Chronic Pain Severity and Depression/Somatization Levels in TMD Patients

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Purpose: The Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) axis II for psychosocial assessment was adopted to grade chronic pain severity and to correlate that severity with levels of depression and somatization in a population of chronic TMD patients. ***Materials and Methods:*** A series of 111 consecutive patients who sought treatment for TMD symptoms lasting longer than 6 months were recruited and underwent assessment using the RDC/TMD axis II instrument. The frequencies of the different scores from the Graded Chronic Pain Scale (GCPS) and the Symptoms Checklist-90R Depression (SCL-DEP) and Somatization (SCL-SOM) scales in the study population were recorded. Correlation between categories of patients identified by the GCPS items and the SCL-DEP and SCL-SOM scales was assessed by means of the Spearman rank correlation test. ***Results:*** Severe or moderate somatization was shown by 47.7% and 26.1% of patients, and severe or moderate depression scores were recorded by 39.6% and 1.8% of the sample, respectively. GCPS scores showed that the vast majority of patients had a low disability or no disability at all, with only 5.4% of patients showing a severely limiting high disability. A significant correlation was found between SCL-SOM and GCPS scores, but not between SCL-DEP and GCPS, even if raw depression scores of patients with a high disability were greater than those of subjects with a low disability. ***Conclusions:*** Within the limitations of the present investigation, the external validity of which is far from optimal and should be improved in future studies on more representative samples, the RDC/TMD axis II for psychosocial assessment has provided interesting data regarding the prevalence of the different degrees of chronic pain severity and their relation with levels of depression and somatization. *Int J Prosthodont 2010;23:529–534.*

Several investigations have reported high levels of psychosocial impairment in different patient groups with temporomandibular disorders (TMD).[1–4] The extent of the impairment appears to influence treatment outcomes[5–8] and may be related to the presence of chronic pain.[9] Compelling evidence of such a relationship is still lacking, since few studies have addressed this issue by adopting instruments validated for use in TMD patients.

The Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) axis II for psychosocial assessment permits clinicians to assess the severity of chronic pain and the levels of depression and somatization.[10] Moreover, its validity and reliability have already been shown in a clinical setting,[11] although little is known about the relationship between the scores of chronic pain severity and those of depression and somatization.

This study used the RDC/TMD axis II instrument to grade chronic pain severity in relation to depression and somatization levels in a select population of chronic TMD patients attending a university TMD clinic.

Materials and Methods

Study Population

The study population comprised 111 patients (90 women, 21 men; mean age: 42.5 years, range: 18 to 61 years) of a total 490 patients who sought treatment at the TMD Clinic, Department of Maxillofacial Surgery, University of Padova, Italy, in 2008 for TMD-related pain. Inclusion in the study was based on pain

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duration (pain lasting longer than 6 months) and on the absence of other potential causes for TMD-like symptoms (eg, otolaryngeal, neurologic, or rheumatologic disorders), which were excluded by other specialists.

Assessment Instruments

All patients underwent an assessment in accordance with RDC/TMD guidelines, and data were gathered via the axis II questionnaire, which contains specific items for the appraisal of chronic pain severity and levels of depression and somatization.[10] A validated Italian version of the RDC/TMD was adopted for all assessment procedures.[12]

The RDC/TMD axis II permits the severity of chronic pain to be rated by means of the Graded Chronic Pain Scale (GCPS), originally developed by Von Korff et al.[13,14] Its validity has been described using a number of pain conditions, and the prognostic value was tested in a 3-year follow-up study on a large sample of primary care pain patients, which included TMD pain patients.[13]

The GCPS comprises seven items assessed on a 10-point scale, with the exception of one item regarding the number of inability days due to facial pain, for which the authors provided hierarchical criteria to grade pain dysfunction into ordinal categories. The scoring criteria are simple to use and allow the categorization of pain patients into five levels of pain-related impairment (0 = no disability; 1= low disability, low intensity; 2 = low disability, high intensity; 3 = high disability, moderately limiting; 4 = high disability, severely limiting).

