

Instruments for anxiety analysis and the utility of its assessment in oral surgical interventions under local anesthesia in patients undergoing four operative procedures

Procjena anksioznosti i njezina korist u oralnoj kirurgiji s lokalnom anestezijom kod pacijenata koji se podvrgavaju četirima operativnim zahvatima

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Abstract

Introduction: Fear of intervention in the oral cavity is declared as dental fear and is defined as a specific form of anxiety. The reaction to oral-surgical intervention will also depend on the feeling the patient acquires about the operator, but the positive experience also plays an important role.

Aim: The aim is to evaluate differences between the sexes and the influence of experience from a previous oral surgical intervention on a similar subsequent intervention.

Material and methods: In the research, anxiety was assessed using Corah's Dental Anxiety Scale (DASR) and Spielberger's State-Trait Anxiety Inventory (X1 and X2). The study included adult patients of both sexes with an indication for surgical extraction of impacted third permanent molars. Preoperative and postoperative anxiety was assessed: 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 determined high levels of general, immediate, and dental anxiety decreased before the surgical procedure itself and were significantly reduced in the postoperative period. The downward trend continued in line with the positive experience. Women had higher anxiety scores than men for all monitored parameters. The use of the STAI scales to assess anxiety by dental practitioners is on par with other well-known anxiety assessment instruments, such as the DASR.

Conclusion: In order to increase patient satisfaction and to prevent possible complications in such oral-surgical procedures, it would be useful to consider adequate therapy for high anxiety.

Keywords: anxiety, extraction of impacted teeth, prevention

Short title: Oral surgery and anxiety

Sažetak

Uvod: Strah od intervencije u usnoj šupljini naziva se dentalni strah i definira se kao specifičan oblik anksioznosti. Reakcija na oralno-kiruršku intervenciju također će ovisiti o osjećaju koji pacijent stječe o operateru, ali i pozitivno iskustvo ima važnu ulogu.

Cilj: Procijenjene su razlike između spolova i utjecaj prethodnog iskustva s oralno-kirurškom intervencijom na sličnu naknadnu intervenciju.

Materijali i metode: U istraživanju su sudjelovali odrasli pacijenti oba spola s indikacijom za kirurško vađenje impaktiranih trećih trajnih molara. U istraživanju je anksioznost procijenjena korištenjem Corahove ljestvice dentalnog straha (DASR) i Spielbergerovog inventara anksioznosti stanja-i-trenutka (X1 i X2). Procijenjena je anksioznost prije i poslije operacije: 1. mjerenje (dan pregleda) - DASR i STAI (X1 i X2); 2. mjerenje (odmah prije intervencije) - STAI (X1 i X2); 3. mjerenje (dan nakon intervencije) - STAI (X1 i X2).

Rezultati: Preoperativno utvrđene visoke razine opće, trenutne i dentalne anksioznosti smanjile su se prije same kirurške procedure i značajno su se smanjile u postoperativnom razdoblju. Silazni trend nastavio se u skladu s pozitivnim iskustvom. Žene su imale više bodova anksioznosti od muškaraca za sve praćene parametre. Upotreba STAI ljestvica za procjenu anksioznosti kojom se koriste stomatološki stručnjaci na istoj je razini s drugim poznatim instrumentima za procjenu anksioznosti, poput DASR-a.

Zaključak: Da bi se povećalo zadovoljstvo pacijenta i spriječile moguće komplikacije u takvim oralno-kirurškim postupcima, korisno bi bilo razmotriti adekvatnu terapiju za visoku anksioznost.

Ključne riječi: anksioznost, vađenje impaktiranih zubi, prevencija

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Introduction

Anxiety is an integral part of life and manifests with varying intensity due to various circumstances [1]. The consistency of term "anxiety" is not uniform, as it is used to denote psychopathological conditions that accompany mental

and physical states, illnesses, and disorders, as well as phenomena that are inherent to healthy individual or social life as a whole [2].

