20]. A large number of patients who faced an anxious experience in the dental office considered it one of the most unpleasant experiences in their life[21]. The closer the subjects got to the actual act of surgery, the more their levels of general and situational anxiety decreased slightly, but significantly. Possible reasons were that patients, through conversation and explanation of the upcoming procedure, gradually faced the situation, and thus subconsciously reduced their anxiety levels. Numerous ways of alleviating preoperative anxiety were known through various preparations of patients for the upcoming treatment, related to ways of conveying information to them and their general preoperative non-medicated relaxation[22-27].

The anxiety levels of the subjects significantly decreased the most postoperatively. The reason for this could be the fact that the surgical procedures were completed without complications, which significantly weakened the thoughts of painful and unpleasant dental treatments. Similar results were found in research on the level of preoperative and postoperative anxiety of patients during oral-surgical extraction of impacted third molars[28, 29].

The existence of statistically significant correlations between preoperative and postoperative general, situational, and DA in the subjects was another important data of our research. It was the correlations that further clarified the nature of the pre-, and postoperative levels of anxiety in the subjects, which were the most reduced after the end of the treatment. Similar results were found in other studies[30,31].

The method of assessing the presence of DA using scales in adults is diverse, not always simple, and can be a painstaking task[32]. In addition to the scales mentioned above, which were used exclusively in dentistry, some were used more in general clinical psychology. Among them, the most used one for assessing the presence of general and current anxiety was the STAI. Its importance was precisely the possibility of assessing the level of anxiety, which was often situationally determined, and fluctuated over time and in different situations[33].

That is why the STAI was conceptually the most commonly used research instrument for examining anxiety in adult patients and in dentistry, mainly due to the observation of anxiety caused by the current situation, or experience (such as oral surgery). The connection between DA levels and anxiety caused by oral surgery, which was normally assessed by different scales, then seemed quite logical[34,35].

This was exactly what the highly significant correlations of the DASR and STAI scores of the subjects at the 1st measurement in our research showed. We have thus confirmed the importance of using the STAI scale in measuring the presence of situational anxiety in adults in the dental office.

Although the levels of anxiety decreased postoperatively, it would be significant if they were reduced in advance and during the preoperative period. Numerous authors researched ways to prevent the development of anxiety before oral surgical intervention[30,31]. Analysis of recent literature indicated that the preoperative use of anxiolytics could significantly reduce the anxiety of patients, and increase the satisfaction of the prescribing physician. So, most authors justified their use, despite the existence of conflicting opinions[36-39]. However, their use in case of elevated preoperative levels of anxiety could be encouraged.

One of the study limitations was that younger patients were mostly included, as older patients with an indication for the extraction of impacted third molars rarely come to the dentist for an examination. Recent literature indicated the constant progress of diagnostic procedures in dental medicine and the trend of extracting third molars at the earliest possible age. So, this type of intervention was then justified to prevent possible complications that the persistence of impacted third molars could cause in perspective. Given that the majority of patients with an indication for the extraction of a third molar decide to have it extracted at a young age, it was likely that the values of the monitored parameters would be different in the older population. It would be useful to conduct a similar study with older patients and investigate the possible influence of socio-demographic parameters. Considering the difficulties in collecting the sample, this would imply the coordination of several oral surgeons in a larger geographical area.

Conclusions

Preoperative anxiety levels in subjects with oral-surgical removal of third permanent molars were high and significantly decreased in the postoperative period. The STAI scale could be used to assess the presence of situational anxiety in the dental office on an equal footing with other known measuring instruments (e.g. DASR). Adequate therapy should be considered to prevent preoperative anxiety, which would increase the satisfaction of patients and therapists while reducing complications related to this type of intervention.

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