The RDC/TMD axis II deals with the assessment of depression and somatization levels by means of the depression and somatization scales of the Symptom Checklist 90R (SCL-90R), an instrument developed originally by Derogatis.[15] The choice to include the SCL-90R Depression and Somatization scales (SCL-DEP and SCL-SOM) in the RDC/TMD axis II for psychosocial assessment found its rationale in the validity of this instrument to provide a contemporary evaluation of concurrent depressive and nonspecific physical symptoms. A total of 31 items were included in the axis II, belonging either to the Depression and Vegetative Symptom Scale or to the Somatization Scale, used to evaluate the presence of nonspecific physical symptoms, as well as 7 additional items added to the Depression and Vegetative Symptom Scale.

The mean scale score is calculated by simply adding the scores of the single items together. This makes it possible to rate patients as having normal, moderate, or severe levels of impairment regarding depression and nonspecific physical symptoms. On the SCL-DEP, scores below 0.535 were considered normal, moderate depression was categorized as scores between 0.535 and 1.105, and scores above 1.105 indicated the presence of a severe ongoing depressive disorder. On the SCL-SOM, including the pain items, scores lower than 0.5 were considered normal, values between 0.5 and 1.0 indicated moderate somatization, and those above 1.0 indicated severe somatization.

Statistical Analysis

The frequencies of the different scores for the GCPS, SCL-DEP, and SCL-SOM in the study population were recorded. Correlation between categories of patients identified by the GCPS items and the SCL-DEP and SCL-SOM scales was assessed by means of the Spearman rank correlation test. Also, correlations between the level of disability (high = GCPS grade III or IV, low = GCPS grade 0, I, or II) and SCL-DEP and SCL-SOM categories were tested. A *t* test for independent samples was also used to compare mean SCL-DEP and SCL-SOM scores of patients with high disability and those of subjects with no or low disability. The null hypotheses were that no correlation existed between GCPS categories and SCL-DEP or SCL-SOM scores and that no difference existed between scores of patients with high disability and no or low disability. Statistical significance was set at $P < .05$. All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS 15.0, SPSS).

Results

Mean scores for the study populations were 1.40 and 0.92 for the SCL-DEP and SCL-SOM scales, respectively. Differences in scores between men and women were not significant.

Approximately 75% of patients showed abnormal values on the SCL-SOM scale, indicating severe (47.7%) or moderate (26.1%) impairment. As for the SCL-DEP scale, the percentage of patients with abnormal values was lower (39.6% severe, 1.8% moderate) (Table 1).

GCPS scores showed that the vast majority of patients had a low disability or no disability at all, with only 5.4% of patients showing a severely limiting high disability (Table 2).

A significant correlation was found between SCL-SOM and GCPS categories ($P = .01$) (Table 3), but not between SCL-DEP and GCPS scores ($P = .301$) (Table 4). To improve the power of statistical analysis and reduce the risk for type II error, patients were

Table 1 No. of Patients with Normal, Moderate, and Severe Levels of Depression (SCL-DEP) and Somatization (SCL-SOM)

	SCL-DEP	SCL-SOM
Normal	65 (58.6%)	29 (26.1%)
Moderate	2 (1.8%)	29 (26.1%)
Severe	44 (39.6%)	53 (47.7%)
Abnormal scores	41.4%	73.8%

Table 2 No. of Patients According to GCPS Category

GCPS categories	No. of patients (%)
No disability	9 (8.1%)
Low disability, low intensity (grade I)	43 (38.7%)
Low disability, high intensity (grade II)	42 (37.8%)
High disability, moderately limiting (grade III)	11 (9.9%)
High disability, severely limiting (grade IV)	6 (5.4%)

Table 3 Correlation Between GCPS and SCL-SOM Categories*

	SCL-SOM		
GCPS	Normal	Moderate	Severe
No disability	4	3	2
Grade I	13	14	16
Grade II	11	10	21
Grade III	1	0	10
Grade IV	0	2	4

*P = .01.