The interplay between anxiety and fear in literature is prevalent but contradictory [1, 2]. Freud distinguished objective and neurotic anxiety [3]. Brachu et al. highlighted the qualitative difference between anxiety and fear, attributing anxiety to a person's inability to cope with a threat. Dental fear specifically refers to anxiety related to oral interventions [4]. Complications are common in surgical removal of impacted third molars, ranging from expected ones to more severe ones [5, 6]. Patient reactions vary based on their perception of the operator and their coping efforts [7, 8]. Female patients may experience higher anxiety scores during and after oral surgical interventions [9, 10]. Unpleasant experiences can lead to avoidance of future interventions [11]. Instruments like scales and questionnaires, administered by trained examiners, assess anxiety symptoms [12].

A variety of instruments are available for assessing anxiety and fear related to oral interventions [13]. These include the Dental Anxiety Question (DAQ), Gatchel's 10-Point Fear Scale, Photo Anxiety Questionnaire, Dental Anxiety Inventory, Venham Picture Scale, Venham Anxiety and Behavior Rating Scales, Adolescents' Fear of Dental Treatment Cognitive Inventory, Behavior Profile Rating Scale, and others [13]. Corah's Dental Anxiety Scale (CDAS) and the Dental Anxiety Question (DAQ) focus on measuring dental fears and anxieties specific to oral interventions, allowing for comparison with other anxiety scales [14-16]. Corah's Dental Anxiety Scale consists of four items, with scores ranging from 4 to 20 indicating increased anxiety and a score above 15 indicating phobic levels of anxiety [17]. The State-Trait Anxiety Inventory (STAI) developed by Spielberger and colleagues is commonly used for assessing trait anxiety, general anxiety, and anxiety related to specific situations or current states [18]. Trait anxiety represents a continuous pattern of anxious responses, while anxiety caused by specific situations is a reaction to particular circumstances [19].

This study aimed to analyze the presence of anxiety using the DASR and STAI instruments in adult patients during the surgical extraction of impacted third molars under local anesthesia.

Material and methods

In this prospective study, the objective was to evaluate the levels of preoperative and postoperative anxiety in patients undergoing four surgical extractions of impacted third molars in a mesioangular position with fully developed root formation. Additionally, the study aimed to analyze the differences in anxiety levels between male and female patients and investigate the influence of previous oral surgical interventions on subsequent similar interventions. The research was conducted in compliance with the Helsinki Declaration on patient rights [20], and the collection and analysis of data were authorized by the management of the Zenica Health Center.

The inclusion criteria involved adult patients who did not exhibit any pain or inflammatory symptoms, including swelling, redness, or restricted mouth opening at the time of planned treatment. Exclusion criteria encompassed patients with kidney or liver diseases, blood disorders, current

or previous gastric ulcers, heart disease, confirmed hypersensitivity or allergic reactions to medications, as well as pregnant or breastfeeding individuals. Before performing the planned surgical procedure, all participants underwent a clinical examination and orthopantomogram radiographic analysis. They were thoroughly informed about the research objectives and provided their informed consent to participate.

The surgical procedures were executed using standardized techniques and instruments in the operating room of the Zenica Health Center. Local anesthesia, comprising 4 cc of 2% lidocaine with 1:80,000 adrenaline, was administered to all patients. Adequate preoperative and postoperative oral surgical therapy, including analgesics and antibiotics, was prescribed to ensure proper care and management.

To assess preoperative anxiety, Corah's Dental Anxiety Scale (DASR) and the State-Trait Anxiety Inventory (STAI) were employed. The DASR scale, consisting of four items, evaluated the presence of anxiety during dental visits and stays in the dental office. The responses were rated on a 5-point Likert scale, with a total score of 20. The STAI scale comprised 40 items, with 20 items measuring general anxiety (X1 form) and 20 items assessing current anxiety (X2 form). Responses were rated on a 4-point Likert scale, with a total score of 80 for each form.

