Factors Related to Oral Health Related Quality of Life in TMD Patients

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A B S T R A C T

The aims of the study were to determine the impact of temporomandibular disorders (TMD) on self-percieved oral health related quality of life (OHRQoL) and to compare OHRQoL of patients with TMD with a control group. A total of 81 TMD patients participated in a study group and 400 adults served as the control group. The mean OHIP summary scores were computed for all patients with the same diagnosis and the same subgroup of axis I according to the RDC/ TMD exam form. The mean OHIP subscores for all seven domains of the OHIP questionnaire were compared between the study and the control group. The hierarchical linear regression model was used to assess the most important variables according to the RDC/TMD protocol that contribute to OHRQoL in TMD patients with the OHIP summary score as dependent variable. According to this study, TMD had a high association with reduced OHRQoL (p<0.001). More diagnoses of axis I according to the RDC/TMD protocol (p<0.001), higher age of TMD patients (p<0.001) and diagnoses associated with limited jaw movements contributed to more impaired OHRQoL (p=0.008 and p=0.030, respectively). Female TMD patients had no significantly different OHRQoL compared to male patients (p=0.436). According to regression analysis, higher age (p<0.001), more physical diagnoses (p=0.018) and diagnosis Ib (p=0.169) explained 39.1% of the variability (p<0.001) of the OHIP summary score in TMD patients.

***Key words:** temporomandibular disorders, orofacial pain, oral health, quality of life, questionnaire*

Introduction

Temporomandibular disorders (TMD) are a group of clinical diagnoses that could be summarized as myofascial pain of the muscles of the stomatognathic system, internal derangements of the temporomandibular joints, and degenerative and/or inflammatory temporomandibular joint disease. Patients suffering from TMD often have more than one diagnosis[1]. The clinical signs are usually orofacial pain, limited jaw opening and joint sounds. The etiology of TMD is multifactorial. Oral parafunctions, especially bruxism, trauma of the mandible or temporomandibular joints, and emotional stress are known as etiological factors[1].

TMD patients often also suffer from different psychological and physical conditions as a consequence of their disease, especially from chronic orofacial pain[2]. Furthermore, different psychological conditions are known as possible risk factors for the development of TMD and can also highly affect the final treatment outcome[2]. Every TMD patient experiences his/her condition in a unique way. Therefore, a standardized assessment of self-percieved disorders of the stomatognathic system should be emphasized in clinical studies.

Various Oral Health Related Quality of Life (OHRQoL) indicators are based on a conceptual framework derived from the International Classification of Impairments, Disabilities and Handicaps (ICIDH) developed by WHO in 1980[3]. The ICIDH model consists of the following key concepts: impairments, functional limitations, pain, disability, and handicap. It provides a theoretical basis for an empirical exploration of the links between various dimensions of general and oral health. Locker subsequently introduced this theoretical framework in dentistry[4].

The original Oral Health Impact Profile (OHIP) questionnaire is accepted worldwide and consists of 49 items, representing seven domains (subscales), namely: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disabil-

ity, and handicap, which measure both the frequency and severity of self-perceived oral problems[5]. For each question, the subjects are asked how frequently they had experienced the impact of the problem in the last month[6].

The aim of this study was to evaluate the impact of different diagnoses of TMD according to axis I of the International Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) exam protocol on self-perceived OHRQoL. The aim was also to compare OHRQoL of TMD patients to the regional adult population sample.

Subjects and Methods

Participants

A total of 81 TMD patients and 400 adults (regional general population sample which served as a control group) participated in the study. All of the 81 TMD patients were seeking treatment for masticatory muscle and TMJ problems at the Department of Fixed Prosthodontics and Occlusion, University Medical Centre of Ljubljana, Slovenia between 2007 and 2009. Sample populations, together with age and gender, are listed in Table 1. All subjects were well-informed about the aim and methods, and gave written consent. The study was approved by the National Medical Ethics Committee of Slovenia.

