

Determining the Quality of Life after Removing of Impacted Lower Wisdom Tooth using the Principal Component Analysis Method

Marko Matijević¹, Zvonimir Užarević², Zrinka Ivanišević¹, Vlatka Gvozdić³, Dinko Leović¹,
Bruno Popić¹ and Aleksandar Včev¹

¹ »J. J. Strossmayer« University, School of Medicine, Osijek, Croatia

² »J. J. Strossmayer« University, Faculty of Education, Osijek, Croatia

³ »J. J. Strossmayer« University, Department of Chemistry, Osijek, Croatia

ABSTRACT

The main objective of this study was to determine to what extent a detailed oral instruction about treatment after surgical removal of a lower wisdom tooth affects postoperative quality of life (QoL). The research on QoL after removal of a lower wisdom tooth was conducted with 108 patients. Depending on the type of information given to each respondent individually, the examinees were divided into two groups: a test group which was given detailed written and oral instructions, and a control group which received only written instructions about treatment after the surgery. In this research the QoL was examined using modified Oral Health Impact Profile-14 (OHIP-14) criterion four, seven and thirty days after the operation depending on the type of information previously provided to the respondents. In order to reduce the dimensionality of the obtained data sets, as well as in order to explain the relationship between the examined variables that are interrelated the principal component analysis (PCA) was applied. Both groups expressed satisfaction with the postoperative period for the individual variables investigated in modified OHIP-14 questionnaire, with the intensity and the order of the major components of satisfaction determined by the PCA differing between the two groups of the patients. On the fourth postoperative day, the test group expressed the highest level of satisfaction with sleep, physical appearance and the ability to eat. In the later postoperative period the test group (on the seventh and thirtieth day) had the highest level of satisfaction with the absence of discomfort during removal of sutures, satisfaction with performed treatment, and the ability to eat. Detailed preoperative oral instructions to patients can significantly improve the quality of life after operative removal of a lower wisdom tooth.

Key words: quality of life, lower wisdom tooth, written and oral instruction, principal component analysis method

Introduction

Surgical removal of lower wisdom teeth is one of the most common dentoalveolar procedure in oral surgery and most people require at some point in their lives¹. This surgery is rarely life-threatening, but the patient still has a significant impact on daily habits and quality of life (QoL) in the postoperative period^{2–5}. After surgical removal of lower wisdom teeth should be given to the patient postoperative instructions which should facilitate the postoperative period is often accompanied by symptoms that significantly impair QoL. The removal of wisdom teeth causes the patient pain, swelling and difficulty in opening the mouth, as well as social isolation and de-

crease in usual activities^{2,5,6}. Factors which increase the risk of postoperative discomfort include traumatic extraction^{7–9}, preoperative infection^{8,10}, cigarette smoking¹⁰, sex¹¹, the place of extraction¹², use of oral contraceptives¹³, the use of local anesthetic with a vasoconstrictor¹⁴, inadequate postoperative irrigation¹⁵ and inexperience surgeon^{5,9,16}. While dental literature offers a number of publications related to the criteria for the removal of wisdom teeth and morbidity^{2,17–21}, relatively few studies have examined the impact of various factors on the QoL of patients after removal of wisdom teeth^{2,4,22–27}. QoL is a comprehensive total satisfaction or dissatisfaction with

their lives. It is the subjective experience of every man who clearly depends on the objective circumstances in which one lives, as well as a system of values, expectations and aspirations. QoL refers to the personal well-being and life satisfaction, mental and physical health²⁸. The literature identifies four main aspects of QoL: 1.) physical well-being: energy, force, function, sleep, rest; 2.) psychological well-being: concentration, agitation, anxiety, depression, grief, anger; 3.) social welfare: financial burden, return to work, housing, household budget; and 4.) spiritual well-being: hope, despair, faith, religion²⁹. QoL is a widely known concept that has been investigated in many areas and are therefore designed a number of medical instruments (questionnaires or tests) for its subjective assessment^{30,31}. One of such instruments for the subjective assessment of oral health and QoL after oral surgery adapted version of the questionnaire Oral Health Impact Profile-14 (OHIP-14)^{3,23,32}. Several authors measure the subjective experience of patients before and after removal of the lower wisdom teeth using the above procedures. They all had a similar course of recovery, and a significant proportion of patients taking the pain medication during the postoperative period. The average recovery period was 3 to 4 days to return to normal life activities, and 5 to 7 days to perform oral function^{33–36}. The main objective of this study was to determine the effectiveness of a detailed oral instruction on the treatment after surgical removal of lower wisdom teeth on the QoL of the patient. The results from this research will serve as a basis for monitoring the success of surgical treatment and to enable future patient's better postoperative course and faster integration into daily life.

Patients and Methods

Patients studied and treatment

This research included patients undergoing lower third molar extraction. The patients who agreed to participate in the study signed an informed consent. The identity of patients was protected in such a way that the patients identification number was used instead their full names. The study involved 108 adults who were ran-

domly chosen and divided into two groups, test and control group. The test group received detailed verbal and standard written instructions for treatment after surgery, while patients in the control group received only detailed standard written instructions. The surgical procedure for all patients was the same regardless of the operators' experience and it was implemented through the elevation of mucoperiosteal flap with or without of bone removal. All patients were recommended to take paracetamol (3x500 mg) as the sole analgesic in the postoperative period. After signing an informed consent to participate in the study for each participant in the first part of the customized questionnaire comprised according to the format of questionnaires that constructed the Colorado-Bonin and coauthors³ were entered basic information of the individual patient (Table 1).