Data analysis was performed using IBM SPSS statistical software for Windows, with a significance level set at $p \leq 0.05$. Differences between male and female patients on the first, second, and third days of measurement after each of the four surgical extractions were assessed using analysis of variance (ANOVA) tests. Additionally, paired samples t-tests were conducted to analyze the differences in the monitored parameters across the sequential surgical procedures and measurement days.

Results

During the study, a total of 168 impacted third molars were surgically extracted. The research was conducted on 42 patients of both genders, with 32 (76.19%) females and 10 (23.80%) males. The youngest participant was 21 years old, while the oldest was 46 years old. Each patient underwent four surgical operations, during which four impacted third molars were surgically removed. Analyzing the preoperative anxiety levels in Table 1, we observe that the average DASR score for female patients was higher compared to male patients for all four oral surgical procedures.

By analyzing the results in Table 1, it can be observed that the average values of Spielberger's coefficients for preoperative anxiety (1st and 2nd day of measurement) and postoperative anxiety (3rd day of measurement) were higher in female patients compared to male patients for all four oral surgical procedures.

ANOVA tests were conducted to examine the differences between genders in the study among patients undergoing four surgical procedures. The F-test analysis for the DASR parameter (preoperative anxiety on the 1st day of measurement) indicates that the values were higher in female patients compared to male patients (Table 2). Statistical si-

TABLE 1. Descriptive statistics of DASR, X1 and X2 in relation to the day of surgery

on the day of measurement	Variable		1st operation		2nd operation		3rd operation		4th operation			
	Parameter	gender	N	Mean	SD	Mean	SD	SD	SD	Mean	SD	
1st day of measurement	X1	Female	32	57,19	4,789	49,88	5,259	41,313	42,762	40,688	47,684	
		Male	10	50,70	7,543	44,60	8,303	36,400	48,351	36,600	50,376	
		Total	42	55,64	6,136	48,62	6,420	40,143	48,417	39,714	50,860	
	X2	Female	32	61,22	4,730	54,31	5,114	45,438	44,789	44,719	50,433	
		Male	10	54,80	7,829	47,90	8,582	40,100	53,219	40,300	55,388	
		Total	42	59,69	6,166	52,79	6,602	44,167	51,652	43,667	54,400	
	DASR	Female	32	18,69	1,575	16,28	1,938	11,84	2,886	11,53	2,688	
		Male	10	15,30	3,335	13,30	2,908	9,50	1,900	9,70	2,111	
		Total	42	17,88	2,539	15,57	2,520	11,29	2,848	11,10	2,658	
2nd day of measurement	X1	Female	32	57,19	4,504	50,00	5,137	41,219	45,205	40,563	49,899	
		Male	10	51,20	7,421	45,00	8,014	36,700	48,086	36,500	50,827	
		Total	42	55,76	5,839	48,81	6,220	40,143	49,316	39,595	52,501	
	X2	Female	32	61,31	4,582	54,44	4,931	45,469	48,259	44,750	53,642	
		Male	10	55,20	7,955	48,70	8,693	39,600	54,201	39,800	56,332	
		Total	42	59,86	6,059	53,07	6,410	44,071	55,189	43,571	57,685	
	3rd day of measurement	X1	Female	32	52,81	4,875	45,34	5,637	36,344	45,267	35,813	46,728
			Male	10	46,50	7,200	41,00	6,831	33,300	36,833	33,200	48,028
			Total	42	51,31	6,063	44,31	6,147	35,619	44,936	35,190	47,792
X2		Female	32	56,50	5,334	48,56	5,803	39,313	45,326	38,625	49,039	
		Male	10	50,00	8,179	43,90	7,430	35,900	38,427	34,900	47,714	
		Total	42	54,95	6,637	47,45	6,451	38,500	45,759	37,738	50,753	

Legend: X1 – STAI for general anxiety; X2 – STAI for current anxiety; DASR - Corah's Dental Anxiety Scale

gnificance was found for the first, second, and third surgeries ($p < 0.05$), while for the fourth surgery, the DASR values between female and male patients did not show statistical significance ($p > 0.05$) (Table 2). The F-test analysis for the parameter of current and general preoperative anxiety (1st

and 2nd day of measurement) assessed by Spilberger's coefficients X1 and X2 indicates that the values were higher in female patients compared to male patients. Statistical significance was found for all four surgical procedures ($p < 0.05$) (Table 2).