Methods

The RDC/TMD protocol was used for clinical assessment of TMD patients, since it had been introduced in this institution as a standard diagnostic criterion in 2005. The majority of TMD patients were referred from the Department of Maxillofacial and Oral Surgery, University Medical Centre of Ljubljana, Slovenia, when other diagnoses had been excluded. According to the RDC/TMD protocol[7], patients with at least one physical (axis I) TMD diagnosis were included in this study.

The majority of TMD patients (70.4 %) had more than one diagnosis according to the RDC/TMD protocol. Only one diagnosis from axis I was established in 24 patients (29.6%). The same percentage of patients had three diagnoses and 26 patients (32.1%) had two diagnoses (Table 2). All patients had natural dentition and/or fixed prostheses. They had no other specific oral/dental problems and they had no removable dentures.

OHRQoL was assessed using the Slovenian version of the oral health impact profile (OHIP-SVN) questionnaire. All participants filled-out the questionnaire before the clinical exam. Responses were rated on a Likert-type scale with the following responses: 0 – never, 1 – hardly ever, 2 – sometimes, 3 – fairly often, and 4 – very often. The minimal theoretical result of this questionnaire was 0 and the maximum was 196. The OHIP summary score of the OHIP questionnaire was calculated.

TABLE 1
SAMPLE GROUPS BY AGE AND GENDER

Sample	Sample type	N	Age X (SD)	Age range	% women
TMD patients [a]	Consecutive	81	36.1 (13.4)	17–65	80.2
General population	Random	400	41.4 (12.7)	19–80	72.7

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TABLE 2
PROPORTION OF PATIENTS WITH DIFFERENT TMD DIAGNOSES ACCORDING TO THE RDC/TMD PROTOCOL AND THEIR OHIP SUMMARY SCORES (X±SD)

RDC/TMD Diagnosis	Number (%)	OHIP–SVN score	
		X	SD
I Myofascial pain			
Ia: Myofascial pain without limited opening	45 (55.6%)	40.8	36.6
Ib: Myofascial pain with limited opening	19 (23.5%)	63.5	41.7
II Disc displacement			
IIa: Disc displacement with reduction	24 (29.6%)	40.5	33.9
IIb: Disc displacement without reduction, with limited opening	9 (11.1%)	69.3	45.6
IIc: Disc displacement without reduction, without limited opening	15 (18.5%)	56.8	42.4
III Arthralgia, osteoarthritis and osteoarthrosis			
IIIa: Arthralgia	40 (49.4%)	47.3	35.0
IIIb: Osteoarthritis of the TMJ	14 (17.3%)	59.6	38.9
IIIc: Osteoarthrosis of the TMJ	4 (4.9%)	76.2	73.8

Data analysis

Statistical analysis was made using the statistical software package SPSS 14 for Windows XP, with the probability of a type I error set at the 0.05 level. Normality of distribution was tested by the Kolmogorov-Smirnov test. Means, standard deviations, and the 95% confidence intervals were calculated. The significance of the differences between the OHIP summary scores of the study and the control group was assessed by the independent sample t-test. Hierarchical regression analysis was used to assess changes of the explained variability of the OHIP-SVN summary score in the group of TMD patients.

Results

The mean OHIP summary score±SD of the TMD patients was 44.0±37.5 points, compared with 25.4±26.6 of the general population. The partial summary score for each of the seven OHIP domains (7 subscale summary scores) in the TMD group and the control group are displayed as box plots in Figure 1.

The diagnoses of axis I according to the RDC/TMD exam form, together with the OHIP scores in TMD patients are listed in Table 2. The lowest OHIP-SVN summary score was observed for temporomandibular disc displacement with reduction (X±SD was 40.5±33.9, Diagnosis IIa). The highest mean OHIP-SVN summary scores were found in patients with osteoarthrosis of one or both temporomandibular joints (Diagnosis IIIc) and disc displacement without reduction, with limited jaw opening (Diagnosis IIb).