Collection of data

All subjects received after surgery questionnaire which were completed and then returned. The questionnaire also asked respondents to answer different questions to assess QoL after third molar extraction. The questions were grouped into different sections related to social isolation, isolation at work, ability and choice of meals, speaking skills, sleep disturbance, and change in physical appearance.

Statistical analysis

The data collected through the survey questionnaire are stored in a database in Microsoft Office Excel 2003, and processed by computer using the statistical software Statistica, version 10. In this research the questionnaire, filled in by patients on the fourth, seventh, and thirtieth day after the removal of the lower wisdom teeth, was analyzed. In order to reduce the abundance of the obtained data sets as well as in order to explain the mutual relations between the examined interrelated variables the principal component analysis (PCA) was applied. The aim of this multivariate analysis is that the interconnection of a large number of variables explains some smaller number of fundamental and latent variables or sources of covariation. In this way, the dimensionality was re-

TABLE 1
SOCIOECONOMIC INDICATORS OF STUDY PATIENTS

Indicator	Test group	Control group	Total
Age/years ($\bar{X} \pm SD$)	33 ± 11	31 ± 12	32 ± 11
Female	27 (50.00%)	38 (70.37%)	65 (60.19%)
Male	27 (50.00%)	16 (29.63%)	43 (39.81%)
Elementary school	1 (1.85%)	3 (5.56%)	4 (3.70%)
High school	44 (81.48%)	44 (81.48%)	88 (81.48%)
High school student	1 (1.85%)	3 (5.56%)	4 (3.70%)
University student	9 (16.67%)	16 (29.63%)	25 (23.15%)
High school degree	35 (64.81%)	28 (51.85%)	63 (58.33%)
University degree	9 (16.67%)	7 (12.96%)	16 (14.82%)

\bar{X} – mean, SD – standard deviation

duced and latent variables were constructed that are mutually independent and not correlated. The main aspect of this analysis is to summarize linear correlation analysis of a large number of distributed multivariate quantitative correlated variables in terms of their condensing into a smaller number of components, i.e. new variables that are uncorrelated with each other with minimal loss of information. After finding the principal components applied to an orthogonal varimax rotation factor by transforming to obtain simple structures, i.e. to get as autonomous components as possible. The criterion under which only those factors that have eigenvalues higher than one was used. A part of the total variance explained by one principal component is the eigenvalue and it is the highest in the first principal component and lower in each of its next values. The goal of the iterative procedure is to extract as much of the total variance as possible in the first few principal components which is reflected in the cumulative percentages of total variance and thus to reduce the number of original variables. The factor structure matrix after varimax rotation provides the basis for interpretation of factors singled out. Each factor structure matrix contains loadings of factors sin-

TABLE 2
EIGENVALUES, PERCENTAGES OF EXPLAINED VARIANCE AND CUMULATIVE PERCENTAGES OF VARIANCE FOR THE FOURTH DAY AFTER SURGERY FOR THE TEST GROUP

Factor	Eigenvalue	Percentages of explained variance	Cumulative percentages of variance
1.	6.54	27.24	27.24
2.	2.97	12.39	39.63
3.	2.19	9.13	48.76
4.	1.76	7.33	56.09
5.	1.53	6.36	62.45
6.	1.39	5.78	68.23

gled out that depict the correlation coefficients between the factors singled out and variables. The structure factor load after completion of the rotation allows for better interpretation of the factors in relation to the initial factor matrix and indicates the importance of each variable for each extracted factor. In our case we have taken the lower limit of the factor loading of 0.7 which is consid-

TABLE 3
THE ROTATED FACTOR STRUCTURE MATRIX FOR THE FOURTH DAY AFTER SURGERY FOR THE TEST GROUP

Variable	Factor					
	1.	2.	3.	4.	5.	6.
Maintaining normal social activities	0.4418	0.1517	0.4354	0.0760	0.5332	0.0719
Practicing favorite sport or hobby	0.5140	-0.0535	0.6209	-0.0260	0.2475	-0.0663
Going to sick leave or termination of employment	-0.1005	0.8646*	0.0117	0.1443	0.1468	-0.1137
Duration of absence from work	0.1642	0.7584*	0.0605	0.3512	0.1479	-0.2052
Impact of surgery on your ability to work	0.4037	0.1651	0.5137	-0.0064	0.2963	-0.2772
Need to be accompanied	0.2233	0.5956	-0.0443	-0.1630	-0.0592	0.3486
Continuing the usual diet	0.0362	0.1424	0.0150	0.0584	0.8698*	0.0498
Duration of trouble with eating	0.3136	0.1129	0.2375	-0.0523	0.6266	0.2229
Changes in taste perception	0.0208	-0.1779	-0.0156	0.9387*	-0.0233	0.0029
Duration of the change in perception of taste	-0.1157	0.0570	0.1119	0.9296*	-0.0170	0.0603
Termination of chewing on the surgical side of the jaw	0.1372	0.2611	0.3384	0.0436	-0.3013	0.0793
Changes in the ability to chew	0.2107	0.0181	0.2487	-0.0434	0.6323	0.2198
Problem when opening your mouth	0.5638	-0.0733	0.4616	-0.1073	0.3422	0.2077
Changes in voice	0.1127	-0.1021	0.1265	0.0007	0.2033	0.7383*
Changes in the ability to speak	0.3527	-0.1348	0.1054	0.0883	0.1000	0.6786
Duration of speech problems	0.4574	-0.0836	0.0970	0.0545	0.1400	0.6501
The problem of sleep	0.8889*	0.0469	0.0358	-0.1105	0.1356	0.0296
Sleep disturbance	0.9171*	0.0479	0.0409	-0.0308	0.0199	0.1289
Duration of sleep disorders	0.8900*	-0.0093	-0.1017	-0.0220	-0.0053	0.2271
Dream becomes refreshing	-0.0238	0.1612	0.0072	0.1492	-0.0381	-0.0417
Feeling sleepy	0.6559	0.1036	-0.0185	-0.0500	0.3300	0.1625
Changes in physical appearance	-0.1616	-0.0765	0.8275*	0.1209	0.0869	0.1384
Duration of changes in physical appearance	-0.0424	0.0940	0.8518	0.0855	0.0409	0.1107
Past operations as expected	0.0786	0.2785	0.3565	-0.3615	-0.1142	0.3460