TABLE 2. Values of the F test (ANOVA) for the monitored parameters

on the day of measurement	parameter	1st operation		2nd operation		3rd operation		4th operation	
		F	p	F	p	F	p	F	p
1st day of measurement	X1	10,488	0,002	5,738	0,021	9,462	0,004	5,456	0,025
	X2	10,085	0,003	8,503	0,006	9,903	0,003	5,590	0,023
	DASR	19,761	0,000	14,066	0,001	5,759	0,021	3,870	0,056
2nd day of measurement	X1	9,716	0,003	5,458	0,025	7,394	0,010	5,008	0,031
	X2	9,330	0,004	6,996	0,012	10,642	0,002	6,341	0,016
3rd day of measurement	X1	10,092	0,003	4,092	0,050	3,728	0,061	2,352	0,133
	X2	8,677	0,005	4,300	0,045	4,610	0,038	4,449	0,041

Legend: X1 – STAI for general anxiety; X2 – STAI for current anxiety; DASR - Corah's Dental Anxiety Scale

The F-test analysis for the parameters of current and general postoperative anxiety (3rd day of measurement) assessed by Spilberger's coefficients X1 and X2 indicates that the values were higher in female patients compared to male patients for all four surgical procedures. Statistical significance was found for general patient anxiety (Spilberger's coefficient X2) for all four surgical procedures ($p > 0.05$). Regarding the parameter of current anxiety (Spilberger's coefficient X1), statistical significance was found for the 1st and 2nd surgery ($p < 0.05$), while for the 3rd surgery ($p = 0.061$) and the fourth surgery ($p = 0.133$), no statistical significance was observed.

Paired Samples T-Test was performed to test the influence of the order of surgeries on the significance of differences

in the parameters of preoperative anxiety assessed by the DASR form, as well as the X1 and X2 Spilberger's forms. The results of the Paired Samples T-Test are provided in Table 3. Statistical significance was found between the first and second surgeries ($p < 0.05$) and between the second and third surgeries ($p < 0.05$). That means there are differences between female and male patients across surgical procedures. The values for the second surgery were lower compared to the first surgery, and the values for the third surgery were lower compared to the second surgery. There was no statistical significance between the third and fourth surgeries ($p > 0.05$) for both the parameters of current (X1) and general anxiety (X1) (Table 3), as well as for the parameter of preoperative anxiety assessed by the DASR ($p > 0.05$).

TABLE 3. T-test values for paired parameters between surgical interventions

on the day of measurement	Paired parameters	first and second operation		second and third operation		third and fourth operation	
		T	p	T	p	T	p
1st day of measurement	X1	16,392	0,000	14,111	0,000	0,919	0,363
	X2	16,112	0,000	13,947	0,000	0,982	0,332
	DASR	14,180	0,000	11,925	0,000	1,052	0,299
2nd day of measurement	X1	16,286	0,000	13,659	0,000	1,114	0,272
	X2	15,841	0,000	13,672	0,000	0,929	0,358
3rd day of measurement	X1	16,236	0,000	13,664	0,000	0,988	0,329
	X2	16,088	0,000	13,833	0,000	1,672	0,102

Legend: X1 – STAI for general anxiety; X2 – STAI for current anxiety; DASR - Corah's Dental Anxiety Scale

Discussion

Patients with a pronounced fear of intervention in the oral cavity represent patients who tend to have a negative experience during oral surgery, motivated by a subjective assessment, that is, an experience, and most often, the application of local anesthesia during oral-surgical intervention will not be sufficient for its successful performance. Identifying anxiety can be a painstaking task [21].