Table 4 Correlation Between GCPS and SCL-DEP Categories*

	SCL-DEP		
GCPS	Normal	Moderate	Severe
No disability	5	0	4
Grade I	27	1	15
Grade II	26	1	15
Grade III	6	0	5
Grade IV	1	0	5

*P = .301.

then divided into groups according to high disability (dysfunctionals: GCPS grade III or IV; n = 17) and no or low disability (nondysfunctionals: GCPS grade 0, I, or II; n = 94), and the same correlation analysis was performed with the SCL-SOM and SCL-DEP. Levels of dysfunction were correlated with SCL-SOM (P = .002), but not the SCL-DEP (P = .097).

Nonetheless, when raw scores were considered, dysfunctional patients showed significantly higher scores for both the SCL-SOM (1.44 versus 0.83, P = .001) and SCL-DEP (2.31 versus 1.24, P = .006).

Discussion

A considerable amount of literature describes the high prevalence of moderate to severe levels of depression and somatization in chronic TMD patients,[4,16] but information on their relationship with pain severity is lacking. The present investigation produced findings that cannot be extended to the general population due to their lack of external validity, related to the convenient selection of patients, a consecutive sample of patients showing pain for longer than 6 months. Such a selection criteria allowed for inclusion of approximately only 25% of the total population attending a tertiary university clinic for TMD treatment, and studies on TMD populations at large including patients with pain symptoms for less than 6 months are needed to confirm these findings. The study hypothesis was that pain-related disability and depression and somatization levels would be higher in patients with chronic TMD, with respect to those described in the literature for TMD patient populations as a whole, and that the two main assessment variables of the RDC/TMD axis II (pain-related disability and psychosocial impairment) would be related.

The association of several psychosocial factors with the presence of TMD has already been reported,[9] and pain appears to be regarded as the actual cause of any described TMD–psychosocial impairment association, independent of its location.[16] Depression and somatization (nonspecific physical symptoms) are likely the two psychosocial disorders most investigated in TMD patients.[17] Hence, specific scales for the appraisal of depression and somatization were selected for inclusion in the RDC/TMD axis II for psychosocial assessment on the basis of their potential usefulness to identify specific clusters of TMD patients to be targeted therapeutically.[10]

Such an observation is striking, if one considers that an instrument to rate the severity of chronic pain (eg, the GCPS) is provided by the RDC/TMD axis II itself. It is a common belief that long-lasting disorders are more frequently associated with psychosocial impairment than disorders in acute stages. In particular, anxiety symptoms seem to be associated prevalently with pain in the acute stage, while depressive disorders seem mainly to affect patients with chronic pain.[18]

In the present investigation, the prevalence of moderate to severe levels of depression and somatization was 41.4% and 73.9%, respectively, which is similar to reported findings in a sample of TMD patients who were recruited independently by duration of pain. In that study, prevalence was 49% for depression and 69% for somatization,[4] which is also in line with findings from two other groups who conducted similar investigations.[3,19,20] Only one study, despite sharing similar SCL-DEP values, reported much lower SCL-SOM values with respect to the present investigation.[21]

Taken together, these findings seem to conclude that the widely described TMD–psychosocial disorder association may be part of a more complex pain-psychopathology association, at least for symptoms of depression and somatization, and, even more importantly, that more investigations are needed before accepting the paradigm that differences exist between chronic and nonchronic pain patients with respect to their association with psychosocial impairment.

As for scores from the GCPS, which is intended to rate pain intensity and pain-related disability in a patient's everyday life, findings from the present investigation suggest that only a small portion of patients with long-lasting TMD pain developed disabling pain with negative influences on their daily activities and that only 5.4% of them felt severely limited by the presence of pain.