* a statistically significant value of the factor loading; Factor loading – points to the importance of each variable for each extracted factor

ered a strong load factor³⁷. PCA was applied to a data matrix consisting of 24 questions (variables) and 108 respondents for the first part of the survey, which was completed four days after surgery. Another analysis is applied to the second part of the survey, which was conducted seven days after surgery on the data matrix of 7x108, and the same principle is analyzed and the third part of the survey was conducted on the thirtieth day (the period from the seventh to the thirtieth day) after the removal of the lower wisdom tooth surgery.

Results

Experience of patients four days after surgery

The following interpretation was obtained by the factor analysis of the questionnaire completed by the test group patients on the fourth day after the tooth extraction: the multidimensional space of 24 variables was reduced to six mutually independent variables of principal components, i.e. factors (Tables 2 and 3). Six eigenvalues explain total of 68.23% of the variance. The first factor accounts for 27.24% of the variance and points out prob-

TABLE 4
EIGENVALUES, PERCENTAGES OF EXPLAINED VARIANCE AND CUMULATIVE PERCENTAGES OF VARIANCE FOR THE FOURTH DAY AFTER SURGERY FOR THE CONTROL GROUP

Factor	Eigenvalue	Percentages of explained variance	Cumulative percentages of variance
1.	5.09	21.22	21.22
2.	2.89	12.06	33.28
3.	2.26	9.42	42.70
4.	2.04	8.51	51.21
5.	1.78	7.41	58.62
6.	1.29	5.37	63.99

lems with sleep (sleep problems, sleep disorder duration of sleep disturbances) as the main component. The contribution of this component is the largest, because the eigenvalue is 6.54. The second factor accounts for a further 12.39% of the variance and distinguishes insulation work (going on medical leave or downtime, the length of absence from work), thus explaining the total variance of

TABLE 5
THE ROTATED FACTOR STRUCTURE MATRIX FOR THE FOURTH DAY AFTER SURGERY FOR THE CONTROL GROUP

Variable	Factor					
	1.	2.	3.	4.	5.	6.
Maintaining normal social activities	0.7757*	0.2776	0.0788	0.1287	0.0168	0.1338
Practicing favorite sport or hobby	0.8636*	-0.0474	-0.1225	-0.0025	0.1893	0.0512
Going to work sick or of termination employment	0.0514	0.8712*	-0.1074	-0.0342	0.1765	-0.1405
Duration of absence from work	0.0007	0.8542*	-0.0193	-0.0360	0.0962	-0.0939
Impact of surgery on your ability to work	0.1644	0.8539*	-0.0176	0.1619	0.0718	-0.0070
Need to be accompanied	-0.0067	0.0553	0.1888	-0.0011	-0.0212	-0.0760
Continuing the usual diet	0.0703	0.0415	0.1266	0.1226	0.0744	0.1667
Duration trouble eating	0.1352	0.0036	0.2294	0.2229	0.0438	-0.0490
Changes in taste perception	-0.0157	-0.0566	0.9404*	0.0701	-0.0018	-0.0264
Duration of the change in the perception of taste	0.0049	-0.0387	0.9563*	-0.0035	-0.0670	0.0566
Termination of chewing on the surgical side of the jaw	0.3142	0.0048	0.0971	0.0394	0.0665	0.0039
Changes in the ability to chew	0.3397	0.0039	0.0168	0.2599	0.2516	0.2020
Problem when opening your mouth	0.6226	0.2026	0.1231	0.1613	-0.0927	0.1250
Changes in voice	0.0061	-0.0092	-0.1397	-0.1177	-0.2802	0.6311
Changes in the ability to speak	0.0889	-0.1660	0.1151	0.0871	0.2457	0.8669*
Duration speech problems	0.1318	-0.0461	-0.0263	0.2856	0.2107	0.7979*
The problem of sleep	0.2028	0.3324	-0.2502	0.5475	-0.1390	0.2778
Sleep disturbance	-0.0233	0.0019	0.0173	0.9095*	0.0686	0.1591
Duration of sleep disorders	0.1193	-0.0053	0.0800	0.8732*	-0.0321	-0.0140
Dream becomes refreshing	0.1909	-0.0718	0.1101	0.5038	0.3532	0.0075
Feeling sleepy	0.0363	0.3977	0.0874	0.5510	-0.0078	0.2261
Changes in physical appearance	0.0704	0.1262	-0.0618	0.0705	0.8681*	0.1262
Duration of changes in physical appearance	0.1167	0.3332	-0.0636	-0.0711	0.7523*	0.2657
Past operations as expected	0.0431	0.4031	0.0652	0.3793	0.3337	0.0474