In most cases, anxious patients believe that their concerns about the upcoming operation are not sufficiently understood by the medical staff, or they complain about insufficient information about the upcoming operation, which they interpret as a lack of respect for them [22].

In this study, high levels of general and current anxiety assessed with the STAI scale and dental anxiety assessed with the DASR scale were found in patients with indications for, according to some authors, the most common oral surgical intervention, the extraction of an impacted third molar. According to research, such patients show a significantly higher level of dental anxiety compared to patients with an indication for conservative or endodontic treatment in the oral cavity. A large number of patients who face an anxious experience in the dental office consider it one of the most unpleasant experiences of their lives [23].

In the researches of Vansend et al. [24], Hmud et al. [25], and Perez et al. [26], it was established that anxiety was

more common in women than in men and that the scores in women were significantly higher than in men. Results of this research indicate the persistence of differences and higher scores of all monitored anxiety parameters in female patients compared to male patients.

Results of this research suggest the fact that the closer the patients got to the act of surgery, their levels of general and immediate anxiety were lower. That can be explained by the fact that through an informative interview and an explanation of the upcoming oral surgical intervention provided for in the research protocol, patients faced the situation, and thus subconsciously reduced their anxiety levels and became more relaxed.

This trend continued after the first operation and during subsequent operations, and patients had lower anxiety scores with each subsequent operation, which can be explained by the positive experience experienced during the previous operation. Throughout the literature, numerous ways of alleviating preoperative anxiety are presented through various ways of preoperatively preparing patients for surgery, related to ways of conveying information to the patient and their general preoperative non-medicated relaxation, etc. [27-30].

The anxiety levels of the patients significantly decreased postoperatively. The reason for that was successfully com-

pleted surgical procedures without complications, which proved the expectations of painful and unpleasant treatments related to the oral cavity to be unfounded. Similar results were found in research on the level of preoperative and postoperative anxiety of patients during oral-surgical extraction of impacted third molars [31, 32].

As with other authors with similar studies, this explains to a large extent the nature of the levels of preoperative and postoperative anxiety in the subjects, and suggests the reasons because of which scores of the monitored parameters were most reduced after the end of the treatment [33, 34]. Although the levels of anxiety decreased postoperatively, it would be significant if they were reduced in advance and in the preoperative period. Numerous authors have investigated ways of preventing the development of anxiety before oral surgical intervention [35, 36].

Bailey E. et al [36], Monteiro et al. [37], and Martinez-Bernal D et al. in their research deal with factors that cause fear of oral-surgical intervention and ways to overcome the mentioned problem [38].

The study monitored the differences between patients who had undergone four surgical extractions of impacted third molars and evaluated the effect of this experience on the monitored parameters. Some authors emphasize the advantage of a positive experience during an intervention in the oral cavity, which in the next similar intervention can influence the reduction of feelings of anxiety. The research evaluated the differences between surgical interventions and found that values were statistically significantly reduced

with each subsequent operation, where this statistical significance was $p < 0.05$ for the first three operations and $p > 0.05$ for the fourth operation.

Some authors suggest and justify the use of anxiolytics, considering that this could significantly reduce patients' anxiety and increase their satisfaction, but there are conflicting opinions [39] with the remark that their use in case of elevated preoperative levels of anxiety could be justified.

Conclusion

The use of anxiety assessment scales in oral cavity interventions is recommended in routine clinical practice to evaluate symptoms and guide further treatment to increase satisfaction for both patients and healthcare providers. In this study, preoperative anxiety levels in patients indicated for surgical extraction of third molars were high and significantly decreased in the postoperative period. In relation to the sequence of performed surgical procedures, scores decreased with each subsequent operation, indicating increasing patient relaxation. The use of STAI scales to assess current anxiety levels in oral cavity interventions is comparable to other well-established measurement instruments, such as DASS. Adequate therapy should be considered to prevent preoperative anxiety, thereby avoiding potential complications associated with this type of intervention, particularly when anxiety scores indicate high values.

Authors declare no conflict of interest.

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