Female patients (N=65) had an OHIP-SVN summary score (mean± SD) of 45.6±38.1, which was not significantly different in comparison to male patients (N=16, 37.4±34.9; independent samples t-test, p=0.436). A percentage of male and female patients with equal diagnosis is shown in Figure 2.
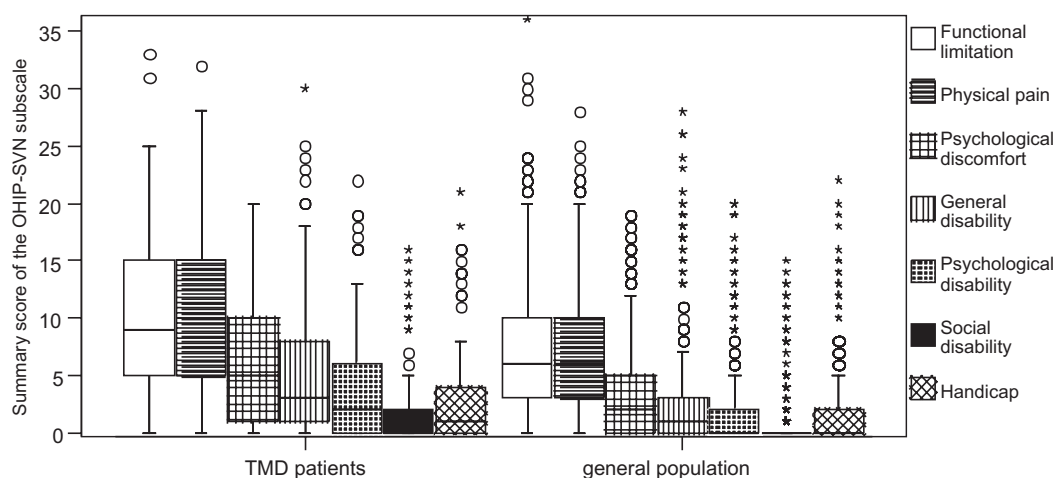

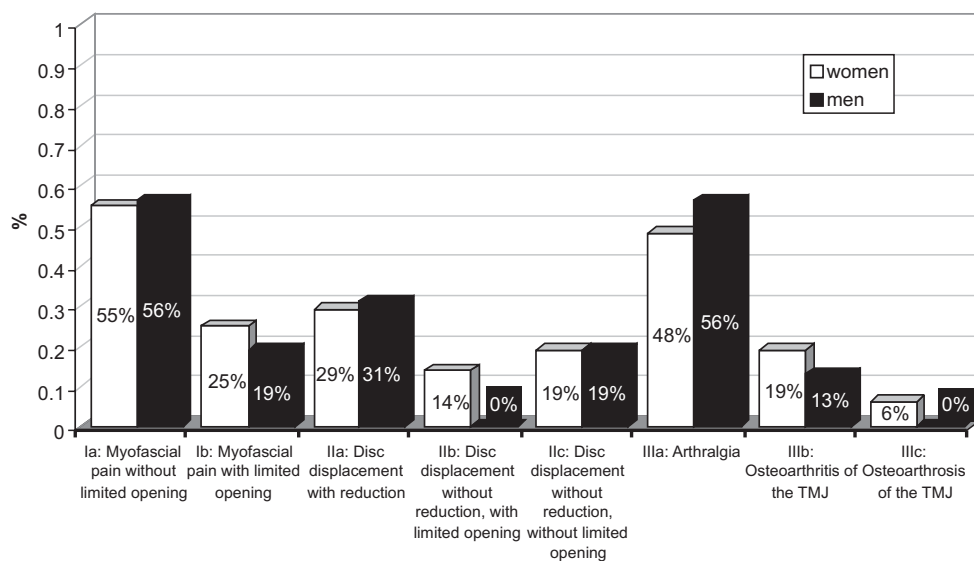Fig. 1. The OHIP subscale scores in the TMD (N=81) and control group (N=400).

Fig. 2. A bar graph showing the proportion of male and female tmd patients with different diagnoses according to the rdc/tmd protocol.

The number and the percentages of patients with single and multiple diagnoses of axis I, together with the OHIP scores, are presented in Table 3.