The TMD literature provides very few data on this issue. Studies using the GCPS, replicated on totally independent samples in large population-based studies several years apart, indicate that of those reporting chronic TMD pain, 35% to 40% are grade I, 35% to 40% are grade II, 15% to 18% are grade III, and 3% to 6% are grade IV.[13]

In recent years, available data on the prevalence of the different GCPS categories mainly came from a single study, which reported a 3.1% prevalence of high intensity, severely limiting pain.[21] Interestingly, the same study showed that GCPS scores are strongly related with scores of the Oral Health Impact Profile, an instrument that has been used increasingly over the past few years to assess the quality of life in relation to oral health in TMD patients.[22]

GCPS scores have been proven useful to identify clusters of patients who may benefit from tailored cognitive-behavioral approaches.[5] Thus, thanks to its proven contribution to successful clinical decision making for the management of TMD, an increase in GCPS diffusion in both the research and clinical setting should be strongly desired for the near future.

The GCPS assesses three domains that include pain ratings (present, worst, and average), pain interference (work, recreational, social, and family), and days lost from work. It is a common belief that in combination with data from the clinical examination and history, using standard assessments such as the GCPS and the SCL-90R provide clinicians with a set of convenient measures for baseline assessment of an individual's current level of functioning.[23]

The data sets of patients on which the axis II instruments were tested provided hierarchical results, with positive relationships between the three main instruments (GCPS, SCL-DEP, and SCL-SOM). That is, patients with the highest pain-related disability were those with the highest levels of depression and somatization.[11]

In the present investigation, GCPS scores were tested for correlation with those of the SCL-DEP and SCL-SOM, with the aim of verifying if the level of RDC/TMD axis II–assessed psychologic impairment (ie, the presence of depressive and somatization symptoms) was related to the level of pain-related disability in daily activities. The findings suggest that high GCPS scores were related with increased prevalence of nonspecific physical symptoms, since 14 of 17 subjects (82.4%) with high disability, moderately or severely limiting pain (dysfunctionals) showed severe somatization levels, with respect to the portion (41.5%) of low-disabled subjects (nondysfunctionals) with severe somatization. The same was not true for SCL-DEP scores, since the prevalence of severe depression in patients with grade III or IV GCPS scores was only slightly higher than that of grades 0, I, or II disability (45.4% versus 36.9%, respectively). Nonetheless, there was a clear trend for higher raw depression scores in dysfunctional patients with respect to nondysfunctional, thus suggesting that future research on larger samples of dysfunctional patients is needed to exclude the risk for type II error in the assessment of the relationship between pain-related impairment and depression levels. However, it should be kept in mind that the low prevalence of high-disability patients in populations of chronic TMD patients might force researchers to recruit large study samples to achieve a sufficient number of patients with grade IV ratings in the GCPS, thus increasing the risk for the opposite error (type I; detection of statistical, not clinical, significance).

The present investigation's observations are also open to different interpretations. For example, they only partially support the view that all components of the integrated axis II assessment are related to one another, since the SCL-DEP scores used to categorize patients as suggested by the RDC/TMD guidelines[10] seem to be unrelated to levels of pain-related disability. Such observations may suggest interesting

considerations, with potential consequences at the therapeutic level. The usefulness of the GCPS to provide clinically valid information for the management phases has been shown in a series of well-designed randomized controlled clinical trials,[7] and also, somatization levels have been indicated as potential predictors for treatment outcome.[24,25]

This study's observed relationship between SCL-SOM and GCPS scores may suggest that those two parameters are actually the most clinically valid components of the RDC/TMD axis II psychosocial assessment, while depression items may provide interesting ancillary documentation, the validity of which is yet to be demonstrated in the clinical decision-making process.

The present investigation is characterized by limitations, which prevent the generalization of the results and are related mainly to the difficulties of designing studies on chronic pain patients. In particular, the external validity of the present results[26] is not warranted and needs to be confirmed with future investigations. The methodologic aspects concerning the size and representativeness of the study population should be taken into account to design more studies on this issue. With this consideration in mind, it should be remembered that there are several objective difficulties to designing studies regarding chronic pain patients, mainly related to the definition of chronicity.

Many studies in several medical specialties have demonstrated that prolonged (chronic or recurrent) pain has an impact on the patients' lives that is more disabling than acute pain.[27] The fact that this investigation did not support such a suggestion may be explained by the differences in criteria for patient recruitment.