* a statistically significant value of the factor loading; Factor loading – points to the importance of each variable for each extracted factor

TABLE 6
EIGENVALUES, PERCENTAGES OF EXPLAINED VARIANCE
AND CUMULATIVE PERCENTAGES OF VARIANCE FOR THE
SEVENTH DAY AFTER SURGERY FOR THE TEST GROUP

Factor	Eigenvalue	Percentages of explained variance	Cumulative percentages of variance
1.	2.52	36.03	36.03
2.	1.24	17.69	53.72
3.	0.99	14.04	67.76

39.63%. Eigenvalue of the second factor is 2.97. The third factor, physical appearance (change in physical appearance, duration of change in physical appearance) explains further 9.13%, thus explaining a total of 48.76% of the variance with eigenvalue of 2.19. The fourth factor accounts for 7.33% of the variance, and the ability to make food choices (changes in the perception of taste, duration of changes in taste perception), thereby explaining the total of 56.09% of the variance. The eigenvalue of the fourth factor is 1.76. The fifth factor refers to the ability to eat (continuing usual diet), and explains further 6.36%, thus explaining the total of 62.45% of the variance with eigenvalue of 1.53. The sixth factor explains 5.78% of variance followed by the separation of speech (changes in tone) and thus explains the total of 68.23% of the variance with the inherent value of 1.39. The following interpretation was obtained by the factor analysis of the questionnaire completed by the control group patients on the fourth day after the tooth extraction: the multidimensional space of 24 variables was reduced to six mutually independent variables of principal components, i.e. factors (Tables 4 and 5). Six eigenvalues explain total of 63.99% of the variance. The first factor accounts for 21.22% of the variance and points out social isolation (maintaining ordinary social activities, engaging in favorite sport or hobby) as a main component. The contribution of this component is the largest since the eigenvalue of the first factor 5.09. The second factor accounts for a further 12.06% of the variance and distinguishes insulation work (going on medical leave or downtime, the

length of absence from work, the effect of surgery on your ability to work), thus explaining the total variance of 33.28%. Eigenvalue of the second factor is 2.89. The third factor, the ability to choose dishes (change in taste perception, duration changes in the perception of taste), and explains further 9.42%, thus explaining a total of 42.70% of the variance with eigenvalue of 2.26. The fourth factor accounts for 8.51% of the variance and points out problems with sleep (sleep disorders, sleep disturbances lasting), thus explaining the total variance of 51.21%. The inherent value of the fourth factor is 2.04. The fifth factor, physical appearance (change in physical appearance, duration of change in physical appearance), and explains further 7.41%, thus explaining a total of 58.62% of the variance with eigenvalue of 1.78. The sixth factor explained 5.37% of variance followed by the separation of speech (changes in the ability of speech, changes in the duration of speech) and thus explains the total of 63.99% of the variance with the inherent value of 1.29.

Experience of patients seven days after surgery

The following interpretation was obtained by the factor analysis of the questionnaire completed by the test group patients on the seventh day after the tooth extraction: the multidimensional space of seven variables was reduced to three latent mutually independent variables of principal components, i.e. factors (Tables 6 and 7). Three eigenvalues explain total of 67.76% of the variance. The first factor accounts for 36.03% of the variance and separated discomfort removal of sutures (discomfort in the stripped threads, scheduling treatment for removal of sutures causing anxiety) as a main component. The contribution of this component is the largest, because the eigenvalue is 2.52. The second factor accounts for a further 17.69% of the variance and separated satisfaction with treatment (treatment recommendation to another person, repeated treatment), thus explaining the total variance of 53.72%. Eigenvalue of the second factor is 1.24. The third factor as in the control group of patients also points out satisfaction with treatment (dental problem solved), and explains further 14.04% and thus explains the 67.76% total variance with eigenvalue of 0.99. The following interpretation was obtained by the

TABLE 7
THE ROTATED FACTOR STRUCTURE MATRIX FOR THE SEVENTH DAY AFTER SURGERY FOR THE TEST GROUP

Variable	Factor		
	1.	2.	3.
Discomfort while removing sutures	0.8455*	-0.1142	0.1123
Schedule appointments for removal of sutures caused anxiety	0.8027*	0.2599	0.0421
The necessary accompaniment to the removal of sutures	0.3750	0.5311	0.2175
Satisfied with the implemented treatment	0.6365	0.2630	-0.0860
Treatment recommendations to another person	-0.0417	0.8730*	-0.0266
Repeated treatments	0.2434	0.7407*	0.0243
Resolved dental problem	-0.0493	-0.0095	0.9806*

* a statistically significant value of the factor loading; Factor loading – points to the importance of each variable for each extracted factor

TABLE 8
EIGENVALUES, PERCENTAGES OF EXPLAINED VARIANCE AND CUMULATIVE PERCENTAGES OF VARIANCE FOR THE SEVENTH DAY AFTER SURGERY FOR THE CONTROL GROUP