The mean OHIP-SVN scores of each of the 7 OHIP domains (subscores) were compared between the TMD patients and the general population (the control group). The mean 7 subscores were significantly lower in the control group (general population) (p<0.001) than in the TMD group.

Linear regression analysis for the OHIP summary score in TMD patients as the dependent variable and age, number of diagnoses RDC/TMD, each group diagnosis each separate diagnosis and gender as independent variables were computed and the results are listed in Table 4. Only the following five independent variables were significantly related to the OHIP-SVN summary score: Age,

Number of the RDC/TMD diagnoses, Diagnosis Ib, Diagnoses from group III of the RDC/TMD protocol, and Diagnosis IIb. All of these five variables were then entered into a multiple regression model in a »hierarchic« manner. In the first step, the variable Age was introduced, then the Number of RDC/TMD diagnoses, and so on, until all five variables were introduced into the model (Table 5). The model with all five variables explained 39.1% of the variability of the OHIP-SVN summary scores (Table 5). Variable age explained 29.1% of the variability of the OHIP summary score in TMD patients ($R^2 = 0.291$) and was statistically significant (p<0.001).

The hierarchical regression model was statistically significant only for the first two variables (Age and Number of RDC/TMD diagnoses) (Table 6).

TABLE 3
A TOTAL NUMBER OF RDC/TMD DIAGNOSES IN TMD PATIENTS TOGETHER WITH THE OHIP SUMMARY SCORES BY GENDER

Number of Diagnoses RDC/TMD	Gender		Total	OHIP–SVN score X±SD
	Female Nr. (%)	Male Nr. (%)		
one	19 (29.2%)	5 (31.3%)	24 (29.6%)	23.0±19.0
two	20 (30.8%)	6 (37.5%)	26 (32.1%)	38.9±32.2
three	20 (30.8%)	4 (25.0%)	24 (29.6%)	68.1±45.4
four	5 (7.7%)	1 (6.2%)	6 (7.5%)	51.5±31.9
five	1 (1.5%)	0 (0%)	1 (1.2%)	53
TOTAL	65 (100.0%)	16 (100.0%)	81 (100.0%)	

TABLE 4
LINEAR REGRESSION ANALYSIS WITH THE OHIP SUMMARY SCORE AS DEPENDENT VARIABLE AND DIFFERENT INDEPENDENT VARIABLES OBTAINED FROM THE RDC/TMD PROTOCOL

Variable	Linear Regression			
	Unstardardized Coefficients		t	Sig.
	B	Std. Error		
Age	1.506	0.265	5.689	<0.001
Number of diagnoses RDC/TMD	15.322	3.897	3.931	<0.001
Diagnosis Ib	25.559	9.456	2.703	0.008
III. group RDC/TMD (arthralgia. osteoarthritis and osteoarthrosis)	23.029	9.199	2.503	0.014
Diagnosis IIb	28.542	12.933	2.207	0.030
Diagnosis IIIc	33.964	18.948	1.793	0.077
Diagnosis IIIb	18.870	10.871	1.736	0.086
II. group RDC/TMD (disc displacement)	14.390	8.823	1.631	0.107
Diagnosis IIc	15.755	10.635	1.481	0.142
I. group RDC/TMD (myofascial pain)	15.500	10.639	1.457	0.149
Diagnosis Ia	–7.067	8.391	–0.842	0.402
Diagnosis IIIa	6.691	8.343	0.802	0.425
Gender	–8.210	10.478	–0.783	0.436
Diagnosis IIa	–4.862	9.155	–0.531	0.597

TABLE 5

CHANGES OF THE EXPLAINED VARIABILITY OF THE DEPENDENT VARIABLE: THE OHIP SUMMARY SCORE WHEN INTRODUCING
INDEPENDENT VARIABLES IN THE HIERARCHICAL LINEAR REGRESSION MODEL