Far more research is needed to achieve a better and more quantifiable definition of chronic pain. The temporal criterion (pain lasting for longer than 3 or 6 months) used in the present investigation, as well as in many others, may very well be a suitable selection criterion for large-scale studies, but it is not the most accurate or reliable definition. A recent paper[4] described the existence of a close association between pain and psychosocial disorders in a population of randomly selected TMD patients seeking treatment at a tertiary clinic, which suggests that the factor "time since pain onset" is not likely to be the most important predictor of pain-related disability. Thus, future research will need to reconsider the very definition of chronic pain to include features of chronic pain quality (persistency, intensity, fluctuation) and states (emotional distress, disabling effects).[28] A better qualitative description of chronic pain may also increase the external validity of literature studies, thanks to the reduction of potential bias, such as treatment-seeking behavior, which is inherently related to the individual qualitative perception of pain and poorly controlled by the adoption of a simple pain duration criterion to select study populations. Such a definition should be useful in the clinical setting and should help researchers to obtain deeper insight into the relationship of the different aspects of the pain experience.

Moreover, it should be noted that in the future, the inclusion of a TMD population at large, without excluding patients suffering for less than 6 months, as done in the present investigation, might help in gaining deeper insight into the clinical relevance of axis II findings and the inter-relationship between the different aspects of the psychosocial assessment, improving the external validity of the current findings. Thus, findings from the present investigation and their potential clinical usefulness need to be confirmed with future studies, taking into account the entire complexity of the pain experience for a better definition of chronic pain. In any case, it can be suggested that the instruments adopted in the RDC/TMD axis II, especially the GCPS and SCL-SOM scales, might be indicators of the pain experience and should be included in screening of chronic pain patients in pain clinics and considered as potential markers of an actual chronic pain status.

Conclusions

The present investigation's limitations preclude the generalization of the results since they lack external validity. However, it provides interesting insight into the prevalence of the different degrees of chronic pain severity and their relationship with levels of depression and somatization in a clinically based population of chronic TMD patients. Given the context of the defined inclusion criterion, it appeared that the vast majority of patients had a low disability or no disability at all, with only 5.4% of patients showing a severely limiting high disability. A significant correlation was found between chronic pain disability and somatization levels, but only a weak relationship emerged with depression. Future research is needed to verify the potential clinical relevance of these observations.

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Literature Abstract

The effect of different shades of specific luting agents and IPS Empress ceramic thickness on overall color

The purpose of the present study was to determine the effect of different shades of specific luting materials and the thickness of IPS Empress ceramics on the final color. Forty disk-shaped IPS Empress specimens were prepared with four different thicknesses (n = 10; 0.5, 1, 2, and 3 mm). One surface of each specimen was glazed, placed on a positioning apparatus, and a baseline colorimetric evaluation was performed with an in vitro colorimeter. Dual-polymerized adhesive resin cement of shade A1 was applied in thickness of 0.3 mm. A thin layer of boning agent was applied between each cement-ceramic layer and the final color was evaluated using the postioning apparatus and colorimeter. The polymerized cement layer was separated easily and the bonding surfaces of each specimen were abraded with airborne particles before repeating the experiment with a different shade of cement (A3). The measure of the color difference ΔE was then calculated. Results showed that the difference between baseline and postcementation color was statistically significant. There were no statistically significant differences observed between groups with different cement shades and different ceramic thicknesses. The study concluded that a color shift and decreased brightness was observed for all specimens after the application of the cement layer, regardless of the thickness or the shade of cement. Further studies should be conducted to investigate the color shift of other cement systems available today when used with IPS Empress.

Terzioğlu H, Yılmaz B, Yurdukoru B. *Int J Periodontics Restorative Dent* 2009;29:499–505. **References:** 17. **Reprints:** Hakan Terzioğlu, Ankara Üniversitesi Diş Hekimliği Fakültesi, Protetik Diş Tedavisi Anabilim Dalı, 06500 Besevler Ankara, Turkey. Fax: +90-312-212-39-54. Email: terzoglu@dentistry.ankara.edu.tr—*Sze-Kheng Lim, Singapore*