Factor	Eigenvalue	Percentages of explained variance	Cumulative percentages of variance
1.	2.23	31.82	31.82
2.	1.24	17.64	49.46
3.	1.05	14.98	64.44

factor analysis of the questionnaire completed by the control group patients on the seventh day after the tooth extraction: the multidimensional space of seven variables was reduced to three latent mutually independent variables of principal components, i.e. factors (Tables 8 and 9). Three eigenvalues explain total of 64.44% of the variance. The first factor accounts for 31.82% of the variance and distinguishes satisfaction with treatment (treatment recommendations to another person, repeated treatment) as its main component. The contribution of this component is the largest, because the eigenvalue is 2.23. The second factor accounts for a further 17.64% of the variance and separated discomfort removal of sutures (stitches discomfort when stripped) and thus explains the total variance of 49.46%. Eigenvalue of the second factor is 1.24. The third factor also distinguishes satisfaction with treatment (dental problem solved), and explains further 14.98% and thus explains the 64.44% total variance with eigenvalue of 1.05.

Experience of patients thirty days after surgery

The following interpretation was obtained by the factor analysis of the questionnaire completed by the test group patients on the thirtieth day after the tooth extraction: the multidimensional space of 14 variables was reduced to three latent mutually independent variables of principal components, i.e. factors (Tables 10 and 11). Three eigenvalues explain total of 59.35% of the variance. The first factor accounts for 32.85% of the variance, and the ability to make meals (continuing the usual

diet, duration of problems with eating, stop chewing on the surgical side of the jaw, a change in the ability to chew) as the main component. The contribution of this component is the largest, because the eigenvalue is 4.60. The second factor accounts for further 16.84% of the variance and points out satisfaction with treatment (satisfied with the implemented treatment, treatment recommendations to another person, repeated treatment), thus explaining the total variance of 49.69%. Eigenvalue of the second factor is 2.36. The third factor, the ability to choose dishes (change in taste perception, duration changes in the perception of taste), and explains further 9.66% of the variance and thus explains the total of 59.35% of the variance with eigenvalue of 1.35. The following interpretation was obtained by the factor analysis of the questionnaire completed by the control group patients on the thirtieth day after the tooth extraction: the multidimensional space of 14 variables was reduced to three latent mutually independent variables of principal components, i.e. factors (Tables 12 and 13). Three eigenvalues explain total of 65.96% of the variance. The first factor accounts for 34.54% of the variance and distinguishes satisfaction with treatment (satisfied with the implemented treatment, treatment recommendations to another person, repeated treatments, dental problem solved) as the main component. The contribution of this component is the largest, because the eigenvalue is 4.84. The second factor accounts for a further 22.22% of the variance and distinguishes social isolation (holding ordinary social activities, engaging in favorite sport or hobby), thus explaining the total variance of 56.76%. Eigen-

TABLE 10
EIGENVALUES, PERCENTAGES OF EXPLAINED VARIANCE AND CUMULATIVE PERCENTAGES OF VARIANCE FOR THE THIRTIETH DAY AFTER SURGERY FOR THE TEST GROUP

Factor	Eigenvalue	Percentages of explained variance	Cumulative percentages of variance
1.	4.60	32.85	32.85
2.	2.36	16.84	49.69
3.	1.35	9.66	59.35

TABLE 9
THE ROTATED FACTOR STRUCTURE MATRIX FOR THE SEVENTH DAY AFTER SURGERY FOR THE CONTROL GROUP

Variable	Factor		
	1.	2.	3.
Discomfort while removing sutures	-0.1198	0.8460*	-0.1177
Schedule appointments for removal of sutures caused anxiety	0.3180	0.6248	0.1820
The necessary accompaniment to the removal of sutures	0.4020	0.0783	-0.4738
Satisfied with the implemented treatment	0.3372	0.5058	0.0915
Treatment recommendations to another person	0.9171*	0.0126	-0.0291
Repeated treatments	0.9226*	0.0401	0.0249
Resolved dental problem	0.0366	-0.0150	0.8805*

* a statistically significant value of the factor loading; Factor loading – points to the importance of each variable for each extracted factor

TABLE 11
THE ROTATED FACTOR STRUCTURE MATRIX FOR THE THIRTIETH DAY AFTER SURGERY FOR THE TEST GROUP

Variable	Factor		
	1.	2.	3.
Maintaining normal social activities	0.1987	0.0443	0.0325
Practicing favorite sport or hobby	0.2427	-0.0655	0.0938
Continuing the usual diet	0.8961*	0.0189	0.0631
Duration trouble eating	0.7281*	0.2338	0.2224
Changes in taste perception	0.1001	0.0185	0.9214*
Duration of the change in the perception of taste	0.0060	0.2611	0.8903*
Termination of chewing on the surgical side of the jaw	0.7871*	0.0358	-0.0614
Changes in the ability to chew	0.7442*	0.1134	0.1121
Problems when opening your mouth	0.5049	0.2505	-0.0177
Changes in physical appearance	0.3992	0.1117	0.3496
Satisfied with the implemented treatment	0.1495	0.7919*	0.2443
Treatment recommendations to another person	0.1176	0.8924*	0.0807
Repeated treatments	-0.1323	0.7117*	0.1160
Resolved dental problem	0.4703	-0.1945	-0.1495

* a statistically significant value of the factor loading; Factor loading – points to the importance of each variable for each extracted factor

TABLE 12
EIGENVALUES, PERCENTAGES OF EXPLAINED VARIANCE
AND CUMULATIVE PERCENTAGES OF VARIANCE FOR THE
THIRTIETH DAY AFTER SURGERY FOR THE CONTROL GROUP

Factor	Eigenvalue	Percentages of explained variance	Cumulative percentages of variance
1.	4.84	34.54	34.54
2.	3.11	22.22	56.76
3.	1.29	9.20	65.96

value of the second factor is 3.11. The third factor, the ability to choose dishes (change in taste perception, duration changes in the perception of taste), and explains further 9.20% of the variance and thus explains the total of 65.96% of the variance with eigenvalue of 1.29.