Variable	Nr. of Variables in Model	R^2	Adjusted R^2	R^2 Change	F Change	F	Sig.
Age	1	0.291	0.282	0.291	32.369	32.369	<0.001
Number of RDC/TMD diagnoses	2	0.371	0.354	0.080	9.896	22.955	<0.001
Diagnosis Ib	3	0.391	0.367	0.020	2.526	16.444	<0.001
III. group RDC/TMD	4	0.391	0.359	<0.001	0.039	12.189	<0.001
Diagnosis IIb	5	0.391	0.351	<0.001	0.036	9.635	<0.001

TABLE 6

COEFFICIENTS IN MULTIPLE LINEAR REGRESSION MODEL WITH FIVE INDEPENDENT VARIABLES (N=81)

Variable	Unstandardized Coefficients		t	Sig.
	B	Std. Error		
Age	1.237	0.266	4.650	<0.001
Number of diagnoses RDC/TMD	10.308	4.246	2.427	0.018
Diagnosis Ib	12.636	9.108	1.387	0.169
III. group RDC/TMD	−1.330	9.644	−0.138	0.891
Diagnosis IIb	2.340	12.300	0.190	0.850
(Constant)	−25.456	11.356	−2.242	0.028

Discussion

The results of this study revealed that the TMD patients had more impaired oral health than the control group, as was presented by significantly higher OHIP summary scores and all seven subscores in the TMD group. The impact of TMD on self-perceived OHRQoL has been the focus of interest in only a few previous studies[8–12]. According to available literature, the first study in this field was performed at the University of Pavia in Italy, where 124 consecutive patients and 61 »pain free« controls were compared[8]. The results of that study revealed that orofacial pain negatively affected the quality of life of patients with temporomandibular disorders, which is in line with the results of the current study. The same research group also published a specialized version of the OHIP instrument with 30 items for TMD patients[9]. In two German studies, OHRQoL was markedly impaired in 416 consecutive patients with TMD in comparison to 135 individuals without any RDC/TMD axis I diagnosis[10,11]. Recently, another study assessed OHRQoL in Brazilian TMD patients[13]. In spite of the fact that only a short version of the OHIP questionnaire with 14 items was used in the Brazilian study, the results unquestionably showed that orofacial pain appears to have some impact and reduces OHRQoL in patients with TMD. In the current study, a larger control group than the experimental group was used for statistical comparison. This strategy increases the probability that the control group can provide an accurate framework for statistical comparison and also increases statistical precision[14].

The mean age of TMD patients was 36.1 years, which is similar to the Italian (35.1 years)[8], German (38.5 years)[10] or Brazilian study (36.5)[13].

Although it is well documented that TMD affects predominantly females in the years of fertility[1], and that females ask for treatment more frequently than men, the results of this study found no significant difference in OHRQoL between genders.

The mean OHIP subscale scores were also compared between the TMD patients and controls and were significantly higher in the TMD patients (Figure 1). The results are similar to the German studies[10,11]. Furthermore, patients with two or more diagnoses had significantly higher OHIP values than patients with a lower number of diagnoses. These results are also in accordance with the German study[11]. This phenomenon could indicate that the impairment of different anatomical structures of the orofacial system results as a summarizing effect. The lowest mean OHIP-SVN summary score was observed for temporomandibular disc displacement with reduction (IIa), which is often pain-free and only joint sounds may be reported or discovered during examination. Obviously, this diagnosis had the best OHRQoL compared to other diagnoses of the RDC/TMD protocol.

In the hierarchical linear regression model, the variable age had the highest impact on OHRQoL in TMD patients (Table 6). One explanation for the high impact of the variable age to OHRQoL may be that older TMD patients had more RDC/TMD diagnoses than younger patients and their symptoms lasted for a longer period of time, which may make them more irritable. However,

other medical diagnoses of chronic diseases might also be present in older TMD patients, which could make them less tolerant of any other pain and discomfort.

The results of the current study confirmed that those diagnoses of axis I, which have been associated with pain and limited movements of the lower jaw, have an especially high impact in relation to the OHIP subscore Psychological discomfort[15]. Myofascial pain, together with restricted mouth opening (Diagnosis Ib), disc displacement without reduction, together with a restricted opening (Diagnosis IIb), and osteoarthrosis (Diagnosis IIIc), resulted in the highest mean values of the OHIP summary scores (Figure 1).

Two major strengths of this study are the application of the standardized internationally accepted OHIP questionnaire and also the standardized assessment of the level of impairment of different anatomical structures that constitute the orofacial system according to the RDC/TMD protocol. Nevertheless, this study is limited by the small number of patients for some specific diagnoses of axis I (for example, osteoarthrosis of the temporomandibular joint (TMJ) (Diagnosis IIIc), was confirmed in only 4 patients). Moreover, a clinical examination according to the RDC/TMD protocol was not performed in the general population (control group). The fact that the majority of TMD patients had more than one RDC/TMD diagnosis also influenced the impact of each diagnosis on OHRQoL.

The results of the current study, which were completed under standardized protocol, allow international comparison of the OHRQoL of Slovenian TMD patients with TMD patients of other nationalities, socioeconomic, or ethnic groups[16–36]. In the future, multicentre studies should be performed, as in that way the number of patients would increase. Such multicentre studies can currently be performed with a standardized assessment of OHRQoL using the OHIP questionnaire, which has already been translated into more than 20 languages worldwide, together with an evaluation of their psychometric properties[16–29].

Conclusions

Temporomandibular dysfunctional patients were highly associated with a lower OHRQoL. More physical diagnoses, according to the axis I from the RDC/TMD protocol resulted in an impaired OHRQoL. The higher age of the patient group was associated with an impaired OHRQoL. Diagnoses comprising limited jaw movements (Diagnoses Ib and IIb) contributed substantially to a reduced OHRQoL. Female TMD patients had no significantly different quality of life compared with male TMD patients. In a regression analysis, higher age and more diagnoses identified in the context of TMD and myofascial pain with limited jaw movements (Diagnosis Ib according to the RDC/TMD protocol), explained the 39.1% variability in the OHIP-SVN summary score of TMD patients.

Acknowledgements

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ČIMBENICI KVALITETE ŽIVOTA KOJA OVISI O ORALNOM ZDRAVLJU U TMD PACIJENATA

S A Ž E T A K

Ciljevi istraživanja bili su utvrditi utjecaj temporomandibularnih poremećaja (TMD) na kvalitetu života koja ovisi o oralnom zdravlju (OHRQoL) (prema vlastitoj spoznaji pacijenata) te usporediti rezultate sa kontrolnom skupinom. U istraživanju je sudjelovao 81 pacijent s dijagnozom temporomandibularne disfunkcije (TMD) kao i 400 ispitanika odrasle populacije (kontrolna skupina). Izračunate su srednje vrijednosti OHIP zbroja bodova za sve TMD pacijente s istom dijagnozom iz iste podgrupe osi I prema RDC/TMD protokolu. Srednje vrijednosti OHIP zbroja bodova za svih 7 podskupina OHIP upitnika uspoređene su između TMD pacijenata i kontrolne skupine. Hijerarhijskom linearnom regresijskom analizom procijenjen je utjecaj različitih varijabla prema RDC/TMD protokolu na OHRQoL (OHIP zbroj bodova bio je zavisna varijabla) u TMD pacijenata. Dijagnoza TMD bila je povezana sa smanjenjem OHRQoL (p< 0,001). Više dijagnoza osi I prema RDC/TMD protokolu (p<0,001), starija dob TMD pacijenata (p<0,001) i dijagnoze povezane s ograničenim otvaranjem usta najviše doprinose narušenom oralnom zdravlju (OHRQoL) (dijagnoza Ib p= 0,008; dijagnoza IIb p=0,030). Nije bilo značajne razlike u OHRQoL između muških i ženskih TMD pacijenata (p= 0,436). Prema rezultatima regresijske analize starija dob (p<0,001), veći broj dijagnoza (p=0,018) i dijagnoza Ib (p= 0,169) objašnjavaju 39,1% varijabiliteta OHRQoL (p<0,001) (OHIP zbroja bodova) u TMD pacijenata.