Discussion

The impacts of various factors on the QoL of patients after third molar extraction were the subject of several previous studies on^{2,4,22–27,38,39}. A detailed oral informing the patients and providing them with standard written information about the patient's postoperative behavior was taken as a major factor that could affect the QoL in the postoperative period. The study of QoL in the postoperative period after third molar extraction and application of PCA with rotation of factors was aimed to reduce more variables to a smaller number of variables that describe the QoL of patients. After the analysis of the principal components the factor interpretation starts from the structure matrix following the completion of the or-

thogonal varimax rotation of factors and identification of variables that have high absolute factor loadings on the same factor. Based the factor analysis of the questionnaire completed by the test and control group patients on the fourth day after the tooth extraction, it can be concluded that for each test group of six factors singled out and variables associated with their loadings that describe the QoL of patients in each extracted factor (Table 3, 5 and 14). Table 14 shows that in the test group compared to the control group, the smallest problem is related to difficulty in sleeping, and then to physical appearance and the ability to choose meals and ability to eat, while in the control group, social isolation is the smallest problem followed by the ability to choose meals and difficulty in sleeping and then physical appearance, working isolation and the ability to speak ranked the second and sixth place in both test groups. In our case equal isolation at work was recorded as in the results of the studies carried out to date^{2,40}. Contrary, the report of the study conducted by the Colorado-Bonin and coauthors³ noted that the group of patients who received a detailed verbal instruction was characterized by significantly intensive work disability. In the control group as compared to the test group, sleeping difficulties and physical appearance are distinguished as the components that affect the QoL of patients. After the PCA with rotation of the questionnaire factor completed by patients on the seventh day after tooth extraction, it can be concluded that each group involves total of three factors singled out and variables associated with their loadings that describe the QoL of patients for each extracted factor (Table 7, 9 and 15). Table 15 shows that in the test group compared to the control group, the discomfort while was the smallest one, while satisfaction with the treatment is pointed out in the first place in the control group. In both groups, the

TABLE 13
THE ROTATED FACTOR STRUCTURE MATRIX FOR THE THIRTIETH DAY AFTER SURGERY FOR THE CONTROL GROUP

Variable	Factor		
	1.	2.	3.
Maintaining normal social activities	-0.0725	0.8821*	-0.0332
Practicing favorite sport or hobby	-0.0619	0.9200*	-0.0539
Continuing the usual diet	0.1347	0.3824	0.3837
Duration trouble eating	0.6445	0.1162	0.4966
Changes in taste perception	0.0095	0.0207	0.9226*
Duration of the change in the perception of taste	0.5526	-0.1481	0.7025*
Termination of chewing on the surgical side of the jaw	0.2465	0.5196	0.3230
Changes in the ability to chew	0.4028	0.5192	0.3051
Problems when opening your mouth	0.3247	0.4294	0.1322
Changes in physical appearance	-0.2164	0.1945	-0.0930
Satisfied with the implemented treatment	0.8615*	-0.1717	0.2337
Treatment recommendations to another person	0.7470*	0.2991	0.0067
Repeated treatments	0.7005*	0.2469	0.1519
Resolved dental problem	0.7466*	-0.2358	-0.0889

* a statistically significant value of the factor loading; Factor loading – points to the importance of each variable for each extracted factor

TABLE 14
COMPARATIVE VIEW OF SOME FACTORS SINGLED OUT OF QoL OF PATIENTS IN THE TEST AND THE CONTROL GROUP FOR THE FOURTH DAY AFTER TOOTH EXTRACTION

Factor	Name of factor	
	Test group	Control group
1.	Difficulty in sleeping	Social isolation
2.	Working isolation	Working isolation
3.	Physical appearance	Ability to choose meals
4.	Ability to choose meals	Difficulty in sleeping
5.	Ability to eat	Physical appearance
6.	Ability to speak	Ability to speak

TABLE 15
COMPARATIVE VIEW OF SOME FACTORS SINGLED OUT OF QoL OF PATIENTS IN THE TEST AND THE CONTROL GROUP FOR THE SEVENTH DAY AFTER TOOTH EXTRACTION

Factor	Name of factor	
	Test group	Control group
1.	Discomfort while removing sutures	Satisfaction with treatment
2.	Satisfaction with treatment	Discomfort while removing sutures
3.	Resolved dental problem	Resolved dental problem

solution of a dental problem is on the third position. In the control group as compared to the test group, discomfort while removing sutures is pointed out as a component that affects the quality of patients' life. Comparing the results of the patient's QoL during the first seven days after the extraction of the lower wisdom with the re-

TABLE 16
COMPARATIVE VIEW OF SOME FACTORS SINGLED OUT OF QoL OF PATIENTS IN THE TEST AND THE CONTROL GROUP FOR THE THIRTIETH DAY AFTER TOOTH EXTRACTION

Factor	Name of factor	
	Test group	Control group
1.	Ability to eat	Satisfaction with treatment
2.	Satisfaction with treatment	Social isolation
3.	Ability to choose meals	Ability to choose meals

sults of previous studies^{2,3,26,27,41,42}, we noticed that the surgical procedure performed significantly affects the patient's QoL during the first four days after surgery. After performed factor analysis of the questionnaire completed by the test group patients on the thirtieth day after the tooth extraction it can be concluded that each group involves total of three for with a total of three factors singled out and variables associated with their loadings that describe the QoL of patients in each extracted factor (Tables 11, 13 and 16). Table 16 shows that in the test group compared to the control one, the problem of ability to eat is the smallest one, followed by satisfaction with treatment, while in the control group satisfaction with treatment is on the first position followed by social isolation. In both groups, the third is the ability to choose meals. The results obtained on the patient's QoL thirty days (the period from the seventh to the thirtieth day) after the extraction of the lower wisdom teeth cannot be compared with the results of previous studies similar to our study, because we did not find any such information by examining the existing relevant publications.

REFERENCES

1. SLADE GD, FOY SP, SHUGARS DA, PHILLIPS C, WHITE RP JR, J Oral Maxillofac Surg, 62 (2004) 1118. DOI: 10.1016/j.joms.2003.11.014.
- 2. WHITE RP JR, SHUGARS DA, SHAFER DM, LASKIN DM, BUCKLEY MJ, PHILLIPS C, J Oral Maxillofac Surg, 61 (2003) 535.
- 3. COLARADO-BONIN M, VALMASEDA-CASTELLÓN E, BERINI-AYTÉS L, GAY-ESCODA C, Int J Oral Maxillofac Surg, 35 (2006) 343. DOI: 10.1016/j.jom.2005.08.008.
- 4. MATIJEVIĆ M, UŽAREVIĆ Z, GVOZDIĆ V, LEOVIĆ D, IVANIŠEVIĆ Z, MATIJEVIĆ-MIKELIĆ V, BOGUT I, VČEV A, MACAN D, Coll Antropol, 36 (2012) 1279.
- 5. MATIJEVIĆ M, UŽAREVIĆ Z, GVOZDIĆ V, MATIJEVIĆ-MIKELIĆ V, LEOVIĆ D, MACAN D, Acta Clin Croat, 52 (2013) 23.
- 6. SANDERS AE, SPENCER AJ, SLADE GD, Community Dent Oral Epidemiol, 34 (2006) 71.
- 7. BIRN H, Int J Oral Surg, 2 (1973) 211. DOI: 10.1016/S0300-9785(73)80045-6.
- 8. AL-KHATEEB TL, EL-MARSAFI AI, BUTLER NP, J Oral Maxillofac Surg, 49 (1991) 141. DOI: 10.1016/0278-2391(91)90100-Z.
- 9. ALEXANDER RE, J Oral Maxillofac Surg, 58 (2000) 538. DOI: 10.1016/S0278-2391(00)90017-X.
- 10. SWEET JB, BUTLER DP, J Oral Surg, 37(1979) 732.
- 11. MACGREGOR AJ, Br J Oral Surg, 6 (1968) 49. DOI: 10.1016/S0007-117X(68)80026-5.
- 12. FIELD EA, SPEECHLEY JA, ROTTER E, SCOTT J, J Oral Maxillofac Surg, 23 (1985) 419. DOI: 10.1016/0266-4356(85)90026-9.
- 13. CATELLANI JE, HARVEY S, ERICKSON SH, CHERKIN D, J Am Dent Assoc, 101 (1980) 777.
- 14. MEECHAN JG, VENCHARD GR, ROGERS SN, HOBSON RS, PRIOR I, TAVARES C, MELNICENKO S, Int J Oral Maxillofac Surg, 16 (1987) 279. DOI: 10.1016/S0901-5027(87)80148-0.
- 15. BUTLER DP, SWEET JB, Oral Surg Oral Med Oral Pathol, 44 (1977) 14.
- 16. OGinni FO, FATUSI OA, ALAGBE AO, J Oral Maxillofac Surg, 61 (2003) 871. DOI: 10.1016/S0278-2391(03)00248-9.
- 17. MERCIER P, PRECIOUS D, J Oral Maxillofac Surg, 21 (1992) 17.
- 18. HAZELKORN HM, MACEK MD, J Oral Maxillofac Surg, 52 (1994) 681.
- 19. COULTHARD P, PLEUVRY BJ, DOBSON M, PRICE M, Br J Oral Maxillofac Surg, 38 (2000) 127.
- 20. VALMASEDA-CASTELLÓN E, BERINI-AYTÉS L, GAY-ESCODA C, Oral Surg Oral Med Oral Pathol Oral Radiol Endod, 90 (2000) 567.
- 21. VALMASEDA-CASTELLÓN E, BERINI-AYTÉS L, GAY-ESCODA C, Oral Surg Oral Med Oral Pathol Oral Radiol Endod, 92 (2001) 377.
- 22. BERGE TI, Acta Odontol Scand, 55 (1997) 64.
- 23. SAVIN J, OGDEN GR, Br J Oral Maxillofac Surg, 35 (1997) 246. DOI: 10.1016/S0266-4356(97)90042-5.
- 24. OGDEN GR, BISSIAS E, RUTA DA, OGDEN S, Br Dent J, 185 (1998) 407. DOI: 10.1038/sj.bdj.4809827.
- 25. MCGRATH C, BEDI R, Community Dent Health, 18 (2001) 138.
- 26. MCGRATH C, COMFORT MB, LO EC, LUO Y, J Oral Maxillofac Surg, 61 (2003) 759.
- 27. MCGRATH C, COMFORT MB, LO EC, LUO Y, Br Dent J, 194 (2003) 265.
- 28. KUGLER S, E-Quality, 2 (2001) 70.
- 29. DONGBO F, DING Y, MCGOWAN P, FU H, Patient Educ Couns, 61 (2006) 389.
- 30. SKARET E, ASTROM AN, HAUGEJORDEN O, Oral health-related quality of life (OHRQoL): Review of existing instruments and suggestions for use in oral health outcome measure research in Europe (Quintessence International, London, 2004).
- 31. HEBLING E, PEREIRA AC, Gerodontology, 24 (2007) 151.
- 32. SLADE GD, SPENCER AJ, Community Dent Health, 11 (1994) 3.
- 33. FOY SP, SHUGARS DA, PHILLIPS C, MARCIANI RD, CONRAD SM, WHITE RP JR, J Oral Maxillofac Surg, 62 (2004) 15.
- 34. BRENNAN DS, SINGH KA, SPENCER AJ, ROBERTS-THOMSON KF, Health Qual Life Outcomes, 4(2006) 83.
- 35. SHUGARS DA, GENTILE MA, AHMAD N, STAVROPOULOS MF, SLADE GD, PHILLIPS C, CONRAD SM, FLEUCHAUS PT, WHITE RP, J Oral Maxillofac Surg, 64 (2006) 1721.
- 36. FROUZANFAR T, SABELIS A, AUSEMS S, BAART JA, VAN DER WAAL I, Int J Oral Maxillofac Surg, 37 (2008) 824.
- 37. VANDEGINSTE BGM, MASSART DL, BUYDENS LMC, DE JONG S, LEWI PJ, SMEYERS-VERBEKE J, Handbook of chemometrics and qualimetrics (Elsevier, Amsterdam, 1998).
- 38. VOEGELIN TC, SUTER VG, BORNSTEIN MM, Schweiz Monatsschr Zahnmed, 118 (2008) 192.
- 39. CARVALHO RW, DO EGITO VASCONCELOS BC, J Oral Maxillofac Surg, 69 (2011) 2714.
- 40. LOPES V, MUMENYA R, FEINMANN C, HARRIS M, Br J Oral Maxillofac Surg, 33 (1995) 33.
- 41. AKINWANDE JA, Niger Dent J, 10 (1991) 3.
- 42. VAN WIJK A, KIEFFER JM, LINDEBOOM JH, J Oral Maxillofac Surg, 67 (2009) 1026.

Z. Užarević

»J. J. Strossmayer« University, Faculty of Education, Ulica cara Hadrijana 10, 31000 Osijek, Croatia
e-mail: zuzarevic@ufos.hr

UTVRĐIVANJE KVALITETE ŽIVOTA NAKON UKLANJANJA DONJEG UMNJAKA KORIŠTENJEM METODE ANALIZE GLAVNIH KOMPONENATA

SAŽETAK

Glavni cilj ovoga istraživanja bio je utvrditi u kojoj mjeri detaljan usmeni naputak o postupanju nakon kirurškog odstranjenja donjeg umnjaka utječe na poslijeoperacijsku kvalitetu života pacijenta. Provedeno je istraživanje kvalitete života nakon odstranjenja donjeg umnjaka kod 108 ispitanika. Ovisno o tipu informacije dane svakom ispitaniku posebice, ispitanici su podijeljeni u dvije skupine: ispitnu u kojoj su pacijenti dobili detaljan pismeni i usmeni naputak te kontrolnu skupinu u kojoj su dobili samo pismeni naputak o postupanju nakon operativnog zahvata. U ovom istraživanju ispitana je kvaliteta života korištenjem modificiranog OHIP-14 kriterija četvrti, sedmi i trideseti poslijeoperacijski dan ovisno o tipu ranije dane informacije ispitanicima. U svrhu reduciranja dimenzionalnosti dobivenog seta podataka, kao i u cilju objašnjenja međusobnog odnosa ispitivanih varijabli koje su međusobno povezane primijenjena je analiza glavnih komponenata. Obje skupine izrazile su zadovoljstvo u poslijeoperacijskom razdoblju za pojedine istražene varijable modificiranoga OHIP-14 upitnika, pri čemu se intenzitet i redoslijed glavnih komponenata zadovoljstva koje su određene analizom glavnih komponenata razlikuje među dvjema ispitivanim skupinama pacijenata. Ispitna skupina četvrti poslijeoperacijski dan imala je najviši stupanj zadovoljstva sa snom, fizičkim izgledom i mogućnošću prehrane. U kasnijem poslijeoperacijskom periodu ispitna skupina (sedmi i trideseti dan) imala je najviši stupanj zadovoljstva s odsutnošću nelagode pri odstranjenju konaca, zadovoljstva obavljenim tretmanom te sposobnošću jela. Detaljne prijeoperacijske usmene upute pacijentima mogu značajno unaprijediti kvalitetu života nakon kirurškoga odstranjenja donjih umnjaka.